最終報告書

Undecanal のラットを用いる
反復投与毒性・生殖発生毒性併合試験

厚生労働省医薬食品局審査管理課 化学物質安全対策室 委託

試験施設
一般財団法人食品薬品安全センター 秦
〒257-8523 神奈川県秦野市落合 729 番地
TEL 0463-82-4751

試験委託者	厚生労働省医薬食品局審査管理課 化学物質安全対策室 (東京都千代田区霞が関 1-2-2)
試験番号	R-13-006
被験物質	Undecanal
試験項目	反復投与毒性・生殖発生毒性併合試験
試験開始日	2013 年 9 月 18 日
実験開始日	2013 年 10 月 7 日
実験終了日	2014 年 1 月 9 日
試験終了日	試験責任者の捺印日
試資料保管場所	一般財団法人食品薬品安全センター資料保存施設
被験物質保管場所	一般財団法人食品薬品安全センター被験物質保存庫
保管期間	試験終了後 10 年間 その後の保管については試験委託者と協議する。
運営管理者	一般財団法人食品薬品安全センター 秦野研究所 所長 [redacted]

本試験は、「新規化学物質等に係る試験の方法について」(平成 23 年 3 月 31 日付け、薬食発 0331 第 7 号厚生労働省医薬食品局長、平成 23・03・29 製局第 5 号経済産業省製造産業局長、環保企発第 110331009 号環境省総合環境政策局長通知)に準拠し、「新規化学物質等に係る試験を実施する試験施設に関する基準」(平成 23 年 3 月 31 日付け、薬食発 0331 第 8 号厚生労働省医薬食品局長、平成 23・03・29 製局第 6 号経済産業省製造産業局長、環保企発第 110331010 号環境省総合環境政策局長通知)を遵守して実施した。

2014年 2月 25日　　試験責任者 [redacted]

試験従事者

試験責任者	[redacted]
試験担当主任者	
試験担当者 投与・観察	
動物飼育管理 （検疫を含む）	
尿検査	
血液学的検査 （採血を含む）	
血液生化学的検査	
病理学的検査	
被験物質管理	
検体調製	
化学分析	

目次

要約 6
試験目的 7
試験ガイドラインとGLP 7
動物愛護 7
材料と方法 7
1. 被験物質 7
2. 動物および飼育方法 8
3. 投与検体 9
1)調製 9
2)安定性試験 9
3)含量試験 9
4. 投与量の設定および投与方法 9
5. 検査法 10
1)親動物(F_0) 10
2)出生児(F_1) 14
6. データの解析法 15
予見することができなかった試験の信頼性に影響を及ぼす疑いのある事態及び試験計画書に従わなかったこと 15
試験成績 16
1. 親動物 16
1)一般状態 16
2)詳細な症状観察 16
3)体重 16
4)摂餌量 16
5)機能検査 17
6)尿検査 17
7)血液学的検査 17
8)血液生化学的検査 18
9)器官重量 19
10)剖検所見 19
11)病理組織学的検査所見 20
2. 生殖能力 23
1)性周期および交配成績 23
2)出産率および妊娠期間 23
3)分娩および哺育状態 23
4)黄体数、着床数および着床率 23

3. 出生児 23
1) 生存 23
2) 体重 23
3) 出生児観察 23
考察 24
文献 25
Annexes 26
Tables 30
Appendices 110

(最終ページ:315 ページ)

信頼性保証書

要約

Undecanal の反復投与毒性・生殖発生毒性併合試験を化審法ガイドラインに従って実施した。被験物質をトウモロコシ油に希釈して 0、100、300 ならびに 1000 mg/kg の用量で、各群とも雌雄各 12 匹の Crl:CD(SD)ラットに強制経口投与した。雄は 42 日間投与した後に剖検し、雌は交配前 2 週間および交配期間、妊娠期間を通して哺育 4 日までの 41～55 日間投与し、出生児は哺育 4 日、母動物は哺育 5 日に剖検した。

また、0 および 1000 mg/kg の用量に非交配雌(10 匹/群)を設け、42 日間投与した後に半数を剖検し、残りの半数と 0 および 1000 mg/kg 群の雄 5 匹は、42 日間投与した後に 14 日間飼育して剖検した。

1. 反復投与毒性および回復性

1000 mg/kg 群の非交配雌を含む雌雄では、被験物質の刺激性によると考えられる一過性の流涎が散見された。血液生化学的検査では、アスパラギン酸アミノトランスフェラーゼ(AST)の増加が 1000 mg/kg 群の非交配雌で認められた。詳細な症状観察、機能検査、体重推移、摂餌量、尿検査、器官重量および病理組織学的検査においては、被験物質投与の影響と考えられる変化ならびに所見は認められなかった。

回復観察終了時の血液生化的検査では、1000 mg/kg 群の非交配雌に AST の増加は認められなかった。

2. 生殖発生毒性

性周期、交配成績、出産率、妊娠期間、分娩状態、哺育状態、黄体数、着床数および着床率に、被験物質投与の影響は認められなかった。また、出生児の生存率、体重および形態にも被験物質投与の影響は認められなかった。

3. 無毒性量

1000 mg/kg 群の非交配雌で AST が増加したことから雌動物の反復投与毒性に対する無毒性量(NOAEL)は 300 mg/kg/day、雄動物では 1000 mg/kg までの用量で毒性影響が認められなかったことから無毒性量は 1000 mg/kg/day と判断された。また、1000 mg/kg までの用量は、親動物の生殖能力および新生児の発育に影響を及ぼさなかったことから、生殖発生毒性に対する無毒性量は 1000 mg/kg/day と判断された。

試験目的

雌雄ラットの交配前(2 週間)および交配期間中(最長 2 週間)、ならびに雄では交配期間終了後 2 週間、雌では妊娠期間を通して周産期(哺育 4 日まで)に Undecanal を反復経口投与し、雌雄ラットに現れる一般毒性および回復性、ならびに生殖発生毒性を明らかにすることを目的とした。

試験ガイドラインと GLP

本試験は、「新規化学物質等に係る試験の方法について:以下、化審法ガイドライン」(平成 23 年 3 月 31 日付け、薬食発 0331 第 7 号厚生労働省医薬食品局長、平成 23・03・29 製局第 5 号経済産業省製造産業局長、環保企発第 110331009 号環境省総合環境政策局長通知)に準拠し、「新規化学物質等に係る試験を実施する試験施設に関する基準」(平成 23 年 3 月 31 日付け、薬食発 0331 第 8 号厚生労働省医薬食品局長、平成 23・03・29 製局第 6 号経済産業省製造産業局長、環保企発第 110331010 号環境省総合環境政策局長通知)を遵守して実施した。

動物愛護

全ての実験操作は、「動物の愛護及び管理に関する法律」(昭和 48 年 10 月 1 日 法律第 105 号、平成 24 年 9 月 5 日 一部改正)、「実験動物の飼養及び保管並びに苦痛の軽減に関する基準」(平成 18 年 4 月 28 日、環境省告示第 88 号)および「厚生労働省の所管する実施機関における動物実験等の実施に関する基本指針」(平成 18 年 6 月 1 日、科発第 0601001 号)を遵守し、「一般財団法人食品薬品安全センター 動物実験に関する指針(機関内規程)」(平成 2 年 10 月 1 日、平成 25 年 4 月 1 日改定)に基づいて実施した。本試験における動物実験計画は、秦野研究所動物実験委員会の審査を受け、承認されている(動物実験承認番号:1130232A)。なお、承認された動物実験計画からの変更はなかった。

材料と方法

1. 被験物質

被験物質である Undecanal〔化学名(IUPAC 名):ウンデカナール、CAS No. 112-44-7、分子式:$C_{11}H_{22}O$、分子量:170.30、性状:無色～わずかにうすい黄色の透明な液体、融点:-2℃、沸点:80℃/0.1 kPa)、ロット番号:N633K、含量:98.8%(GC)、Annex A、略称:Und)は、東京化成工業株式会社より購入し(被験物質入手:2013 年 6 月 18 日)、使用時まで冷蔵(実測値 3～6℃)、暗所、密閉、開封後は窒素充填の条件下で保管した。Undecanal の構造式を次に示す。

被験物質の安定性については、実験開始前および実験終了後に秦野研究所にて赤外吸収スペクトルを測定し、色調や性状、スペクトルに変化がなかったことが確認されている(試験番号 Q-13-011)。

2. 動物および飼育方法

日本チャールス・リバー厚木飼育センターより 8.5 週齢の Sprague-Dawley(SD)系〔Crl:CD(SD)、SPF〕ラット雄 55 匹、雌 83 匹を購入し、飼育室(4 号室)に収容した。入荷日も含めて 13 日間、検疫と飼育環境への馴化のため飼育した。その間毎日、動物の一般状態を観察し、入荷日(検疫 1 日)および検疫終了日に体重を測定した。検疫・馴化期間中は動物の尾に赤のフェルトペンで馴化番号を記し、飼育ケージに試験番号、性別および馴化番号を記入した動物カードを掛けて識別した。また、雌動物については、検疫 2 日から毎日、性周期を観察した。入荷動物の入荷時および検疫終了時の体重は下記の通りであった。

動物入荷日	:2013 年 9 月 25 日
入荷時体重	:雄 279.0～303.2 g、雌 186.3～220.6 g
検疫終了日	: 2013 年 10 月 7 日
検疫終了時体重	:雄 356.3～432.0 g、雌 223.2～280.1 g

検疫・馴化期間中の一般状態、詳細な症状観察および体重推移に試験実施に影響を及ぼすと判断される異常は認められなかった。なお、雌動物では、規則的な性周期の回帰が認められない 6 匹を除外し、検疫終了時の体重を基に体重別層化無作為抽出法により群分けを行った。群分けした動物には一連の動物番号を割り当て、フェルトペンで尾に動物番号を標識し、色彩の異なった動物カードに試験番号および動物番号を記入して飼育ケージに掛けた。群分けから棄却した雄動物 7 匹、雌動物 15 匹(性周期の結果により除外した例を含む)は全て余剰動物としたが、その内の雌 12 匹は他試験(試験番号:Z-13-011)に移管し、残りの動物は安楽死させた。

動物は許容温度 21.0～25.0℃、許容湿度 40.0～75.0%、換気設定約 15 回/時間、明暗サイクル 12 時間(7 時～19 時)点灯、12 時間(19 時～7 時)消灯に設定された飼育室内で、金属製金網床ケージ(220w×270d×190h mm)に 1 匹ずつ(交配時は 2 匹)収容し、固型飼料(CE-2、日本クレア)と水道水(秦野市水道局給水)を自由に摂取させて飼育した(剖検前の絶食に関しては剖検の項を参照)。交配雌は、妊娠 18 日から哺育 4 日までラット用プラスチック製繁殖ケージ(350w×400d×180h mm)に 1 匹ずつ収容し、床敷として紙パルプ製チップ(ペパークリーン、日本エスエルシー)を適宜供給した。飼育期間中の動物室の温度は 22.0～25.5℃、湿度は 49.0～72.0%であった。また、供給した飼料、飲料水および床敷の分析結果は、いずれも標準操作手順書に記載の許容範囲内であることを確認した。

3. 投与検体

1)調製

被験物質を秤量し、媒体(トウモロコシ油、製造元:ナカライテスク、ロット番号:V3A0313)を加え撹拌混和させ、250 mg/mL 液を調製した。さらに 250 mg/mL 液を媒体によって希釈し、75 ならびに 25 mg/mL 液を段階的に調製した。調製した検体は窒素を充填後、冷蔵(実測値 1～6℃)、遮光、窒素充填、密閉で保管し、安定性の保証期間内に使用した。

2)安定性試験

トウモロコシ油を媒体とした 2.00 および 250 mg/mL 濃度の被験物質調製液については、冷蔵、遮光条件下における 8 日間の安定性が確認されている(試験番号:Q-13-011)。

3)含量試験

初回に調製(調製日:2013 年 10 月 4 日)した投与検体(25、75 および 250mg/mL)について、被験物質含量を測定した。その結果、平均含量は調製指示濃度の 101.5～104.5%であり、各測定値のばらつきはそれぞれ平均値の 98.9～101.5%で規定範囲内にあった(Annex B)。なお、投与検体中の被験物質含量測定法は Annex C に従った。

4. 投与量の設定および投与方法

本試験の投与量は、「Undecanal のラットを用いる反復投与毒性・生殖発生毒性併合試験(予備試験)」(試験番号:R-13-005)の結果をもとに設定した。なお、予備試験で使用した被験物質は本試験と同じロットを用いた。

予備試験では、0(媒体、トウモロコシ油)、250、500 および 1000 mg/kg の undecanal を 10 週齢の雌雄各 3 匹の SD 系ラットに 14 日間、反復強制経口投与した結果、1000 mg/kg 群では雌雄各 1 例に自発運動の低下が認められたが、いずれも一過性の変化であり、体重推移、血液学的検査、血液生化学的検査、病理学的検査で明らかな毒性変化は観察されなかった。

従って、限度量の 1000 mg/kg を本試験の高用量に設定し、以下公比約 3 で中用量には 300 mg/kg を、低用量には 100 mg/kg を設定した。

本試験では、雄動物は交配前 2 週間、交配期間を通して剖検前日まで(総投与回数 42 回)、雌動物は交配前 2 週間、交配期間、妊娠期間を通して分娩後の哺育 4 日まで(総投与回数 41～55 回)、交尾が確認されなかった雌は剖検前日まで(総投与回数 52 回)、分娩しなかった雌は妊娠 25 日相当日まで、非交配雌の反復毒性を評価するために設定したサテライト群は投与 42 日まで、1 日 1 回、1 週 7 回、毎日 9 時～13 時の間(9 時 01 分～12 時 04 分)に投与した。投与容量は 4 mL/kg とし、雌雄とも最新の測定日の体重を基に投与液量を算出した。なお、対照群には媒体であるトウモロコシ油を同様に投与した。投与経路は化審法ガイドラインに拠り、ラット用胃管による強制経口投与とした。

本試験の群構成および動物番号を以下に示した。

群	投与物質	投与量 (mg/kg)	濃度 (mg/mL)	投与容量 (mL/kg)	動物番号	
					雄	雌
対照群	トウモロコシ油（媒体）	0	0	4	M01001～M01012*	F01001～F01012
低用量群	Und	100	25	4	M02013～M02024	F02013～F02024
中用量群	Und	300	75	4	M03025～M03036	F03025～F03036
高用量群	Und	1000	250	4	M04037～M04048*	F04037～F04048
対照群［非交配（サテライト）群］	トウモロコシ油（媒体）	0	0	4	-	F05049～F05058*
高用量群［非交配（サテライト）群］	Und	1000	250	4	-	F06059～F06068*

＊ 雄の対照群および高用量群、雌の非交配群の動物番号の大きい各 5 例は回復観察に供した。

5. 検査法

1)親動物(F_0)

①一般状態の観察

全例について、飼育期間中は毎日 1 回以上、投与期間中は投与前後の毎日 2 回以上観察した。

②回復および遅発毒性の観察

雄動物は対照群および高用量群のうち動物番号の大きい各 5 例を、雌動物はサテライト群の動物番号の大きい各 5 例を最終投与翌日（回復 1 日）から 14 日間、毎日 1 回以上、一般状態を観察した。

③詳細な症状観察

全例について、検疫終了日、投与 8、15、24、30、36 および 42 日（分娩例は哺育 0 日から 4 日の間）、回復期間中は回復 7 および 14 日にスコアリング法による詳細な症状観察を行った。観察は、いずれも 13 時～17 時の間（13 時 04 分～15 時 32 分）に行った。

まず、ケージ越しでの観察を行い、ケージから取り出す際に外表を観察し、作業台上での観察を行った。作業台上では、体位、姿勢、探索行動、立毛、眼裂、振戦、痙攣、呼吸数、歩行、常同行動、奇妙な行動、挙尾反応、身づくろい、発声、排尿、排便、接触に対する反応、撤去反射、耳介反射を観察した。

④機能検査

各群の動物番号の若い雄 5 例とサテライト群の動物番号の若い 5 例については、投与 39 日に自発運動量測定と握力測定を実施し、投与 42 日に詳細な症状観察に引き続いて刺激に対する感覚運動反応を検査した。分娩例については投与期間が近接し、出来るだけ分娩から日数が経過した各群の 5 例を選び、投与最終週に自発運動量測定、握力測定および刺激に対する感覚運動反応を検査した。なお、投与最終週に実施した自発運動量測定で分娩雌および非交配雌に投与の影響を示す変化がみられたことから、回復 14 日の詳細な症状観察後に非交配雌の自発運動量測定を実施した。

(1) 刺激に対する感覚運動反応

プライエル反応、瞳孔反射、視覚定位、驚愕反応、後肢引込み反射、眼瞼(瞬目)反射、正向反射の有無を検査した。

(2) 握力測定

小動物握力測定システム(Chatillon、Columbus Instruments)を用いて握力を測定した。各動物の前肢および後肢の握力をそれぞれ 5 回測定し、最高値および最低値を除外した 3 回の握力値の平均値を求めた。

(3) 自発運動量測定

自発運動量測定装置(SUPER-MEX、室町機械)を用いて、20 分間の自発運動量(区画移動数および立ち上がり回数)を計測し、計測値は 5 分毎に集計した。試験対象動物は、検査直前に別室の装置設置場所に運搬し、速やかに自発運動量測定を開始した。

⑤体重測定

雄および雌動物のサテライト群は、投与 1(投与開始日)、4、7、14、21、28、35、42 日、回復 1、7、14 日および剖検日に測定した。雌動物は投与 1、4、7、14 日、妊娠 0、7、14、20 日、哺育 0、4 日および剖検日に測定し、未交尾例は投与 21、28、35、42、49 日および剖検日に測定した。

⑥摂餌量測定

雄および雌動物のサテライト群は、投与 1～2、7～8、14～15、29～30、35～36、41～42 日、回復 6～7、12～13 日に測定し、サテライト群は投与 21～22 日にも測定した。雌動物は投与 1～2、7～8、14～15 日および妊娠 0～1、7～8、14～15、20～21 日ならびに哺育 3～4 日に測定し、未交尾例は投与 29～30、35～36、41～42、48～49 日に測定した。

⑦尿検査

雄動物および雌動物のサテライト群を検査対象とし、投与 37 日の検査では各群の動物番号が若い 5 例、また、回復 13 日における検査では回復例全例を検査した。

投与 37 日の検査では当日の投与後に、回復 13 日の検査では一般状態の観察終了後に動物を代謝ケージに収容し、以下の項目について検査した。ただし、色調・濁度、試験紙による検査および尿沈渣は、採尿開始後約 4 時間の時点で採取した蓄尿で、その他の項目は約 24 時間の蓄尿で行った。

項目	測定法	使用機器
色調・濁度	視診	
pH・潜血・蛋白・糖・ケトン体	試験紙法	オーションイレブンAE-4020(アークレイ)
ウロビリノーゲン・ビリルビン	同上	同上
沈渣	鏡検	光学顕微鏡
尿量	計量	メスシリンダー等
比重	屈折法	デジタル臨床屈折計SU-202(エルマ販売)
ナトリウムイオン濃度	イオン電極法	全自動分析装置 JCA-BM6010(日本電子)
カリウムイオン濃度	同上	同上
塩素イオン濃度	同上	同上

⑧性周期観察

全例の雌について、検疫 2 日から性周期を観察し、群分け後、投与開始以降も引き続きサテライト群を除く全例の腟スメア標本を作製し、各動物の同居後、交尾が確認されるまで性周期を観察した。また、群ごとの平均発情回帰日数(個体ごとの発情期から発情期までの日数の平均)および投与開始後に 4 あるいは 5 日間隔の性周期がそれ以外の性周期に変化した動物の頻度を群毎に算出した。なお、規則的に 4～5 日の間で性周期が回帰している動物は正常と判断した。

⑨交配

投与 15 日の 16 時 05 分より同群内の雌雄を 1 対 1 で同居させた。中用量群の雌 1 例(動物番号 F03031)は交尾が確認された雄(動物番号 M03025)と投与 17 日の 16 時 00 分から同居させた。翌朝より毎朝、腟栓を確認し、同居中の雌の腟スメア標本を作製して鏡検した。腟内に腟栓あるいは腟スメア標本中に精子が確認された動物を交尾成立動物とし、この日を妊娠 0 日と起算して個別飼育に戻した。交配結果および妊娠の成否により、同居開始日から交尾確認日までの日数およびその間に回帰した発情期の回数、交尾率〔(交尾動物数/交配に用いた動物数)×100, %〕、妊娠率〔(妊娠動物数/交尾した雌動物数)×100, %〕を算出した。

⑩妊娠・分娩・哺育状態の観察

交尾が確認された全例を自然分娩させた。分娩の確認は、妊娠 21 日相当日から分娩が確認されるまで毎日、午前と午後に行い、15 時までに分娩が完了した例について、その日を哺育 0 日(分娩日)とした。分娩状態の直接観察は観察可能な動物について行い、直接観察できなかった動物についても、分娩後の一般状態および産児の状態から異常の有無を判断した。分娩後は、哺育状態を哺育 1～4 日の間、毎日観察した。分娩例については、妊娠期間(妊娠 0 日から分娩日までの日数)を求めた。また、剖検時には、妊娠黄体数と着床数を数え、着床率〔(着床数/妊娠黄体数)×100, %〕を算出した。

⑪採血

雄の投与終了時剖検では各群の動物番号が若い5例、回復15日における剖検では回復観察に供した全例について採血を行った。また、分娩雌の投与終了時剖検では、投与期間が近接し、可能な限り分娩から日数が経過した各群の5例について採血を行った。サテライト群の投与終了時剖検では各群の動物番号が若い5例、回復15日における剖検では回復観察に供した全例について採血を行った。いずれも解剖前18～24時間絶食させた後、腹部後大静脈から以下の(1)、(2)、(3)の順に注射筒を換えて採血した。

(1) 血液学的検査用:抗凝固剤 EDTA-2K
(2) 血液学的検査用:抗凝固剤 クエン酸ナトリウム
(3) 血液生化学的検査用:抗凝固剤 ヘパリン

⑫血液学的検査

採血対象動物について以下の項目を検査した。抗凝固剤としてクエン酸ナトリウムを用いて採取した血液から血漿を分離して、プロトロンビン時間および活性化部分トロンボプラスチン時間を測定し、その他の項目は抗凝固剤として EDTA-2K を用いて採取した血液で測定した。

項目	測定法	使用機器
赤血球数(RBC)	電気抵抗検出法	血液自動分析装置 XT-2000iV(シスメックス)
白血球数(WBC)	半導体レーザを用いたフローサイトメトリー法	同上
白血球分類	同上	同上
網状赤血球比率(RET%)	同上	同上
血色素量(HGB)	SLSヘモグロビン法	同上
平均赤血球容積(MCV)	計算(HCT×1000/RBC)	同上
血小板数(PLT)	電気抵抗検出法	同上
ヘマトクリット値(HCT)	同上	同上
平均赤血球血色素量(MCH)	計算(HGB×1000/RBC)	同上
平均赤血球血色素濃度(MCHC)	計算(HGB×100/HCT)	同上
活性化部分トロンボプラスチン時間(APTT)	光散乱検出法	全自動血液凝固測定装置 CA-1000(シスメックス)
プロトロンビン時間(PT)	同上	同上

⑬血液生化学的検査

採血対象動物について以下の項目を検査した。抗凝固剤としてヘパリンを用いて採取した血液から血漿を分離して測定した。なお、得られた血漿の一部は甲状腺機能に関するホルモン(T3、T4 および TSH)測定用として凍結保存(-70℃以下)したが、甲状腺の病理学的検査およびその他全ての検査項目の結果から、本被験物質は甲状腺機能に影響を及ぼさないと判断されたため、甲状腺ホルモン測定は実施しなかった。

項目	測定法	使用機器
総蛋白濃度(TP)	ビウレット法	自動分析装置 JCA-BM6010(日本電子)
アルブミン濃度(rALB)	BCG法	同上
グルコース濃度(Glc)	ヘキソキナーゼ・G-6-PDH法	同上
総コレステロール濃度(TC)	コレステロールオキシダーゼ・HMMPS法	同上
トリグリセライド濃度(TG)	GPO・HMMPS法、グリセリン消去法	同上
リン脂質濃度(PL)	コリンオキシダーゼ・DAOS法	同上
尿素窒素濃度(BUN)	ウレアーゼ・GLDH法,ウレアーゼ律速系	同上
クレアチニン濃度(cre)	Jaffé法	同上
γ-グルタミルトランスペプチダーゼ活性(γ-GTP)	IFCC法	同上
アルカリフォスファターゼ活性(ALP)	GSCC法	同上
アスパラギン酸アミノトランスフェラーゼ活性(AST)	IFCC法	同上
アラニンアミノトランスフェラーゼ活性(ALT)	同上	同上
乳酸脱水素酵素活性(LDH)	JSCC標準化対応法	同上
カルシウム濃度(Ca)	OCPC法	同上
総ビリルビン濃度(tbil)	酵素法	同上
無機リン濃度(IP)	モリブデン酸直接法	同上
胆汁酸濃度(TBA)	酵素サイクリング法	同上
A/G比	計算(rALB/(TP- rALB))	同上
ナトリウムイオン濃度(Na)	イオン電極法	同上
カリウムイオン濃度(K)	同上	同上
塩素イオン濃度(Cl)	同上	同上

⑭剖検および器官重量

以下の時期に、採血対象動物はペントバルビタールナトリウム麻酔下で採血した後、これ以外の動物はペントバルビタールナトリウム麻酔下で放血致死させ、引き続き剖検した。

対象動物	解剖時期	屠殺前の絶食
雄		
投与終了時剖検例	投与 42 日の翌日	18～24 時間絶食
回復観察例	回復 15 日	18～24 時間絶食
雌		
分娩例	哺育 4 日の翌日	18～24 時間絶食
未分娩例	妊娠26日相当日	実施せず
交尾が確認されなかった例(未交尾)	投与52日の翌日	実施せず
非交配群(投与終了時剖検例)	投与42日の翌日	18～24 時間絶食
非交配群(回復観察例)	回復15日	18～24 時間絶食
死亡動物	死亡確認日	実施せず

全例について、脳、甲状腺および上皮小体、胸腺、心臓、肝臓、腎臓、脾臓、副腎、精巣、精巣上体、前立腺(腹側葉)、精嚢(凝固腺を含む)、卵巣および子宮の重量を測定した。また、全例の脳、脊髄、下垂体、眼球(ハーダー腺)、顎下腺および舌下腺、気管、甲状腺および上皮小体、胸腺、心臓、肺および気管支、肝臓、腎臓、脾臓、膵臓、副腎、胃、十二指腸、空腸、回腸、盲腸、結腸、直腸、下顎リンパ節、腸間膜リンパ節、精巣、精巣上体、前立腺、精嚢および凝固腺、卵巣、子宮、腟、膀胱、大腿骨および大腿骨骨髄、骨格筋、坐骨神経および病変部を採取し、保存した。肺および気管支は 15 cm 水柱以下の圧力で、気管内に 10%中性緩衝ホルマリン溶液 5 mL 以下を注入し固定してから摘出して同固定液に保存した。精巣および精巣上体はブアン液に固定(長期保存は 10%中性緩衝ホルマリン溶液)し、その他の器官・組織は 10%中性緩衝ホルマリン溶液に固定した。

なお、未分娩例および未交尾例の器官重量値は評価対象から除外した。

⑮病理組織学的検査

剖検した動物のうち、雄およびサテライト群の投与終了時剖検では対照群ならびに高用量群の動物番号が若い各 5 例、分娩雌の投与終了時剖検では採血を行った対照群ならびに高用量群の各 5 例について、組織学的検査対象器官のヘマトキシリン・エオジン(HE)標本を作製し、病理組織学的検査を実施した。また、剖検時に異常がみられた器官・組織に関しても同様に HE 標本を作製し、病理組織学的検査を実施した。

2)出生児(F_1)

①出生児の観察

哺育 0 日に生存児数および死亡児数を雌雄別に数えて、性別および外表奇形の有無を観察し、分娩率[(産児数/着床痕数)×100, %]、生児出産率[(出産生児数/着床痕数)×100, %]、出産率[(生児出産雌数/妊娠動物数)×100, %]および出生率[(出産生児数/産児数)×100, %]を算出した。また、哺育 0～4 日まで、毎日、一般状態を観察し、生存児数と死亡児数を雌雄別に数え、新生児生存率[(哺育 4 日の生児数/哺育 0 日の生児数)×100, %]を算出した。生存児については、哺育 0 および 4 日に個

別の体重を測定し、腹ごとに雌雄別の平均体重を算出するとともに、哺育 0 日および 4 日における性比[(雄生児数/総生児数)×100, %]を算出した。

②剖検

死亡児は外表奇形の有無を観察して剖検し、10%中性緩衝ホルマリン溶液に固定して保存した。生存児は哺育 4 日に外表奇形の有無を観察してセボフルラン吸入麻酔下に放血致死させて剖検し、内部器官の異常の有無を観察した。

6. データの解析法

性周期の変化した動物の頻度、交尾率、妊娠率(受胎率)については Fisher の直接確率検定を行った(有意水準:5%)。被験物質投与群の病理組織学的検査所見のうち、グレード分けしたデータは Mann-Whitney の U 検定により、また陽性グレードの合計値は Fisher の直接確率の片側検定により対照群との間の有意差検定を行った(有意水準:5%)。

その他のデータは、個体ごとに得られた値あるいは litter ごとの平均値を 1 標本とし、サテライト群内あるいはその他の群内で比較した。その際、解析の対象が 2 群の場合には、まず F 検定を行い、有意差が認められなければ Student's-t 検定を行った。F 検定において有意差が認められた場合は、Aspin-Welch 検定を行った。解析の対象が 3 群以上の場合は、先ず、Bartlett の方法により各群の分散の一様性について検定(有意水準:5%)を行った。分散が一様であった場合には、一元配置型の分散分析(有意水準:5%)を行い、群間に有意性が認められた場合は、Dunnett 法により多重比較を行った(有意水準:5%)。一方、いずれかの群で分散が 0 となった場合および分散が一様でなかった場合には、Kruskal-Wallis の順位検定(有意水準:5%)を行い、群間に有意性が認められた場合には、Dunnett 型の検定法により多重比較を行った(有意水準:5%)。

予見することができなかった試験の信頼性に影響を及ぼす疑いのある事態及び試験計画書に従わなかったこと

2013 年 10 月 26 日に飼育室で一過性の温度上昇(21:00～21:15、最高温度 25.5℃)が観察された。しかし、いずれの動物の一般状態にも上述事象に起因したと考えられる変化は認められず、また、温度上昇はわずかでごく短時間であったことから、試験への影響はないと判断した。

その他、「予見することができなかった試験の信頼性に影響を及ぼす疑いのある事態及び試験計画書に従わなかったこと」はなかった。

試験成績

1. 親動物

1)一般状態 (Table 1-1～Table 4, Appendix 1-1-1～Appendix 4-4)

雄では投与 15 日の投与後に 300 mg/kg 群の 1 例(動物番号 M03031)が突然死した。その他の生存例では投与 4 日から 1000 mg/kg 群の 8 例(動物番号 M04038、M04041、M04042、M04043、M04045、M04046、M04047、M04048)において、投与後に流涎が散見されたが、いずれも 1 時間以内に消失する一過性の変化であった。その他、投与 22 日から 1000 mg/kg 群の 1 例(動物番号 M04038)で腹部の貧毛または脱毛、投与 35 日から 100 mg/kg 群の 1 例(動物番号 M02019)で前肢の貧毛または脱毛が観察されたが、被験物質の影響とは考えなかった。

雌では、投与 3 日から 1000 mg/kg 群の交配雌 4 例(動物番号 F04037、F04039、F04043、F04045)および非交配雌 4 例(F06061、F06062、F06065、F06068)において、投与後の流涎が散見されたが、雄と同様に一過性の変化であった。

2)詳細な症状観察 (Table 5～Table 6-2, Appendix 5-1-1～Appendix 6-2-2)

雌雄とも、投与期間ならびに回復期間を通して、被験物質投与の影響を示す変化は認められなかった。

3)体重 (Table 7-1～Table 10, Appendix 7-1-1～Appendix 10-4)

雄では、投与期間ならびに回復期間を通して、被験物質投与の影響を示す体重の変化は認められなかった。

非交配雌を含む雌においても、投与期間ならびに回復期間を通して、被験物質投与の影響を示す体重の変化は認められなかった。また、妊娠中および分娩後の体重推移にも被験物質投与の影響を示す変化は認められなかった。

4)摂餌量 (Table 11-1～Table 14, Appendix 11-1-1～Appendix 14-4)

雄では、投与期間および回復期間を通して被験物質投与の影響を示す摂餌量の変化は認められなかった。

交配雌では、300 mg/kg 群の投与 14～15 日の摂餌量が対照群と比較して有意に減少したが、用量に依存した変化ではなかった。その他、1000 mg/kg 群の投与 1～2 日の摂餌量が対照群と比較して有意に増加したが、体重の変化を伴っていないことから偶発的なものと判断した。

非交配雌では、投与期間および回復期間を通して被験物質投与の影響を示す摂餌量の変化は認めらなかった。また、妊娠中および分娩後の摂餌量にも被験物質投与の影響を示す変化は認められなかった。

5)機能検査

①刺激に対する感覚運動反応 (Table 15～Table 16, Appendix 15-1～Appendix 16-6)

投与最終週に実施したプライエル反応、瞳孔反射、視覚定位、驚愕反応、後肢引込み反射、眼瞼反射、正向反射の検査では、非交配雌を含む雌雄いずれの群の検査対象動物においても異常は認められなかった。

②握力測定 (Table 17～Table 19, Appendix 17-1～Appendix 19-2)

雄では、投与最終週に測定した前肢および後肢の握力に、被験物質投与の影響を示す変化は認められなかった。

分娩雌では、各被験物質投与群の後肢の握力が対照群に比較して有意に増加したが、前肢の握力に被験物質の影響を示す変化は認められなかった。

分娩雌(投与時)	試験数*	サンプル数	平均	平均±2SD
後肢の握力	6	30	0.558	0.223-0.894

*: 2011 年 4 月～2013 年 3 月に実施した併合試験の媒体対照群(媒体:トウモロコシ油)を使用

非交配雌では、被験物質投与の影響を示す握力の変化は認められなかった。

③自発運動量測定 (Table 20～Table 22-2, Appendix 20-1～Appendix 22-4)

雄では、投与最終週に実施した自発運動量測定では、被験物質投与の影響を示す変化は認められなかった。

分娩雌では、投与最終週に実施した自発運動量測定で、1000 mg/kg 群の開始 10～15 分の区画移動数が対照群と比較して有意に増加した。

非交配雌においても 1000 mg/kg 群の開始 10～15 分の区画移動数および立ち上がり回数が対照群と比較して有意に増加した。非交配雌の回復終了週に実施した自発運動量測定では、被験物質投与の影響を示す変化は認められなかった。

6)尿検査 (Table 23-1-1～Table 24-2-2, Appendix 23-1-1～Appendix 24-2-2)

雄および非交配雌について投与最終週および回復 13 日に実施した尿検査では、被験物質投与の影響を示す変化は認められなかった。

7)血液学的検査 (Table 25-1～Table 26-3, Appendix 25-1-1～Appendix 26-3-2)

①雄動物

投与終了時の雄では、いずれの検査項目についても被験物質投与の影響を示す変化は認められなかった。

回復終了時の雄では、いずれの検査項目についても被験物質投与の影響を示す変化は認められなかった。

②雌動物

投与終了時の分娩雌では、100 および 1000 mg/kg 群の APTT が対照群と比較して有意に短縮したが、延長の変化ではなかった。その他の検査項目についても被験物質投与の影響を示す変化は認められなかった。

投与終了時の非交配雌では、いずれの検査項目についても被験物質投与の影響を示す変化は認められなかった。

回復終了時の非交配雌では、1000 mg/kg 群の好酸球比率(平均 1.8%)が対照群と比較して有意に低下したが、背景データの範囲内であったことから被験物質の影響ではないと判断した。

非交配雌(回復終了時)	試験数*	サンプル数	平均	平均±2SD
好酸球比率	6	30	2.0	1.0-3.0

*: 2011 年 4 月～2013 年 3 月に実施した併合試験の媒体対照群(媒体:トウモロコシ油)を使用

8)血液生化学的検査 (Table 27-1～Table 28-3, Appendix 27-1-1～Appendix 28-3-2)

①雄動物

投与終了時の雄では、1000 mg/kg 群の塩素イオン濃度(平均 109.7 mEq/L)が対照群(平均 107.5 mEq/L)と比較して有意に増加した。その他の検査項目に被験物質投与の影響を示す変化は認められなかった。

雄(投与終了時)	試験数*	サンプル数	平均	平均±2SD
塩素イオン濃度	6	30	106.3	102.2-110.3

*: 2011 年 4 月～2013 年 3 月に実施した併合試験の媒体対照群(媒体:トウモロコシ油)を使用

回復終了時の雄では、1000 mg/kg 群のナトリウムイオン(平均 146.7 mEq/L)および塩素イオン濃度(平均 108.4 mEq/L)が対照群と比較して有意に増加した。

雄(回復終了時)	試験数*	サンプル数	平均	平均±2SD
ナトリウムイオン濃度	6	30	144.0	141.8-146.3
塩素イオン濃度	6	30	107.4	105.7-109.0

*: 2011 年 4 月～2013 年 3 月に実施した併合試験の媒体対照群(媒体:トウモロコシ油)を使用

②雌動物

投与終了時の分娩雌では、300 および 1000 mg/kg 群の ALT が対照群と比較して有意に低下したが、逸脱酵素の増加を示す変化ではなかった。その他、1000 mg/kg 群の塩素イオン濃度が対照群と比較して有意に増加した。

投与終了時の非交配雌では、1000 mg/kg 群の AST の値(平均 191 U/L)が対照群(平均 66 U/L)と

比較して有意に増加した。

非交配雌(投与終了時)	試験数*	サンプル数	平均	平均±2SD
AST	6	30	60.8	50.0-71.7

*: 2011 年 4 月～2013 年 3 月に実施した併合試験の媒体対照群(媒体:トウモロコシ油)を使用

9)器官重量 (Table 29-1～Table 30-3, Appendix 29-1-1～Appendix 30-3-2)

①雄動物

投与終了時の雄では、300 mg/kg 群において前立腺の相対重量が対照群と比較して有意に増加したが、用量に依存した変化ではなかった。その他の器官重量に被験物質投与の影響を示す変化は認められなかった。

回復終了時の雄では、いずれの器官重量にも被験物質投与の影響を示す変化は認められなかった。

②雌動物

投与終了時の分娩雌では、いずれの器官重量にも被験物質投与の影響を示す変化は認められなかった。

投与終了時の非交配雌では、1000 mg/kg 群において脾臓の絶対重量(平均 489.8 mg)および相対重量(平均 1.744 mg/g)が対照群の絶対重量(平均 644.5 mg)および相対重量(平均 2.153 mg/g)と比較して有意に低下した。その他、副腎の相対重量が対照群と比較して有意に増加したが、絶対重量に有意差が認められていないことから、被験物質投与の影響を示す変化ではないと判断した。

非交配雌(投与終了時)	試験数*	サンプル数	平均	平均±2SD
脾臓の絶対重量	6	30	550.1	493.1-607.1
脾臓の相対重量	6	30	1.887	1.666-2.108

*: 2011 年 4 月～2013 年 3 月に実施した併合試験の媒体対照群(媒体:トウモロコシ油)を使用

回復終了時の非交配雌では、いずれの器官重量にも被験物質投与の影響を示す変化は認められなかった。

10)剖検所見 (Table 31-1～Table 32-3, Appendix 31-1～Appendix 32-3)

①雄の途中死亡例

投与期間中に死亡動物が 300 mg/kg 群の 1 例にみられたが、肉眼的な変化は認められなかった。

②雄の投与終了時剖検例

精巣上体尾部では両側性の黄白色結節が 1 例に、腎臓では片側性の陥凹部および肝臓では横隔膜と一部癒着した横隔膜結節が 1 例に、右側前肢皮膚では脱毛が 1 例にいずれも 100 mg/kg 群に認められた。その他の雄の投与終了時剖検例に肉眼的な変化は認められなかった。

③雄の回復観察例

いずれの例にも肉眼的な変化は認められなかった。

④分娩雌の投与終了時剖検例

回腸では憩室が 300 mg/kg 群の 1 例に、肺では左葉腹側面の暗色点が対照群の 1 例に、卵巣では片側性の嚢胞が 100 および 300 mg/kg 群の各 1 例に、脾臓では大型化が 1000 mg/kg 群の 1 例に、胃では腺胃粘膜の暗色域が対照群および 1000 mg/kg 群の各 1 例にそれぞれ認められた。

⑤不妊例および未交尾例

1000 mg/kg 群では不妊および未交尾動物が各 1 例みられたが、いずれの例にも肉眼的な変化は認められなかった。

⑥非交配雌の投与終了時剖検例

胃では腺胃粘膜の暗色域が、子宮では左子宮角の部分的な内腔拡張が対照群の各 1 例に認められたほかは、いずれの例にも肉眼的な変化は認められなかった。

⑦非交配雌の回復観察例

回復観察例では雄および非交配群ともにいずれの例にも肉眼的な変化は認められなかった。

11)病理組織学的検査所見 (Table 33～Table 34-2, Appendix 33～Appendix 34-2)

①雄の途中死亡例

300 mg/kg 群の死亡動物 1 例では、肝臓に門脈周囲性の肝細胞の脂肪化、脾臓に髄外造血および褐色色素沈着、前立腺に間質のリンパ球浸潤がそれぞれみられたが、変化の程度は軽微であり、その他の観察指定器官に組織学的変化は認められなかった。

②雄の投与終了時剖検例

対照群および 1000 mg/kg 群の対象動物各 5 例の病変部を含む指定器官ならびにその他の例の病変部の病理組織学的検査結果は以下の通りである。

甲状腺では、第四鰓弓由来の遺残物と考えられる鰓後体が 1000 mg/kg 群の 1 例に認められた。

心臓では、限局性の心筋の変性/線維化が対照群の 2 例および 1000 mg/kg 群の 3 例にみられたが、両群間に程度および頻度の差は認められなかった。

肺では、肺胞腔の泡沫細胞の集簇が対照群の 1 例および 1000 mg/kg 群の 2 例にみられたが、両群間に程度および頻度の差は認められなかった。その他、限局性の出血が 1000 mg/kg 群の 1 例に認められたが、変化の程度は軽微であった。

肝臓では、門脈周囲性の肝細胞の脂肪化が対照群の 3 例および 1000 mg/kg 群の全例にみられたが、両群間に程度および頻度の差は認められなかった。その他、小肉芽腫および限局性の壊死が 1000 mg/kg 群の各 1 例に認められたが、いずれの所見も変化の程度は軽微であった。

脾臓では、髄外造血および褐色色素沈着が両群全例にみられたが、両群間に程度の差は認められなかった。

腎臓では、皮質の好塩基性尿細管が両群各 2 例にみられたが、両群間に程度の差は認められなかっ

た。その他、髄質の嚢胞が対照群の 2 例および 1000 mg/kg 群の 1 例にみられたが、両群間に頻度の差は認められなかった。

精巣では、両側性に限局性のセルトリ細胞細胞質の空胞化が 1000 mg/kg 群の 1 例に認められ、さらに、この例の精巣上体では内腔に細胞残屑が両側性に観察されたが、いずれの所見も変化の程度は軽微であった。その他、精巣上体では片側性の間質のリンパ球浸潤が両群各 1 例にみられたが、両群間に程度の差は認められなかった。

前立腺では、間質のリンパ球浸潤が対照群の 3 例および 1000 mg/kg 群の 2 例にみられたが、両群間に程度および頻度の差は認められなかった。

眼球では、先天性と考えられる片側性の網膜異形成が 1000 mg/kg 群の 1 例にみられた。

対照群においてはその他に、下垂体では嚢胞が、腎臓では間質のリンパ球浸潤および髄質の鉱質沈着が、精巣では両側性の精細管萎縮がそれぞれ 1 例みられ、甲状腺では異所性の胸腺組織が 3 例に認められたほか、肝臓の髄外造血および大腿骨骨髄の造血亢進が同一例に観察された。

また、剖検時に横隔膜結節がみられた 100 mg/kg 群の 1 例の肝臓では横隔膜結節のほかに組織学的な変化は認められなかった。陥凹部がみられた 100 mg/kg 群の 1 例の腎臓では漿膜下に限局性の線維化が認められ、その周囲の皮質には好塩基性尿細管が観察された。両側性の黄白色結節がみられた 100 mg/kg 群の 1 例の精巣上体では精子肉芽腫が認められた。

その他の組織学的検査対象器官・組織には、病理組織学的変化は観察されなかった。

③分娩雌の投与終了時剖検例

対照群および 1000 mg/kg 群の対象動物各 5 例の病変部を含む指定器官ならびにその他の例の病変部の病理組織学的検査結果は以下の通りである。ただし、対象動物以外の病変部がみられた対照群の肺および胃ならびに 1000 mg/kg 群の脾臓の組織所見については、対象動物も含み各 6 例で検定を実施した。

甲状腺では、発生途中の異常と考えられる異所性の胸腺組織が対照群の 2 例および 1000 mg/kg 群の 1 例、鰓後体が 1000 mg/kg 群の 1 例にそれぞれ認められた。

胸腺では、萎縮が 1000 mg/kg 群の 1 例にみられたが、変化の程度は軽微であった。

心臓では、限局性の心筋の変性/線維化が 1000 mg/kg 群の 1 例にみられたが、変化の程度は軽微であった。

肺では、肺胞腔の泡沫細胞の集簇が両群各 2 例にみられたが、両群間に程度の差は認められなかった。

肝臓では、門脈周囲性の肝細胞の脂肪化が 1000 mg/kg 群の 1 例にみられたが、変化の程度は軽微であった。

脾臓では、髄外造血および褐色色素沈着が両群全例にみられたが、両群間に程度の差は認められなかった。

腎臓では、皮質の好塩基性尿細管が両群各 1 例にみられたが、両群間に程度の差は認められなかった。その他、間質のリンパ球浸潤および移行上皮の限局性過形成が 1000 mg/kg 群の各 1 例にみられ

たが、変化の程度は軽微であった。

ハーダー腺では、間質のリンパ球浸潤が 1000 mg/kg 群の 1 例にみられたが、変化の程度は軽微であった。

対照群においてはその他に、下垂体では嚢胞が 2 例にみられ、肺では限局性の出血および動脈壁の鉱質沈着が、肝臓では限局性の壊死が、卵巣では片側性の間質腺の鉱質沈着が各 1 例に観察された。さらに、剖検時に暗色点がみられた肺では肺胞壁の限局性の肥厚が認められ、暗色域がみられた腺胃では鉱質沈着を伴った潰瘍およびその周囲には出血が観察された。

また、剖検時に片側性の嚢胞がみられた 100 および 300 mg/kg 群の各 1 例の卵巣では、卵胞嚢胞が認められた。憩室がみられた 300 mg/kg 群の 1 例の回腸では、憩室部筋層の一部菲薄化が観察されたほかは粘膜等に異常は認められなかった。

なお、その他の観察器官に異常所見は認められなかった。

④非交配雌の投与終了時剖検例

対照群および 1000 mg/kg 群の対象動物各 5 例の病変部を含む指定器官の病理組織学的検査結果は以下の通りである。

甲状腺では、異所性の胸腺組織が両群各 1 例に認められた。

心臓では、限局性の心筋の変性/線維化が 1000 mg/kg 群の 1 例にみられたが、変化の程度は軽微であった。

肺では、肺胞腔の泡沫細胞の集簇が対照群の 1 例および 1000 mg/kg 群の 3 例にみられたが、両群間に程度および頻度の差は認められなかった。

肝臓では、門脈周囲性の肝細胞の脂肪化が対照群の 2 例および 1000 mg/kg 群の 3 例に、小肉芽腫が両群各 1 例にみられたが、両群間に程度および頻度の差は認められなかった。

膵臓では、限局性の腺房細胞萎縮が 1000 mg/kg 群の 1 例にみられたが、変化の程度は軽微であった。

脾臓では、髄外造血および褐色色素沈着が両群全例にみられたが、両群間に程度の差は認められなかった。

腎臓では、皮質の好塩基性尿細管および髄質の鉱質沈着が対照群の各 2 例および 1000 mg/kg 群の各 1 例にみられたが、両群間に程度および頻度の差は認められなかった。

卵巣では、両側性の閉鎖卵胞数の増加が対照群の 1 例および 1000 mg/kg 群の 2 例に認められたが、両群間に程度および頻度の差は認められなかった。そのうち、閉鎖卵胞数の増加がみられた対照群の 1 例では、黄体数の減少も両側性に認められた。その他、片側性の間質腺の鉱質沈着が両群各 1 例にみられたが、両群間に程度の差は認められなかった。

対照群においてはその他に、下垂体では異所性頭蓋咽頭管組織および嚢胞が各 1 例に認められた。異所性頭蓋咽頭管組織がみられた 1 例の子宮では、限局性の内腔拡張および子宮体部上皮の扁平上皮化生が、眼球では、片側性の水晶体線維の変性および網膜異形成がそれぞれ認められた。

なお、その他の観察器官に異常所見は認められなかった。

2. 生殖能力

1)性周期および交配成績 (Table 35～Table 36, Appendix 35-1～Appendix 36-4)

4 あるいは 5 日間隔の性周期が投与開始後にそれ以外の性周期に変化した動物は、対照群を含む各投与群に 1～2 例認められたが、その頻度に対照群と各被験物質投与群との間に有意差はなかった。2 週間の交配期間中に交尾が確認されなかった動物は、1000 mg/kg 群で 1 組みられたが、その他の動物では交尾が確認された。また、交尾が確認されたが不妊であった雌は 1000 mg/kg 群に 1 例みられたが、交尾率および妊娠率(受胎率)に対照群と各被験物質投与群との間に有意差はなかった。その他、100 および 300 mg/kg 群の同居開始日から交尾確認日までの日数が対照群と比較して有意に延長したが、その間に回帰した発情期の回数および投与期間中の平均発情回帰日数に対照群との差は認められなかったことから、対照群では同居日に発情前期の動物が偶発的に多かったことが原因と考えら、被験物質投与の影響を示す変化ではないと考えられた。

2)出産率および妊娠期間 (Table 37, Appendix 37-1～Appendix 37-4)

各群の出産率はいずれも 100%を示した。分娩例の妊娠期間には、被験物質投与の影響を示す変化は認められなかった。

3)分娩および哺育状態

分娩状態は、いずれの動物も良好であった。また、いずれの動物の哺育状態についても、異常は認められなかった。

4)黄体数、着床数および着床率 (Table 37, Appendix 37-1～Appendix 37-4)

黄体数、着床数および着床率に、被験物質投与の影響を示す変化は認められなかった。

3. 出生児

1)生存 (Table 37, Appendix 37-1～Appendix 37-4)

産児数、出産生児数、分娩率、生児出産率、出生率、哺育 0 日および哺育 4 日の性比、新生児生存率に被験物質投与の影響は認められなかった。また、哺育 0 日に産児の外表奇形は観察されなかった。

2)体重 (Table 38, Appendix 38-1～Appendix 38-4)

哺育 0 日および哺育 4 日に測定した出生児体重には、雌雄とも被験物質投与の影響を示す変化は認められなかった。

3)出生児観察(Table 39～Table 40, Appendix 39-1～Appendix 39-4)

出生児の一般状態に被験物質投与の影響を示す変化はみられなかった。また、死亡児および哺育 4 日の生存児の剖検では、異常は認められなかった。

考察

雌雄ラットの交配前(2 週間)および交配期間中、ならびに雄では交配期間終了後を通して計 42 日間、雌では妊娠期間を通して周産期(哺育 4 日まで)に undecanal を経口投与し、雌雄ラットに対する反復投与毒性および回復性、ならびに生殖発生毒性および新生児の発育に及ぼす影響について検討した。

1. 反復投与毒性および回復性

投与 15 日に 300 mg/kg 群の雄 1 例が突然死したが、剖検時に肉眼的な変化は認められず、病理組織学的検査でも被験物質の影響と考えられる変化は認められなかった。また、死亡原因を特定できる所見もなかった。その他、1000 mg/kg 群の非交配雌を含む雌雄では、投与後に一過性の流涎が散見されたが、同群の詳細な症状観察においても神経毒性を示す異常は認められなかったこと、本被験物質は弱い皮膚刺激性を有する(製品安全データシートより)ことから、流涎は被験物質の刺激性によるものと考えられた。

機能検査のうち自発運動量測定では、1000 mg/kg 群の分娩雌および非交配雌に区画移動数または立ち上がり回数の増加がみられたが、開始 10～15 分のみの一過性の変化であることから、毒性学的な意義はないと判断した。握力測定では、各被験物質投与群の分娩雌において後肢握力の増加がみられたが、いずれも背景データの範囲内であり、用量依存性がないことから被験物質の影響ではないと判断した。

血液生化学的検査では、1000 mg/kg 群の雄および分娩雌の塩素イオン濃度が対照群と比較して有意に増加したが、その差はわずかであり、背景データの範囲内であることから被験物質投与の影響ではないと判断した。その他、投与終了時の非交配雌では、1000 mg/kg 群の AST が対照群と比較して有意に増加し、背景データの範囲を上回ったことから、被験物質投与の影響が示唆された。しかし、その他の逸脱酵素の上昇や肝臓の病理組織学的検査で肝障害を示す所見は認められなかった。

器官重量の測定では 1000 mg/kg 群の非交配雌に脾臓重量の低下が認められたが、脾臓の病理組織学的検査および血液学的検査では被験物質投与の影響と考えられる変化は認めらず、対照群の脾臓重量が背景値よりも高値であったことなどから、偶発的な変化と判断した。

雄および非交配雌を含む雌の体重、摂餌量、刺激に対する感覚運動反応および病理組織学的検査の結果には、被験物質投与の影響と考えられる変化は認められなかった。

回復期間中に流涎は認められなかった。回復終了時の血液生化学的検査では、1000 mg/kg 群の非交配雌に AST の増加は認められなかった。1000 mg/kg 群の雄では塩素イオンおよびナトリウムイオン濃度が対照群と比較して有意に増加したが、いずれも背景データの範囲内であることから被験物質投与の影響ではないと判断した。

2. 生殖発生毒性

1000 mg/kg 群では不妊および未交尾動物が各 1 例みられたが、いずれの例にも剖検時に肉眼的な

異常は認められなかった。また、精巣の病理組織学的検査では、両側性に限局性のセルトリ細胞細胞質の空胞化が 1000 mg/kg 群の 1 例に観察されたが、変化の程度は軽微であり、同例の妊孕性は確認された。Undecanal は、ヒトの精子表面にある嗅覚レセプターhOR 17-4 のアンタゴニストとして精子の運動性を阻害する可能性が *in vitro* で報告[1]されているが、ラットを用いた本試験では、被験物質の交配成績への影響は認められなかった。さらに、性周期、出産率、妊娠期間、分娩状態、哺育状態、黄体数、着床数および着床率に、被験物質投与の影響を示す変化は認められなかったことから、1000 mg/kg までの用量は、親動物の生殖能力に影響を及ぼさないと考えられる。また、出生児の生存率、体重および形態にも被験物質投与の影響を示す変化は認められなかったことから、1000 mg/kg までの用量は、新生児の発育にも影響を及ぼさないと考えられる。

3. 無毒性量

1000 mg/kg 群の非交配雌で AST が増加したことから雌動物の反復投与毒性に対する無毒性量(NOAEL)は 300 mg/kg/day、雄動物では 1000 mg/kg までの用量で毒性影響は認められなかったことから無毒性量は 1000 mg/kg/day と判断された。また、1000 mg/kg までの用量は、親動物の生殖能力および新生児の発育に影響を及ぼさなかったことから、生殖発生毒性に対する無毒性量は 1000 mg/kg/day と判断された。

文献

1) Spehr, M., Gisselmann, G., Poplawski, A., Riffell, J. A., Wetzel, C. H., Zimmer, R. K., Hatt, H.: Identification of a testicular odorant receptor mediating human sperm chemotaxis. Science 299: 2054-2058 (2003)

Annex A

試験成績書

2013年06月19日

東京化成工業株式会社　品質保証[redacted]
〒103-0023
東京都中央区日本橋本町4丁目10[redacted]
TEL: 03(5640)8860　FAX: 03(564[redacted]

製品名：Undecanal			
製品コード：U0009	等級：	製品ロット：N633K	判定：合格

項目	結果	規格値
純度(GC)	98.8 %	97.0 %以上
比重 (20/20)	0.8302	0.8280 ～ 0.8330
屈折率 n20/D	1.4318	1.4300 ～ 1.4340

Annex B

SOP/CHE/001
採用開始 2013年4月19日

試験番号： R－13－006

含 量 試 験 結 果

被験物質：Undecanal　　調製年月日：2013年10月4日

ロット番号： N633K　　測定年月日：2013年10月4日

媒　　体：トウモロコシ油

試料番号	調製濃度 (A) (mg/mL)	測定濃度 (B) (mg/mL)	平均測定濃度 (C) (mg/mL)	含量 B/A×100 (%)	平均含量 (%)	ばらつき B/C×100 (%)
1	25.0	25.3	25.4	101.2	101.5	99.6
2		25.5		102.0		100.4
3		25.3		101.2		99.6
4	75.0	76.9	77.6	102.5	103.5	99.1
5		77.4		103.2		99.7
6		78.6		104.8		101.3
7	250	265	261	106.0	104.5	101.5
8		258		103.2		98.9
9		261		104.4		100.0

含量の判定基準(溶液検体)

平均含量が調製濃度の90.0～110.0%、各測定濃度のばらつきが90.0～110.0%以内であるとする

Annex C

投与検体中の被験物質濃度測定法

試験操作は特に規定する場合を除き室温下で行う。

1. 試薬
アセトン(HPLC用)　　和光純薬工業

2. 使用機器
電子天秤(RC210DまたはR200D)　　ザルトリウス
ガスクロマトグラフ　　島津製作所
構成: GC-14B(ガスクロマトグラフ)、AOC-20i(オートインジェクタ)、C-R7A またはC-R7A plus (データ処理装置)

3. 標準溶液の調製
被験物質約 50 mg を精密に量り採り、アセトンに溶かし正確に 10 mL する。この液 1 mL を正確に採り、アセトンを加えて正確に 100 mL として標準原液(約 0.05 mg/mL)とする。標準原液を 1、1、3 及び 4 mL ずつ正確に採り、それぞれアセトンを加えて正確に 50、20、20 及び 10 mL として標準溶液(約 1、2.5、7.5 及び 20 μg/mL、St 1～4)とする。標準原液及び標準溶液は測定日ごとに n=1 で調製する。

4. 試料溶液の調製
1)投与検体約 25 mg/mL
投与検体 1 mL を正確にとり、アセトンを加えて正確に 100 mL とする。この液 1 mL を正確に採り、アセトンを加えて正確に 25 mL として試料溶液とする(約 0.01 mg/mL、希釈率 2500)。試料溶液の調製は投与検体の採取から n=3 とする。
2)投与検体約 75 mg/mL
投与検体 1 mL を正確にとり、アセトンを加えて正確に 100 mL とする。この液 1 mL を正確に採り、アセトンを加えて正確に 50 mL として試料溶液とする(約 0.015 mg/mL、希釈率 5000)。試料溶液の調製は投与検体の採取から n=3 とする。
3)投与検体約 250 mg/mL
投与検体 1 mL を正確にとり、アセトンを加えて正確に 100 mL とする。この液を段階希釈(①1→50、②2→10、希釈溶媒はアセトン)して試料溶液とする(約 0.01 mg/mL、希釈率 25000)。試料溶液の調製は投与検体の採取から n=3 とする。

5. 試験液中被験物質の濃度測定法
標準溶液(St 1～4)および試料溶液をそれぞれ下記の試験条件でガスクロマトグラフィーにより試験を行う。標準溶液は各濃度3回ずつ、試料溶液はそれぞれ1回ずつ測定し、標準溶液から作成した検量線を用いて試料溶液中の被験物質濃度を求め、これに希釈率を乗じて試験液中の被験物質濃度を算出する。また、投与検体の媒体(1→2500・アセトン、n=1)を1回測定し、被験物質に相当するピークがないことを確認する。

<u>試験条件</u>

検出器	水素炎イオン化検出器(FID) 水素60 kPa、空気50 kPa、メイクアップガス(ヘリウム)30 mL/min
カラム	DB-5(内径0.32 mm、長さ30 m、膜厚0.25 μm)、J&W Scientific
キャリアガス	ヘリウム(He、100 kPa)
カラム温度	50℃(1分)、15℃/分、200℃(、25℃/分、300℃、5分)* *:トウモロコシ油から調製した試料溶液を測定する際のみ実施
注入口温度	250℃
検出器温度	250℃
注入量	2 μL
注入方式	スプリットレス(サンプリング時間0.5分)
オートインジェクタ洗浄溶媒	アセトン

Annex C (continued)

システム適合性

測定開始前に溶媒を1回、測定開始前及び測定終了後にシステム適合性用溶液(St 3)を1回ずつ、測定する。溶媒のクロマトグラム上の測定対象物質の保持時間付近に妨害ピークがないことを確認する。また、システム適合性用溶液において保持時間とピーク面積の変動(測定開始前に対する測定終了後の偏差%)を確認する。変動の許容基準は保持時間が±3.0%以内、ピーク面積が±5.0%以内を目安とする。

6. 数値の取り扱い

1) 投与検体の濃度は、四捨五入して、有効数字3桁目まで表示する。
2) 標準溶液の濃度は、切り捨てて、有効数字4桁目まで表示する。
3) 試験結果における測定濃度(mg/mL)及びその平均は四捨五入して有効数字3桁で表示する。
4) 含量(%)、平均含量(%)およびばらつき(%)は四捨五入して、小数第1位まで表示する。
5) システム適合性における偏差%は四捨五入して、小数第1位まで表示する。

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 1-1. General conditions of male rats

Group	Number of males and general conditions	Days of administration																																																	
		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Control (vehicle: corn oil)	Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Abdomen, Alopecia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	General appearance, Death	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 100 mg/kg	Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Abdomen, Alopecia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	General appearance, Death	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 300 mg/kg	Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Abdomen, Alopecia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	General appearance, Death	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 1000 mg/kg	Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	11	12	12	12	12	12	12	12	12	12	12	12	12	12	11	12	8	12	7	12	11	12	12	12	12	12	11	12	11	12	12	12	11	12	11	11	11	11	10	11	10	11	11
	Mouth, Salivation	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	5	0	1	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0
	Abdomen, Alopecia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	General appearance, Death	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.

Group	Number of males and general conditions	Days of administration																																			
		26		27		28		29		30		31		32		33		34		35		36		37		38		39		40		41		42		43	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Control (vehicle: corn oil)	Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	7	
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	7	
	Abdomen, Alopecia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Forelimb, Alopecia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Und 100 mg/kg	Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
	Abdomen, Alopecia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Forelimb, Alopecia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Und 300 mg/kg	Number of males	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
	General appearance, No abnormality	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
	Abdomen, Alopecia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Forelimb, Alopecia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Und 1000 mg/kg	Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	7	
	General appearance, No abnormality	11	7	11	11	11	11	11	11	11	9	11	11	11	11	11	11	11	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	7	
	Abdomen, Alopecia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Forelimb, Alopecia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Mouth, Salivation	0	4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Pre: Before administration, Post: after administration.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 1-2. General conditions of male rats at the recovery period

Group	Number of males	Days of recovery														
	and general conditions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Control (vehicle: corn oil)	Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	General appearance, No abnormality	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Und 1000 mg/kg	Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	General appearance, No abnormality	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 2-1. General conditions of female rats

Group	Number of females and general conditions	1		2		3		4		5		6		7		8		9		10		11		12		13	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Control (vehicle: corn oil)	Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 100 mg/kg	Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 300 mg/kg	Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 1000 mg/kg	Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	12	12	12	12	12	12	12	12	12	9
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3

Group	Number of females and general conditions	14		15		16		17		18		19		20		21		22		23		24		25	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Control (vehicle: corn oil)	Number of females	12	12	12	12	5	5	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	General appearance, No abnormality	12	12	12	12	5	5	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 100 mg/kg	Number of females	12	12	12	12	12	12	10	10	7	7	3	3	3	3	2	2	1	1	1	1	1	1	1	1
	General appearance, No abnormality	12	12	12	12	12	12	10	10	7	7	3	3	3	3	2	2	1	1	1	1	1	1	1	1
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 300 mg/kg	Number of females	12	12	12	12	10	10	10	10	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	General appearance, No abnormality	12	12	12	12	10	10	10	10	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 1000 mg/kg	Number of females	12	12	12	12	9	9	7	7	6	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	General appearance, No abnormality	12	12	12	12	9	8	7	7	6	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Mouth, Salivation	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.

Group	Number of females and general conditions	26		27		28		29		30		31		32		33		34		35		36		37		38	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Und 100 mg/kg	Number of females	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	General appearance, No abnormality	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 1000 mg/kg	Number of females	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	General appearance, No abnormality	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Group	Number of females and general conditions	39		40		41		42		43		44		45		46		47		48		49		50	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Und 100 mg/kg	Number of females	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	General appearance, No abnormality	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 1000 mg/kg	Number of females	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	General appearance, No abnormality	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Pre: Before administration, Post: after administration.

Group	Number of females and general conditions	Days of administration					
		51		52		53	
		Pre	Post	Pre	Post	Pre	Post
Und 1000 mg/kg	Number of females	1	1	1	1	1	
	General appearance, No abnormality	1	1	1	1	1	

Pre: Before administration, Post: after administration.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 2-2. General conditions of female rats, satellite group

Group	Number of females and general conditions	Days of administration 1		2		3		4		5		6		7		8		9		10		11		12		13	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Control (vehicle: corn oil)	Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	General appearance, No abnormality	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 1000 mg/kg	Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	General appearance, No abnormality	10	10	10	10	10	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	7
	Mouth, Salivation	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3

Group	Number of females and general conditions	Days of administration 14		15		16		17		18		19		20		21		22		23		24		25	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Control (vehicle: corn oil)	Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	General appearance, No abnormality	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 1000 mg/kg	Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	General appearance, No abnormality	10	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9
	Mouth, Salivation	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Pre: Before administration, Post: after administration.

Group	Number of females and general conditions	Days of administration 26		27		28		29		30		31		32		33		34		35		36		37		38		39		40		41		42		43	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Control (vehicle: corn oil)	Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	5	
	General appearance, No abnormality	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	5	
Und 1000 mg/kg	Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	5	
	General appearance, No abnormality	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	5	

Pre: Before administration, Post: after administration.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 2-3. General conditions of female rats at the recovery period

Group	Number of females	Days of ercovery													
	and general conditions	1	2	3	4	5	6	8	9	10	11	12	13	14	15
Control (vehicle: corn oil)	Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	General appearance, No abnormality	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Und 1000 mg/kg	Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	General appearance, No abnormality	5	5	5	5	5	5	5	5	5	5	5	5	5	5

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 3. General conditions in dams during pregnancy

Days of pregnancy 0–7:

Group	Number of dams and general conditions	0 Pre	0 Post	1 Pre	1 Post	2 Pre	2 Post	3 Pre	3 Post	4 Pre	4 Post	5 Pre	5 Post	6 Pre	6 Post	7 Pre	7 Post
Control (vehicle: corn oil)	Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 100 mg/kg	Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 300 mg/kg	Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 1000 mg/kg	Number of dams	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	General appearance, No abnormality	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

Days of pregnancy 8–15:

Group	Number of dams and general conditions	8 Pre	8 Post	9 Pre	9 Post	10 Pre	10 Post	11 Pre	11 Post	12 Pre	12 Post	13 Pre	13 Post	14 Pre	14 Post	15 Pre	15 Post
Control (vehicle: corn oil)	Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 100 mg/kg	Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 300 mg/kg	Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 1000 mg/kg	Number of dams	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	General appearance, No abnormality	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Days of pregnancy 16–22:

Group	Number of dams and general conditions	16 Pre	16 Post	17 Pre	17 Post	18 Pre	18 Post	19 Pre	19 Post	20 Pre	20 Post	21 Pre	21 Post	22
Control (vehicle: corn oil)	Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	2
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	2
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 100 mg/kg	Number of dams	12	12	12	12	12	12	12	12	12	12	11	11	4
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	11	11	4
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 300 mg/kg	Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	4
	General appearance, No abnormality	12	12	12	12	12	12	12	12	12	12	12	12	4
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0
Und 1000 mg/kg	Number of dams	10	10	10	10	10	10	10	10	10	10	10	10	4
	General appearance, No abnormality	10	10	10	10	10	10	10	10	10	10	10	10	4
	Mouth, Salivation	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 4. General conditions in dams during lactation

Group	Number of dams and general conditions	Days of lactation											
		0		1		2		3		4		5	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Control (vehicle: corn oil)	Number of dams	10	10	12	12	12	12	12	12	12	12	12	
	General appearance, No abnormality	10	10	12	12	12	12	12	12	12	12	12	
Und 100 mg/kg	Number of dams	8	8	12	12	12	12	12	12	12	12	12	
	General appearance, No abnormality	8	8	12	12	12	12	12	12	12	12	12	
Und 300 mg/kg	Number of dams	5	5	12	12	12	12	12	12	12	12	12	
	General appearance, No abnormality	5	5	12	12	12	12	12	12	12	12	12	
Und 1000 mg/kg	Number of dams	6	6	10	10	10	10	10	10	10	10	10	
	General appearance, No abnormality	6	6	10	10	10	10	10	10	10	10	10	

Pre: Before administration, Post: after administration.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 5. Detailed clinical observations of male rats

Findings	Group	Initial number of animals	Pre-treatment	Days of treatment										Days of recovery [a]	
				8	15	24		30		36		42		7	14
[Urination] (frequency/30sec)	Control (vehicle: corn oil)	12	0 [b]	2	1	0		4		3		0		0	2
	Und (100 mg/kg)	12	0	1	0	0		0		0		0			
	Und (300 mg/kg)	12	0	1	0	0	(11)	0	(11)	0	(11)	0	(11)		
	Und (1000 mg/kg)	12	0	0	1	0		1		1		1		0	0

[a] The recovery test was performed in 5 animals for each of the 0 and 1000 mg/kg groups.

[b] Values represent total score of each group.

Figures in parenthese indicate number of animals.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 6-1. Detailed clinical observations of female rats

Findings	Group	Initial number of animals	Pre-treatment	Days of treatment										Days of recovery [a]	
				8	15	24		30		36		42		7	14
[Urination] (frequency/30sec)	Control (vehicle: corn oil)	12	0 [b]	2	1	0		4		3		0		0	2
	Und (100 mg/kg)	12	0	1	0	0		0		0		0			
	Und (300 mg/kg)	12	0	1	0	0	(11)	0	(11)	0	(11)	0	(11)		
	Und (1000 mg/kg)	12	0	0	1	0		1		1		1		0	0

[a] The recovery test was performed in 5 animals for each of the control and 1000 mg/kg groups.

[b] Values represent total score of each group.

Figures in parenthese indicate number of animals.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 6-2. Detailed clinical observations of female rats, satellite group

Findings	Group	Initial number of animals	Pre-treatment	Days of treatment						Days of recovery [a]	
				8	15	24	30	36	42	7	14
[Urination] (frequency/30sec)	Control (vehicle: corn oil)	10	0 [b]	0	0	0	0	0	0	0	0
	Und (1000 mg/kg)	10	0	0	0	0	0	0	0	0	0

[a] The recovery test was performed in 5 animals for each of the control and 1000 mg/kg groups.

[b] Values represent total score of each group.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 7-1. Body weights of male rats

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of males	12	12	12	12
Days of administration				
1	398.2 ± 11.7	401.9 ± 12.7	402.2 ± 16.0	401.7 ± 13.2
4	411.1 ± 13.8	414.8 ± 16.4	414.9 ± 17.3	413.5 ± 18.1
7	424.8 ± 19.5	427.5 ± 17.9	432.6 ± 18.5	427.7 ± 22.8
14	450.9 ± 19.6	451.8 ± 21.2	456.5 ± 23.0	449.3 ± 26.7
21	473.8 ± 20.6	467.6 ± 23.8	468.8 ± 27.0 (11)	463.5 ± 30.1
28	499.5 ± 23.0	489.9 ± 27.9	490.1 ± 30.6 (11)	484.8 ± 30.7
35	519.0 ± 27.2	508.5 ± 28.3	510.3 ± 31.3 (11)	502.5 ± 33.3
42	530.5 ± 33.0	518.6 ± 29.8	524.6 ± 36.8 (11)	516.7 ± 34.2

Each value shows mean (g) ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 7-2. Body weights of male rats at the recovery period

Group	Control (vehicle: corn oil)	Und 1000 mg/kg
Number of males	5	5
Days of recovery		
1	539.5 ± 41.9	523.4 ± 42.8
7	552.0 ± 41.8	536.2 ± 48.2
14	553.6 ± 41.9	541.6 ± 40.7

Each value shows mean (g) ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 8-1. Body weights of female rats

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of females	12	12	12	10
Days of administration				
1	249.7 ± 8.5	245.4 ± 6.8	245.8 ± 8.1	251.1 ± 12.6
4	254.6 ± 7.4	251.4 ± 11.8	251.8 ± 7.9	258.1 ± 11.4
7	261.3 ± 7.4	257.4 ± 15.0	255.0 ± 10.8	264.1 ± 13.1
14	268.7 ± 9.6	268.5 ± 17.8	265.4 ± 10.7	273.9 ± 17.1

Each value shows mean (g) ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 8-2. Body weights of female rats, satellite group

Group		Control (vehicle: corn oil)			Und 1000 mg/kg		
Number of females		10			10		
Days of administration							
	1	251.2	±	13.2	250.1	±	8.4
	4	254.8	±	16.1	255.1	±	9.8
	7	261.4	±	19.8	257.4	±	11.2
	14	270.2	±	20.5	269.0	±	14.4
	21	278.0	±	23.7	275.0	±	14.4
	28	283.8	±	26.7	283.0	±	20.3
	35	290.4	±	27.7	285.7	±	21.9
	42	299.0	±	24.1	291.4	±	21.8

Each value shows mean (g) ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 8-3. Body weights of female rats at the recovery period

Group	Control (vehicle: corn oil)	Und 1000 mg/kg
Number of females	5	5
Days of recovery		
1	279.1 ± 10.6	289.1 ± 17.6
7	285.3 ± 12.4	298.7 ± 18.9
14	285.1 ± 15.8	298.6 ± 25.5

Each value shows mean (g) ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 9. Body weights of dams during pregnancy

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of dams	12	12	12	10
Days of pregnancy				
0	275.3 ± 8.1	281.8 ± 17.5	275.5 ± 14.3	284.7 ± 18.6
7	314.2 ± 10.1	316.3 ± 18.9	313.7 ± 14.8	328.7 ± 22.4
14	355.0 ± 14.1	354.3 ± 21.2	352.2 ± 15.0	364.7 ± 24.0
20	441.2 ± 18.1	436.6 ± 29.5	431.5 ± 20.7	447.3 ± 33.3

Each value shows mean ± S.D. (g).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 10. Body weights of dams during lactation

Group		Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of dams		12	12	12	10
Days of lactation					
	0	329.7 ± 30.3	338.6 ± 24.3	342.9 ± 19.7	355.5 ± 19.6
	4	351.2 ± 15.5	350.8 ± 23.9	346.4 ± 10.3	360.1 ± 25.6

Each value shows mean ± S.D. (g).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 11-1. Food consumption of male rats

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of males	12	12	12	12
Days of administration				
1	26.3 ± 3.8	27.1 ± 2.9	26.9 ± 4.3	26.3 ± 2.9
7	25.0 ± 2.9	25.8 ± 3.5	25.8 ± 2.4	24.5 ± 2.2
14	24.0 ± 2.7	22.7 ± 1.9	23.5 ± 2.5	23.3 ± 2.0
29	25.2 ± 1.9	23.8 ± 3.0	23.9 ± 3.1 (11)	23.6 ± 1.4
35	24.3 ± 2.7	24.2 ± 2.4	24.5 ± 2.9 (11)	24.1 ± 2.0
41	25.6 ± 2.4	23.7 ± 3.3	23.8 ± 3.2 (11)	24.9 ± 2.3

Each value shows mean (g) ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 11-2. Food consumption of male rats at the recovery period

Group	Control (vehicle: corn oil)	Und 1000 mg/kg
Number of males	5	5
Days of recovery		
6	29.3 ± 1.9	27.9 ± 3.1
12	30.4 ± 1.5	28.0 ± 4.3

Each value shows mean (g) ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 12-1. Food consumption of female rats

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of females	12	12	12	12
Days of administration				
1	16.9 ± 3.3	19.2 ± 2.6	16.8 ± 3.4	20.3 ± 2.7 *
7	17.3 ± 2.5	19.4 ± 2.7	19.5 ± 2.1	19.5 ± 2.4
14	17.5 ± 1.8	16.7 ± 3.7	14.1 ± 2.9 *	17.8 ± 3.9

Each value shows mean (g) ± S.D.

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 12-2. Food consumption of female rats, satellite group

Group	Control (vehicle: corn oil)	Und 1000 mg/kg
Number of females	10	10
Days of administration		
1	18.2 ± 4.4	18.3 ± 2.4
7	17.9 ± 4.0	19.5 ± 3.7
14	17.3 ± 2.6	15.1 ± 2.9
21	17.4 ± 3.9	17.4 ± 2.8
29	18.0 ± 3.2	18.0 ± 2.9
35	16.3 ± 4.0	17.8 ± 3.8
41	17.0 ± 3.2	17.0 ± 3.8

Each value shows mean (g) ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 12-3. Food consumption of female rats at the recovery period

Group		Control (vehicle: corn oil)	Und 1000 mg/kg
Number of females		5	5
Days of recovery			
	6	19.9 ± 3.4	22.9 ± 1.5
	12	21.4 ± 2.9	20.8 ± 3.5

Each value shows mean (g) ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 13. Food consumption in dams during pregnancy

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of dams	12	12	12	10
Days of pregnancy				
0	19.8 ± 1.8	19.7 ± 3.0	19.5 ± 3.2	20.4 ± 3.1
7	24.4 ± 2.4	24.0 ± 3.0	24.9 ± 3.6	25.6 ± 2.3
14	22.3 ± 2.4	22.7 ± 2.6	22.8 ± 3.2	24.4 ± 2.5
20	22.1 ± 3.1	20.7 ± 4.1	20.9 ± 2.4	21.3 ± 2.2

Each value shows mean ± S.D. (g).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 14. Food consumption in dams during lactation

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of dams	12	12	12	10
Days of lactation				
3	40.3 ± 4.5	41.2 ± 5.6	37.1 ± 3.0	39.0 ± 8.8

Each value shows mean ± S.D. (g).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 15. Functional findings of male rats at the last week of the dosing period

Group	Cotrol (vehicle: corn oil)	Und (100 mg/kg)	Und (300 mg/kg)	Und (1000 mg/kg)
Male				
Number of animals	5	5	5	5
Righting reflex	100	100	100	100
Visual placing	100	100	100	100
Pupillary reflex	100	100	100	100
Startle reaction	100	100	100	100
Preyer's reaction	100	100	100	100
Withdrawal reflex	100	100	100	100
Eyelid reflex	100	100	100	100

Values represent % of animals showing normal responses.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 16. Functional findings of female rats at the end of the dosing period

Group	Cotrol (vehicle: corn oil)	Und (100 mg/kg)	Und (300 mg/kg)	Und (1000 mg/kg)
Female, dam				
Number of animals	5	5	5	5
Righting reflex	100	100	100	100
Visual placing	100	100	100	100
Pupillary reflex	100	100	100	100
Startle reaction	100	100	100	100
Preyer's reaction	100	100	100	100
Withdrawal reflex	100	100	100	100
Eyelid reflex	100	100	100	100
Female, satelite group				
Number of animals	5			5
Righting reflex	100			100
Visual placing	100			100
Pupillary reflex	100			100
Startle reaction	100			100
Preyer's reaction	100			100
Withdrawal reflex	100			100
Eyelid reflex	100			100

Values represent % of animals showing normal responses.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 17. Assessment of grip strength of male rats at the last week of the dosing period

Group	Control (vehicle: corn oil)	Und (100 mg/kg)	Und (300 mg/kg)	Und (1000 mg/kg)
Number of males	5	5	5	5
Administration period				
Forelimb	1.169 ± 0.052	1.131 ± 0.040	1.128 ± 0.041	1.144 ± 0.043
Hindlimb	0.829 ± 0.058	0.838 ± 0.066	0.844 ± 0.067	0.809 ± 0.061

Each value shows mean (kg) ±S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 18. Assessment of grip strength of female rats at the last week of the dosing period

Group	Control (vehicle: corn oil)	Und (100 mg/kg)	Und (300 mg/kg)	Und (1000 mg/kg)
Number of females	5	5	5	5
Administration period				
Forelimb	1.050 ± 0.054	1.087 ± 0.082	1.114 ± 0.068	1.124 ± 0.056
Hindlimb	0.695 ± 0.049	0.784 ± 0.027 **	0.783 ± 0.022 **	0.793 ± 0.034 **

Each value shows mean (kg) ±S.D.

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 19. Assessment of grip strength of female rats at the last week of the dosing period, satellite group

Group	Control (vehicle: corn oil)	Und (1000 mg/kg)
Number of females	5	5
Administration period		
Forelimb	1.098 ± 0.059	1.082 ± 0.039
Hindlimb	0.786 ± 0.023	0.807 ± 0.020

Each value shows mean (kg) ±S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 20. Motor activity of male rats at the last week of the dosing period

Group	Control (Vehicle: corn oil)	Und (100 mg/kg)	Und (300 mg/kg)	Und (1000 mg/kg)
Number of males	5	5	5	5
Administration period				
Ambulation (counts)				
5min	1149 ± 148	1256 ± 375	1060 ± 223	1149 ± 92
10min	1127 ± 164	1210 ± 350	974 ± 212	1082 ± 106
15min	1065 ± 212	968 ± 487	966 ± 179	1001 ± 213
20min	932 ± 371	851 ± 278	837 ± 94	939 ± 163
Total	4273 ± 858	4285 ± 1451	3837 ± 690	4170 ± 445
Rearing (counts)				
5min	27 ± 9	24 ± 6	26 ± 5	25 ± 5
10min	27 ± 8	25 ± 4	21 ± 3	26 ± 7
15min	24 ± 9	14 ± 10	20 ± 4	20 ± 5
20min	16 ± 9	10 ± 4	18 ± 13	18 ± 9
Total	94 ± 31	73 ± 22	85 ± 9	89 ± 17

Each value shows mean±S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 21. Motor activity of female rats at the last week of the dosing period

Group	Control (Vehicle: corn oil)	Und (100 mg/kg)	Und (300 mg/kg)	Und (1000 mg/kg)
Number of females	5	5	5	5
Administration period				
Ambulation (counts)				
5min	1123 ± 121	863 ± 279	928 ± 283	1240 ± 422
10min	968 ± 150	754 ± 225	857 ± 253	997 ± 401
15min	645 ± 120	727 ± 88	586 ± 171	968 ± 295 *
20min	523 ± 158	483 ± 306	523 ± 326	797 ± 325
Total	3259 ± 310	2827 ± 858	2894 ± 928	4003 ± 1438
Rearing (counts)				
5min	24 ± 5	21 ± 7	19 ± 7	35 ± 11
10min	19 ± 10	13 ± 5	15 ± 9	10 ± 7
15min	7 ± 5	9 ± 7	4 ± 4	13 ± 7
20min	2 ± 3	5 ± 6	4 ± 3	9 ± 9
Total	52 ± 10	48 ± 13	42 ± 14	67 ± 29

Each value shows mean±S.D.
Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 22-1. Motor activity of female rats at the last week of the dosing period, satellite group

Group	Control (Vehicle: corn oil)	Und (1000 mg/kg)
Number of females	5	5
Administration period		
Ambulation (counts)		
5min	1033 ± 260	1276 ± 111
10min	947 ± 222	1121 ± 266
15min	838 ± 179	1137 ± 161 *
20min	856 ± 214	1134 ± 325
Total	3674 ± 745	4669 ± 770
Rearing (counts)		
5min	26 ± 5	36 ± 14
10min	26 ± 11	36 ± 19
15min	14 ± 9	28 ± 6 *
20min	19 ± 11	30 ± 27
Total	85 ± 29	130 ± 58

Each value shows mean±S.D.
Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 22-2. Motor activity of female rats at the recovery period

Group	Control (Vehicle: corn oil)	Und (1000 mg/kg)
Number of females	5	5
Ambulation (counts)		
5min	1244 ± 151	1124 ± 179
10min	1182 ± 107	1002 ± 206
15min	961 ± 258	956 ± 235
20min	895 ± 313	882 ± 231
Total	4282 ± 705	3964 ± 790
Rearing (counts)		
5min	37 ± 13	35 ± 3
10min	32 ± 10	29 ± 11
15min	17 ± 11	23 ± 10
20min	20 ± 13	18 ± 5
Total	106 ± 40	104 ± 20

Each value shows mean±S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 23-1. Urinalysis in male rats

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of males	5	5	5	5
pH				
≦5.0	0	0	0	0
6.5	1	1	2	1
7.0	2	3	3	3
7.5	2	1	0	0
8.5	0	0	0	1
Protein				
+ (30 ≦ and < 100 mg/dL)	0	3	0	3
2+ (100 ≦ and < 300 mg/dL)	4	2	4	2
3+ (300 ≦ and < 600 mg/dL)	1	0	1	0
Glucose				
- (negative)	4	5	4	5
±(30 ≦ and < 70 mg/dL)	0	0	1	0
2+ (150 ≦ and < 300 mg/dL)	1	0	0	0
Ketone				
±(5 ≦ and < 10 mg/dL)	1	0	0	1
+ (10 ≦ and < 40 mg/dL)	4	5	5	4
Bilirubin				
- (negative)	5	5	5	5
Occult blood				
- (negative)	4	5	2	5
2+ (0.20 ≦ and < 1.00 mg/dL)	0	0	3	0
3+ (1.00 mg/dL ≦)	1	0	0	0
Urobilinogen				
±(normal)	1	1	0	1
+ (2.0 ≦ and < 4.0 mg/dL)	3	4	3	4
2+ (4.0 ≦ and < 8.0 mg/dL)	1	0	2	0
Color				
light yellow	4	5	4	5
yellow	0	0	1	0
bloody	1	0	0	0
Turbidity				
- (negative)	3	5	4	5
+ (slight)	1	0	1	0
3+ (marked)	1	0	0	0
Red Blood cells				
- (not observed)	4	5	3	5
2+ (100-299/3 visual field)	0	0	2	0
3+ (≧300/3 visual field)	1	0	0	0
White Blood cells				
- (not observed)	5	5	3	5
±(1-9/3 visual field)	0	0	2	0
Casts				
- (not observed)	5	5	5	5
Cristals				
- (not observed)	2	0	0	0
±(a few)	3	4	5	5
+ (abundant)	0	1	0	0
Epithelial cells				
- (not observed)	5	5	5	5

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 23-1 (continued). Urinalysis in male rats

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of males	5	5	5	5
Urine volume (mL/24hr)	14.0 ± 7.4	12.0 ± 3.9	11.9 ± 5.6	11.5 ± 3.4
Specific gravity	1.064 ± 0.023	1.066 ± 0.016	1.070 ± 0.021	1.069 ± 0.008
Electrolyte, density				
Na(mEq/L)	101.3 ± 52.6	110.4 ± 62.8	152.5 ± 42.9	151.7 ± 28.2
K(mEq/L)	274.5 ± 113.6	264.5 ± 93.2	310.9 ± 80.3	319.6 ± 44.3
Cl(mEq/L)	133.2 ± 69.8	136.5 ± 66.8	183.1 ± 48.9	189.5 ± 23.9
Electrolyte, gross volume				
Na(mEq/24hr)	1.17 ± 0.38	1.33 ± 0.70	1.66 ± 0.37	1.69 ± 0.27
K(mEq/24hr)	3.20 ± 0.62	3.13 ± 1.27	3.36 ± 0.60	3.58 ± 0.60
Cl(mEq/24hr)	1.49 ± 0.56	1.63 ± 0.82	1.99 ± 0.42	2.13 ± 0.42

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 23-2. Urinalysis in male rats of the recovery period

Group	Control (vehicle: corn oil)	Und 1000 mg/kg
Number of males	5	5
pH		
≦5.0	0	0
7.0	2	3
7.5	2	0
8.0	0	1
8.5	1	0
≧9.0	0	1
Protein		
- (negative)	0	0
+ (30 ≦ and < 100 mg/dL)	3	3
2+ (100 ≦ and < 300 mg/dL)	2	2
Glucose		
- (negative)	5	5
Ketone		
- (negative)	0	1
±(5 ≦ and < 10 mg/dL)	4	1
+ (10 ≦ and < 40 mg/dL)	1	3
Bilirubin		
- (negative)	5	5
Occult blood		
- (negative)	4	5
+ (0.06 ≦ and <0.20 mg/dL)	1	0
Urobilinogen		
±(normal)	3	2
+ (2.0 ≦ and < 4.0 mg/dL)	2	3
Color		
light yellow	5	5
Turbidity		
- (negative)	4	4
+ (slight)	1	1
Red Blood cells		
- (not observed)	5	5
White Blood cells		
- (not observed)	5	5
Casts		
- (not observed)	5	5
Cristals		
±(a few)	5	5
Epithelial cells		
- (not observed)	5	5

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 23-2 (continued). Urinalysis in male rats of the recovery period

Group	Control (vehicle: corn oil)			Und 1000 mg/kg		
Number of males	5			5		
Urine volume (mL/24hr)	16.5	±	3.3	17.3	±	7.9
Specific gravity	1.056	±	0.010	1.064	±	0.019
Electrolyte, density						
Na(mEq/L)	103.0	±	36.9	117.2	±	29.6
K(mEq/L)	234.9	±	72.6	294.8	±	81.3
Cl(mEq/L)	118.9	±	58.2	151.7	±	40.9
Electrolyte, gross volume						
Na(mEq/24hr)	1.68	±	0.70	1.86	±	0.26
K(mEq/24hr)	3.84	±	1.20	4.60	±	0.45
Cl(mEq/24hr)	1.97	±	1.01	2.40	±	0.35

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 24-1. Urinalysis in female rats, satellite group

Group	Control (vehicle: corn oil)	Und 1000 mg/kg
Number of females	5	5
pH		
≦5.0	0	0
6.0	1	0
6.5	3	3
7.0	1	2
≧9.0	0	0
Protein		
- (negative)	0	1
±(10 ≦ and < 30 mg/dL)	1	2
+ (30 ≦ and < 100 mg/dL)	3	2
2+ (100 ≦ and < 300 mg/dL)	1	0
Glucose		
- (negative)	5	5
Ketone		
- (negative)	1	1
±(5 ≦ and < 10 mg/dL)	2	3
+ (10 ≦ and < 40 mg/dL)	2	1
Bilirubin		
- (negative)	5	5
Occult blood		
- (negative)	5	5
Urobilinogen		
±(normal)	3	4
+ (2.0 ≦ and < 4.0 mg/dL)	2	1
Color		
light yellow	5	5
Turbidity		
- (negative)	5	5
Red Blood cells		
- (not observed)	5	5
White Blood cells		
- (not observed)	5	5
Casts		
- (not observed)	5	5
Cristals		
- (not observed)	2	3
±(a few)	3	2
Epithelial cells		
- (not observed)	5	5

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 24-1 (continued). Urinalysis in female rats, satellite group

Group	Control (vehicle: corn oil)			Und 1000 mg/kg		
Number of females	5			5		
Urine volume (mL/24hr)	11.4	±	1.6	11.7	±	5.8
Specific gravity	1.047	±	0.010	1.051	±	0.019
Electrolyte, density						
Na(mEq/L)	82.3	±	23.0	93.0	±	32.3
K(mEq/L)	194.7	±	64.1	215.5	±	101.6
Cl(mEq/L)	105.9	±	43.9	119.8	±	54.0
Electrolyte, gross volume						
Na(mEq/24hr)	0.93	±	0.24	0.99	±	0.33
K(mEq/24hr)	2.18	±	0.66	2.31	±	0.89
Cl(mEq/24hr)	1.18	±	0.45	1.28	±	0.49

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 24-2. Urinalysis in female rats of the recovery period

Group	Control (vehicle: corn oil)	Und 1000 mg/kg
Number of females	5	5
pH		
≦5.0	0	0
6.0	0	1
6.5	1	0
7.0	3	0
7.5	1	3
8.0	0	1
≧9.0	0	0
Protein		
- (negative)	1	0
±(10 ≦ and < 30 mg/dL)	2	2
+ (30 ≦ and < 100 mg/dL)	1	3
2+ (100 ≦ and < 300 mg/dL)	1	0
Glucose		
- (negative)	5	5
Ketone		
- (negative)	3	4
±(5 ≦ and < 10 mg/dL)	1	1
+ (10 ≦ and < 40 mg/dL)	1	0
Bilirubin		
- (negative)	5	5
Occult blood		
- (negative)	5	5
Urobilinogen		
±(normal)	3	4
+ (2.0 ≦ and < 4.0 mg/dL)	2	1
Color		
light yellow	4	5
yellow	1	0
Turbidity		
- (negative)	5	5
Red Blood cells		
- (not observed)	5	5
White Blood cells		
- (not observed)	5	5
Casts		
- (not observed)	5	5
Cristals		
- (not observed)	2	0
±(a few)	3	5
Epithelial cells		
- (not observed)	5	5

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 24-2 (continued). Urinalysis in female rats of the recovery period

Group	Control (vehicle: corn oil)			Und 1000 mg/kg		
Number of females	5			5		
Urine volume (mL/24hr)	12.6	±	6.1	12.6	±	3.5
Specific gravity	1.056	±	0.017	1.059	±	0.020
Electrolyte, density						
Na(mEq/L)	110.8	±	34.7	107.9	±	42.2
K(mEq/L)	233.8	±	82.6	254.0	±	106.9
Cl(mEq/L)	133.0	±	50.6	139.1	±	68.6
Electrolyte, gross volume						
Na(mEq/24hr)	1.27	±	0.40	1.29	±	0.46
K(mEq/24hr)	2.69	±	1.03	3.02	±	1.13
Cl(mEq/24hr)	1.53	±	0.69	1.68	±	0.86

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 25-1. Hematological findings of male rats at the end of the dosing period

Group		Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of males		5	5	5	5
RBC	10000/μL	801 ± 173	842 ± 28	851 ± 46	850 ± 15
HGB	g/dL	14.4 ± 2.6	15.3 ± 0.4	15.3 ± 0.7	15.1 ± 0.2
Hematocrit	%	41.8 ± 5.3	43.5 ± 1.2	43.5 ± 1.5	43.2 ± 0.5
MCV	fL	53.3 ± 7.4	51.7 ± 0.9	51.1 ± 1.3	50.8 ± 1.1
MCH	pg	18.1 ± 1.2	18.2 ± 0.3	18.0 ± 0.3	17.7 ± 0.4
MCHC	g/dL	34.3 ± 2.1	35.1 ± 0.3	35.3 ± 0.4	34.9 ± 0.3
Platelet	10000/μL	120.3 ± 18.4	102.8 ± 7.9	114.5 ± 16.1	104.0 ± 7.8
PT	sec.	19.1 ± 4.6	18.4 ± 2.4	19.8 ± 5.0	18.9 ± 3.1
APTT	sec.	26.2 ± 4.4	25.2 ± 2.2	26.8 ± 3.3	24.9 ± 1.5
WBC	100/μL	84.8 ± 9.5	87.0 ± 23.5	98.1 ± 27.8	89.0 ± 19.2
Neutrophil	%	14.6 ± 1.8	17.8 ± 2.6	18.3 ± 3.9	14.6 ± 3.8
Eosinophil	%	1.6 ± 0.5	1.7 ± 0.8	1.6 ± 0.3	1.3 ± 0.4
Basophil	%	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0
Monocyte	%	4.2 ± 1.0	4.5 ± 0.9	4.1 ± 0.5	3.5 ± 0.7
Lymphocyte	%	79.7 ± 1.8	76.0 ± 2.3	76.1 ± 4.2	80.6 ± 4.3
Reticulocyte	%	7.41 ± 10.41	2.72 ± 0.54	2.74 ± 0.22	2.73 ± 0.56

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 25-2. Hematological findings of male rats at the end of the recovery period

Group		Control (vehicle: corn oil)	Und 1000 mg/kg
Number of males		5	5
RBC	10000/μL	866 ± 26	850 ± 35
HGB	g/dL	15.2 ± 0.7	14.8 ± 0.7
Hematocrit	%	43.0 ± 2.2	42.0 ± 1.7
MCV	fL	49.7 ± 3.6	49.5 ± 1.6
MCH	pg	17.6 ± 1.1	17.3 ± 0.4
MCHC	g/dL	35.4 ± 0.6	35.1 ± 0.6
Platelet	10000/μL	113.7 ± 14.5	111.7 ± 10.8
PT	sec.	19.3 ± 3.9	20.4 ± 2.3
APTT	sec.	25.2 ± 2.9	23.2 ± 1.8
WBC	100/μL	72.3 ± 22.5	59.3 ± 13.4
Neutrophil	%	15.9 ± 3.3	19.4 ± 3.3
Eosinophil	%	1.8 ± 0.3	2.1 ± 1.1
Basophil	%	0.0 ± 0.1	0.0 ± 0.0
Monocyte	%	3.5 ± 1.2	4.0 ± 0.7
Lymphocyte	%	78.8 ± 3.8	74.5 ± 4.4
Reticulocyte	%	2.84 ± 0.48	3.47 ± 0.53

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 26-1. Hematological findings of female rats at the end of the dosing period

Group		Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of females		5	5	5	5
RBC	10000/μL	681 ± 35	669 ± 35	701 ± 23	701 ± 17
HGB	g/dL	13.2 ± 0.5	13.1 ± 0.9	13.4 ± 0.4	13.6 ± 0.4
Hematocrit	%	39.0 ± 1.3	39.0 ± 2.0	39.8 ± 0.8	40.0 ± 0.9
MCV	fL	57.4 ± 2.5	58.3 ± 1.3	56.9 ± 1.5	57.1 ± 1.2
MCH	pg	19.4 ± 0.7	19.6 ± 0.5	19.1 ± 0.3	19.4 ± 0.2
MCHC	g/dL	33.9 ± 0.5	33.6 ± 0.8	33.6 ± 0.5	34.0 ± 0.6
Platelet	10000/μL	119.5 ± 10.1	116.4 ± 17.8	134.5 ± 23.5	118.5 ± 19.0
PT	sec.	12.8 ± 0.1	13.3 ± 0.4	13.4 ± 0.5	12.8 ± 0.6
APTT	sec.	21.6 ± 1.2	19.3 ± 1.3 *	20.5 ± 1.5	19.6 ± 0.6 *
WBC	100/μL	119.1 ± 46.4	124.8 ± 40.2	129.0 ± 40.4	120.5 ± 40.5
Neutrophil	%	34.7 ± 5.8	27.7 ± 7.0	33.2 ± 7.6	33.1 ± 9.8
Eosinophil	%	0.9 ± 0.5	0.7 ± 0.2	1.0 ± 0.2	1.1 ± 0.6
Basophil	%	0.0 ± 0.1	0.1 ± 0.1	0.0 ± 0.0	0.0 ± 0.1
Monocyte	%	3.7 ± 0.9	4.3 ± 1.5	3.7 ± 0.7	4.2 ± 0.7
Lymphocyte	%	60.6 ± 7.0	67.2 ± 5.6	62.1 ± 7.8	61.6 ± 8.9
Reticulocyte	%	7.89 ± 1.00	8.37 ± 2.95	6.67 ± 0.98	6.70 ± 2.03

Each value shows mean ± S.D.

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 26-2. Hematological findings of female rats at the end of the dosing period, satellite group

Group		Control (vehicle: corn oil)	Und 1000 mg/kg
Number of females		5	5
RBC	10000/μL	774 ± 23	739 ± 33
HGB	g/dL	14.3 ± 0.5	13.8 ± 0.4
Hematocrit	%	41.0 ± 0.8	39.3 ± 1.4
MCV	fL	52.9 ± 1.0	53.2 ± 0.9
MCH	pg	18.5 ± 0.1	18.7 ± 0.3
MCHC	g/dL	35.0 ± 0.7	35.0 ± 0.5
Platelet	10000/μL	111.6 ± 10.4	102.2 ± 15.8
PT	sec.	12.2 ± 0.4	12.2 ± 0.3
APTT	sec.	20.1 ± 2.4	20.6 ± 0.5
WBC	100/μL	82.0 ± 27.2	67.7 ± 22.2
Neutrophil	%	15.7 ± 6.7	16.1 ± 8.4
Eosinophil	%	1.3 ± 0.8	1.6 ± 0.4
Basophil	%	0.0 ± 0.0	0.0 ± 0.0
Monocyte	%	3.0 ± 0.9	4.6 ± 1.9
Lymphocyte	%	80.0 ± 7.4	77.7 ± 9.9
Reticulocyte	%	2.89 ± 0.56	3.62 ± 0.61

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 26-3. Hematological findings of female rats at the end of the recovery period

Group		Control (vehicle: corn oil)	Und 1000 mg/kg	
Number of females		5	5	
RBC	10000/μL	813 ± 51	804 ± 52	
HGB	g/dL	14.8 ± 0.4	14.9 ± 1.0	
Hematocrit	%	42.0 ± 0.9	41.5 ± 2.5	
MCV	fL	51.8 ± 2.6	51.7 ± 1.4	
MCH	pg	18.3 ± 0.6	18.5 ± 0.4	
MCHC	g/dL	35.3 ± 0.7	35.8 ± 0.5	
Platelet	10000/μL	106.7 ± 10.9	105.5 ± 10.4	
PT	sec.	12.4 ± 0.7	12.1 ± 0.8	
APTT	sec.	19.4 ± 1.0	17.3 ± 2.2	
WBC	100/μL	41.9 ± 12.8	29.6 ± 9.5	
Neutrophil	%	20.0 ± 4.9	23.2 ± 9.1	
Eosinophil	%	2.6 ± 0.5	1.8 ± 0.4	*
Basophil	%	0.0 ± 0.0	0.0 ± 0.0	
Monocyte	%	3.8 ± 1.8	2.6 ± 1.0	
Lymphocyte	%	73.7 ± 4.3	72.4 ± 8.5	
Reticulocyte	%	2.80 ± 0.36	3.35 ± 0.70	

Each value shows mean ± S.D.

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 27-1. Biochemical findings of male rats at the end of the dosing period

Group		Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg	
Number of males		5	5	5	5	
Total protein	g/dL	5.2 ± 0.3	5.5 ± 0.3	5.5 ± 0.2	5.2 ± 0.1	
Albumin	g/dL	3.4 ± 0.1	3.6 ± 0.1	3.6 ± 0.2	3.5 ± 0.2	
A/G		1.88 ± 0.11	1.88 ± 0.12	1.83 ± 0.18	1.98 ± 0.18	
Glucose	mg/dL	138 ± 8	139 ± 10	143 ± 10	140 ± 15	
Total cholesterol	mg/dL	48 ± 7	45 ± 9	46 ± 8	47 ± 7	
Triglyceride	mg/dL	33 ± 9	50 ± 15	41 ± 8	43 ± 13	
Phospholipid	mg/dL	77 ± 10	77 ± 15	75 ± 10	81 ± 9	
AST	U/L	63 ± 13	61 ± 17	62 ± 5	59 ± 12	
ALT	U/L	25 ± 4	27 ± 4	27 ± 5	25 ± 2	
γ-GTP	U/L	0 ± 0	0 ± 0	0 ± 0	0 ± 0	
LDH	U/L	113 ± 66	158 ± 131	123 ± 50	124 ± 76	
Bile acid	μmol/L	9.2 ± 3.8	11.4 ± 6.6	9.6 ± 5.1	7.8 ± 1.3	
BUN	mg/dL	15 ± 3	14 ± 2	14 ± 1	13 ± 1	
Creatinine	mg/dL	0.5 ± 0.0	0.5 ± 0.0	0.5 ± 0.0	0.4 ± 0.1	
Total bilirubin	mg/dL	0.05 ± 0.01	0.05 ± 0.01	0.07 ± 0.02	0.08 ± 0.02	
ALP	U/L	527 ± 53	464 ± 107	554 ± 40	633 ± 166	
Inorganic phosphorus	mg/dL	5.6 ± 0.2	5.6 ± 0.2	5.8 ± 0.4	6.1 ± 0.6	
Ca	mg/dL	9.0 ± 0.3	9.2 ± 0.2	9.3 ± 0.2	9.2 ± 0.3	
Na	mEq/L	143.5 ± 1.3	144.5 ± 1.0	144.8 ± 0.5	145.1 ± 0.8	
K	mEq/L	3.88 ± 0.22	3.83 ± 0.12	4.02 ± 0.28	3.99 ± 0.13	
Cl	mEq/L	107.5 ± 1.7	108.2 ± 1.1	109.4 ± 0.5	109.7 ± 1.2	*

Each value shows mean ± S.D.

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 27-2. Biochemical findings of male rats at the end of the recovery period

Group		Control (vehicle: corn oil)	Und 1000 mg/kg	
Number of males		5	5	
Total protein	g/dL	5.7 ± 0.2	5.6 ± 0.3	
Albumin	g/dL	3.6 ± 0.1	3.6 ± 0.1	
A/G		1.73 ± 0.21	1.85 ± 0.13	
Glucose	mg/dL	136 ± 20	133 ± 12	
Total cholesterol	mg/dL	42 ± 10	46 ± 19	
Triglyceride	mg/dL	15 ± 9	17 ± 5	
Phospholipid	mg/dL	68 ± 9	73 ± 19	
AST	U/L	64 ± 6	64 ± 4	
ALT	U/L	24 ± 2	25 ± 2	
γ-GTP	U/L	0 ± 0	0 ± 0	
LDH	U/L	160 ± 82	222 ± 109	
Bile acid	μmol/L	9.5 ± 3.2	9.5 ± 3.9	
BUN	mg/dL	16 ± 2	14 ± 2	
Creatinine	mg/dL	0.6 ± 0.1	0.5 ± 0.1	
Total bilirubin	mg/dL	0.05 ± 0.01	0.05 ± 0.01	
ALP	U/L	370 ± 82	421 ± 58	
Inorganic phosphorus	mg/dL	5.4 ± 0.2	5.2 ± 0.6	
Ca	mg/dL	8.6 ± 0.2	8.7 ± 0.2	
Na	mEq/L	145.7 ± 0.7	146.7 ± 0.7	*
K	mEq/L	3.94 ± 0.13	3.99 ± 0.11	
Cl	mEq/L	106.5 ± 1.0	108.4 ± 1.2	*

Each value shows mean ± S.D.

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 28-1. Biochemical findings of female rats at the end of the dosing period

Group		Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of females		5	5	5	5
Total protein	g/dL	5.7 ± 0.2	5.7 ± 0.3	5.8 ± 0.3	5.8 ± 0.2
Albumin	g/dL	3.9 ± 0.1	3.9 ± 0.2	3.9 ± 0.1	3.9 ± 0.2
A/G		2.09 ± 0.14	2.10 ± 0.26	2.08 ± 0.15	1.95 ± 0.16
Glucose	mg/dL	127 ± 8	117 ± 10	123 ± 11	128 ± 6
Total cholesterol	mg/dL	47 ± 9	51 ± 10	50 ± 9	52 ± 11
Triglyceride	mg/dL	36 ± 11	29 ± 10	33 ± 10	27 ± 7
Phospholipid	mg/dL	93 ± 12	99 ± 11	95 ± 10	101 ± 18
AST	U/L	113 ± 43	107 ± 16	82 ± 9	93 ± 19
ALT	U/L	48 ± 8	44 ± 5	37 ± 2 *	37 ± 8 *
γ-GTP	U/L	0 ± 0	0 ± 0	0 ± 0	0 ± 0
LDH	U/L	129 ± 63	233 ± 174	97 ± 31	205 ± 162
Bile acid	μmol/L	16.5 ± 11.1	13.2 ± 5.0	17.8 ± 8.4	9.6 ± 1.8
BUN	mg/dL	15 ± 1	14 ± 3	16 ± 2	12 ± 2
Creatinine	mg/dL	0.5 ± 0.1	0.5 ± 0.0	0.5 ± 0.1	0.6 ± 0.0
Total bilirubin	mg/dL	0.09 ± 0.04	0.09 ± 0.02	0.09 ± 0.02	0.08 ± 0.02
ALP	U/L	262 ± 194	285 ± 111	262 ± 67	230 ± 51
Inorganic phosphorus	mg/dL	6.6 ± 0.6	6.2 ± 0.5	6.0 ± 0.1	6.1 ± 0.6
Ca	mg/dL	9.0 ± 0.2	9.0 ± 0.3	9.0 ± 0.1	9.1 ± 0.2
Na	mEq/L	143.2 ± 1.9	143.5 ± 1.4	144.0 ± 0.8	144.5 ± 0.5
K	mEq/L	3.76 ± 0.48	3.86 ± 0.30	3.83 ± 0.22	3.71 ± 0.26
Cl	mEq/L	104.2 ± 0.8	106.4 ± 1.9	106.3 ± 1.1	107.4 ± 1.3 **

Each value shows mean ± S.D.

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 28-2. Biochemical findings of female rats at the end of the dosing period, satellite group

Group		Control (vehicle: corn oil)	Und 1000 mg/kg	
Number of females		5	5	
Total protein	g/dL	5.8 ± 0.6	6.0 ± 0.3	
Albumin	g/dL	4.2 ± 0.4	4.2 ± 0.4	
A/G		2.55 ± 0.31	2.28 ± 0.40	
Glucose	mg/dL	128 ± 13	139 ± 18	
Total cholesterol	mg/dL	69 ± 4	68 ± 8	
Triglyceride	mg/dL	19 ± 6	24 ± 21	
Phospholipid	mg/dL	119 ± 11	123 ± 18	
AST	U/L	66 ± 17	191 ± 120	*
ALT	U/L	24 ± 5	37 ± 14	
γ-GTP	U/L	0 ± 0	0 ± 0	
LDH	U/L	70 ± 17	127 ± 76	
Bile acid	μmol/L	11.3 ± 2.7	15.7 ± 8.5	
BUN	mg/dL	16 ± 2	15 ± 2	
Creatinine	mg/dL	0.6 ± 0.0	0.6 ± 0.1	
Total bilirubin	mg/dL	0.11 ± 0.03	0.10 ± 0.02	
ALP	U/L	252 ± 67	228 ± 22	
Inorganic phosphorus	mg/dL	5.0 ± 0.6	5.0 ± 0.6	
Ca	mg/dL	9.1 ± 0.4	9.4 ± 0.2	
Na	mEq/L	144.3 ± 1.3	144.8 ± 0.4	
K	mEq/L	3.83 ± 0.34	3.80 ± 0.13	
Cl	mEq/L	108.6 ± 1.1	109.1 ± 0.9	

Each value shows mean ± S.D.

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 28-3. Biochemical findings of female rats at the end of the recovery period

Group		Control (vehicle: corn oil)	Und 1000 mg/kg
Number of females		5	5
Total protein	g/dL	5.8 ± 0.3	5.8 ± 0.4
Albumin	g/dL	4.0 ± 0.2	3.9 ± 0.3
A/G		2.19 ± 0.14	2.08 ± 0.26
Glucose	mg/dL	105 ± 10	109 ± 12
Total cholesterol	mg/dL	61 ± 9	60 ± 13
Triglyceride	mg/dL	11 ± 4	10 ± 4
Phospholipid	mg/dL	107 ± 15	102 ± 16
AST	U/L	81 ± 37	81 ± 19
ALT	U/L	41 ± 30	38 ± 15
γ-GTP	U/L	0 ± 0	0 ± 0
LDH	U/L	62 ± 16	111 ± 55
Bild acid	μmol/L	10.3 ± 3.1	10.5 ± 3.0
BUN	mg/dL	16 ± 4	18 ± 3
Creatinine	mg/dL	0.7 ± 0.1	0.7 ± 0.0
Total bilirubin	mg/dL	0.08 ± 0.02	0.10 ± 0.03
ALP	U/L	188 ± 27	232 ± 39
Inorganic phosphorus	mg/dL	3.9 ± 0.4	4.0 ± 0.4
Ca	mg/dL	8.5 ± 0.2	8.5 ± 0.5
Na	mEq/L	146.4 ± 1.9	146.9 ± 1.3
K	mEq/L	3.54 ± 0.25	3.44 ± 0.28
Cl	mEq/L	108.6 ± 1.2	109.1 ± 0.8

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 29-1. Organ weights of male rats at the end of the dosing period

Group		Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of males		7	12	11	7
Body weight	(g)	500.5 ± 25.7	492.5 ± 27.6	499.9 ± 34.3	489.4 ± 28.2
Brain	(mg)	2041.7 ± 44.4	2007.4 ± 71.5	2056.1 ± 82.3	2022.2 ± 95.2
	(mg/g)	4.089 ± 0.235	4.088 ± 0.280	4.126 ± 0.249	4.145 ± 0.324
Thymus	(mg)	322.1 ± 116.9	343.7 ± 63.0	330.0 ± 83.4	304.7 ± 33.0
	(mg/g)	0.638 ± 0.203	0.698 ± 0.121	0.660 ± 0.150	0.625 ± 0.079
Heart	(mg)	1487.3 ± 146.3	1458.5 ± 125.9	1475.9 ± 122.6	1486.4 ± 85.8
	(mg/g)	2.979 ± 0.346	2.962 ± 0.199	2.964 ± 0.312	3.044 ± 0.220
Liver	(mg)	13910.5 ± 1303.3	13759.7 ± 1436.2	13907.6 ± 1423.1	13369.9 ± 820.7
	(mg/g)	27.795 ± 2.187	27.895 ± 1.759	27.814 ± 2.081	27.331 ± 1.079
Kidney (R)	(mg)	1678.3 ± 109.1	1646.8 ± 119.9	1672.2 ± 144.8	1586.0 ± 84.7
	(mg/g)	3.356 ± 0.200	3.350 ± 0.269	3.349 ± 0.239	3.245 ± 0.164
Kidney (L)	(mg)	1664.8 ± 143.1	1648.6 ± 135.9	1651.7 ± 144.4	1576.3 ± 109.6
	(mg/g)	3.333 ± 0.323	3.353 ± 0.283	3.308 ± 0.243	3.222 ± 0.150
Kidneys	(mg)	3343.0 ± 240.3	3295.5 ± 248.7	3324.0 ± 282.5	3162.3 ± 189.2
	(mg/g)	6.689 ± 0.514	6.703 ± 0.537	6.657 ± 0.467	6.466 ± 0.296
Spleen	(mg)	908.8 ± 166.2	822.7 ± 124.6	804.4 ± 107.8	827.0 ± 140.8
	(mg/g)	1.818 ± 0.339	1.670 ± 0.226	1.616 ± 0.248	1.695 ± 0.319
Testis (R)	(mg)	1678.0 ± 114.5	1625.4 ± 143.8	1736.9 ± 121.3	1666.4 ± 115.4
	(mg/g)	3.365 ± 0.355	3.305 ± 0.297	3.487 ± 0.312	3.413 ± 0.275
Testis (L)	(mg)	1672.4 ± 143.5	1612.8 ± 138.6	1731.5 ± 135.2	1666.7 ± 114.9
	(mg/g)	3.357 ± 0.426	3.279 ± 0.279	3.476 ± 0.330	3.414 ± 0.294
Testes	(mg)	3350.4 ± 251.0	3238.2 ± 276.9	3468.4 ± 254.2	3333.0 ± 219.8
	(mg/g)	6.722 ± 0.773	6.585 ± 0.566	6.964 ± 0.638	6.827 ± 0.552
Epididymis (R)	(mg)	651.6 ± 91.8	617.9 ± 42.7	639.5 ± 44.3	595.9 ± 37.5
	(mg/g)	1.309 ± 0.226	1.255 ± 0.059	1.285 ± 0.131	1.221 ± 0.099
Epididymis (L)	(mg)	657.2 ± 94.4	602.0 ± 42.6	623.0 ± 46.3	599.4 ± 53.9
	(mg/g)	1.322 ± 0.243	1.224 ± 0.083	1.251 ± 0.116	1.229 ± 0.130
Epididymides	(mg)	1308.8 ± 183.1	1219.9 ± 80.6	1262.6 ± 82.0	1195.3 ± 86.8
	(mg/g)	2.630 ± 0.465	2.479 ± 0.133	2.536 ± 0.234	2.449 ± 0.221

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 29-1 (continued). Organ weights of male rats at the end of the dosing period

Group		Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of males		7	12	11	7
Prostate, ventral	(mg)	548.6 ± 169.5	552.2 ± 61.4	688.6 ± 109.2	617.4 ± 112.4
	(mg/g)	1.090 ± 0.311	1.123 ± 0.126	1.380 ± 0.206 *	1.258 ± 0.193
Seminal vesicles	(mg)	1815.1 ± 195.6	1614.2 ± 295.3	1871.6 ± 213.0	1649.6 ± 125.1
	(mg/g)	3.636 ± 0.449	3.279 ± 0.600	3.754 ± 0.429	3.381 ± 0.349
Thyroid gland	(mg)	18.9 ± 3.3	19.8 ± 3.4	21.8 ± 3.3	21.3 ± 3.1
	(mg/g)	0.038 ± 0.007	0.040 ± 0.007	0.044 ± 0.007	0.044 ± 0.007
Adrenal gland (R)	(mg)	27.8 ± 3.4	27.7 ± 4.9	26.7 ± 3.8	24.9 ± 4.4
	(mg/g)	0.056 ± 0.006	0.056 ± 0.010	0.054 ± 0.008	0.051 ± 0.009
Adrenal gland (L)	(mg)	29.7 ± 2.9	28.8 ± 4.6	28.1 ± 4.6	26.2 ± 3.7
	(mg/g)	0.060 ± 0.006	0.059 ± 0.009	0.057 ± 0.011	0.054 ± 0.007
Adrenal glands	(mg)	57.5 ± 6.1	56.5 ± 9.3	54.8 ± 8.1	51.1 ± 7.6
	(mg/g)	0.115 ± 0.011	0.115 ± 0.019	0.110 ± 0.018	0.105 ± 0.015

Each value shows mean ± S.D.

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 29-2. Organ weights of male rats at the end of the recovery period

Group		Control (vehicle: corn oil)			Und 1000 mg/kg		
Number of males		5			5		
Body weight	(g)	528.5	±	42.2	517.4	±	46.0
Brain	(mg)	2044.3	±	84.3	2103.0	±	75.4
	(mg/g)	3.881	±	0.246	4.083	±	0.277
Thymus	(mg)	336.6	±	63.3	329.2	±	107.3
	(mg/g)	0.645	±	0.160	0.634	±	0.199
Heart	(mg)	1512.9	±	167.1	1427.1	±	162.5
	(mg/g)	2.873	±	0.348	2.756	±	0.149
Liver	(mg)	13856.8	±	1873.4	13022.4	±	1707.2
	(mg/g)	26.164	±	2.317	25.111	±	1.548
Kidney (R)	(mg)	1585.3	±	124.2	1627.9	±	104.0
	(mg/g)	3.014	±	0.315	3.159	±	0.248
Kidney (L)	(mg)	1644.9	±	108.8	1622.8	±	99.8
	(mg/g)	3.129	±	0.320	3.151	±	0.291
Kidneys	(mg)	3230.2	±	222.5	3250.7	±	200.9
	(mg/g)	6.142	±	0.618	6.310	±	0.536
Spleen	(mg)	756.7	±	64.6	825.9	±	85.5
	(mg/g)	1.437	±	0.151	1.596	±	0.093
Testis (R)	(mg)	1621.9	±	141.5	1654.2	±	106.3
	(mg/g)	3.093	±	0.461	3.207	±	0.193
Testis (L)	(mg)	1619.1	±	119.3	1670.8	±	71.5
	(mg/g)	3.087	±	0.422	3.244	±	0.237
Testes	(mg)	3241.0	±	256.8	3325.0	±	176.3
	(mg/g)	6.181	±	0.878	6.451	±	0.424
Epididymis (R)	(mg)	629.4	±	36.1	644.8	±	34.5
	(mg/g)	1.200	±	0.154	1.253	±	0.119
Epididymis (L)	(mg)	620.8	±	44.8	651.5	±	42.1
	(mg/g)	1.184	±	0.165	1.269	±	0.157
Epididymides	(mg)	1250.2	±	80.0	1296.3	±	72.2
	(mg/g)	2.384	±	0.317	2.522	±	0.272

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 29-2 (continued). Organ weights of male rats at the end of the recovery period

Group		Control (vehicle: corn oil)	Und 1000 mg/kg
Number of males		5	5
Prostate, ventral	(mg)	612.4 ± 114.4	574.2 ± 184.1
	(mg/g)	1.161 ± 0.218	1.108 ± 0.328
Seminal vesicles	(mg)	1863.8 ± 513.6	1821.8 ± 228.2
	(mg/g)	3.576 ± 1.181	3.553 ± 0.621
Thyroid gland	(mg)	26.7 ± 6.8	21.0 ± 3.1
	(mg/g)	0.051 ± 0.016	0.041 ± 0.007
Adrenal gland (R)	(mg)	24.7 ± 4.4	24.9 ± 3.9
	(mg/g)	0.047 ± 0.010	0.048 ± 0.005
Adrenal gland (L)	(mg)	26.2 ± 3.3	26.8 ± 3.6
	(mg/g)	0.050 ± 0.009	0.052 ± 0.005
Adrenal glands	(mg)	50.9 ± 7.5	51.7 ± 7.4
	(mg/g)	0.097 ± 0.018	0.100 ± 0.009

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 30-1. Organ weights of female rats at the end of the dosing period

Group		Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of females		12	12	12	10
Body weight	(g)	317.3 ± 15.9	316.5 ± 19.4	315.4 ± 11.8	326.8 ± 19.1
Brain	(mg)	1915.5 ± 77.3	1925.4 ± 109.8	1941.2 ± 68.3	1947.3 ± 76.5
	(mg/g)	6.050 ± 0.366	6.090 ± 0.271	6.163 ± 0.325	5.977 ± 0.404
Thymus	(mg)	217.3 ± 68.4	223.8 ± 33.2	238.8 ± 71.4	224.4 ± 51.5
	(mg/g)	0.683 ± 0.210	0.707 ± 0.095	0.757 ± 0.222	0.684 ± 0.140
Heart	(mg)	1052.7 ± 50.1	1056.4 ± 86.0	991.2 ± 70.5	1050.5 ± 96.5
	(mg/g)	3.324 ± 0.204	3.341 ± 0.228	3.145 ± 0.228	3.214 ± 0.207
Liver	(mg)	10478.8 ± 825.6	10333.6 ± 832.7	9941.2 ± 507.5	10560.8 ± 861.6
	(mg/g)	33.043 ± 2.305	32.687 ± 2.400	31.552 ± 1.762	32.289 ± 1.230
Kidney (R)	(mg)	1021.5 ± 79.5	1046.4 ± 93.1	1048.9 ± 69.2	1087.3 ± 73.8
	(mg/g)	3.226 ± 0.286	3.304 ± 0.192	3.326 ± 0.182	3.332 ± 0.227
Kidney (L)	(mg)	998.6 ± 76.2	1047.1 ± 82.0	1028.6 ± 68.7	1060.5 ± 73.2
	(mg/g)	3.150 ± 0.236	3.313 ± 0.245	3.261 ± 0.160	3.249 ± 0.207
Kidneys	(mg)	2020.0 ± 152.7	2093.5 ± 169.8	2077.5 ± 129.3	2147.9 ± 136.6
	(mg/g)	6.376 ± 0.515	6.617 ± 0.415	6.587 ± 0.308	6.581 ± 0.401
Spleen	(mg)	785.4 ± 90.2	670.9 ± 67.4	730.7 ± 124.9	742.1 ± 114.4
	(mg/g)	2.473 ± 0.233	2.129 ± 0.263	2.326 ± 0.456	2.268 ± 0.287
Ovary (R)	(mg)	57.4 ± 12.4	55.7 ± 8.0	57.8 ± 7.7	55.3 ± 9.1
	(mg/g)	0.182 ± 0.040	0.176 ± 0.022	0.183 ± 0.022	0.169 ± 0.022
Ovary (L)	(mg)	52.3 ± 9.6	53.1 ± 9.5	54.1 ± 5.6	52.4 ± 7.0
	(mg/g)	0.166 ± 0.036	0.168 ± 0.026	0.172 ± 0.017	0.160 ± 0.019
Ovaries	(mg)	109.8 ± 15.6	108.8 ± 11.5	111.9 ± 8.1	107.6 ± 13.7
	(mg/g)	0.348 ± 0.058	0.343 ± 0.024	0.355 ± 0.021	0.329 ± 0.033
Uterus	(mg)	621.6 ± 90.1	621.5 ± 111.1	667.0 ± 66.0	632.9 ± 56.0
	(mg/g)	1.967 ± 0.329	1.966 ± 0.357	2.115 ± 0.191	1.945 ± 0.232
Thyroid gland	(mg)	17.6 ± 3.4	17.0 ± 3.4	16.1 ± 3.8	17.3 ± 3.7
	(mg/g)	0.056 ± 0.012	0.054 ± 0.009	0.051 ± 0.013	0.053 ± 0.011
Adrenal gland (R)	(mg)	37.1 ± 4.7	36.1 ± 6.0	35.0 ± 5.0	34.5 ± 4.0
	(mg/g)	0.117 ± 0.015	0.114 ± 0.016	0.111 ± 0.015	0.106 ± 0.015
Adrenal gland (L)	(mg)	39.7 ± 5.4	38.6 ± 7.1	37.4 ± 5.4	37.1 ± 5.0
	(mg/g)	0.125 ± 0.019	0.122 ± 0.019	0.119 ± 0.017	0.114 ± 0.019
Adrenal glands	(mg)	76.7 ± 9.7	74.8 ± 13.0	72.3 ± 10.2	71.7 ± 9.0
	(mg/g)	0.242 ± 0.033	0.236 ± 0.035	0.229 ± 0.031	0.221 ± 0.034

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 30-2. Organ weights of female rats at the end of the dosing period, satellite group

Group		Control (vehicle: corn oil)			Und 1000 mg/kg			
Number of females		5			5			
Body weight	(g)	299.6	±	18.5	281.3	±	26.2	
Brain	(mg)	1870.3	±	51.9	1860.9	±	93.4	
	(mg/g)	6.259	±	0.395	6.674	±	0.835	
Thymus	(mg)	256.5	±	67.8	242.9	±	47.6	
	(mg/g)	0.850	±	0.200	0.871	±	0.197	
Heart	(mg)	966.0	±	64.3	931.7	±	31.1	
	(mg/g)	3.230	±	0.238	3.331	±	0.273	
Liver	(mg)	7832.1	±	923.3	8103.8	±	1123.2	
	(mg/g)	26.124	±	2.397	28.727	±	1.391	
Kidney (R)	(mg)	942.3	±	169.0	921.2	±	87.2	
	(mg/g)	3.132	±	0.428	3.286	±	0.305	
Kidney (L)	(mg)	952.0	±	149.1	902.2	±	127.3	
	(mg/g)	3.164	±	0.346	3.210	±	0.376	
Kidneys	(mg)	1894.3	±	316.8	1823.4	±	213.3	
	(mg/g)	6.296	±	0.771	6.495	±	0.662	
Spleen	(mg)	644.5	±	46.9	489.8	±	96.4	*
	(mg/g)	2.153	±	0.123	1.744	±	0.319	*
Ovary (R)	(mg)	42.1	±	7.6	50.3	±	12.3	
	(mg/g)	0.142	±	0.031	0.180	±	0.048	
Ovary (L)	(mg)	41.7	±	13.6	47.1	±	10.6	
	(mg/g)	0.140	±	0.045	0.169	±	0.043	
Ovaries	(mg)	83.9	±	19.6	97.3	±	21.9	
	(mg/g)	0.281	±	0.070	0.350	±	0.088	
Uterus	(mg)	698.2	±	276.2	621.2	±	283.3	
	(mg/g)	2.341	±	0.930	2.251	±	1.156	
Thyroid gland	(mg)	14.8	±	3.6	16.7	±	3.0	
	(mg/g)	0.050	±	0.015	0.059	±	0.008	
Adrenal gland (R)	(mg)	29.6	±	5.8	35.5	±	3.6	
	(mg/g)	0.099	±	0.021	0.127	±	0.015	*
Adrenal gland (L)	(mg)	31.8	±	8.4	37.2	±	6.6	
	(mg/g)	0.107	±	0.028	0.133	±	0.026	
Adrenal glands	(mg)	61.4	±	14.0	72.8	±	10.1	
	(mg/g)	0.206	±	0.049	0.260	±	0.041	

Each value shows mean ± S.D.

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 30-3. Organ weights of female rats at the end of the recovery period

Group		Control (vehicle: corn oil)			Und 1000 mg/kg		
Number of females		5			5		
Body weight	(g)	270.1	±	12.1	279.5	±	21.1
Brain	(mg)	1930.1	±	68.0	1928.3	±	39.8
	(mg/g)	7.155	±	0.323	6.934	±	0.597
Thymus	(mg)	205.1	±	44.3	247.6	±	28.9
	(mg/g)	0.763	±	0.179	0.886	±	0.092
Heart	(mg)	856.0	±	65.2	824.5	±	38.0
	(mg/g)	3.173	±	0.250	2.956	±	0.122
Liver	(mg)	6536.7	±	332.5	6778.0	±	525.8
	(mg/g)	24.217	±	1.044	24.248	±	0.431
Kidney (R)	(mg)	855.8	±	19.5	875.9	±	43.9
	(mg/g)	3.173	±	0.136	3.144	±	0.223
Kidney (L)	(mg)	841.8	±	15.0	855.5	±	52.8
	(mg/g)	3.122	±	0.159	3.066	±	0.168
Kidneys	(mg)	1697.6	±	32.2	1731.5	±	95.0
	(mg/g)	6.296	±	0.291	6.211	±	0.387
Spleen	(mg)	498.4	±	28.8	470.4	±	69.3
	(mg/g)	1.851	±	0.181	1.689	±	0.261
Ovary (R)	(mg)	40.6	±	10.3	42.9	±	9.6
	(mg/g)	0.152	±	0.043	0.156	±	0.044
Ovary (L)	(mg)	43.6	±	4.6	40.6	±	7.3
	(mg/g)	0.162	±	0.018	0.148	±	0.038
Ovaries	(mg)	84.2	±	13.1	83.5	±	16.0
	(mg/g)	0.313	±	0.057	0.303	±	0.079
Uterus	(mg)	521.4	±	173.7	677.6	±	221.4
	(mg/g)	1.924	±	0.591	2.432	±	0.806
Thyroid gland	(mg)	19.3	±	4.8	15.6	±	4.1
	(mg/g)	0.072	±	0.018	0.056	±	0.015
Adrenal gland (R)	(mg)	33.1	±	5.5	29.7	±	2.8
	(mg/g)	0.123	±	0.020	0.107	±	0.015
Adrenal gland (L)	(mg)	33.9	±	6.2	32.4	±	2.2
	(mg/g)	0.126	±	0.022	0.117	±	0.013
Adrenal glands	(mg)	67.0	±	11.6	62.1	±	4.8
	(mg/g)	0.248	±	0.042	0.224	±	0.028

Each value shows mean ± S.D.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 31-1. Macroscopic findings of male rats at the end of the dosing period

Group	Control (vehicle: corn oil)		Und 100 mg/kg		Und 300 mg/kg		Und 1000 mg/kg	
Findings Grade	-	P	-	P	-	P	-	P
Epididymis								
Nodule, yellowish white, caudal, bilateral	7	0	11	1	11	0	7	0
Kidney								
Recessed area, unilateral	7	0	11	1	11	0	7	0
Liver								
Diaphragmatic nodule, partial adhesion with diaphragm	7	0	11	1	11	0	7	0
Skin								
Alopecia, right forelimb	7	0	11	1	11	0	7	0

Notes) - : No abnormal changes P : Non-graded change
Numerals represent the number of animals.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 31-2. Macroscopic findings of male rats at the end of the recovery period

	Group	Control (vehicle: corn oil)		Und 1000 mg/kg	
Findings	Grade	-	P	-	P
All organs and tissues					
		5		5	

Notes) - : No abnormal changes P : Non-graded change

Numerals represent the number of animals.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 32-1. Macroscopic findings of female rats at the end of the dosing period

Group	Control (vehicle: corn oil)		Und 100 mg/kg		Und 300 mg/kg		Und 1000 mg/kg	
Findings / Grade	-	P	-	P	-	P	-	P
Ileum								
Diverticulum	12	0	12	0	11	1	10	0
Lung								
Dark colored spot, left lobe, ventral aspect	11	1	12	0	12	0	10	0
Ovary								
Cyst, unilateral	12	0	11	1	11	1	10	0
Spleen								
Enlargement	12	0	12	0	12	0	9	1
Stomach								
Dark colored area, mucosa, glandular stomach	11	1	12	0	12	0	9	1

Notes) - : No abnormal changes P : Non-graded change

Numerals represent the number of animals.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 32-2. Macroscopic findings of female rats at the end of the dosing period, satellite group

Findings	Group / Grade	Control (vehicle: corn oil) -	Control (vehicle: corn oil) P	Und 1000 mg/kg -	Und 1000 mg/kg P
Stomach					
Dark colored area, mucosa, glandular stomach		4	1	5	0
Uterus					
Dilatation, lumen, left horn, partially		4	1	5	0

Notes) - : No abnormal changes P : Non-graded change

Numerals represent the number of animals.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 32-3. Macroscopic findings of female rats at the end of the recovery period

	Group	Control (vehicle: corn oil)		Und 1000 mg/kg	
Findings	Grade	-	P	-	P
All organs and tissues		5		5	

Notes) - : No abnormal changes P : Non-graded change

Numerals represent the number of animals.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 33. Histopathological findings of male rats at the end of the dosing period [H.E. staining]

Findings	Group / Grade	Control (vehicle: corn oil)							Und 100 mg/kg							Und 1000 mg/kg						
		-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE
Brain		5														5						
Spinal cord		5														5						
Pituitary gland																						
Cyst		4					1									5					0	
Submandibular gland		5														5						
Sublingual gland		5														5						
Lymph node, submandibular		5														5						
Thyroid gland																						
Ectopic thymic tissue		2					3									5					0	
Ultimobranchial body		5					0									4					1	
Parathyroid gland		5														5						
Thymus		5														5						
Heart																						
Degeneration/fibrosis, myocardial, focal		3	2	0	0	0										2	3	0	0	0		
Trachea		5														5						
Lung																						
Accumulation, foam cell, alveolus		4	1	0	0	0										3	2	0	0	0		
Hemorrhage, focal		5	0	0	0	0										4	1	0	0	0		

Notes) -: No abnormal changes ±: Very slight +: Slight 2+: Moderate 3+: Marked
P: Non-graded change NE: Not examined
Numerals represent the number of animals.
Not significantly different from control.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 33 (continued). Histopathological findings of male rats at the end of the dosing period [H.E. staining]

Findings	Group / Grade	Control (vehicle: corn oil)							Und 100 mg/kg							Und 1000 mg/kg						
		-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE
Bronchus		5														5						
Liver																						
Fatty change, hepatocyte, periportal		2	2	1	0	0			1	0	0	0	0			0	3	2	0	0		
Hematopoiesis, extramedullary		4	1	0	0	0			1	0	0	0	0			5	0	0	0	0		
Microgranuloma		5	0	0	0	0			1	0	0	0	0			4	1	0	0	0		
Necrosis, focal		5	0	0	0	0			1	0	0	0	0			4	1	0	0	0		
Nodule, hepatodiaphragmatic		5					0		0					1		5					0	
Pancreas		5														5						
Stomach		5														5						
Duodenum		5														5						
Jejunum		5														5						
Ileum		5														5						
Cecum		5														5						
Colon		5														5						
Rectum		5														5						
Lymph node, mesenteric		5														5						

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked

P : Non-graded change NE: Not examined

Numerals represent the number of animals.

Not significantly different from control.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 33 (continued). Histopathological findings of male rats at the end of the dosing period [H.E. staining]

Group	Control (vehicle: corn oil)							Und 100 mg/kg							Und 1000 mg/kg						
Findings Grade	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE
Spleen																					
Deposit, pigment, brown	0	2	3	0	0										0	1	4	0	0		
Hematopoiesis, extramedullary	0	0	4	0	1										0	0	5	0	0		
Kidney																					
Basophilic tubule, cortex	3	2	0	0	0			0	0	1	0	0			3	2	0	0	0		
Cellular infiltration, lymphocyte, interstitial	4	1	0	0	0			1	0	0	0	0			5	0	0	0	0		
Cyst, medulla	3					2		1					0		4					1	
Fibrosis, focal, subserosa	5	0	0	0	0			0	1	0	0	0			5	0	0	0	0		
Mineralization, medulla	4	1	0	0	0			1	0	0	0	0			5	0	0	0	0		
Urinary bladder	5														5						
Adrenal gland	5														5						
Testis																					
Atrophy, seminiferous tubule, bilateral	4	1	0	0	0										5	0	0	0	0		
Vacuolation, cytoplasmic, sertoli cell, focal, bilateral	5	0	0	0	0										4	1	0	0	0		
Epididymis																					
Cell debris, lumen, bilateral	5	0	0	0	0			1	0	0	0	0			4	1	0	0	0		
Cellular infiltration, lymphocyte, interstitial, unilateral	4	1	0	0	0			1	0	0	0	0			4	1	0	0	0		
Granuloma, spermatic, bilateral	5	0	0	0	0			0	0	1	0	0			5	0	0	0	0		
Prostate																					
Cellular infiltration, lymphocyte, interstitial	2	1	2	0	0										3	2	0	0	0		
Seminal vesicle	5														5						

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined
Numerals represent the number of animals.
Not significantly different from control.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 33 (continued). Histopathological findings of male rats at the end of the dosing period [H.E. staining]

Group	Control (vehicle: corn oil)							Und 100 mg/kg							Und 1000 mg/kg						
Findings / Grade	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE
Coagulating gland	5														5						
Eyeball																					
Dysplasia, retina, unilateral	5					0									4					1	
Harderian gland	5														5						
Sciatic nerve	5														5						
Skeletal muscle	5														5						
Femur	5														5						
Marrow, femur																					
Increase, hematopoiesis	4	0	1	0	0										5	0	0	0	0		

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined
Numerals represent the number of animals.
Not significantly different from control.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 34-1. Histopathological findings of female rats at the end of the dosing period [H.E. staining]

Group	Control (vehicle: corn oil)							Und 100 mg/kg							Und 300 mg/kg							Und 1000 mg/kg						
Findings / Grade	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE
Brain	5						2															5						1
Spinal cord	5						2															5						1
Pituitary gland																												
Cyst	3					2	2															5					0	1
Submandibular gland	5						2															5						1
Sublingual gland	5						2															5						1
Lymph node, submandibular	5						2															5						1
Thyroid gland																												
Ectopic thymic tissue	3					2	2															4					1	1
Ultimobranchial body	5					0	2															4					1	1
Parathyroid gland	5						2															5						1
Thymus																												
Atrophy	5	0	0	0	0		2															4	1	0	0	0		1
Heart																												
Degeneration/fibrosis, myocardial, focal	5	0	0	0	0		2															4	1	0	0	0		1
Trachea	5						2															5						1

Notes) -: No abnormal changes ±: Very slight +: Slight 2+: Moderate 3+: Marked
P: Non-graded change NE: Not examined
Numerals represent the number of animals.
Not significantly different from control.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 34-1 (continued). Histopathological findings of female rats at the end of the dosing period [H.E. staining]

Group	Control (vehicle: corn oil)							Und 100 mg/kg							Und 300 mg/kg							Und 1000 mg/kg						
Findings Grade	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE
Lung																												
Accumulation, foam cell, alveolus	4	2	0	0	0		1															3	2	0	0	0		1
Hemorrhage, focal	5	1	0	0	0		1															5	0	0	0	0		1
Mineralization, arterial wall	5	1	0	0	0		1															5	0	0	0	0		1
Thickening, alveolar wall, focal	5	1	0	0	0		1															5	0	0	0	0		1
Bronchus	5						2															5						1
Liver																												
Fatty change, hepatocyte, periportal	5	0	0	0	0		2															4	1	0	0	0		1
Necrosis, focal	4	0	1	0	0		2															5	0	0	0	0		1
Pancreas	5						2															5						1
Stomach																												
Hemorrhage, focal, glandular stomach	5	1	0	0	0		1															5	0	0	0	0		1
Ulcer, with mineralization, glandular stomach	5	0	1	0	0		1															5	0	0	0	0		1
Duodenum	5						2															5						1
Jejunum	5						2															5						1
Ileum																												
Thinning, muscular layer, focal, diverticulum site	5					0	2								0					1		5					0	1
Cecum	5						2															5						1
Colon	5						2															5						1

Notes) -: No abnormal changes ±: Very slight +: Slight 2+: Moderate 3+: Marked
P: Non-graded change NE: Not examined
Numerals represent the number of animals.
Not significantly different from control.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 34-1 (continued). Histopathological findings of female rats at the end of the dosing period [H.E. staining]

Findings	Group	Control (vehicle: corn oil)							Und 100 mg/kg							Und 300 mg/kg							Und 1000 mg/kg						
	Grade	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE
Rectum		5						2															5						1
Lymph node, mesenteric		5						2															5						1
Spleen																													
Deposit, pigment, brown		0	0	3	2	0		2															0	0	4	2	0		
Hematopoiesis, extramedullary		0	0	1	4	0		2															0	0	3	3	0		
Kidney																													
Basophilic tubule, cortex		4	1	0	0	0		2															4	1	0	0	0		1
Cellular infiltration, lymphocyte, interstitial		5	0	0	0	0		2															4	1	0	0	0		1
Hyperplasia, transitional cell, focal		5	0	0	0	0		2															4	1	0	0	0		1
Urinary bladder		5						2															5						1
Adrenal gland		5						2															5						1
Ovary																													
Cyst, follicular, unilateral		5					0	2	0					1		0					1		5					0	1
Mineralization, interstitial gland, unilateral		4	1	0	0	0		2	1	0	0	0	0			1	0	0	0	0			5	0	0	0	0		1
Uterus		5						2															5						1
Vagina		5						2															5						1
Eyeball		5						2															5						1
Harderian gland																													
Cellular infiltration, lymphocyte, interstitial		5	0	0	0	0		2															4	1	0	0	0		1

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined
Numerals represent the number of animals.
Not significantly different from control.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 34-1 (continued). Histopathological findings of female rats at the end of the dosing period [H.E. staining]

	Group	Control (vehicle: corn oil)							Und 100 mg/kg							Und 300 mg/kg							Und 1000 mg/kg						
Findings	Grade	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE
Sciatic nerve		5						2															5						1
Skeletal muscle		5						2															5						1
Femur		5						2															5						1
Marrow, femur		5						2															5						1

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined
Numerals represent the number of animals.
Not significantly different from control.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 34-2. Histopathological findings of female rats at the end of the dosing period, satellite group [H.E. staining]

Group	Control (vehicle: corn oil)							Und 1000 mg/kg						
Findings / Grade	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE
Brain	5							5						
Spinal cord	5							5						
Pituitary gland														
Aberrant craniopharyngeal tissue	4					1		5					0	
Cyst	4					1		5					0	
Submandibular gland	5							5						
Sublingual gland	5							5						
Lymph node, submandibular	5							5						
Thyroid gland														
Ectopic thymic tissue	4					1		4					1	
Parathyroid gland	5							5						
Thymus	5							5						
Heart														
Degeneration/fibrosis, myocardial, focal	5	0	0	0	0			4	1	0	0	0		
Trachea	5							5						
Lung														
Accumulation, foam cell, alveolus	4	1	0	0	0			2	3	0	0	0		

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined
Numerals represent the number of animals.
Not significantly different from control.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 34-2 (continued). Histopathological findings of female rats at the end of the dosing period, satellite group [H.E. staining]

Group	Control (vehicle: corn oil)							Und 1000 mg/kg						
Findings / Grade	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE
Bronchus	5							5						
Liver														
Fatty change, hepatocyte, periportal	3	2	0	0	0			2	3	0	0	0		
Microgranuloma	4	1	0	0	0			4	1	0	0	0		
Pancreas														
Atrophy, acinar cell, focal	5	0	0	0	0			4	1	0	0	0		
Stomach	5							5						
Duodenum	5							5						
Jejunum	5							5						
Ileum	5							5						
Cecum	5							5						
Colon	5							5						
Rectum	5							5						
Lymph node, mesenteric	5							5						
Spleen														
Deposit, pigment, brown	0	0	3	2	0			0	0	2	3	0		
Hematopoiesis, extramedullary	0	0	5	0	0			0	0	5	0	0		

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined
Numerals represent the number of animals.
Not significantly different from control.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 34-2 (continued). Histopathological findings of female rats at the end of the dosing period, satellite group [H.E. staining]

Group	Control (vehicle: corn oil)							Und 1000 mg/kg						
Findings / Grade	-	±	+	2+	3+	P	NE	-	±	+	2+	3+	P	NE
Kidney														
Basophilic tubule, cortex	3	2	0	0	0			4	1	0	0	0		
Mineralization, medulla	3	2	0	0	0			4	1	0	0	0		
Urinary bladder	5							5						
Adrenal gland	5							5						
Ovary														
Atretic follicle, increased number, bilateral	4	0	0	0	1			3	2	0	0	0		
Decreased number, corpus luteum, bilateral	4	0	0	0	1			5	0	0	0	0		
Mineralization, interstitial gland, unilateral	4	1	0	0	0			4	1	0	0	0		
Uterus														
Dilatation, lumen, focal	4	0	1	0	0			5	0	0	0	0		
Metaplasia, squamous cell, epithelium, corpus	4	0	1	0	0			5	0	0	0	0		
Vagina	5							5						
Eyeball														
Degeneration, lens fiber, unilateral	4	1	0	0	0			5	0	0	0	0		
Dysplasia, retina, unilateral	4					1		5					0	
Harderian gland	5							5						
Sciatic nerve	5							5						
Skeletal muscle	5							5						
Femur	5							5						
Marrow, femur	5							5						

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined
Numerals represent the number of animals.
Not significantly different from control.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 35. Results of observations about estrous cycle

Group	Control (vehicle :corn oil)	Und (100 mg/kg)	Und (300 mg/kg)	Und (1000 mg/kg)
Number of animals examined	12	12	12	12
Pre-treatment period				
Number of animals showing type of cycle				
4-day cycle	9	6	3	9
4/5-day cycle	0	1	7	1
5-day cycle	3	5	2	2
Mean length of estrous cycle in days; Mean±S.D. (N)	4.3 ± 0.5 (12)	4.5 ± 0.5 (12)	4.5 ± 0.3 (12)	4.2 ± 0.4 (12)
Treatment period				
Number of animals showing each type of cycle				
4-day cycle	11	7	7	8
4/5-day cycle	0	2	3	2
5-day cycle	0	1	1	1
irregular cycle	1	1	1	1
uncycle	0	1	0	0
Mean length of estrous cycle in days; Mean±S.D. (N)	4.3 ± 0.9 (12)	4.4 ± 0.6 (11)	4.3 ± 0.6 (12)	4.3 ± 0.4 (12)
Frequency of animals that show abnormal estrous cycles after the treatment	1 / 12	2 / 12	1 / 12	1 / 12
Mean times of vaginal estrus during mating period; Mean±S.D. (N)	1.0 ± 0.0 (12)	1.2 ± 0.4 (12)	1.0 ± 0.0 (12)	1.0 ± 0.0 (11)

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 36. Results of observations about reproductive performance

Group	Control (vehicle: corn oil)	Und (100 mg/kg)	Und (300 mg/kg)	Und (1000 mg/kg)
Number of mated pairs [A]	12	12	12	12
Number of copulated pairs [B]	12	12	12	11
Copulation index [(B/A)×100,%]	100.0	100.0	100.0	91.7
Number of pregnant females [C]	12	12	12	10
Fertility index [(C/B)×100,%]	100.0	100.0	100.0	90.9
Pairing days until copulation ;Mean±S.D.(N)	1.8 ± 1.0 (12)	4.7 ± 3.3** (12)	3.3 ± 1.2** (12)	2.7 ± 1.3 (11)

Significantly different from the control group (*: $p<0.05$, **: $p<0.01$).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 37. Observation of offspring (F_1)

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of dams	12	12	12	10
Gestation length (days)				
Mean ± S.D. per dam	22.0 ± 0.0	21.9 ± 0.3	21.8 ± 0.5	22.0 ± 0.5
Number of corpora lutea				
Total	199	192	193	155
Mean ± S.D. per dam	16.6 ± 1.6	16.0 ± 1.7	16.1 ± 1.7	15.5 ± 3.0
Number of implantation scars				
Total	197	186	189	152
Mean ± S.D. per dam	16.4 ± 1.5	15.5 ± 1.7	15.8 ± 1.8	15.2 ± 3.2
Implantation index (%) [a)]	99.0 ± 2.2	96.9 ± 4.5	98.0 ± 5.1	97.6 ± 5.0
Delivery index (dams,%) [b)]	100.0	100.0	100.0	100.0
Number of offspring at birth				
Total	184	169	171	139
Mean ± S.D. per dam	15.3 ± 1.1	14.1 ± 2.0	14.3 ± 2.1	13.9 ± 3.8
Number of live offspring at birth				
Male	88	68	75	65
Female	89	96	94	71
Total	177	164	169	136
Mean ± S.D. per dam	14.8 ± 1.6	13.7 ± 2.0	14.1 ± 2.2	13.6 ± 4.1
Sex ratio [c)]				
Mean ± S.D. per dam	0.50 ± 0.14	0.42 ± 0.20	0.45 ± 0.12	0.49 ± 0.11
Number of dead offspring				
Total	7	5	2	3
Mean ± S.D. per dam	0.6 ± 1.2	0.4 ± 0.5	0.2 ± 0.4	0.3 ± 0.5
Delivery index (offspring) [d)]				
Mean% ± S.D. per dam	93.8 ± 6.5	90.9 ± 8.1	90.3 ± 7.0	89.5 ± 12.5
Birth index [e)]				
Mean% ± S.D. per dam	90.5 ± 11.9	88.3 ± 9.3	89.2 ± 7.5	86.8 ± 16.2
Live birth index [f)]				
Mean% ± S.D. per dam	96.2 ± 7.8	97.1 ± 3.6	98.8 ± 2.9	96.1 ± 8.0
Number of offspring on day 4				
Male	85	67	75	63
Female	89	95	92	71
Sex ratio [c)]				
Mean ± S.D. per dam	0.49 ± 0.14	0.42 ± 0.21	0.45 ± 0.12	0.49 ± 0.11
Viability index [g)]				
Mean% ± S.D. per dam	98.3 ± 3.0	98.6 ± 3.3	99.0 ± 2.4	98.7 ± 2.7

a): (Number of implantation scars/Number of corpora lutea)×100.
b): (Number of dams with live offspring/number of pregnant dams)×100.
c): Number of male offspring/(number of male offspring + number of female offspring).
d): (Number of offspring at birth/Number of implantation scars)×100.
e): (Number of live offspring at birth/number of implantation scars)×100.
f): (Number of live offspring at birth/number of offspring at birth)×100.
g): (Number of live offspring 4 days after birth/number of live offspring at birth)×100.
h): Number of external abnormalities in live offspring at birth.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 38. Body weights of offspring (F_1) before weaning

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Number of dams	12	12	12	10
Male				
Days after birth				
0	6.6 ± 0.3	6.6 ± 0.6	6.5 ± 0.6	6.7 ± 0.5
4	11.1 ± 1.2	11.2 ± 1.3	10.4 ± 1.5	11.2 ± 1.5
Number of dams	12	12	12	10
Female				
Days after birth				
0	6.3 ± 0.4	6.3 ± 0.5	6.2 ± 0.6	6.4 ± 0.5
4	10.7 ± 1.0	10.7 ± 1.2	10.0 ± 1.4	10.6 ± 1.4

Each value shows mean ± S.D. per dam. (g).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 39. General conditions in offspring (F_1) before weaning

Group	Number of offspring	Days after birth				
	and general conditions	0	1	2	3	4
Control (vehicle: corn oil)	Number of offspring	177	177	176	175	174
	General appearance, No abnormality	177	176	175	174	174
	General appearance, Death		1	1	1	
Und 100 mg/kg	Number of offspring	164	164	162	162	162
	General appearance, No abnormality	164	162	162	162	162
	General appearance, Death		2			
Und 300 mg/kg	Number of offspring	169	169	168	167	167
	General appearance, No abnormality	169	168	167	167	167
	General appearance, Death		1	1		
Und 1000 mg/kg	Number of offspring	136	136	134	134	134
	General appearance, No abnormality	136	134	134	134	134
	General appearance, Death		2			

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Table 40. Morphological observations of offspring (F_1)

Group	Control (vehicle: corn oil)	Und 100 mg/kg	Und 300 mg/kg	Und 1000 mg/kg
Dead pups				
Number of dead pups [a)]	10	7	4	5
Number of missing pups	2	2	1	1
Number of dead pups examined	8	5	3	4
Number of dead pups with external changes	0	0	0	0
Number of dead pups with visceral changes	0	0	0	0
Live pups				
Number of live pups examined (postnatal day 0)	177	164	169	136
Number of live pups with external changes	0	0	0	0
Number of live pups examined (postnatal day 4)	174	162	167	134
Number of live pups with external changes	0	0	0	0
Number of live pups with visceral changes	0	0	0	0

[a)] including missing pups

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 1-1-1. General conditions of male rats

Control (vehicle: corn oil)

Male No.	Days of administration																																																	
	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
M01001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.
a: Mouth, Salivation.
b: Abdomen, Alopecia.
c: General appearance, Death.

Control (vehicle: corn oil)

Male No.	Days of administration																																																
	26		27		28		29		30		31		32		33		34		35		36		37		38		39		40		41		42		43															
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post														
M01001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M01002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M01003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M01004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M01005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M01006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M01007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M01008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M01009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M01010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M01011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M01012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	7													
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	7													
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0													

Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.
b: Abdomen, Alopecia.
c: Forelimb, Alopecia.
a: Mouth, Salivation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 1-1-2. General conditions of male rats

Und 100 mg/kg

Male No.	Days of administration																																										
	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
M02013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M02014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M02015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M02016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M02017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M02018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M02019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M02020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M02021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M02022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M02023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M02024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

a: Mouth, Salivation.

b: Abdomen, Alopecia.

c: General appearance, Death.

Und 100 mg/kg

Male No.	Days of administration																																										
	26		27		28		29		30		31		32		33		34		35		36		37		38		39		40		41		42		43									
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post								
M02013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
M02014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
M02015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
M02016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
M02017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
M02018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
M02019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c								
M02020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
M02021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
M02022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
M02023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
M02024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12								
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11								
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1								
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

b: Abdomen, Alopecia.

c: Forelimb, Alopecia.

a: Mouth, Salivation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 1-1-3. General conditions of male rats

Und 300 mg/kg

Male No.	Days of administration																																																	
	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
M03025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M03026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M03027	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M03028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M03029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M03030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M03031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	c																			
M03032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M03033	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M03034	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M03035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M03036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

a: Mouth, Salivation.

b: Abdomen, Alopecia.

c: General appearance, Death.

Und 300 mg/kg

Male No.	Days of administration																																																
	26		27		28		29		30		31		32		33		34		35		36		37		38		39		40		41		42		43															
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post														
M03025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M03026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M03027	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M03028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M03029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M03030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M03032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M03033	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M03034	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M03035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
M03036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
Number of males	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11														
-	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11														
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0														
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0														
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0														

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

b: Abdomen, Alopecia.

c: Forelimb, Alopecia.

a: Mouth, Salivation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 1-1-4. General conditions of male rats

Und 1000 mg/kg

Male No.	Days of administration 1		2		3		4		5		6		7		8		9		10		11		12	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
M04037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04038	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
M04039	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04041	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04042	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	-	a
M04043	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
M04044	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04045	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04046	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
M04047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
-	12	12	12	12	12	12	12	11	12	12	12	12	12	12	12	12	12	12	12	12	12	11	12	8
a	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Male No.	13		14		15		16		17		18		19		20		21		22		23		24		25	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
M04037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04038	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	b	b	b	b	b	b	b	b
M04039	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04041	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04042	-	-	-	-	-	-	-	-	-	a	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04044	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04045	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04046	-	a	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	-	-
M04047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	-	a	-	-	-	a	-	-	-	-
M04048	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
-	12	7	12	11	12	12	12	12	12	11	12	11	12	12	12	11	12	11	11	11	11	10	11	10	11	11
a	0	5	0	1	0	0	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.
a: Mouth, Salivation.
b: Abdomen, Alopecia.
c: General appearance, Death.

Und 1000 mg/kg

Male No.	Days of administration 26		27		28		29		30		31		32		33		34	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
M04037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04038	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
M04039	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04041	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04042	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04043	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04044	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04045	-	a	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-
M04046	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04047	-	a	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-
M04048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
-	11	7	11	11	11	11	11	11	11	9	11	11	11	11	11	11	11	11
b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
a	0	4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0

Male No.	35		36		37		38		39		40		41		42		43	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
M04037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M04038	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M04039	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M04040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M04041	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M04042	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M04043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M04044	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
M04045	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
M04046	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
M04047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
M04048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	7	
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	7	
b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.
b: Abdomen, Alopecia.
c: Forelimb, Alopecia.
a: Mouth, Salivation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 1-2-1. General conditions of male rats at the recovery period

Control (vehicle: corn oil)

Male No.	Days of recovery														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
M01008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M01012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
-	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 1-2-2. General conditions of male rats at the recovery period

Und 1000 mg/kg

Male No.	Days of recovery														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
M04044	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04045	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04046	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M04048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
-	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 2-1-1. General conditions of female rats

Control (vehicle: corn oil)

Female No.	Days of administration																															
	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F01001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F01003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F01004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F01007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F01009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F01012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	5	5	4	4
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	5	5	4	4
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

a: Mouth, Salivation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 2-1-2. General conditions of female rats

Und 100 mg/kg

Female No.	Days of administration																									
	1		2		3		4		5		6		7		8		9		10		11		12		13	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F02013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Female No.	Days of administration																							
	14		15		16		17		18		19		20		21		22		23		24		25	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F02013	-	-	-	-	-	-																		
F02014	-	-	-	-	-	-	-	-	-	-														
F02015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
F02016	-	-	-	-	-	-																		
F02017	-	-	-	-	-	-	-	-																
F02018	-	-	-	-	-	-	-	-																
F02019	-	-	-	-	-	-	-	-	-	-														
F02020	-	-	-	-	-	-	-	-																
F02021	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
F02022	-	-	-	-	-	-	-	-	-	-														
F02023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02024	-	-	-	-	-	-	-	-	-	-														
Number of females	12	12	12	12	12	12	10	10	7	7	3	3	3	3	2	2	1	1	1	1	1	1	1	1
-	12	12	12	12	12	12	10	10	7	7	3	3	3	3	2	2	1	1	1	1	1	1	1	1
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.
a: Mouth, Salivation.

Und 100 mg/kg

Female No.	Days of administration					
	26		27		28	
	Pre	Post	Pre	Post	Pre	Post
F02023	-	-	-	-	-	-
Number of females	1	1	1	1	1	1
-	1	1	1	1	1	1

Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 2-1-3. General conditions of female rats

Und 300 mg/kg

Female No.	Days of administration																																	
	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F03025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
F03026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03027	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
F03028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03033	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03034	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F03036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	10	10	10	10	8	8
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	10	10	10	10	8	8
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

a: Mouth, Salivation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 2-1-4. General conditions of female rats

Und 1000 mg/kg

Female No.	Days of administration																									
	1		2		3		4		5		6		7		8		9		10		11		12		13	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F04037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
F04038	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04039	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	a
F04040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04041	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04042	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04044	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04045	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
F04046	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	12	12	12	12	12	12	12	12	12	9
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3

Female No.	Days of administration																							
	14		15		16		17		18		19		20		21		22		23		24		25	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F04037	-	-	-	-																				
F04038	-	-	-	-	-	-	-	-	-	-														
F04039	-	-	-	-	-	-	-	-	-	-														
F04040	-	-	-	-	-	-	-	-																
F04041	-	-	-	-	-	-																		
F04042	-	-	-	-																				
F04043	-	-	-	-	-	a	-	-	-	-														
F04044	-	-	-	-																				
F04045	-	-	-	-	-	-																		
F04046	-	-	-	-	-	-	-	-	-	-														
F04047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04048	-	-	-	-	-	-	-	-	-	-														
Number of females	12	12	12	12	9	9	7	7	6	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1
-	12	12	12	12	9	8	7	7	6	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1
a	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.
a: Mouth, Salivation.

Und 1000 mg/kg

Female No.	Days of administration																									
	26		27		28		29		30		31		32		33		34		35		36		37		38	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F04047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of females	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Female No.	Days of administration																							
	39		40		41		42		43		44		45		46		47		48		49		50	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F04047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of females	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.

Und 1000 mg/kg

Female No.	Days of administration					
	51		52		53	
	Pre	Post	Pre	Post	Pre	Post
F04047	-	-	-	-	-	
Number of females	1	1	1	1	1	
-	1	1	1	1	1	

Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 2-2-1. General conditions of female rats, satellite group

Control (vehicle: corn oil)

Female No.	Days of administration																																																	
	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F05049	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05051	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05052	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05053	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05054	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05055	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05056	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05057	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05058	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
-	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.
a: Mouth, Salivation.

Control (vehicle: corn oil)

Female No.	Days of administration																																																
	26		27		28		29		30		31		32		33		34		35		36		37		38		39		40		41		42		43															
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F05049	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05051	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05052	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05053	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05054	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05055	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05056	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05057	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05058	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	5													
-	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	5													

Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 2-2-2. General conditions of female rats, satellite group

Und 1000 mg/kg

Female No.	Days of administration																																											
	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F06059	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06060	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06061	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a
F06062	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06063	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06064	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06065	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06066	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06067	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06068	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
-	10	10	10	10	10	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	7	10	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9
a	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

a: Mouth, Salivation.

Und 1000 mg/kg

Female No.	Days of administration																																											
	26		27		28		29		30		31		32		33		34		35		36		37		38		39		40		41		42		43										
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F06059	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06060	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06061	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06062	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06063	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06064	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06065	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06066	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06067	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06068	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	5											
-	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	5											

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 2-3-1. General conditions of female rats at the recovery period

Control (vehicle: corn oil)

Female No.	Days of recovery													
	1	2	3	4	5	6	8	9	10	11	12	13	14	15
F05054	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05055	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05056	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05057	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F05058	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5
-	5	5	5	5	5	5	5	5	5	5	5	5	5	5

-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 2-3-2. General conditions of female rats at the recovery period

Und 1000 mg/kg

Female No.	Days of recovery													
	1	2	3	4	5	6	8	9	10	11	12	13	14	15
F06064	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06065	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06066	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06067	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F06068	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5
-	5	5	5	5	5	5	5	5	5	5	5	5	5	5

-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 3-1. General conditions in dams during pregnancy

Control (vehicle: corn oil)

Dam No.	Days of pregnancy																																											
	0		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F01001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F01005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F01010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F01012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	2	2		
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	2	2		
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

>: Excluded from analysis (not pregnant)

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

a: Mouth, Salivation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 3-2. General conditions in dams during pregnancy

Und 100 mg/kg

Dam No.	Days of pregnancy																																							
	0		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F02013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F02024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	4	4
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	4	4
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

>: Excluded from analysis (not pregnant)

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

a: Mouth, Salivation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 3-3. General conditions in dams during pregnancy

Und 300 mg/kg

Dam No.	Days of pregnancy																							
	0		1		2		3		4		5		6		7		8		9		10		11	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F03025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03027	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03033	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03034	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Dam No.	Days of pregnancy																					
	12		13		14		15		16		17		18		19		20		21		22	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F03025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F03027	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F03028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F03029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F03030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F03032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03033	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F03034	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F03035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
F03036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Number of dams	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	4	4
-	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	4	4
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

>: Excluded from analysis (not pregnant)
Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.
a: Mouth, Salivation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 3-4. General conditions in dams during pregnancy

Und 1000 mg/kg

Dam No.	Days of pregnancy																									
	0		1		2		3		4		5		6		7		8		9		10		11		12	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F04037	-	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04038	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04039	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04041	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04042	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -
F04043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04044	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04045	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04046	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F04048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Number of dams	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
-	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
a	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Dam No.	Days of pregnancy																							
	13		14		15		16		17		18		19		20		21		22		23		24	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F04037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
F04038	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
F04039	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
F04040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
F04041	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
F04042	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -	> -
F04043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
F04044	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
F04045	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
F04046	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
F04048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Number of dams	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	4	4	0	0	0	0
-	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	4	4	0	0	0	0
a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

>: Excluded from analysis (not pregnant)
Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.
a: Mouth, Salivation.

Und 1000 mg/kg

Dam No.	Days of pregnancy			
	25		26	
	Pre	Post	Pre	Post
F04037				
F04038				
F04039				
F04040				
F04041				
F04042	> -	> -	> -	
F04043				
F04044				
F04045				
F04046				
F04048				
Number of dams	0	0	0	
-	0	0	0	
a	0	0	0	

>: Excluded from analysis (not pregnant)
Pre: Before administration, Post: after administration.
-: General appearance, No abnormality.
a: Mouth, Salivation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 4-1. General conditions in dams during lactation

Control (vehicle: corn oil)

Dam No.	Days of lactation											
	0		1		2		3		4		5	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F01001	-	-	-	-	-	-	-	-	-	-	-	
F01002	-	-	-	-	-	-	-	-	-	-	-	
F01003	-	-	-	-	-	-	-	-	-	-	-	
F01004	#	#	-	-	-	-	-	-	-	-	-	
F01005	-	-	-	-	-	-	-	-	-	-	-	
F01006	-	-	-	-	-	-	-	-	-	-	-	
F01007	-	-	-	-	-	-	-	-	-	-	-	
F01008	-	-	-	-	-	-	-	-	-	-	-	
F01009	#	#	-	-	-	-	-	-	-	-	-	
F01010	-	-	-	-	-	-	-	-	-	-	-	
F01011	-	-	-	-	-	-	-	-	-	-	-	
F01012	-	-	-	-	-	-	-	-	-	-	-	
Number of dams	10	10	12	12	12	12	12	12	12	12	12	
-	10	10	12	12	12	12	12	12	12	12	12	

#: Animal was administred to dosing formulation before derivery, and no abnormality was observed on day 0 of lactation

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 4-2. General conditions in dams during lactation

Und 100 mg/kg

Dam No.	Days of lactation											
	0		1		2		3		4		5	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F02013	#	#	-	-	-	-	-	-	-	-	-	
F02014	#	#	-	-	-	-	-	-	-	-	-	
F02015	-	-	-	-	-	-	-	-	-	-	-	
F02016	-	-	-	-	-	-	-	-	-	-	-	
F02017	#	#	-	-	-	-	-	-	-	-	-	
F02018	-	-	-	-	-	-	-	-	-	-	-	
F02019	-	-	-	-	-	-	-	-	-	-	-	
F02020	-	-	-	-	-	-	-	-	-	-	-	
F02021	-	-	-	-	-	-	-	-	-	-	-	
F02022	#	#	-	-	-	-	-	-	-	-	-	
F02023	-	-	-	-	-	-	-	-	-	-	-	
F02024	-	-	-	-	-	-	-	-	-	-	-	
Number of dams	8	8	12	12	12	12	12	12	12	12	12	
-	8	8	12	12	12	12	12	12	12	12	12	

#: Animal was administred to dosing formulation before derivery, and no abnormality was observed on day 0 of lactation

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 4-3. General conditions in dams during lactation

Und 300 mg/kg

Dam No.	Days of lactation											
	0		1		2		3		4		5	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F03025	#	#	-	-	-	-	-	-	-	-	-	
F03026	#	#	-	-	-	-	-	-	-	-	-	
F03027	-	-	-	-	-	-	-	-	-	-	-	
F03028	-	-	-	-	-	-	-	-	-	-	-	
F03029	#	#	-	-	-	-	-	-	-	-	-	
F03030	#	#	-	-	-	-	-	-	-	-	-	
F03031	#	#	-	-	-	-	-	-	-	-	-	
F03032	#	#	-	-	-	-	-	-	-	-	-	
F03033	-	-	-	-	-	-	-	-	-	-	-	
F03034	#	#	-	-	-	-	-	-	-	-	-	
F03035	-	-	-	-	-	-	-	-	-	-	-	
F03036	-	-	-	-	-	-	-	-	-	-	-	
Number of dams	5	5	12	12	12	12	12	12	12	12	12	
-	5	5	12	12	12	12	12	12	12	12	12	

#: Animal was administred to dosing formulation before derivery, and no abnormality was observed on day 0 of lactation

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 4-4. General conditions in dams during lactation

Und 1000 mg/kg

Dam No.	Days of lactation											
	0		1		2		3		4		5	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
F04037	-	-	-	-	-	-	-	-	-	-	-	
F04038	-	-	-	-	-	-	-	-	-	-	-	
F04039	#	#	-	-	-	-	-	-	-	-	-	
F04040	#	#	-	-	-	-	-	-	-	-	-	
F04041	-	-	-	-	-	-	-	-	-	-	-	
F04043	#	#	-	-	-	-	-	-	-	-	-	
F04044	#	#	-	-	-	-	-	-	-	-	-	
F04045	-	-	-	-	-	-	-	-	-	-	-	
F04046	-	-	-	-	-	-	-	-	-	-	-	
F04048	-	-	-	-	-	-	-	-	-	-	-	
Number of dams	6	6	10	10	10	10	10	10	10	10	10	
-	6	6	10	10	10	10	10	10	10	10	10	

#: Animal was administred to dosing formulation before derivery, and no abnormality was observed on day 0 of lactation

Pre: Before administration, Post: after administration.

-: General appearance, No abnormality.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 5-1-1. Detailed clinical observations of male rats

Control (vehicle: corn oil)

Male No.	Open-field observations [c)]								
	Urination								
	Pre[a]	T8[b]	T15	T24	T30	T36	T42	R7[c]	R14
M01001	0	0	0	0	0	1	0		
M01002	0	0	0	0	0	0	0		
M01003	0	0	0	0	0	0	0		
M01004	0	0	0	0	0	0	0		
M01005	0	1	0	0	0	0	0		
M01006	0	0	0	0	1	0	0		
M01007	0	1	0	0	1	0	0		
M01008	0	0	1	0	1	1	0	0	1
M01009	0	0	0	0	0	0	0	0	0
M01010	0	0	0	0	1	0	0	0	1
M01011	0	0	0	0	0	0	0	0	0
M01012	0	0	0	0	0	1	0	0	0
Total score	0	2	1	0	4	3	0	0	2
(N)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(5)	(5)

[a] pre-treatment; [b] day 8 of treatment; [c] day 7 of recovery

Urination [frequency/30sec]

Except the above findings, there were no changes in all animals; a) Cage-side observation (posture in home-cage, locomoter activity in home-cage, vocalization, tremor, convulsion), b) Observations made while handling (behavior while removing from cage, handling behavir, heart beats, body temperature, fur, skin/mucous membranes color, lacrimation, exophthalmos, pupillary size, salivation), and c) Open-field observations (posture, exploration, piloerection, palpebral opening, tremor, convulsion, respiratory rate, gait, stereotypy, bizarre behavior, straub tail, grooming, vocalization, defecation, touch response, withdrawal reflex, pinna reflex).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 5-1-2. Detailed clinical observations of male rats

Und (100 mg/kg)

Male No.	Open-field observations [c)]								
	Urination								
	Pre[a]	T8[b]	T15	T24	T30	T36	T42	R7[c]	R14
M02013	0	0	0	0	0	0	0		
M02014	0	1	0	0	0	0	0		
M02015	0	0	0	0	0	0	0		
M02016	0	0	0	0	0	0	0		
M02017	0	0	0	0	0	0	0		
M02018	0	0	0	0	0	0	0		
M02019	0	0	0	0	0	0	0		
M02020	0	0	0	0	0	0	0		
M02021	0	0	0	0	0	0	0		
M02022	0	0	0	0	0	0	0		
M02023	0	0	0	0	0	0	0		
M02024	0	0	0	0	0	0	0		
Total score	0	1	0	0	0	0	0		
(N)	(12)	(12)	(12)	(12)	(12)	(12)	(12)		

[a] pre-treatment; [b] day 8 of treatment

Urination [frequency/30sec]

Except the above findings, there were no changes in all animals; a) Cage-side observation (posture in home-cage, locomoter activity in home-cage, vocalization, tremor, convulsion), b) Observations made while handling (behavior while removing from cage, handling behavir, heart beats, body temperature, fur, skin/mucous membranes color, lacrimation, exophthalmos, pupillary size, salivation), and c) Open-field observations (posture, exploration, piloerection, palpebral opening, tremor, convulsion, respiratory rate, gait, stereotypy, bizarre behavior, straub tail, grooming, vocalization, defecation, touch response, withdrawal reflex, pinna reflex).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 5-1-3. Detailed clinical observations of male rats

Und (300 mg/kg)

Male No.	Open-field observations [c]								
	Urination								
	Pre[a]	T8[b]	T15	T24	T30	T36	T42	R7[c]	R14
M03025	0	0	0	0	0	0	0		
M03026	0	0	0	0	0	0	0		
M03027	0	1	0	0	0	0	0		
M03028	0	0	0	0	0	0	0		
M03029	0	0	0	0	0	0	0		
M03030	0	0	0	Died on day 15 of administration					
M03031	0	0	0	0	0	0	0		
M03032	0	0	0	0	0	0	0		
M03033	0	0	0	0	0	0	0		
M03034	0	0	0	0	0	0	0		
M03035	0	0	0	0	0	0	0		
M03036	0	0	0	0	0	0	0		
Total score	0	1	0	0	0	0	0		
(N)	(12)	(12)	(12)	(11)	(11)	(11)	(11)		

[a] pre-treatment; [b] day 8 of treatment; [c] day 7 of recovery

Urination [frequency/30sec]

Except the above findings, there were no changes in all animals; a) Cage-side observation (posture in home-cage, locomoter activity in home-cage, vocalization, tremor, convulsion), b) Observations made while handling (behavior while removing from cage, handling behavir, heart beats, body temperature, fur, skin/mucous membranes color, lacrimation, exophthalmos, pupillary size, salivation), and c) Open-field observations (posture, exploration, piloerection, palpebral opening, tremor, convulsion, respiratory rate, gait, stereotypy, bizarre behavior, straub tail, grooming, vocalization, defecation, touch response, withdrawal reflex, pinna reflex).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 5-1-4. Detailed clinical observations of male rats

Und (1000 mg/kg)

Male No.	Open-field observations [c]								
	Urination								
	Pre[a]	T8[b]	T15	T24	T30	T36	T42	R7[c]	R14
M04037	0	0	1	0	0	1	1		
M04038	0	0	0	0	0	0	0		
M04039	0	0	0	0	0	0	0		
M04040	0	0	0	0	0	0	0		
M04041	0	0	0	0	0	0	0		
M04042	0	0	0	0	1	0	0		
M04043	0	0	0	0	0	0	0		
M04044	0	0	0	0	0	0	0	0	0
M04045	0	0	0	0	0	0	0	0	0
M04046	0	0	0	0	0	0	0	0	0
M04047	0	0	0	0	0	0	0	0	0
M04048	0	0	0	0	0	0	0	0	0
Total score	0	0	1	0	1	1	1	0	0
(N)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(5)	(5)

[a] pre-treatment; [b] day 8 of treatment; [c] day 7 of recovery

Urination [frequency/30sec]

Except the above findings, there were no changes in all animals; a) Cage-side observation (posture in home-cage, locomoter activity in home-cage, vocalization, tremor, convulsion), b) Observations made while handling (behavior while removing from cage, handling behavir, heart beats, body temperature, fur, skin/mucous membranes color, lacrimation, exophthalmos, pupillary size, salivation), and c) Open-field observations (posture, exploration, piloerection, palpebral opening, tremor, convulsion, respiratory rate, gait, stereotypy, bizarre behavior, straub tail, grooming, vocalization, defecation, touch response, withdrawal reflex, pinna reflex).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 6-1-1. Detailed clinical observations of female rats

Control (vehicle: corn oil)

Female No.	Open-field observations [c] Urination								
	Pre[a]	T8[b]	T15	T24	T30	T36	T42	T49	L[c]
F01001	0	0	0	0	0	0			0
F01002	0	0	0	0	0	0			0
F01003	0	0	0	0	0	0			0
F01004	0	0	0	0	0	0			0
F01005	0	0	0	0	0	0			0
F01006	0	0	0	0	0	0			0
F01007	0	0	0	0	0	0			0
F01008	0	0	0	0	0	0			0
F01009	0	0	0	0	0	0			0
F01010	0	0	0	0	0	0			0
F01011	0	0	0	0	0	0			0
F01012	0	0	0	0	0	0			0
Total score	0	0	0	0	0	0	0	0	0
(N)	(12)	(12)	(12)	(12)	(12)	(12)	(0)	(0)	(12)

[a] pre-treatment; [b] day 8 of treatment; [c] lactation period

Urination [frequency/30sec]

Except the above findings, there were no changes in all animals; a) Cage-side observation (posture in home-cage, locomoter activity in home-cage, vocalization, tremor, convulsion), b) Observations made while handling (behavior while removing from cage, handling behavir, heart beats, body temperature, fur, skin/mucous membranes color, lacrimation, exophthalmos, pupillary size, salivation), and c) Open-field observations (posture, exploration, piloerection, palpebral opening, tremor, convulsion, respiratory rate, gait, stereotypy, bizarre behavior, straub tail, grooming, vocalization, defecation, touch response, withdrawal reflex, pinna reflex).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 6-1-2. Detailed clinical observations of female rats

Und (100 mg/kg)

Female No.	Open-field observations [c]								
	Urination								
	Pre[a]	T8[b]	T15	T24	T30	T36	T42	T49	L[c]
F02013	0	0	0	0	0	0			0
F02014	0	0	0	0	0	0			0
F02015	0	0	0	0	0	0			0
F02016	0	0	0	0	0	0			0
F02017	0	0	0	0	0	0			0
F02018	0	0	0	0	0	0			0
F02019	0	0	0	0	0	0			0
F02020	0	0	0	0	0	0			0
F02021	0	0	0	0	0	0			0
F02022	0	0	0	0	0	0			0
F02023	0	0	0	0	0	0	0	0	0
F02024	0	0	0	0	0	0			0
Total score	0	0	0	0	0	0	0	0	0
(N)	(12)	(12)	(12)	(12)	(12)	(12)	(1)	(1)	(12)

[a] pre-treatment; [b] day 8 of treatment; [c] lactation period

Urination [frequency/30sec]

Except the above findings, there were no changes in all animals; a) Cage-side observation (posture in home-cage, locomoter activity in home-cage, vocalization, tremor, convulsion), b) Observations made while handling (behavior while removing from cage, handling behavir, heart beats, body temperature, fur, skin/mucous membranes color, lacrimation, exophthalmos, pupillary size, salivation), and c) Open-field observations (posture, exploration, piloerection, palpebral opening, tremor, convulsion, respiratory rate, gait, stereotypy, bizarre behavior, straub tail, grooming, vocalization, defecation, touch response, withdrawal reflex, pinna reflex).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 6-1-3. Detailed clinical observations of female rats

Und (300 mg/kg)

Female No.	Open-field observations [c] Urination								
	Pre[a]	T8[b]	T15	T24	T30	T36	T42	T49	L[c]
F03025	0	0	0	0	0	0			0
F03026	0	0	1	0	0	0			0
F03027	0	0	0	0	0	0			0
F03028	0	0	0	0	0	0			0
F03029	0	0	0	0	0	0			0
F03030	0	0	0	0	0	0			0
F03031	0	0	0	0	0	0			0
F03032	0	0	0	0	0	0			0
F03033	0	0	0	0	0	0			0
F03034	0	0	0	0	0	0			0
F03035	0	0	0	0	0	0			0
F03036	0	0	0	0	0	0			0
Total score	0	0	1	0	0	0	0	0	0
(N)	(12)	(12)	(12)	(12)	(12)	(12)	(0)	(0)	(12)

[a] pre-treatment; [b] day 8 of treatment; [c] lactation period

Urination [frequency/30sec]

Except the above findings, there were no changes in all animals; a) Cage-side observation (posture in home-cage, locomoter activity in home-cage, vocalization, tremor, convulsion), b) Observations made while handling (behavior while removing from cage, handling behavir, heart beats, body temperature, fur, skin/mucous membranes color, lacrimation, exophthalmos, pupillary size, salivation), and c) Open-field observations (posture, exploration, piloerection, palpebral opening, tremor, convulsion, respiratory rate, gait, stereotypy, bizarre behavior, straub tail, grooming, vocalization, defecation, touch response, withdrawal reflex, pinna reflex).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 6-1-4. Detailed clinical observations of female rats

Und (1000 mg/kg)

Female No.	Open-field observations [c)] Urination								
	Pre[a]	T8[b]	T15	T24	T30	T36	T42	T49	L[c]
F04037	0	0	0	0	0	0			0
F04038	0	0	0	0	0	0			0
F04039	0	0	0	0	0	0			0
F04040	0	0	0	0	0	0			0
F04041	0	0	0	0	0	0			0
F04042	0	0	0	0	0	0	0		
F04043	0	0	0	0	0	0			0
F04044	0	0	0	0	0	0			0
F04045	0	0	0	0	0	0			0
F04046	0	0	0	0	0	0			0
F04047	0	0	0	0	0	0	0	0	
F04048	0	0	0	0	0	0			0
Total score	0	0	0	0	0	0	0	0	0
(N)	(12)	(12)	(12)	(12)	(12)	(12)	(2)	(1)	(10)

[a] pre-treatment; [b] day 8 of treatment; [c] lactation period

Urination [frequency/30sec]

Except the above findings, there were no changes in all animals; a) Cage-side observation (posture in home-cage, locomoter activity in home-cage, vocalization, tremor, convulsion), b) Observations made while handling (behavior while removing from cage, handling behavir, heart beats, body temperature, fur, skin/mucous membranes color, lacrimation, exophthalmos, pupillary size, salivation), and c) Open-field observations (posture, exploration, piloerection, palpebral opening, tremor, convulsion, respiratory rate, gait, stereotypy, bizarre behavior, straub tail, grooming, vocalization, defecation, touch response, withdrawal reflex, pinna reflex).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 6-2-1. Detailed clinical observations of female rats, satellite group

Control (vehicle: corn oil)

Female No.	Open-field observations [c]								
	Urination								
	Pre[a]	T8[b]	T15	T24	T30	T36	T42	R7[c]	R14
F05049	0	0	0	0	0	0	0		
F05050	0	0	0	0	0	0	0		
F05051	0	0	0	0	0	0	0		
F05052	0	0	0	0	0	0	0		
F05053	0	0	0	0	0	0	0		
F05054	0	0	0	0	0	0	0	0	0
F05055	0	0	0	0	0	0	0	0	0
F05056	0	0	0	0	0	0	0	0	0
F05057	0	0	0	0	0	0	0	0	0
F05058	0	0	0	0	0	0	0	0	0
Total score	0	0	0	0	0	0	0	0	0
(N)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(5)	(5)

[a] pre-treatment; [b] day 8 of treatment; [c] day 7 of recovery

Urination [frequency/30sec]

Except the above findings, there were no changes in all animals; a) Cage-side observation (posture in home-cage, locomoter activity in home-cage, vocalization, tremor, convulsion), b) Observations made while handling (behavior while removing from cage, handling behavir, heart beats, body temperature, fur, skin/mucous membranes color, lacrimation, exophthalmos, pupillary size, salivation), and c) Open-field observations (posture, exploration, piloerection, palpebral opening, tremor, convulsion, respiratory rate, gait, stereotypy, bizarre behavior, straub tail, grooming, vocalization, defecation, touch response, withdrawal reflex, pinna reflex).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 6-2-2. Detailed clinical observations of female rats, satellite group

Und (1000 mg/kg)

Female No.	Open-field observations [c]								
	Urination								
	Pre[a]	T8[b]	T15	T24	T30	T36	T42	R7[c]	R14
F06059	0	0	0	0	0	0	0		
F06060	0	0	0	0	0	0	0		
F06061	0	0	0	0	0	0	0		
F06062	0	0	0	0	0	0	0		
F06063	0	0	0	0	0	0	0		
F06064	0	0	0	0	0	0	0	0	0
F06065	0	0	0	0	0	0	0	0	0
F06066	0	0	0	0	0	0	0	0	0
F06067	0	0	0	0	0	0	0	0	0
F06068	0	0	0	0	0	0	0	0	0
Total score	0	0	0	0	0	0	0	0	0
(N)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(5)	(5)

[a] pre-treatment; [b] day 8 of treatment; [c] day 7 of recovery

Urination [frequency/30sec]

Except the above findings, there were no changes in all animals; a) Cage-side observation (posture in home-cage, locomoter activity in home-cage, vocalization, tremor, convulsion), b) Observations made while handling (behavior while removing from cage, handling behavir, heart beats, body temperature, fur, skin/mucous membranes color, lacrimation, exophthalmos, pupillary size, salivation), and c) Open-field observations (posture, exploration, piloerection, palpebral opening, tremor, convulsion, respiratory rate, gait, stereotypy, bizarre behavior, straub tail, grooming, vocalization, defecation, touch response, withdrawal reflex, pinna reflex).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 7-1-1. Body weights of male rats

Control (vehicle: corn oil)

Male No.	Days of administration							
	1	4	7	14	21	28	35	42
M01001	413.1	422.4	434.2	464.2	479.0	504.5	524.6	525.6
M01002	380.1	393.6	406.8	431.5	452.8	477.6	491.0	493.7
M01003	402.4	420.1	440.4	462.3	482.3	493.5	504.6	505.8
M01004	403.3	411.4	423.6	438.4	480.0	506.3	527.4	532.3
M01005	384.8	391.7	399.3	431.5	448.4	464.8	485.3	493.1
M01006	405.8	417.2	433.6	453.2	479.5	504.6	525.6	552.6
M01007	390.5	409.4	430.2	461.8	489.5	524.7	547.3	572.9
M01008	381.8	394.2	396.2	418.6	438.3	472.5	494.8	504.3
M01009	401.8	416.1	424.8	462.5	472.5	499.4	521.9	540.9
M01010	412.3	426.7	451.6	468.4	487.9	521.8	542.4	552.0
M01011	408.9	432.2	453.3	484.2	513.4	542.2	573.9	593.8
M01012	393.3	397.9	404.1	434.2	461.8	482.3	489.3	498.4
Number of males	12	12	12	12	12	12	12	12
Mean	398.2	411.1	424.8	450.9	473.8	499.5	519.0	530.5
S.D.	11.7	13.8	19.5	19.6	20.6	23.0	27.2	33.0

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 7-1-2. Body weights of male rats

Und 100 mg/kg

Male No.	Days of administration							
	1	4	7	14	21	28	35	42
M02013	404.3	420.4	432.4	457.8	465.0	478.5	493.9	483.9
M02014	399.1	409.7	419.5	441.8	466.1	492.4	512.3	521.0
M02015	413.9	429.6	451.2	475.4	488.0	513.6	527.0	539.6
M02016	419.2	435.7	453.1	486.6	512.2	545.1	569.6	572.0
M02017	406.1	423.8	436.6	462.1	467.4	489.1	507.9	516.0
M02018	419.4	437.8	446.3	469.8	488.3	517.8	539.0	565.5
M02019	412.7	424.6	437.0	466.8	489.3	510.3	523.2	539.9
M02020	386.8	395.4	403.8	418.6	434.0	451.9	470.4	483.8
M02021	385.7	392.4	409.9	428.9	438.1	458.2	481.9	496.1
M02022	395.7	410.9	420.2	446.5	465.5	489.1	506.3	498.2
M02023	384.6	391.2	402.0	427.3	438.5	460.6	477.7	499.7
M02024	394.7	405.9	417.4	439.5	458.6	471.9	492.8	507.3
Number of males	12	12	12	12	12	12	12	12
Mean	401.9	414.8	427.5	451.8	467.6	489.9	508.5	518.6
S.D.	12.7	16.4	17.9	21.2	23.8	27.9	28.3	29.8
Significance	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 7-1-3. Body weights of male rats

Und 300 mg/kg

Male No.	Days of administration							
	1	4	7	14	21	28	35	42
M03025	418.4	425.3	444.3	469.1	483.5	498.1	513.0	502.8
M03026	417.9	436.8	458.8	486.9	505.3	533.4	553.9	569.7
M03027	401.0	418.6	435.6	460.9	475.9	501.8	511.0	526.4
M03028	399.8	405.8	424.6	445.3	453.1	468.3	488.1	498.8
M03029	401.2	418.2	435.3	457.1	473.4	495.7	517.7	533.5
M03030	394.1	400.1	420.1	445.2	457.3	478.1	494.5	519.2
M03031	415.4	428.2	447.5	481.9	Died on day 15 of administration			
M03032	381.3	396.3	406.5	420.2	432.0	452.3	475.6	491.8
M03033	404.9	415.5	432.3	455.3	470.2	491.0	523.4	543.8
M03034	428.4	445.0	461.8	489.8	517.4	547.5	572.0	602.3
M03035	389.9	402.8	420.0	444.0	457.3	475.6	494.1	507.3
M03036	374.2	386.4	404.4	421.7	431.1	449.1	469.6	475.2
Number of males	12	12	12	12	11	11	11	11
Mean	402.2	414.9	432.6	456.5	468.8	490.1	510.3	524.6
S.D.	16.0	17.3	18.5	23.0	27.0	30.6	31.3	36.8
Significance	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 7-1-4. Body weights of male rats

Und 1000 mg/kg

Male No.	Days of administration							
	1	4	7	14	21	28	35	42
M04037	402.0	416.4	429.0	463.0	488.7	522.5	542.5	552.4
M04038	411.4	431.2	449.9	469.4	486.1	499.6	519.5	535.8
M04039	387.4	404.9	414.2	429.8	439.8	448.6	465.5	468.5
M04040	394.3	403.8	419.5	444.9	459.6	474.3	490.9	498.2
M04041	418.1	437.2	455.1	478.7	488.8	511.8	521.7	534.8
M04042	401.8	411.2	419.6	436.0	433.9	460.2	478.8	499.3
M04043	404.3	406.8	416.6	435.2	447.2	469.0	484.8	495.1
M04044	385.3	390.9	405.3	422.7	439.0	463.9	480.6	496.4
M04045	421.4	438.1	458.0	482.5	500.9	521.2	533.6	548.6
M04046	405.8	418.5	429.5	453.9	478.5	496.8	524.3	538.0
M04047	378.4	378.3	383.1	395.9	405.8	432.2	441.4	463.5
M04048	410.6	425.0	452.6	479.5	493.9	517.0	546.2	569.5
Number of males	12	12	12	12	12	12	12	12
Mean	401.7	413.5	427.7	449.3	463.5	484.8	502.5	516.7
S.D.	13.2	18.1	22.8	26.7	30.1	30.7	33.3	34.2
Significance	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 7-2-1. Body weights of male rats at the recovery period

Control (vehicle: corn oil)

Male No.	Days of recovery		
	1	7	14
M01008	508.6	517.2	522.2
M01009	543.1	558.5	564.3
M01010	555.4	557.3	543.6
M01011	598.7	615.6	620.7
M01012	491.5	511.4	517.3
Number of males	5	5	5
Mean	539.5	552.0	553.6
S.D.	41.9	41.8	41.9

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 7-2-2. Body weights of male rats at the recovery period

Und 1000 mg/kg

Male No.	Days of recovery		
	1	7	14
M04044	494.5	498.2	509.1
M04045	548.1	557.7	570.5
M04046	540.0	549.5	557.9
M04047	464.6	477.7	488.4
M04048	569.8	597.7	581.9
Number of males	5	5	5
Mean	523.4	536.2	541.6
S.D.	42.8	48.2	40.7
Significance	NS	NS	NS
Statistical method	TT	TT	TT

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 8-1-1. Body weights of female rats

Control (vehicle: corn oil)

Female No.	Days of administration								
	1	4	7	14	21	28	35	42	49
F01001	243.2	244.5	252.4	264.0					
F01002	261.2	268.1	271.7	270.8					
F01003	255.1	259.1	261.8	268.5					
F01004	244.6	249.3	260.6	270.5					
F01005	263.4	265.0	276.3	287.1					
F01006	245.5	251.5	251.9	252.7					
F01007	243.6	243.8	255.4	270.4					
F01008	232.7	251.9	255.9	256.5					
F01009	252.7	259.5	262.2	265.6					
F01010	253.9	254.4	264.1	278.2					
F01011	251.2	255.8	257.9	262.2					
F01012	249.5	252.5	265.6	278.4					
Number of females	12	12	12	12					
Mean	249.7	254.6	261.3	268.7					
S.D.	8.5	7.4	7.4	9.6					

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 8-1-2. Body weights of female rats

Und 100 mg/kg

Female No.	Days of administration								
	1	4	7	14	21	28	35	42	49
F02013	233.3	237.6	243.9	248.5					
F02014	256.1	269.2	276.7	283.0					
F02015	239.0	245.8	248.0	264.2	269.2				
F02016	245.8	259.7	264.1	265.8					
F02017	250.7	251.2	261.6	269.5					
F02018	253.1	247.3	259.2	266.4					
F02019	248.3	256.4	258.2	277.6					
F02020	246.1	262.3	275.5	310.5					
F02021	251.0	268.6	277.5	279.1					
F02022	242.7	243.7	243.7	254.3					
F02023	240.0	234.1	228.6	245.0	275.5	299.3			
F02024	238.5	241.0	252.2	257.6					
Number of females	12	12	12	12					
Mean	245.4	251.4	257.4	268.5					
S.D.	6.8	11.8	15.0	17.8					
Significance	NS	NS	NS	NS	---	---			
Statistical method	AN	AN	AN	AN	NA	NA			

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

NA: Not analyzed.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 8-1-3. Body weights of female rats

Und 300 mg/kg

Female No.	Days of administration								
	1	4	7	14	21	28	35	42	49
F03025	234.5	246.5	249.9	268.0					
F03026	258.0	270.1	276.8	281.0					
F03027	236.8	243.9	238.8	245.7					
F03028	243.3	247.9	250.1	259.6					
F03029	251.4	249.0	252.5	265.5					
F03030	242.6	251.0	247.6	264.1					
F03031	258.2	264.0	274.0	285.9					
F03032	248.3	254.1	252.3	261.7					
F03033	254.1	251.4	254.6	266.7					
F03034	239.0	248.6	256.8	268.4					
F03035	240.1	243.0	247.7	253.4					
F03036	243.1	251.8	258.6	264.8					
Number of females	12	12	12	12					
Mean	245.8	251.8	255.0	265.4					
S.D.	8.1	7.9	10.8	10.7					
Significance	NS	NS	NS	NS					
Statistical method	AN	AN	AN	AN					

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 8-1-4. Body weights of female rats

Und 1000 mg/kg

Female No.	Days of administration								
	1	4	7	14	21	28	35	42	49
F04037	248.0	248.7	260.6	276.4					
F04038	262.8	267.8	265.3	277.7					
F04039	238.7	253.7	254.7	265.0					
F04040	234.4	238.5	240.0	238.3					
F04041	230.4	245.5	249.7	251.7					
F04042	258.2	259.3	278.4	292.2					
F04043	263.3	263.6	280.7	283.5					
F04044	262.9	261.5	271.6	288.4					
F04045	261.2	273.6	279.6	288.6					
F04046	254.5	269.9	272.3	284.0					
F04047	257.3	255.5	252.0	270.3	299.3	328.1	303.3	315.6	322.5
F04048	254.4	257.8	266.9	285.7					
Number of females	10	10	10	10					
Mean	251.1	258.1	264.1	273.9					
S.D.	12.6	11.4	13.1	17.1					
Significance	NS	NS	NS	NS	---	---	---	---	---
Statistical method	AN	AN	AN	AN	NA	NA	NA	NA	NA

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

NA: Not analyzed.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 8-2-1. Body weights of female rats, satellite group

Control (vehicle: corn oil)

Female No.	Days of administration							
	1	4	7	14	21	28	35	42
F05049	261.2	277.7	287.5	295.5	306.4	321.6	327.7	332.5
F05050	265.0	271.7	278.8	281.8	296.7	306.3	314.5	310.2
F05051	252.8	248.7	252.4	264.0	275.3	271.4	280.7	289.1
F05052	267.6	270.5	285.0	294.8	309.2	317.4	325.2	329.8
F05053	259.9	264.4	270.7	284.9	297.9	306.4	315.3	325.5
F05054	241.3	241.7	241.1	243.0	248.6	253.5	262.8	277.8
F05055	231.0	235.2	232.5	243.5	249.7	252.1	253.7	267.0
F05056	239.4	232.2	240.2	248.8	253.2	258.6	267.1	280.1
F05057	258.2	258.4	270.8	283.6	280.0	275.5	284.3	299.2
F05058	235.9	247.0	254.5	262.4	262.7	275.0	272.5	278.9
Number of females	10	10	10	10	10	10	10	10
Mean	251.2	254.8	261.4	270.2	278.0	283.8	290.4	299.0
S.D.	13.2	16.1	19.8	20.5	23.7	26.7	27.7	24.1

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 8-2-2. Body weights of female rats, satellite group

Und 1000 mg/kg

Female No.	Days of administration							
	1	4	7	14	21	28	35	42
F06059	248.5	243.5	250.5	256.5	257.3	254.4	265.4	275.0
F06060	260.5	263.8	264.4	286.8	291.7	294.8	292.1	290.6
F06061	252.6	260.6	255.2	273.0	270.7	293.5	295.6	302.2
F06062	261.0	267.5	273.9	294.2	301.7	322.4	330.0	339.0
F06063	242.3	242.1	238.7	250.3	258.3	260.0	259.0	269.4
F06064	258.6	269.3	271.6	267.7	272.2	288.4	285.8	278.3
F06065	253.3	254.3	257.4	259.7	275.7	285.3	295.7	296.0
F06066	245.5	253.5	264.3	279.2	283.0	288.5	296.9	305.3
F06067	240.6	249.9	251.2	267.8	278.1	282.0	279.2	293.8
F06068	238.0	246.6	246.3	255.2	261.4	260.9	257.2	264.0
Number of females	10	10	10	10	10	10	10	10
Mean	250.1	255.1	257.4	269.0	275.0	283.0	285.7	291.4
S.D.	8.4	9.8	11.2	14.4	14.4	20.3	21.9	21.8
Significance	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 8-3-1. Body weights of female rats at the recovery period

Control (vehicle: corn oil)

Female No.	Days of recovery		
	1	7	14
F05054	286.8	294.0	302.0
F05055	263.3	269.4	261.7
F05056	278.9	280.5	277.5
F05057	290.5	301.1	294.0
F05058	275.9	281.3	290.4
Number of females	5	5	5
Mean	279.1	285.3	285.1
S.D.	10.6	12.4	15.8

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 8-3-2. Body weights of female rats at the recovery period

Und 1000 mg/kg

Female No.	Days of recovery		
	1	7	14
F06064	284.4	289.0	273.7
F06065	303.8	313.3	328.9
F06066	306.7	317.3	314.7
F06067	287.8	302.5	304.8
F06068	262.8	271.2	271.0
Number of females	5	5	5
Mean	289.1	298.7	298.6
S.D.	17.6	18.9	25.5
Significance	NS	NS	NS
Statistical method	TT	TT	TT

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 9-1. Body weights of dams during pregnancy

Control (vehicle: corn oil)

Dam No.	Days of pregnancy				
	0	7	14	20	26
F01001	270.1	310.4	337.8	421.7	
F01002	291.5	319.5	361.8	445.1	
F01003	280.6	323.3	368.4	466.6	
F01004	272.6	304.7	346.7	433.3	
F01005	286.4	333.6	379.8	476.5	
F01006	273.6	317.8	353.1	447.1	
F01007	272.3	299.3	341.8	420.0	
F01008	261.7	303.4	342.9	423.9	
F01009	268.1	321.7	366.8	444.5	
F01010	272.1	320.0	369.5	454.4	
F01011	279.0	312.7	353.9	436.1	
F01012	275.7	304.5	337.2	425.3	
Number of dams	12	12	12	12	
Mean	275.3	314.2	355.0	441.2	
S.D.	8.1	10.1	14.1	18.1	

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 9-2. Body weights of dams during pregnancy

Und 100 mg/kg

Dam No.	Days of pregnancy				
	0	7	14	20	26
F02013	250.3	285.1	318.1	391.2	
F02014	297.4	333.5	367.8	433.6	
F02015	264.2	292.8	324.2	392.6	
F02016	273.3	303.1	339.7	405.7	
F02017	284.9	310.9	348.2	442.8	
F02018	265.5	319.1	368.2	462.7	
F02019	284.9	325.6	369.1	446.1	
F02020	306.4	336.7	369.5	475.6	
F02021	305.4	352.0	394.4	483.2	
F02022	272.0	306.0	350.7	427.8	
F02023	296.4	316.2	350.5	436.3	
F02024	280.8	315.0	351.6	441.7	
Number of dams	12	12	12	12	
Mean	281.8	316.3	354.3	436.6	
S.D.	17.5	18.9	21.2	29.5	
Significance	NS	NS	NS	NS	
Statistical method	AN	AN	AN	AN	

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 9-3. Body weights of dams during pregnancy

Und 300 mg/kg

Dam No.	Days of pregnancy				
	0	7	14	20	26
F03025	257.9	296.5	339.6	410.7	
F03026	298.1	330.5	376.6	455.7	
F03027	245.4	285.9	327.7	397.6	
F03028	277.3	333.3	367.3	462.7	
F03029	275.5	311.2	352.5	447.9	
F03030	279.2	315.0	351.4	423.7	
F03031	291.6	322.9	363.7	439.9	
F03032	268.7	319.0	351.4	418.7	
F03033	282.0	315.3	358.2	441.1	
F03034	285.6	328.3	365.3	450.5	
F03035	267.8	295.1	331.3	414.2	
F03036	277.0	311.3	341.5	415.1	
Number of dams	12	12	12	12	
Mean	275.5	313.7	352.2	431.5	
S.D.	14.3	14.8	15.0	20.7	
Significance	NS	NS	NS	NS	
Statistical method	AN	AN	AN	AN	

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 9-4. Body weights of dams during pregnancy

Und 1000 mg/kg

Dam No.		Days of pregnancy				
		0	7	14	20	26
F04037		273.9	313.9	348.3	434.1	
F04038		295.1	342.5	381.1	488.0	
F04039		275.8	313.3	342.0	427.4	
F04040		258.3	298.9	340.2	434.2	
F04041		251.4	295.3	325.7	373.9	
F04042	>	295.9 >	306.7 >	314.1 >	315.5 >	313.8 >
F04043		303.9	355.3	390.2	471.9	
F04044		296.6	348.0	384.7	484.9	
F04045		295.5	335.7	370.4	444.9	
F04046		299.1	355.7	394.7	456.5	
F04048		297.5	328.4	369.5	457.2	
Number of dams		10	10	10	10	
Mean		284.7	328.7	364.7	447.3	
S.D.		18.6	22.4	24.0	33.3	
Significance		NS	NS	NS	NS	
Statistical method		AN	AN	AN	AN	

>: Excluded from analysis (not pregnant)

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 10-1. Body weights of dams during lactation

Control (vehicle: corn oil)

Dam No.	Days of lactation	
	0	4
F01001	308.7	335.0
F01002	324.5	342.1
F01003	350.9	378.8
F01004	355.2	350.3
F01005	363.2	366.6
F01006	337.1	361.1
F01007	318.2	335.9
F01008	322.1	341.2
F01009	365.1	360.2
F01010	325.3	367.6
F01011	333.0	347.0
F01012	253.1	329.0
Number of dams	12	12
Mean	329.7	351.2
S.D.	30.3	15.5

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 10-2. Body weights of dams during lactation

Und 100 mg/kg

Dam No.	Days of lactation	
	0	4
F02013	289.9	308.3
F02014	348.7	356.9
F02015	311.8	331.2
F02016	340.3	336.9
F02017	327.2	315.4
F02018	376.8	378.5
F02019	369.9	366.6
F02020	322.4	349.6
F02021	356.8	386.2
F02022	348.6	354.0
F02023	334.6	366.1
F02024	335.7	360.2
Number of dams	12	12
Mean	338.6	350.8
S.D.	24.3	23.9
Significance	NS	NS
Statistical method	AN	KW

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 10-3. Body weights of dams during lactation

Und 300 mg/kg

Dam No.	Days of lactation	
	0	4
F03025	330.8	345.4
F03026	363.1	355.2
F03027	328.7	336.7
F03028	347.7	352.4
F03029	344.5	337.7
F03030	358.5	362.5
F03031	368.3	347.0
F03032	345.3	339.9
F03033	337.9	353.4
F03034	367.1	360.1
F03035	307.3	334.9
F03036	316.0	331.7
Number of dams	12	12
Mean	342.9	346.4
S.D.	19.7	10.3
Significance	NS	NS
Statistical method	AN	KW

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 10-4. Body weights of dams during lactation

Und 1000 mg/kg

Dam No.	Days of lactation	
	0	4
F04037	336.4	325.6
F04038	363.1	400.9
F04039	325.9	334.7
F04040	351.4	336.7
F04041	350.2	338.1
F04043	395.4	386.1
F04044	362.5	359.4
F04045	365.7	373.6
F04046	365.1	382.2
F04048	339.4	363.7
Number of dams	10	10
Mean	355.5	360.1
S.D.	19.6	25.6
Significance	NS	NS
Statistical method	AN	KW

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 11-1-1. Food consumption of male rats

Control (vehicle: corn oil)

Male No.	Days of administration					
	1	7	14	29	35	41
M01001	27.7	27.6	25.3	26.3	19.2	24.6
M01002	24.1	23.6	24.0	25.7	23.6	20.6
M01003	32.5	28.9	25.4	25.1	26.7	25.6
M01004	27.0	19.6	22.4	26.8	26.2	27.5
M01005	23.1	23.3	20.7	20.7	22.4	25.1
M01006	22.6	25.0	23.2	28.1	28.1	26.2
M01007	25.0	25.2	25.3	24.1	23.7	25.9
M01008	25.8	21.9	23.2	25.9	26.2	26.3
M01009	28.0	25.9	27.5	25.6	22.6	29.0
M01010	32.9	29.4	23.3	25.8	26.4	27.6
M01011	27.3	26.4	28.5	25.3	25.6	27.2
M01012	19.9	22.7	18.6	23.1	20.5	21.8
Number of males	12	12	12	12	12	12
Mean	26.3	25.0	24.0	25.2	24.3	25.6
S.D.	3.8	2.9	2.7	1.9	2.7	2.4

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 11-1-2. Food consumption of male rats

Und 100 mg/kg

Male No.	Days of administration					
	1	7	14	29	35	41
M02013	25.9	23.5	20.4	19.0	19.6	16.9
M02014	25.8	24.6	25.1	26.8	25.8	26.2
M02015	30.2	34.1	26.3	21.7	25.7	26.5
M02016	26.7	27.8	22.1	26.1	26.3	26.3
M02017	30.6	28.9	22.8	22.8	24.8	23.5
M02018	29.5	26.7	23.1	28.7	27.7	29.3
M02019	27.8	24.3	23.3	24.0	24.5	24.1
M02020	25.1	20.4	23.1	22.5	20.5	23.3
M02021	27.7	23.7	23.5	20.1	21.5	23.4
M02022	20.6	23.4	22.5	24.1	25.1	19.9
M02023	30.5	25.0	20.5	27.6	25.1	23.4
M02024	25.1	26.8	19.9	22.0	24.2	22.0
Number of males	12	12	12	12	12	12
Mean	27.1	25.8	22.7	23.8	24.2	23.7
S.D.	2.9	3.5	1.9	3.0	2.4	3.3
Significance	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	KW	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 11-1-3. Food consumption of male rats

Und 300 mg/kg

Male No.	Days of administration					
	1	7	14	29	35	41
M03025	31.3	29.2	25.0	24.5	24.0	16.8
M03026	30.9	26.3	24.5	23.0	25.3	25.6
M03027	28.6	28.2	24.1	23.9	23.3	23.0
M03028	23.0	25.0	21.6	18.7	22.1	22.3
M03029	21.1	24.5	25.3	27.7	27.4	25.9
M03030	25.9	26.0	22.5	23.5	26.5	25.7
M03031	29.5	23.6	24.5	Died on day 15 of administration		
M03032	24.9	21.7	19.6	21.6	20.4	23.9
M03033	23.4	27.3	26.2	23.0	25.9	26.3
M03034	35.3	29.5	27.6	30.4	30.2	28.3
M03035	27.0	25.1	19.6	23.7	21.2	22.7
M03036	21.8	23.3	21.4	22.5	23.1	20.9
Number of males	12	12	12	11	11	11
Mean	26.9	25.8	23.5	23.9	24.5	23.8
S.D.	4.3	2.4	2.5	3.1	2.9	3.2
Significance	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	KW	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 11-1-4. Food consumption of male rats

Und 1000 mg/kg

Male No.	Days of administration					
	1	7	14	29	35	41
M04037	26.6	26.8	23.9	25.4	24.7	24.7
M04038	30.0	26.0	26.6	21.6	25.6	26.1
M04039	29.5	24.4	22.3	23.3	23.5	21.7
M04040	24.3	24.1	21.0	23.4	21.6	22.3
M04041	29.9	28.1	25.2	24.2	26.1	24.8
M04042	21.1	21.2	25.1	24.6	22.2	25.3
M04043	23.4	24.0	25.2	26.1	25.1	25.0
M04044	26.7	21.6	19.7	22.7	21.2	21.4
M04045	27.5	25.2	22.9	24.0	23.3	28.7
M04046	27.9	26.7	22.6	21.8	27.8	27.1
M04047	23.1	22.4	21.3	22.7	22.9	23.5
M04048	25.2	22.9	23.3	23.9	25.7	27.6
Number of males	12	12	12	12	12	12
Mean	26.3	24.5	23.3	23.6	24.1	24.9
S.D.	2.9	2.2	2.0	1.4	2.0	2.3
Significance	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	KW	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 11-2-1. Food consumption of male rats at the recovery period

Control (vehicle: corn oil)

Male No.	Days of recovery	
	6	12
M01008	29.6	29.5
M01009	30.5	32.9
M01010	30.4	29.4
M01011	30.2	30.8
M01012	26.0	29.3
Number of males	5	5
Mean	29.3	30.4
S.D.	1.9	1.5

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 11-2-2. Food consumption of male rats at the recovery period

Und 1000 mg/kg

Male No.	Days of recovery	
	6	12
M04044	23.4	23.5
M04045	26.4	28.2
M04046	29.7	24.9
M04047	28.8	29.0
M04048	31.4	34.6
Number of males	5	5
Mean	27.9	28.0
S.D.	3.1	4.3
Significance	NS	NS
Statistical method	TT	TT

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 12-1-1. Food consumption of female rats

Control (vehicle: corn oil)

Female No.	Days of administration						
	1	7	14	29	35	41	48
F01001	19.5	15.9	19.1				
F01002	14.9	18.7	18.2				
F01003	13.5	22.0	16.8				
F01004	19.8	17.1	18.6				
F01005	21.8	15.9	21.0				
F01006	12.3	18.5	14.7				
F01007	19.7	13.6	18.2				
F01008	15.2	18.0	15.2				
F01009	13.1	18.4	15.4				
F01010	19.6	13.4	18.4				
F01011	14.5	19.6	16.7				
F01012	18.5	16.4	18.2				
Number of females	12	12	12				
Mean	16.9	17.3	17.5				
S.D.	3.3	2.5	1.8				

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 12-1-2. Food consumption of female rats

Und 100 mg/kg

Female No.	Days of administration						
	1	7	14	29	35	41	48
F02013	19.1	20.1	18.3				
F02014	21.2	22.5	14.4				
F02015	13.0	22.1	19.0				
F02016	20.2	18.5	19.0				
F02017	21.9	20.2	19.0				
F02018	17.9	16.1	17.1				
F02019	20.4	19.9	13.4				
F02020	18.5	23.8	23.0				
F02021	22.3	18.2	20.5				
F02022	18.5	17.6	13.5				
F02023	16.7	14.4	10.8				
F02024	20.8	19.9	12.7				
Number of females	12	12	12				
Mean	19.2	19.4	16.7				
S.D.	2.6	2.7	3.7				
Significance	NS	NS	NS				
Statistical method	DU	AN	DU				

NS: Not significantly different from the control group.

DU: Analysis by Dunnett's test.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 12-1-3. Food consumption of female rats

Und 300 mg/kg

Female No.	Days of administration						
	1	7	14	29	35	41	48
F03025	16.2	19.7	15.8				
F03026	17.2	24.8	20.4				
F03027	13.4	16.0	12.6				
F03028	21.7	19.5	13.8				
F03029	17.2	18.6	11.6				
F03030	12.8	18.3	10.4				
F03031	21.3	21.0	16.2				
F03032	17.3	18.2	10.9				
F03033	15.7	18.8	11.6				
F03034	22.0	21.2	16.0				
F03035	12.3	19.5	15.7				
F03036	14.4	18.8	14.5				
Number of females	12	12	12				
Mean	16.8	19.5	14.1				
S.D.	3.4	2.1	2.9				
Significance	NS	NS	*				
Statistical method	DU	AN	DU				

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

DU: Analysis by Dunnett's test.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 12-1-4. Food consumption of female rats

Und 1000 mg/kg

Female No.	Days of administration						
	1	7	14	29	35	41	48
F04037	23.1	16.1	20.5				
F04038	21.5	22.7	16.1				
F04039	19.1	18.6	12.5				
F04040	14.3	19.9	17.3				
F04041	18.3	18.3	19.9				
F04042	20.7	16.6	19.8				
F04043	24.8	22.3	23.3				
F04044	22.8	16.8	23.0				
F04045	19.4	19.6	20.4				
F04046	19.0	23.2	13.7				
F04047	20.3	18.3	13.7	17.0	17.2	21.5	21.4
F04048	20.8	21.0	13.5				
Number of females	12	12	12				
Mean	20.3	19.5	17.8				
S.D.	2.7	2.4	3.9				
Significance	*	NS	NS	---	---	---	---
Statistical method	DU	AN	DU	NA	NA	NA	NA

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

DU: Analysis by Dunnett's test.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 12-2-1. Food consumption of female rats, satellite group

Control (vehicle: corn oil)

Female No.	Days of administration						
	1	7	14	21	29	35	41
F05049	20.4	21.0	19.4	18.6	17.0	18.7	15.6
F05050	12.7	22.5	20.9	12.7	13.5	20.0	9.6
F05051	12.6	19.6	18.6	18.7	18.7	11.7	16.1
F05052	21.3	22.9	18.6	20.0	21.4	21.1	19.2
F05053	22.7	17.1	18.1	23.5	19.9	17.7	18.6
F05054	10.8	16.5	13.9	9.9	11.9	18.1	15.9
F05055	19.3	17.5	12.1	17.0	18.5	17.6	19.1
F05056	18.5	10.4	17.4	15.2	17.7	11.6	17.5
F05057	22.1	12.8	16.0	19.4	20.2	9.4	21.3
F05058	21.2	18.9	18.3	19.1	21.5	17.4	17.5
Number of females	10	10	10	10	10	10	10
Mean	18.2	17.9	17.3	17.4	18.0	16.3	17.0
S.D.	4.4	4.0	2.6	3.9	3.2	4.0	3.2

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 12-2-2. Food consumption of female rats, satellite group

Und 1000 mg/kg

Female No.	Days of administration						
	1	7	14	21	29	35	41
F06059	19.6	13.0	13.7	15.8	17.8	12.5	18.7
F06060	20.5	20.8	10.7	16.6	18.9	16.7	13.6
F06061	16.2	18.6	17.6	17.2	17.8	12.5	17.1
F06062	21.1	22.2	18.8	20.5	19.4	21.4	19.2
F06063	15.4	19.0	12.6	18.1	17.4	17.4	15.7
F06064	15.2	26.1	17.4	11.2	11.2	25.1	8.6
F06065	15.4	20.5	17.4	16.5	17.1	19.4	17.5
F06066	20.3	14.2	17.7	21.3	22.2	16.5	21.7
F06067	20.2	19.6	12.9	19.2	20.3	18.5	21.0
F06068	18.6	20.6	12.4	17.3	17.9	18.2	16.6
Number of females	10	10	10	10	10	10	10
Mean	18.3	19.5	15.1	17.4	18.0	17.8	17.0
S.D.	2.4	3.7	2.9	2.8	2.9	3.8	3.8
Significance	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 12-3-1. Food consumption of female rats at the recovery period

Control (vehicle: corn oil)

Female No.	Days of recovery	
	6	12
F05054	21.9	17.9
F05055	19.5	22.4
F05056	17.4	20.9
F05057	24.5	20.2
F05058	16.0	25.8
Number of females	5	5
Mean	19.9	21.4
S.D.	3.4	2.9

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 12-3-2. Food consumption of female rats at the recovery period

Und 1000 mg/kg

Female No.	Days ofrecovery	
	6	12
F06064	22.5	22.4
F06065	25.2	23.7
F06066	22.0	22.6
F06067	23.5	20.4
F06068	21.3	14.8
Number of females	5	5
Mean	22.9	20.8
S.D.	1.5	3.5
Significance	NS	NS
Statistical method	TT	TT

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 13-1. Food consumption in dams during pregnancy

Control (vehicle: corn oil)

Dam No.	Days of pregnancy			
	0	7	14	20
F01001	20.7	24.5	20.6	18.3
F01002	22.2	24.3	20.2	21.5
F01003	20.5	29.1	24.0	24.6
F01004	21.7	21.7	21.4	23.3
F01005	20.6	27.1	26.2	24.2
F01006	15.8	26.0	26.4	26.1
F01007	20.0	24.3	20.3	24.2
F01008	19.3	22.8	23.7	20.8
F01009	19.0	25.4	21.6	22.2
F01010	20.9	24.4	22.5	14.9
F01011	20.0	21.9	21.1	24.3
F01012	17.1	20.7	19.0	20.6
Number of dams	12	12	12	12
Mean	19.8	24.4	22.3	22.1
S.D.	1.8	2.4	2.4	3.1

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 13-2. Food consumption in dams during pregnancy

Und 100 mg/kg

Dam No.	Days of pregnancy			
	0	7	14	20
F02013	18.1	21.3	21.0	17.5
F02014	20.3	20.2	17.5	15.1
F02015	14.3	20.1	22.5	23.9
F02016	22.6	24.8	26.8	17.2
F02017	21.6	22.9	21.4	19.3
F02018	21.2	24.6	24.0	28.3
F02019	22.1	26.5	25.0	20.8
F02020	18.8	23.6	21.1	15.6
F02021	24.3	31.2	21.7	24.8
F02022	19.2	24.8	23.4	19.7
F02023	15.1	23.0	21.5	22.3
F02024	19.0	25.2	26.6	24.2
Number of dams	12	12	12	12
Mean	19.7	24.0	22.7	20.7
S.D.	3.0	3.0	2.6	4.1
Significance	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 13-3. Food consumption in dams during pregnancy

Und 300 mg/kg

Dam No.	Days of pregnancy			
	0	7	14	20
F03025	14.6	22.8	23.3	21.2
F03026	19.3	27.1	25.8	21.4
F03027	17.9	24.9	21.3	22.0
F03028	21.4	33.1	23.4	21.3
F03029	18.0	20.9	23.4	18.5
F03030	19.3	25.5	19.8	18.9
F03031	23.2	23.2	24.5	22.0
F03032	25.0	24.7	22.6	17.5
F03033	19.6	21.0	20.0	20.3
F03034	22.6	29.1	30.3	24.1
F03035	14.2	21.2	18.2	25.4
F03036	19.2	24.7	21.5	18.2
Number of dams	12	12	12	12
Mean	19.5	24.9	22.8	20.9
S.D.	3.2	3.6	3.2	2.4
Significance	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 13-4. Food consumption in dams during pregnancy

Und 1000 mg/kg

Dam No.	Days of pregnancy			
	0	7	14	20
F04037	20.9	27.7	23.1	19.2
F04038	22.6	27.8	29.0	22.2
F04039	17.2	23.9	20.9	19.3
F04040	20.4	22.5	23.0	24.4
F04041	15.5	23.4	22.6	19.7
F04042 >	16.8 >	22.4 >	19.4 >	13.5
F04043	19.9	24.5	25.4	25.2
F04044	25.4	28.0	26.2	22.2
F04045	19.0	24.8	27.1	20.4
F04046	24.3	29.0	24.4	21.2
F04048	18.3	24.8	22.7	18.7
Number of dams	10	10	10	10
Mean	20.4	25.6	24.4	21.3
S.D.	3.1	2.3	2.5	2.2
Significance	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN

>: Excluded from analysis (not pregnant)

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 14-1. Food consumption in dams during lactation

Control (vehicle: corn oil)

Dam No.	Days of lactation
	3
F01001	38.8
F01002	35.0
F01003	48.1
F01004	37.5
F01005	41.1
F01006	39.1
F01007	33.5
F01008	43.8
F01009	36.8
F01010	47.0
F01011	42.9
F01012	39.4
Number of dams	12
Mean	40.3
S.D.	4.5

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 14-2. Food consumption in dams during lactation

Und 100 mg/kg

Dam No.	Days of lactation
	3
F02013	38.0
F02014	46.0
F02015	41.8
F02016	32.2
F02017	32.1
F02018	44.2
F02019	36.4
F02020	42.4
F02021	46.9
F02022	39.6
F02023	47.0
F02024	47.9
Number of dams	12
Mean	41.2
S.D.	5.6
Significance	NS
Statistical method	KW

NS: Not significantly different from the control group.

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 14-3. Food consumption in dams during lactation

Und 300 mg/kg

Dam No.	Days of lactation
	3
F03025	37.4
F03026	33.2
F03027	34.0
F03028	36.8
F03029	38.5
F03030	38.8
F03031	33.3
F03032	34.2
F03033	39.0
F03034	37.1
F03035	41.9
F03036	41.2
Number of dams	12
Mean	37.1
S.D.	3.0
Significance	NS
Statistical method	KW

NS: Not significantly different from the control group.

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 14-4. Food consumption in dams during lactation

Und 1000 mg/kg

Dam No.	Days of lactation
	3
F04037	29.5
F04038	51.0
F04039	43.1
F04040	34.7
F04041	20.7
F04043	46.1
F04044	41.3
F04045	40.7
F04046	44.2
F04048	38.4
Number of dams	10
Mean	39.0
S.D.	8.8
Significance	NS
Statistical method	KW

NS: Not significantly different from the control group.

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 15-1. Functional findings of male rats at the last week of the dosing period

Cotrol (vehicle: corn oil)

Male No.	Righting reflex	Visual placing	Pupillary reflex	Startle reaction	Preyer's reaction	Withdrawal reflex	Eyelid reflex
M01001	2	2	2	2	+	+	+
M01002	2	2	2	2	+	+	+
M01003	2	2	2	2	+	+	+
M01004	2	2	2	2	+	+	+
M01005	2	2	2	2	+	+	+
Total	2: 5	2: 5	2: 5	2: 5	+: 5	+: 5	+: 5

2 or +, normal

Appendix 15-2. Functional findings of male rats at the last week of the dosing period

Und (100 mg/kg)

Male No.	Righting reflex	Visual placing	Pupillary reflex	Startle reaction	Preyer's reaction	Withdrawal reflex	Eyelid reflex
M02013	2	2	2	2	+	+	+
M02014	2	2	2	2	+	+	+
M02015	2	2	2	2	+	+	+
M02016	2	2	2	2	+	+	+
M02017	2	2	2	2	+	+	+
Total	2: 5	2: 5	2: 5	2: 5	+: 5	+: 5	+: 5

2 or +, normal

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 15-3. Functional findings of male rats at the last week of the dosing period

Und (300 mg/kg)

Male No.	Righting reflex	Visual placing	Pupillary reflex	Startle reaction	Preyer's reaction	Withdrawal reflex	Eyelid reflex
M03025	2	2	2	2	+	+	+
M03026	2	2	2	2	+	+	+
M03027	2	2	2	2	+	+	+
M03028	2	2	2	2	+	+	+
M03029	2	2	2	2	+	+	+
Total	2: 5	2: 5	2: 5	2: 5	+: 5	+: 5	+: 5

2 or +, normal

Appendix 15-4. Functional findings of male rats at the last week of the dosing period

Und (1000 mg/kg)

Male No.	Righting reflex	Visual placing	Pupillary reflex	Startle reaction	Preyer's reaction	Withdrawal reflex	Eyelid reflex
M04037	2	2	2	2	+	+	+
M04038	2	2	2	2	+	+	+
M04039	2	2	2	2	+	+	+
M04040	2	2	2	2	+	+	+
M04041	2	2	2	2	+	+	+
Total	2: 5	2: 5	2: 5	2: 5	+: 5	+: 5	+: 5

2 or +, normal

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 16-1. Functional findings of female rats at the last week of the dosing period

Control (vehicle: corn oil)

Female, dam

Female No.	Righting reflex	Visual placing	Pupillary reflex	Startle reaction	Preyer's reaction	Withdrawal reflex	Eyelid reflex
F01001	2	2	2	2	+	+	+
F01004	2	2	2	2	+	+	+
F01005	2	2	2	2	+	+	+
F01007	2	2	2	2	+	+	+
F01009	2	2	2	2	+	+	+
Total	2: 5	2: 5	2: 5	2: 5	+: 5	+: 5	+: 5

2 or +, normal

Appendix 16-2. Functional findings of female rats at the last week of the dosing period

Und (100 mg/kg)

Female, dam

Female No.	Righting reflex	Visual placing	Pupillary reflex	Startle reaction	Preyer's reaction	Withdrawal reflex	Eyelid reflex
F02013	2	2	2	2	+	+	+
F02016	2	2	2	2	+	+	+
F02017	2	2	2	2	+	+	+
F02018	2	2	2	2	+	+	+
F02020	2	2	2	2	+	+	+
Total	2: 5	2: 5	2: 5	2: 5	+: 5	+: 5	+: 5

2 or +, normal

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 16-3. Functional findings of female rats at the last week of the dosing period

Und (300 mg/kg)
Female, dam

Female No.	Righting reflex	Visual placing	Pupillary reflex	Startle reaction	Preyer's reaction	Withdrawal reflex	Eyelid reflex
F03025	2	2	2	2	+	+	+
F03026	2	2	2	2	+	+	+
F03027	2	2	2	2	+	+	+
F03029	2	2	2	2	+	+	+
F03031	2	2	2	2	+	+	+
Total	2: 5	2: 5	2: 5	2: 5	+: 5	+: 5	+: 5

2 or +, normal

Appendix 16-4. Functional findings of female rats at the last week of the dosing period

Und (1000 mg/kg)
Female, dam

Female No.	Righting reflex	Visual placing	Pupillary reflex	Startle reaction	Preyer's reaction	Withdrawal reflex	Eyelid reflex
F04037	2	2	2	2	+	+	+
F04040	2	2	2	2	+	+	+
F04041	2	2	2	2	+	+	+
F04044	2	2	2	2	+	+	+
F04045	2	2	2	2	+	+	+
Total	2: 5	2: 5	2: 5	2: 5	+: 5	+: 5	+: 5

2 or +, normal

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 16-5. Functional findings of female rats at the last week of the dosing period

Control (vehicle: corn oil)

Female, satelite group

Female No.	Righting reflex	Visual placing	Pupillary reflex	Startle reaction	Preyer's reaction	Withdrawal reflex	Eyelid reflex
F05049	2	2	2	2	+	+	+
F05050	2	2	2	2	+	+	+
F05051	2	2	2	2	+	+	+
F05052	2	2	2	2	+	+	+
F05053	2	2	2	2	+	+	+
Total	2: 5	2: 5	2: 5	2: 5	+: 5	+: 5	+: 5

2 or +, normal

Appendix 16-6. Functional findings of male rats and female rats at the end of the dosing period

Und (1000 mg/kg)

Female, satelite group

Female No.	Righting reflex	Visual placing	Pupillary reflex	Startle reaction	Preyer's reaction	Withdrawal reflex	Eyelid reflex
F06059	2	2	2	2	+	+	+
F06060	2	2	2	2	+	+	+
F06061	2	2	2	2	+	+	+
F06062	2	2	2	2	+	+	+
F06063	2	2	2	2	+	+	+
Total	2: 5	2: 5	2: 5	2: 5	+: 5	+: 5	+: 5

2 or +, normal

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 17-1. Assessment of grip strength of male rats at the last week of the dosing period

Control (vehicle: corn oil)

Male No.	Administration period	
	Forelimb	Hindlimb
	(kg)	(kg)
M01001	1.246	0.821
M01002	1.177	0.833
M01003	1.104	0.922
M01004	1.174	0.763
M01005	1.142	0.808
Number of males	5	5
Mean	1.169	0.829
S.D.	0.052	0.058

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 17-2. Assessment of grip strength of male rats at the last week of the dosing period

Und (100 mg/kg)

Male No.	Administration period	
	Forelimb	Hindlimb
	(kg)	(kg)
M02013	1.140	0.917
M02014	1.132	0.744
M02015	1.190	0.837
M02016	1.106	0.816
M02017	1.085	0.878
Number of males	5	5
Mean	1.131	0.838
S.D.	0.040	0.066

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 17-3. Assessment of grip strength of male rats at the last week of the dosing period

Und (300 mg/kg)

Male No.	Administration period	
	Forelimb	Hindlimb
	(kg)	(kg)
M03025	1.090	0.922
M03026	1.112	0.902
M03027	1.103	0.835
M03028	1.142	0.773
M03029	1.192	0.788
Number of males	5	5
Mean	1.128	0.844
S.D.	0.041	0.067

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 17-4. Assessment of grip strength of male rats at the last week of the dosing period

Und (1000 mg/kg)

Male No.	Administration period	
	Forelimb	Hindlimb
	(kg)	(kg)
M04037	1.138	0.863
M04038	1.143	0.759
M04039	1.188	0.843
M04040	1.077	0.728
M04041	1.172	0.851
Number of males	5	5
Mean	1.144	0.809
S.D.	0.043	0.061

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 18-1. Assessment of grip strength of female rats at the last week of the dosing period

Control (vehicle: corn oil)

Female No.	Administration period	
	Forelimb	Hindlimb
	(kg)	(kg)
F01001	1.017	0.672
F01004	0.993	0.691
F01005	1.027	0.736
F01007	1.115	0.628
F01009	1.099	0.748
Number of females	5	5
Mean	1.050	0.695
S.D.	0.054	0.049

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 18-2. Assessment of grip strength of female rats at the last week of the dosing period

Und (100 mg/kg)

Female No.	Administration period		
	Forelimb	Hindlimb	
	(kg)	(kg)	
F02013	0.977	0.795	
F02016	1.190	0.818	
F02017	1.110	0.745	
F02018	1.119	0.779	
F02020	1.038	0.781	
Number of females	5	5	
Mean	1.087	0.784	**
S.D.	0.082	0.027	

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 18-3. Assessment of grip strength of female rats at the last week of the dosing period

Und (300 mg/kg)

Female No.	Administration period		
	Forelimb	Hindlimb	
	(kg)	(kg)	
F03025	1.119	0.818	
F03026	1.202	0.758	
F03027	1.033	0.771	
F03029	1.064	0.786	
F03031	1.153	0.782	
Number of females	5	5	
Mean	1.114	0.783	**
S.D.	0.068	0.022	

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 18-4. Assessment of grip strength of female rats at the last week of the dosing period

Und (1000 mg/kg)

Female No.	Administration period		
	Forelimb	Hindlimb	
	(kg)	(kg)	
F04037	1.072	0.791	
F04040	1.113	0.740	
F04041	1.109	0.785	
F04044	1.219	0.821	
F04045	1.108	0.826	
Number of females	5	5	
Mean	1.124	0.793	**
S.D.	0.056	0.034	

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 19-1. Assessment of grip strength of female rats at the last week of the dosing period, satellite group

Control (vehicle: corn oil)

Female No.	Administration period	
	Forelimb	Hindlimb
	(kg)	(kg)
F05049	1.038	0.777
F05050	1.194	0.798
F05051	1.067	0.819
F05052	1.088	0.762
F05053	1.102	0.774
Number of females	5	5
Mean	1.098	0.786
S.D.	0.059	0.023

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 19-2. Assessment of grip strength of female rats at the last week of the dosing period, satellite group

Und (1000 mg/kg)

Female No.	Administration period	
	Forelimb	Hindlimb
	(kg)	(kg)
F06059	1.071	0.787
F06060	1.040	0.799
F06061	1.144	0.840
F06062	1.067	0.806
F06063	1.090	0.804
Number of females	5	5
Mean	1.082	0.807
S.D.	0.039	0.020

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 20-1. Motor activity of male rats at the last week of the dosing period

Control (Vehicle: corn oil)

Male No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
M01001	1232	1185	1149	1095	4661	35	22	34	24	115
M01002	962	948	712	297	2919	13	19	10	0	42
M01003	1041	1079	1071	1024	4215	24	23	30	20	97
M01004	1333	1379	1277	1261	5250	31	30	20	16	97
M01005	1175	1044	1115	984	4318	33	39	27	19	118
Number of males	5	5	5	5	5	5	5	5	5	5
Mean	1149	1127	1065	932	4273	27	27	24	16	94
S.D.	148	164	212	371	858	9	8	9	9	31

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 20-2. Motor activity of male rats at the last week of the dosing period

Und (100 mg/kg)

Male No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
M02013	928	1002	727	602	3259	21	27	9	8	65
M02014	981	918	378	522	2799	16	18	2	6	42
M02015	1281	1136	945	966	4328	22	24	12	11	69
M02016	1219	1188	1098	988	4493	31	30	20	17	98
M02017	1871	1807	1692	1178	6548	30	25	29	7	91
Number of males	5	5	5	5	5	5	5	5	5	5
Mean	1256	1210	968	851	4285	24	25	14	10	73
S.D.	375	350	487	278	1451	6	4	10	4	22

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 20-3. Motor activity of male rats at the last week of the dosing period

Und (300 mg/kg)

Male No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
M03025	1113	1012	1050	879	4054	29	23	19	9	80
M03026	738	680	744	750	2912	17	20	17	41	95
M03027	1128	1071	980	924	4103	27	26	16	13	82
M03028	1345	1241	1206	910	4702	31	19	27	17	94
M03029	974	868	849	721	3412	27	18	19	9	73
Number of males	5	5	5	5	5	5	5	5	5	5
Mean	1060	974	966	837	3837	26	21	20	18	85
S.D.	223	212	179	94	690	5	3	4	13	9

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 20-4. Motor activity of male rats at the last week of the dosing period

Und (1000 mg/kg)

Male No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
M04037	1256	1096	1041	908	4301	20	18	17	16	71
M04038	1188	1117	1233	1200	4738	25	28	25	33	111
M04039	1079	901	790	810	3580	33	31	13	20	97
M04040	1030	1118	770	976	3894	24	33	26	12	95
M04041	1191	1179	1170	799	4339	25	18	20	10	73
Number of males	5	5	5	5	5	5	5	5	5	5
Mean	1149	1082	1001	939	4170	25	26	20	18	89
S.D.	92	106	213	163	445	5	7	5	9	17

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 21-1. Motor activity of female rats at the last week of the dosing period

Control (Vehicle: corn oil)

Female No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
F01001	1010	826	732	718	3286	20	21	16	2	59
F01004	1178	895	636	468	3177	23	9	6	2	40
F01005	1257	867	512	297	2933	32	7	5	0	44
F01007	981	1079	550	524	3134	24	26	5	7	62
F01009	1188	1172	796	609	3765	21	30	4	1	56
Number of females	5	5	5	5	5	5	5	5	5	5
Mean	1123	968	645	523	3259	24	19	7	2	52
S.D.	121	150	120	158	310	5	10	5	3	10

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 21-2. Motor activity of female rats at the last week of the dosing period

Und (100 mg/kg)

Female No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
F02013	412	473	632	7	1524	23	17	0	13	53
F02016	985	671	747	421	2824	29	8	14	0	51
F02017	1059	810	784	641	3294	21	13	4	5	43
F02018	1080	1089	831	828	3828	20	18	16	9	63
F02020	777	729	640	517	2663	10	7	11	0	28
Number of females	5	5	5	5	5	5	5	5	5	5
Mean	863	754	727	483	2827	21	13	9	5	48
S.D.	279	225	88	306	858	7	5	7	6	13

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 21-3. Motor activity of female rats at the last week of the dosing period

Und (300 mg/kg)

Female No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
F03025	1255	1162	784	825	4026	27	23	10	2	62
F03026	475	553	508	377	1913	24	5	6	5	40
F03027	957	1000	653	779	3389	9	24	1	8	42
F03029	945	645	336	33	1959	17	5	1	0	23
F03031	1007	923	650	603	3183	18	16	4	5	43
Number of females	5	5	5	5	5	5	5	5	5	5
Mean	928	857	586	523	2894	19	15	4	4	42
S.D.	283	253	171	326	928	7	9	4	3	14

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 21-4. Motor activity of female rats at the last week of the dosing period

Und (1000 mg/kg)

Female No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
F04037	1902	1616	1450	1295	6263	31	2	5	7	45
F04040	1328	1056	977	821	4182	43	13	17	14	87
F04041	1220	1021	956	842	4039	42	19	22	21	104
F04044	880	720	766	584	2950	42	12	11	0	65
F04045	871	573	693	443	2580	17	5	10	3	35
Number of females	5	5	5	5	5	5	5	5	5	5
Mean	1240	997	968 *	797	4003	35	10	13	9	67
S.D.	422	401	295	325	1438	11	7	7	9	29

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 22-1. Motor activity of female rats at the last week of the dosing period, satellite group

Control (Vehicle: corn oil)

Female No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
F05049	1066	963	730	784	3543	22	27	20	23	92
F05050	926	1031	904	1016	3877	31	39	25	34	129
F05051	650	604	608	588	2450	20	20	3	9	52
F05052	1324	922	868	1125	4239	29	11	10	20	70
F05053	1198	1214	1081	769	4262	29	31	12	9	81
Number of females	5	5	5	5	5	5	5	5	5	5
Mean	1033	947	838	856	3674	26	26	14	19	85
S.D.	260	222	179	214	745	5	11	9	11	29

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 22-2. Motor activity of female rats at the last week of the dosing period, satellite group

Und (1000 mg/kg)

Female No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
F06059	1121	873	876	671	3541	14	14	18	5	51
F06060	1261	1305	1245	1438	5249	42	53	29	39	163
F06061	1239	856	1173	955	4223	37	17	34	15	103
F06062	1346	1108	1109	1417	4980	51	46	32	73	202
F06063	1413	1464	1283	1191	5351	34	50	27	18	129
Number of females	5	5	5	5	5	5	5	5	5	5
Mean	1276	1121	1137 *	1134	4669	36	36	28 *	30	130
S.D.	111	266	161	325	770	14	19	6	27	58

Significantly different from the control group (*: P<0.05, **: P<0.01).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 22-3. Motor activity of female rats at the recovery period

Control (Vehicle: corn oil)

Female No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
F05054	1189	1217	926	1266	4598	34	34	11	39	118
F05055	1340	1135	1007	836	4318	55	40	23	15	133
F05056	1225	1081	1113	971	4390	30	26	15	16	87
F05057	1431	1353	1216	992	4992	45	42	32	27	146
F05058	1034	1125	544	409	3112	21	17	2	5	45
Number of females	5	5	5	5	5	5	5	5	5	5
Mean	1244	1182	961	895	4282	37	32	17	20	106
S.D.	151	107	258	313	705	13	10	11	13	40

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 22-4. Motor activity of female rats at the recovery period

Und (1000 mg/kg)

Female No.	Administration period									
	Ambulation (counts)					Rearing (counts)				
	5min	10min	15min	20min	Total	5min	10min	15min	20min	Total
F06064	1261	1311	1324	1132	5028	33	43	39	18	133
F06065	1097	1008	907	967	3979	32	28	23	26	109
F06066	1252	957	1008	1033	4250	34	20	16	17	87
F06067	827	734	699	601	2861	34	36	23	14	107
F06068	1184	1000	840	678	3702	40	16	14	13	83
Number of females	5	5	5	5	5	5	5	5	5	5
Mean	1124	1002	956	882	3964	35	29	23	18	104
S.D.	179	206	235	231	790	3	11	10	5	20

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-1-1. Urinalysis in male rats

Control (vehicle: corn oil)

Male No.	Quality									Urinary sediments				
	pH	Protein	Glucose	Ketone	Bilirubin	Occult blood	Urobilinogen	Color	Turbidity	Red blood cells	White blood cells	Casts	Crystals	Epithelial cells
M01001	6.5	2+	-	+	-	-	+	light yellow	-	-	-	-	-	-
M01002	7.5	2+	-	+	-	-	+	light yellow	+	-	-	-	±	-
M01003	7.5	3+	2+	±	-	3+	±	bloody	3+	3+	-	-	-	-
M01004	7.0	2+	-	+	-	-	+	light yellow	-	-	-	-	±	-
M01005	7.0	2+	-	+	-	-	2+	light yellow	-	-	-	-	±	-

Protein, -: negative; ±: 10≦and＜30 mg/dL; +: 30≦and＜100 mg/dL; 2+: 100≦and＜300 mg/dL; 3+: 300≦and＜600 mg/dL; 4+: 600 mg/dL≦

Glucose, -: negative; ±: 30≦and＜70 mg/dL; +: 70≦and＜150 mg/dL; 2+: 150≦and＜300 mg/dL; 3+: 300≦and＜1,000 mg/dL; 4+: 1,000 mg/dL≦

Ketone, -: negative; ±(5≦and＜10 mg/dL; +: 10≦and＜40 mg/dL; 2+: 40≦and＜80 mg/dL; 3+: 80≦and＜150 mg/dL; 4+: 150 mg/dL≦

Bilirubin, -: negative; +: 0.5≦and＜2.0 mg/dL; 2+: 2.0≦and＜6.0 mg/dL; 3+: 6.0≦and＜10.0 mg/dL; 4+: 10.0 mg/dL≦

Occult blood, -: negative; ±: 0.03≦and＜0.06 mg/dL; +: 0.06≦and＜0.20 mg/dL; 2+: 0.20≦and＜1.00 mg/dL; 3+: 1.00 mg/dL≦

Urobilinogen, ±: normal; +: 2.0≦and＜4.0 mg/dL; 2+: 4.0≦and＜8.0 mg/dL; 3+: 8.0≦and＜12.0 mg/dL; 4+: 12.0 mg/dL≦

Turbidity, -: negative; ±: trace; +: slight; 2+: moderate; 3+: marked

Red Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

White Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Casts, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Cristals, -: not observed; ±: a few; +: abundant

Epithelial cells, -: not observed; ±: a few; +: abundant

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-1-1 (continued). Urinalysis in male rats

Control (vehicle: corn oil)

Male No.	Urine volume	S.G.	Electrolyte, density			Electrolyte, gross volume		
			Na	K	Cl	Na	K	Cl
	mL/24hr		mEq/L	mEq/L	mEq/L	mEq/24hr	mEq/24hr	mEq/24hr
M01001	8.5	1.082	87.9	370.0	164.6	0.75	3.15	1.40
M01002	10.2	1.077	148.5	346.4	188.7	1.51	3.53	1.92
M01003	21.9	1.040	37.7	121.7	29.6	0.83	2.66	0.65
M01004	22.2	1.039	70.5	183.8	94.0	1.57	4.08	2.09
M01005	7.4	1.084	161.7	350.4	189.2	1.20	2.59	1.40
Number of males	5	5	5	5	5	5	5	5
Mean	14.0	1.064	101.3	274.5	133.2	1.17	3.20	1.49
S.D.	7.4	0.023	52.6	113.6	69.8	0.38	0.62	0.56

S.G.: Specific gravity

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-1-2. Urinalysis in male rats

Und 100 mg/kg

Male No.	Quality									Urinary sediments				
	pH	Protein	Glucose	Ketone	Bilirubin	Occult blood	Urobilinogen	Color	Turbidity	Red blood cells	White blood cells	Casts	Crystals	Epithelial cells
M02013	6.5	2+	-	+	-	-	+	light yellow	-	-	-	-	±	-
M02014	7.0	+	-	+	-	-	+	light yellow	-	-	-	-	±	-
M02015	7.0	2+	-	+	-	-	+	light yellow	-	-	-	-	±	-
M02016	7.5	+	-	+	-	-	±	light yellow	-	-	-	-	±	-
M02017	7.0	+	-	+	-	-	+	light yellow	-	-	-	-	+	-

Protein, -: negative; ±: 10≦and＜30 mg/dL; +: 30≦and＜100 mg/dL; 2+: 100≦and＜300 mg/dL; 3+: 300≦and＜600 mg/dL; 4+: 600 mg/dL≦

Glucose, -: negative; ±: 30≦and＜70 mg/dL; +: 70≦and＜150 mg/dL; 2+: 150≦and＜300 mg/dL; 3+: 300≦and＜1,000 mg/dL; 4+: 1,000 mg/dL≦

Ketone, -: negative; ±(5≦and＜10 mg/dL; +: 10≦and＜40 mg/dL; 2+: 40≦and＜80 mg/dL; 3+: 80≦and＜150 mg/dL; 4+: 150 mg/dL≦

Bilirubin, -: negative; +: 0.5≦and＜2.0 mg/dL; 2+: 2.0≦and＜6.0 mg/dL; 3+: 6.0≦and＜10.0 mg/dL; 4+: 10.0 mg/dL≦

Occult blood, -: negative; ±: 0.03≦and＜0.06 mg/dL; +: 0.06≦and＜0.20 mg/dL; 2+: 0.20≦and＜1.00 mg/dL; 3+: 1.00 mg/dL≦

Urobilinogen, ±: normal; +: 2.0≦and＜4.0 mg/dL; 2+: 4.0≦and＜8.0 mg/dL; 3+: 8.0≦and＜12.0 mg/dL; 4+: 12.0 mg/dL≦

Turbidity, -: negative; ±: trace; +: slight; 2+: moderate; 3+: marked

Red Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

White Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field, 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Casts, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Cristals, -: not observed; ±: a few; +: abundant

Epithelial cells, -: not observed; ±: a few; +: abundant

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-1-2 (continued). Urinalysis in male rats

Und 100 mg/kg

Male No.	Urine volume	S.G.	Electrolyte, density			Electrolyte, gross volume		
			Na	K	Cl	Na	K	Cl
	mL/24hr		mEq/L	mEq/L	mEq/L	mEq/24hr	mEq/24hr	mEq/24hr
M02013	6.6	1.077	38.9	178.1	63.6	0.26	1.18	0.42
M02014	13.7	1.066	138.7	317.5	173.4	1.90	4.35	2.38
M02015	17.0	1.040	63.4	151.7	67.8	1.08	2.58	1.15
M02016	10.0	1.082	197.7	361.2	210.8	1.98	3.61	2.11
M02017	12.6	1.064	113.4	313.9	166.8	1.43	3.95	2.10
Number of males	5	5	5	5	5	5	5	5
Mean	12.0	1.066	110.4	264.5	136.5	1.33	3.13	1.63
S.D.	3.9	0.016	62.8	93.2	66.8	0.70	1.27	0.82
Significance	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN

S.G.: Specific gravity

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-1-3. Urinalysis in male rats

Und 300 mg/kg

Male No.	Quality									Urinary sediments				
	pH	Protein	Glucose	Ketone	Bilirubin	Occult blood	Urobilinogen	Color	Turbidity	Red blood cells	White blood cells	Casts	Crystals	Epithelial cells
M03025	6.5	2+	-	+	-	-	+	light yellow	+	-	-	-	±	-
M03026	7.0	3+	±	+	-	-	2+	yellow	-	-	-	-	±	-
M03027	7.0	2+	-	+	-	2+	+	light yellow	-	2+	±	-	±	-
M03028	7.0	2+	-	+	-	2+	2+	light yellow	-	-	-	-	±	-
M03029	6.5	2+	-	+	-	2+	+	light yellow	-	2+	±	-	±	-

Protein, -: negative; ±: 10≦and＜30 mg/dL; +: 30≦and＜100 mg/dL; 2+: 100≦and＜300 mg/dL; 3+: 300≦and＜600 mg/dL; 4+: 600 mg/dL≦

Glucose, -: negative; ±: 30≦and＜70 mg/dL; +: 70≦and＜150 mg/dL; 2+: 150≦and＜300 mg/dL; 3+: 300≦and＜1,000 mg/dL; 4+: 1,000 mg/dL≦

Ketone, -: negative; ±(5≦and＜10 mg/dL; +: 10≦and＜40 mg/dL; 2+: 40≦and＜80 mg/dL; 3+: 80≦and＜150 mg/dL; 4+: 150 mg/dL≦

Bilirubin, -: negative; +: 0.5≦and＜2.0 mg/dL; 2+: 2.0≦and＜6.0 mg/dL; 3+: 6.0≦and＜10.0 mg/dL; 4+: 10.0 mg/dL≦

Occult blood, -: negative; ±: 0.03≦and＜0.06 mg/dL; +: 0.06≦and＜0.20 mg/dL; 2+: 0.20≦and＜1.00 mg/dL; 3+: 1.00 mg/dL≦

Urobilinogen, ±: normal; +: 2.0≦and＜4.0 mg/dL; 2+: 4.0≦and＜8.0 mg/dL; 3+: 8.0≦and＜12.0 mg/dL; 4+: 12.0 mg/dL≦

Turbidity, -: negative; ±: trace; +: slight; 2+: moderate; 3+: marked

Red Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

White Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field, 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Casts, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Cristals, -: not observed; ±: a few; +: abundant

Epithelial cells, -: not observed; ±: a few; +: abundant

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-1-3 (continued). Urinalysis in male rats

Und 300 mg/kg

Male No.	Urine volume	S.G.	Electrolyte, density			Electrolyte, gross volume		
			Na	K	Cl	Na	K	Cl
	mL/24hr		mEq/L	mEq/L	mEq/L	mEq/24hr	mEq/24hr	mEq/24hr
M03025	8.7	1.084	198.8	373.5	242.1	1.73	3.25	2.11
M03026	6.6	1.092	162.6	388.7	200.4	1.07	2.57	1.32
M03027	15.0	1.054	111.8	261.6	146.2	1.68	3.92	2.19
M03028	9.2	1.076	185.4	333.2	206.2	1.71	3.07	1.90
M03029	20.2	1.043	103.7	197.4	120.7	2.09	3.99	2.44
Number of males	5	5	5	5	5	5	5	5
Mean	11.9	1.070	152.5	310.9	183.1	1.66	3.36	1.99
S.D.	5.6	0.021	42.9	80.3	48.9	0.37	0.60	0.42
Significance	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN

S.G.: Specific gravity

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-1-4. Urinalysis in male rats

Und 1000 mg/kg

Male No.	Quality									Urinary sediments				
	pH	Protein	Glucose	Ketone	Bilirubin	Occult blood	Urobilinogen	Color	Turbidity	Red blood cells	White blood cells	Casts	Crystals	Epithelial cells
M04037	7.0	+	-	+	-	-	+	light yellow	-	-	-	-	±	-
M04038	8.5	+	-	±	-	-	±	light yellow	-	-	-	-	±	-
M04039	6.5	2+	-	+	-	-	+	light yellow	-	-	-	-	±	-
M04040	7.0	2+	-	+	-	-	+	light yellow	-	-	-	-	±	-
M04041	7.0	+	-	+	-	-	+	light yellow	-	-	-	-	±	-

Protein, -: negative; ±: 10≦and＜30 mg/dL; +: 30≦and＜100 mg/dL; 2+: 100≦and＜300 mg/dL; 3+: 300≦and＜600 mg/dL; 4+: 600 mg/dL≦

Glucose, -: negative; ±: 30≦and＜70 mg/dL; +: 70≦and＜150 mg/dL; 2+: 150≦and＜300 mg/dL; 3+: 300≦and＜1,000 mg/dL; 4+: 1,000 mg/dL≦

Ketone, -: negative, ±(5≦and＜10 mg/dL; +: 10≦and＜40 mg/dL; 2+: 40≦and＜80 mg/dL; 3+: 80≦and＜150 mg/dL; 4+: 150 mg/dL≦

Bilirubin, -: negative; +: 0.5≦and＜2.0 mg/dL; 2+: 2.0≦and＜6.0 mg/dL; 3+: 6.0≦and＜10.0 mg/dL; 4+: 10.0 mg/dL≦

Occult blood, -: negative; ±: 0.03≦and＜0.06 mg/dL; +: 0.06≦and＜0.20 mg/dL; 2+: 0.20≦and＜1.00 mg/dL; 3+: 1.00 mg/dL≦

Urobilinogen, ±: normal; +: 2.0≦and＜4.0 mg/dL; 2+: 4.0≦and＜8.0 mg/dL; 3+: 8.0≦and＜12.0 mg/dL; 4+: 12.0 mg/dL≦

Turbidity, -: negative; ±: trace; +: slight; 2+: moderate; 3+: marked

Red Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

White Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field, 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Casts, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Cristals, -: not observed; ±: a few; +: abundant

Epithelial cells, -: not observed; ±: a few; +: abundant

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-1-4 (continued). Urinalysis in male rats

Und 1000 mg/kg

Male No.	Urine volume	S.G.	Electrolyte, density			Electrolyte, gross volume		
			Na	K	Cl	Na	K	Cl
	mL/24hr		mEq/L	mEq/L	mEq/L	mEq/24hr	mEq/24hr	mEq/24hr
M04037	10.8	1.076	151.5	349.4	202.0	1.64	3.77	2.18
M04038	14.0	1.063	128.3	290.2	184.4	1.80	4.06	2.58
M04039	8.2	1.076	197.5	370.3	220.0	1.62	3.04	1.80
M04040	8.7	1.071	152.9	327.4	185.3	1.33	2.85	1.61
M04041	16.0	1.057	128.5	260.8	155.6	2.06	4.17	2.49
Number of males	5	5	5	5	5	5	5	5
Mean	11.5	1.069	151.7	319.6	189.5	1.69	3.58	2.13
S.D.	3.4	0.008	28.2	44.3	23.9	0.27	0.60	0.42
Significance	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN

S.G.: Specific gravity

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-2-1. Urinalysis in male rats of the recovery period

Control (vehicle: corn oil)

Male No.	Quality									Urinary sediments				
	pH	Protein	Glucose	Ketone	Bilirubin	Occult blood	Urobilinogen	Color	Turbidity	Red blood cells	White blood cells	Casts	Crystals	Epithelial cells
M01008	7.0	2+	-	+	-	-	+	light yellow	+	-	-	-	±	-
M01009	7.0	2+	-	±	-	+	+	light yellow	-	-	-	-	±	-
M01010	8.5	+	-	±	-	-	±	light yellow	-	-	-	-	±	-
M01011	7.5	+	-	±	-	-	±	light yellow	-	-	-	-	±	-
M01012	7.5	+	-	±	-	-	±	light yellow	-	-	-	-	±	-

Protein, -: negative; ±: 10≦and＜30 mg/dL; +: 30≦and＜100 mg/dL; 2+: 100≦and＜300 mg/dL; 3+: 300≦and＜600 mg/dL; 4+: 600 mg/dL≦

Glucose, -: negative; ±: 30≦and＜70 mg/dL; +: 70≦and＜150 mg/dL; 2+: 150≦and＜300 mg/dL; 3+: 300≦and＜1,000 mg/dL; 4+: 1,000 mg/dL≦

Ketone, -: negative; ±(5≦and＜10 mg/dL; +: 10≦and＜40 mg/dL; 2+: 40≦and＜80 mg/dL; 3+: 80≦and＜150 mg/dL; 4+: 150 mg/dL≦

Bilirubin, -: negative; +: 0.5≦and＜2.0 mg/dL; 2+: 2.0≦and＜6.0 mg/dL; 3+: 6.0≦and＜10.0 mg/dL; 4+: 10.0 mg/dL≦

Occult blood, -: negative; ±: 0.03≦and＜0.06 mg/dL; +: 0.06≦and＜0.20 mg/dL; 2+: 0.20≦and＜1.00 mg/dL; 3+: 1.00 mg/dL≦

Urobilinogen, ±: normal; +: 2.0≦and＜4.0 mg/dL; 2+: 4.0≦and＜8.0 mg/dL; 3+: 8.0≦and＜12.0 mg/dL; 4+: 12.0 mg/dL≦

Turbidity, -: negative; ±: trace; +: slight; 2+: moderate; 3+: marked

Red Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

White Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field, 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Casts, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Cristals, -: not observed; ±: a few; +: abundant

Epithelial cells, -: not observed; ±: a few; +: abundant

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-2-1 (continued). Urinalysis in male rats of the recovery period

Control (vehicle: corn oil)

Male No.	Urine volume	S.G.	Electrolyte, density			Electrolyte, gross volume		
			Na	K	Cl	Na	K	Cl
	mL/24hr		mEq/L	mEq/L	mEq/L	mEq/24hr	mEq/24hr	mEq/24hr
M01008	12.1	1.070	125.0	322.7 §	165.0	1.51	3.90	2.00
M01009	18.3	1.063	157.2	286.5	183.3	2.88	5.24	3.35
M01010	13.9	1.048	76.3	137.9	37.9	1.06	1.92	0.53
M01011	19.6	1.047	71.5	199.5	92.0	1.40	3.91	1.80
M01012	18.5	1.053	85.1	228.1	116.4	1.57	4.22	2.15
Number of males	5	5	5	5	5	5	5	5
Mean	16.5	1.056	103.0	234.9	118.9	1.68	3.84	1.97
S.D.	3.3	0.010	36.9	72.6	58.2	0.70	1.20	1.01

§, The re-measurement was carried out because the difference between two measured values exceeded the permissible limit. The re-measured values were employed as the data.

S.G.: Specific gravity

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-2-2. Urinalysis in male rats of the recovery period

Und 1000 mg/kg

Male No.	Quality									Urinary sediments					
	pH	Protein	Glucose	Ketone	Bilirubin	Occult blood	Urobilinogen	Color	Turbidity	Red blood cells	White blood cells	Casts	Crystals	Epithelial cells	
M04044	7.0	+	-	±	-	-	±	light yellow	-	-	-	-	±	-	
M04045	≧9.0	2+	-	-	-	-	±	light yellow	-	-	-	-	±	-	
M04046	7.0	2+	-	+	-	-	+	light yellow	-	-	-	-	±	-	
M04047	8.0	+	-	+	-	-	+	light yellow	+	-	-	-	±	-	
M04048	7.0	+	-	+	-	-	+	light yellow	-	-	-	-	±	-	

Protein, -: negative; ±: 10≦and＜30 mg/dL; +: 30≦and＜100 mg/dL; 2+: 100≦and＜300 mg/dL; 3+: 300≦and＜600 mg/dL; 4+: 600 mg/dL≦

Glucose, -: negative; ±: 30≦and＜70 mg/dL; +: 70≦and＜150 mg/dL; 2+: 150≦and＜300 mg/dL; 3+: 300≦and＜1,000 mg/dL; 4+: 1,000 mg/dL≦

Ketone, -: negative; ±(5≦and＜10 mg/dL; +: 10≦and＜40 mg/dL; 2+: 40≦and＜80 mg/dL; 3+: 80≦and＜150 mg/dL; 4+: 150 mg/dL≦

Bilirubin, -: negative; +: 0.5≦and＜2.0 mg/dL; 2+: 2.0≦and＜6.0 mg/dL; 3+: 6.0≦and＜10.0 mg/dL; 4+: 10.0 mg/dL≦

Occult blood, -: negative; ±: 0.03≦and＜0.06 mg/dL; +: 0.06≦and＜0.20 mg/dL; 2+: 0.20≦and＜1.00 mg/dL; 3+: 1.00 mg/dL≦

Urobilinogen, ±: normal; +: 2.0≦and＜4.0 mg/dL; 2+: 4.0≦and＜8.0 mg/dL; 3+: 8.0≦and＜12.0 mg/dL; 4+: 12.0 mg/dL≦

Turbidity, -: negative; ±: trace; +: slight; 2+: moderate; 3+: marked

Red Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

White Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field, 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Casts, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Cristals, -: not observed; ±: a few; +: abundant

Epithelial cells, -: not observed; ±: a few; +: abundant

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 23-2-2 (continued). Urinalysis in male rats of the recovery period

Und 1000 mg/kg

Male No.	Urine volume	S.G.	Electrolyte, density			Electrolyte, gross volume		
			Na	K	Cl	Na	K	Cl
	mL/24hr		mEq/L	mEq/L	mEq/L	mEq/24hr	mEq/24hr	mEq/24hr
M04044	31.1	1.032	73.4	150.6	84.8	2.28	4.68	2.64
M04045	15.7	1.066	102.4	316.6 §	144.5	1.61	4.97	2.27
M04046	13.7	1.073	138.4	327.0 §	187.3	1.90	4.48	2.57
M04047	14.8	1.071	124.9	335.6 §	180.1	1.85	4.97	2.67
M04048	11.3	1.080	146.7	344.4 §	161.9	1.66	3.89	1.83
Number of males	5	5	5	5	5	5	5	5
Mean	17.3	1.064	117.2	294.8	151.7	1.86	4.60	2.40
S.D.	7.9	0.019	29.6	81.3	40.9	0.26	0.45	0.35
Significance	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT

§, The re-measurement was carried out because the difference between two measured values exceeded the permissible limit. The re-measured values were employed as the data.

S.G.: Specific gravity

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 24-1-1. Urinalysis in female rats, satellite group

Control (vehicle: corn oil)

Female No.	Quality									Urinary sediments				
	pH	Protein	Glucose	Ketone	Bilirubin	Occult blood	Urobilinogen	Color	Turbidity	Red blood cells	White blood cells	Casts	Crystals	Epithelial cells
F05049	6.5	2+	-	+	-	-	+	light yellow	-	-	-	-	±	-
F05050	7.0	±	-	±	-	-	±	light yellow	-	-	-	-	-	-
F05051	6.0	+	-	+	-	-	+	light yellow	-	-	-	-	±	-
F05052	6.5	+	-	±	-	-	±	light yellow	-	-	-	-	-	-
F05053	6.5	+	-	-	-	-	±	light yellow	-	-	-	-	±	-

Protein, -: negative; ±: 10≦and＜30 mg/dL; +: 30≦and＜100 mg/dL; 2+: 100≦and＜300 mg/dL; 3+: 300≦and＜600 mg/dL; 4+: 600 mg/dL≦

Glucose, -: negative; ±: 30≦and＜70 mg/dL; +: 70≦and＜150 mg/dL; 2+: 150≦and＜300 mg/dL; 3+: 300≦and＜1,000 mg/dL; 4+: 1,000 mg/dL≦

Ketone, -: negative; ±(5≦and＜10 mg/dL; +: 10≦and＜40 mg/dL; 2+: 40≦and＜80 mg/dL; 3+: 80≦and＜150 mg/dL; 4+: 150 mg/dL≦

Bilirubin, -: negative; +: 0.5≦and＜2.0 mg/dL; 2+: 2.0≦and＜6.0 mg/dL; 3+: 6.0≦and＜10.0 mg/dL; 4+: 10.0 mg/dL≦

Occult blood, -: negative; ±: 0.03≦and＜0.06 mg/dL; +: 0.06≦and＜0.20 mg/dL; 2+: 0.20≦and＜1.00 mg/dL; 3+: 1.00 mg/dL≦

Urobilinogen, ±: normal; +: 2.0≦and＜4.0 mg/dL; 2+: 4.0≦and＜8.0 mg/dL; 3+: 8.0≦and＜12.0 mg/dL; 4+: 12.0 mg/dL≦

Turbidity, -: negative; ±: trace; +: slight; 2+: moderate; 3+: marked

Red Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

White Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field, 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Casts, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Cristals, -: not observed; ±: a few; +: abundant

Epithelial cells, -: not observed; ±: a few; +: abundant

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 24-1-1 (continued). Urinalysis in female rats, satellite group

Control (vehicle: corn oil)

Female No.	Urine volume	S.G.	Electrolyte, density			Electrolyte, gross volume		
			Na	K	Cl	Na	K	Cl
	mL/24hr		mEq/L	mEq/L	mEq/L	mEq/24hr	mEq/24hr	mEq/24hr
F05049	9.0	1.056	90.1	260.9	154.1	0.81	2.35	1.39
F05050	10.6	1.056	109.7	201.7	106.3	1.16	2.14	1.13
F05051	12.7	1.047	94.4	240.4	142.6	1.20	3.05	1.81
F05052	12.4	1.031	54.5	97.5	49.2	0.68	1.21	0.61
F05053	12.4	1.044	62.8	172.9	77.3	0.78	2.14	0.96
Number of females	5	5	5	5	5	5	5	5
Mean	11.4	1.047	82.3	194.7	105.9	0.93	2.18	1.18
S.D.	1.6	0.010	23.0	64.1	43.9	0.24	0.66	0.45

S.G.: Specific gravity

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 24-1-2. Urinalysis in female rats, satellite group

Und 1000 mg/kg

Female No.	Quality									Urinary sediments				
	pH	Protein	Glucose	Ketone	Bilirubin	Occult blood	Urobilinogen	Color	Turbidity	Red blood cells	White blood cells	Casts	Crystals	Epithelial cells
F06059	7.0	±	-	±	-	-	±	light yellow	-	-	-	-	-	-
F06060	6.5	-	-	-	-	-	±	light yellow	-	-	-	-	-	-
F06061	7.0	+	-	±	-	-	±	light yellow	-	-	-	-	±	-
F06062	6.5	+	-	+	-	-	+	light yellow	-	-	-	-	±	-
F06063	6.5	±	-	±	-	-	±	light yellow	-	-	-	-	-	-

Protein, -: negative; ±: 10≦and＜30 mg/dL; +: 30≦and＜100 mg/dL; 2+: 100≦and＜300 mg/dL; 3+: 300≦and＜600 mg/dL; 4+: 600 mg/dL≦

Glucose, -: negative; ±: 30≦and＜70 mg/dL; +: 70≦and＜150 mg/dL; 2+: 150≦and＜300 mg/dL; 3+: 300≦and＜1,000 mg/dL; 4+: 1,000 mg/dL≦

Ketone, -: negative; ±(5≦and＜10 mg/dL; +: 10≦and＜40 mg/dL; 2+: 40≦and＜80 mg/dL; 3+: 80≦and＜150 mg/dL; 4+: 150 mg/dL≦

Bilirubin, -: negative; +: 0.5≦and＜2.0 mg/dL; 2+: 2.0≦and＜6.0 mg/dL; 3+: 6.0≦and＜10.0 mg/dL; 4+: 10.0 mg/dL≦

Occult blood, -: negative; ±: 0.03≦and＜0.06 mg/dL; +: 0.06≦and＜0.20 mg/dL; 2+: 0.20≦and＜1.00 mg/dL; 3+: 1.00 mg/dL≦

Urobilinogen, ±: normal; +: 2.0≦and＜4.0 mg/dL; 2+: 4.0≦and＜8.0 mg/dL; 3+: 8.0≦and＜12.0 mg/dL; 4+: 12.0 mg/dL≦

Turbidity, -: negative; ±: trace; +: slight; 2+: moderate; 3+: marked

Red Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

White Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field, 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Casts, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Cristals, -: not observed; ±: a few; +: abundant

Epithelial cells, -: not observed; ±: a few; +: abundant

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 24-1-2 (continued). Urinalysis in female rats, satellite group

Und 1000 mg/kg

Female No.	Urine volume	S.G.	Electrolyte, density			Electrolyte, gross volume		
			Na	K	Cl	Na	K	Cl
	mL/24hr		mEq/L	mEq/L	mEq/L	mEq/24hr	mEq/24hr	mEq/24hr
F06059	9.9	1.058	115.8	253.5	151.6	1.15	2.51	1.50
F06060	21.2	1.026	47.4	117.2	60.9	1.00	2.48	1.29
F06061	6.3	1.047	72.1	123.0	69.6	0.45	0.77	0.44
F06062	8.3	1.078	124.4	362.3 §	187.6	1.03	3.01	1.56
F06063	12.6	1.048	105.1	221.6	129.1	1.32	2.79	1.63
Number of females	5	5	5	5	5	5	5	5
Mean	11.7	1.051	93.0	215.5	119.8	0.99	2.31	1.28
S.D.	5.8	0.019	32.3	101.6	54.0	0.33	0.89	0.49
Significance	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AW	TT	TT	TT	TT	TT	TT	TT

§, The re-measurement was carried out because the difference between two measured values exceeded the permissible limit. The re-measured values were employed as the data.

S.G.: Specific gravity

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

AW: Analysis by Aspin-Welch t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 24-2-1. Urinalysis in female rats of the recovery period

Control (vehicle: corn oil)

Female No.	Quality									Urinary sediments				
	pH	Protein	Glucose	Ketone	Bilirubin	Occult blood	Urobilinogen	Color	Turbidity	Red blood cells	White blood cells	Casts	Crystals	Epithelial cells
F05054	7.5	±	-	-	-	-	±	light yellow	-	-	-	-	±	-
F05055	7.0	+	-	±	-	-	+	light yellow	-	-	-	-	±	-
F05056	7.0	-	-	-	-	-	±	light yellow	-	-	-	-	-	-
F05057	6.5	2+	-	+	-	-	+	yellow	-	-	-	-	-	-
F05058	7.0	±	-	-	-	-	±	light yellow	-	-	-	-	±	-

Protein, -: negative; ±: 10≦and＜30 mg/dL; +: 30≦and＜100 mg/dL; 2+: 100≦and＜300 mg/dL; 3+: 300≦and＜600 mg/dL; 4+: 600 mg/dL≦

Glucose, -: negative; ±: 30≦and＜70 mg/dL; +: 70≦and＜150 mg/dL; 2+: 150≦and＜300 mg/dL; 3+: 300≦and＜1,000 mg/dL; 4+: 1,000 mg/dL≦

Ketone, -: negative; ±(5≦and＜10 mg/dL; +: 10≦and＜40 mg/dL; 2+: 40≦and＜80 mg/dL; 3+: 80≦and＜150 mg/dL; 4+: 150 mg/dL≦

Bilirubin, -: negative; +: 0.5≦and＜2.0 mg/dL; 2+: 2.0≦and＜6.0 mg/dL; 3+: 6.0≦and＜10.0 mg/dL; 4+: 10.0 mg/dL≦

Occult blood, -: negative; ±: 0.03≦and＜0.06 mg/dL; +: 0.06≦and＜0.20 mg/dL; 2+: 0.20≦and＜1.00 mg/dL; 3+: 1.00 mg/dL≦

Urobilinogen, ±: normal; +: 2.0≦and＜4.0 mg/dL; 2+: 4.0≦and＜8.0 mg/dL; 3+: 8.0≦and＜12.0 mg/dL; 4+: 12.0 mg/dL≦

Turbidity, -: negative; ±: trace; +: slight; 2+: moderate; 3+: marked

Red Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

White Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field, 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Casts, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Cristals, -: not observed; ±: a few; +: abundant

Epithelial cells, -: not observed; ±: a few; +: abundant

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 24-2-1 (continued). Urinalysis in female rats of the recovery period

Control (vehicle: corn oil)

Female No.	Urine volume	S.G.	Electrolyte, density			Electrolyte, gross volume		
			Na	K	Cl	Na	K	Cl
	mL/24hr		mEq/L	mEq/L	mEq/L	mEq/24hr	mEq/24hr	mEq/24hr
F05054	11.2	1.067	147.4	333.6 §	193.5	1.65	3.74	2.17
F05055	7.8	1.063	131.5	203.5	124.8	1.03	1.59	0.97
F05056	21.2	1.029	56.0	115.5	54.5	1.19	2.45	1.16
F05057	6.6	1.072	114.5	283.0	147.2	0.76	1.87	0.97
F05058	16.3	1.050	104.6	233.2	145.1	1.70	3.80	2.37
Number of females	5	5	5	5	5	5	5	5
Mean	12.6	1.056	110.8	233.8	133.0	1.27	2.69	1.53
S.D.	6.1	0.017	34.7	82.6	50.6	0.40	1.03	0.69

§, The re-measurement was carried out because the difference between two measured values exceeded the permissible limit. The re-measured values were employed as the data.
S.G.: Specific gravity

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 24-2-2. Urinalysis in female rats of the recovery period

Und 1000 mg/kg

Female No.	Quality									Urinary sediments				
	pH	Protein	Glucose	Ketone	Bilirubin	Occult blood	Urobilinogen	Color	Turbidity	Red blood cells	White blood cells	Casts	Crystals	Epithelial cells
F06064	8.0	±	-	-	-	-	±	light yellow	-	-	-	-	±	-
F06065	7.5	±	-	-	-	-	±	light yellow	-	-	-	-	±	-
F06066	7.5	+	-	-	-	-	±	light yellow	-	-	-	-	±	-
F06067	7.5	+	-	-	-	-	±	light yellow	-	-	-	-	±	-
F06068	6.0	+	-	±	-	-	+	light yellow	-	-	-	-	±	-

Protein, -: negative; ±: 10≦and＜30 mg/dL; +: 30≦and＜100 mg/dL; 2+: 100≦and＜300 mg/dL; 3+: 300≦and＜600 mg/dL; 4+: 600 mg/dL≦

Glucose, -: negative; ±: 30≦and＜70 mg/dL; +: 70≦and＜150 mg/dL; 2+: 150≦and＜300 mg/dL; 3+: 300≦and＜1,000 mg/dL; 4+: 1,000 mg/dL≦

Ketone, -: negative; ±(5≦and＜10 mg/dL; +: 10≦and＜40 mg/dL; 2+: 40≦and＜80 mg/dL; 3+: 80≦and＜150 mg/dL; 4+: 150 mg/dL≦

Bilirubin, -: negative; +: 0.5≦and＜2.0 mg/dL; 2+: 2.0≦and＜6.0 mg/dL; 3+: 6.0≦and＜10.0 mg/dL; 4+: 10.0 mg/dL≦

Occult blood, -: negative; ±: 0.03≦and＜0.06 mg/dL; +: 0.06≦and＜0.20 mg/dL; 2+: 0.20≦and＜1.00 mg/dL; 3+: 1.00 mg/dL≦

Urobilinogen, ±: normal; +: 2.0≦and＜4.0 mg/dL; 2+: 4.0≦and＜8.0 mg/dL; 3+: 8.0≦and＜12.0 mg/dL; 4+: 12.0 mg/dL≦

Turbidity, -: negative; ±: trace; +: slight; 2+: moderate; 3+: marked

Red Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

White Blood cells, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field, 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Casts, -: not observed; ±: 1-9/3 visual field; +: 10-99/3 visual field; 2+: 100-299/3 visual field; 3+: ≧300/3 visual field

Cristals, -: not observed; ±: a few; +: abundant

Epithelial cells, -: not observed; ±: a few; +: abundant

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 24-2-2 (continued). Urinalysis in female rats of the recovery period

Und 1000 mg/kg

Female No.	Urine volume	S.G.	Electrolyte, density			Electrolyte, gross volume		
			Na	K	Cl	Na	K	Cl
	mL/24hr		mEq/L	mEq/L	mEq/L	mEq/24hr	mEq/24hr	mEq/24hr
F06064	13.5	1.030	39.8	83.7	22.9	0.54	1.13	0.31
F06065	12.7	1.067	119.7	298.2	173.1	1.52	3.79	2.20
F06066	8.1	1.080	144.8	348.0 §	167.7	1.17	2.82	1.36
F06067	17.7	1.048	97.5	218.0	135.1	1.73	3.86	2.39
F06068	10.8	1.069	137.7	322.1 §	196.6	1.49	3.48	2.12
Number of females	5	5	5	5	5	5	5	5
Mean	12.6	1.059	107.9	254.0	139.1	1.29	3.02	1.68
S.D.	3.5	0.020	42.2	106.9	68.6	0.46	1.13	0.86
Significance	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT

§, The re-measurement was carried out because the difference between two measured values exceeded the permissible limit. The re-measured values were employed as the data.

S.G.: Specific gravity

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 25-1-1. Hematological findings of male rats at the end of the dosing period

Control (vehicle: corn oil)

Male No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
M01001	892	15.7	44.1	49.4	17.6	35.6	101.4	15.9	23.6	90.7	12.3	1.1	0.0	4.6	82.0	2.88
M01002	920	16.5	46.2	50.2	17.9	35.7	118.6	22.5	32.2	94.8	15.1	2.2	0.0	4.6	78.1	2.89
M01003	507	10.3	33.7	66.5	20.3	30.6	151.0	13.6	20.8	71.9	15.6	1.1	0.0	2.8	80.5	26.03
M01004	904	16.0	45.8	50.7	17.7	34.9	116.9	19.0	25.7	88.6	13.1	1.5	0.0	5.4	80.0	2.46
M01005	784	13.5	39.0	49.7	17.2	34.6	113.5	24.7	28.8	78.2	16.7	1.9	0.0	3.7	77.7	2.78
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	801	14.4	41.8	53.3	18.1	34.3	120.3	19.1	26.2	84.8	14.6	1.6	0.0	4.2	79.7	7.41
S.D.	173	2.6	5.3	7.4	1.2	2.1	18.4	4.6	4.4	9.5	1.8	0.5	0.0	1.0	1.8	10.41

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 25-1-2. Hematological findings of male rats at the end of the dosing period

Und 100 mg/kg

Male No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
M02013	881	15.7	44.4	50.4	17.8	35.4	98.1	17.4	25.3	123.6	19.1	1.3	0.1	4.3	75.2	2.12
M02014	835	15.4	44.2	52.9	18.4	34.8	103.6	17.5	28.5	95.1	15.8	3.0	0.0	3.3	77.9	2.75
M02015	858	15.7	44.7	52.1	18.3	35.1	115.7	15.5	22.4	73.4	14.3	1.9	0.0	5.2	78.6	3.45
M02016	812	14.9	42.1	51.8	18.3	35.4	95.2	21.0	24.5	79.7	19.4	1.0	0.0	4.1	75.5	3.00
M02017	824	14.8	42.3	51.3	18.0	35.0	101.3	20.7	25.2	63.1	20.3	1.4	0.0	5.4	72.9	2.27
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	842	15.3	43.5	51.7	18.2	35.1	102.8	18.4	25.2	87.0	17.8	1.7	0.0	4.5	76.0	2.72
S.D.	28	0.4	1.2	0.9	0.3	0.3	7.9	2.4	2.2	23.5	2.6	0.8	0.0	0.9	2.3	0.54
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	KW	KW	KW	KW	KW	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	KW

NS: Not significantly different from the control group.

KW: Analysis by Kruskal-Wallis' test (one-way layout).

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 25-1-3. Hematological findings of male rats at the end of the dosing period

Und 300 mg/kg

Male No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
M03025	902	16.3	45.7	50.7	18.1	35.7	110.9	28.2	31.3	138.9	14.0	1.2	0.0	4.2	80.6	2.44
M03026	823	14.8	42.7	51.9	18.0	34.7	107.0	16.8	25.4	104.2	14.9	2.0	0.1	3.4	79.6	2.98
M03027	801	14.6	41.7	52.1	18.2	35.0	124.4	20.6	29.3	71.1	19.6	1.7	0.0	4.2	74.5	2.90
M03028	831	15.2	43.1	51.9	18.3	35.3	135.9	16.8	23.9	73.0	23.6	1.5	0.0	4.8	70.1	2.59
M03029	898	15.7	44.1	49.1	17.5	35.6	94.1	16.4	24.3	103.2	19.2	1.6	0.0	3.7	75.5	2.77
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	851	15.3	43.5	51.1	18.0	35.3	114.5	19.8	26.8	98.1	18.3	1.6	0.0	4.1	76.1	2.74
S.D.	46	0.7	1.5	1.3	0.3	0.4	16.1	5.0	3.3	27.8	3.9	0.3	0.0	0.5	4.2	0.22
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	KW	KW	KW	KW	KW	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	KW

NS: Not significantly different from the control group.

KW: Analysis by Kruskal-Wallis' test (one-way layout).

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 25-1-4. Hematological findings of male rats at the end of the dosing period

Und 1000 mg/kg

Male No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
M04037	842	15.2	43.5	51.7	18.1	34.9	100.0	16.1	23.9	86.2	17.6	1.3	0.0	4.2	76.9	2.44
M04038	857	15.0	43.4	50.6	17.5	34.6	116.9	17.2	24.6	108.6	12.5	1.2	0.1	2.6	83.6	3.50
M04039	843	15.3	43.7	51.8	18.1	35.0	97.0	16.7	24.6	95.9	11.3	1.1	0.0	3.2	84.4	2.29
M04040	873	15.1	42.8	49.0	17.3	35.3	105.1	22.0	27.4	96.6	11.8	1.9	0.0	3.2	83.1	2.28
M04041	837	14.8	42.5	50.8	17.7	34.8	100.9	22.5	23.9	57.8	19.7	0.9	0.0	4.3	75.1	3.14
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	850	15.1	43.2	50.8	17.7	34.9	104.0	18.9	24.9	89.0	14.6	1.3	0.0	3.5	80.6	2.73
S.D.	15	0.2	0.5	1.1	0.4	0.3	7.8	3.1	1.5	19.2	3.8	0.4	0.0	0.7	4.3	0.56
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	KW	KW	KW	KW	KW	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	KW

NS: Not significantly different from the control group.

KW: Analysis by Kruskal-Wallis' test (one-way layout).

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 25-2-1. Hematological findings of male rats at the end of the recovery period

Control (vehicle: corn oil)

Male No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
M01008	856	15.5	43.8	51.2	18.1	35.4	120.6	17.0	21.8	59.4	14.2	2.2	0.2	2.4	81.0	3.11
M01009	874	16.1	45.0	51.5	18.4	35.8	100.3	24.0	28.7	97.6	17.0	1.5	0.0	5.4	76.1	2.31
M01010	904	14.4	40.5	44.8	15.9	35.6	123.1	16.1	23.4	89.3	10.9	1.5	0.0	3.2	84.4	2.86
M01011	861	14.7	40.8	47.4	17.1	36.0	128.4	16.5	24.2	73.4	19.1	1.8	0.0	2.9	76.2	3.49
M01012	833	15.4	44.8	53.8	18.5	34.4	96.2	23.1	27.7	41.9	18.2	1.9	0.0	3.8	76.1	2.44
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	866	15.2	43.0	49.7	17.6	35.4	113.7	19.3	25.2	72.3	15.9	1.8	0.0	3.5	78.8	2.84
S.D.	26	0.7	2.2	3.6	1.1	0.6	14.5	3.9	2.9	22.5	3.3	0.3	0.1	1.2	3.8	0.48

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 25-2-2. Hematological findings of male rats at the end of the recovery period

Und 1000 mg/kg

Male No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
M04044	869	15.5	44.0	50.6	17.8	35.2	99.0	19.9	22.6	59.1	16.3	1.2	0.0	4.7	77.8	4.10
M04045	858	14.4	40.3	47.0	16.8	35.7	127.5	23.9	26.4	53.6	21.1	2.6	0.0	4.5	71.8	3.68
M04046	838	14.7	41.5	49.5	17.5	35.4	116.0	17.7	21.7	56.5	20.1	3.5	0.0	3.7	72.7	2.92
M04047	890	15.3	43.6	49.0	17.2	35.1	105.7	21.3	22.8	45.6	15.9	0.9	0.0	2.9	80.3	2.92
M04048	797	13.9	40.8	51.2	17.4	34.1	110.3	19.4	22.6	81.5	23.6	2.5	0.0	4.0	69.9	3.71
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	850	14.8	42.0	49.5	17.3	35.1	111.7	20.4	23.2	59.3	19.4	2.1	0.0	4.0	74.5	3.47
S.D.	35	0.7	1.7	1.6	0.4	0.6	10.8	2.3	1.8	13.4	3.3	1.1	0.0	0.7	4.4	0.53
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	AW	TT	TT	TT	TT

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

AW: Analysis by Aspin-Welch t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 26-1-1. Hematological findings of female rats at the end of the dosing period

Control (vehicle: corn oil)

Female No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
F01001	698	13.7	40.9	58.6	19.6	33.5	119.1	12.9	19.6	180.4	31.7	0.4	0.1	2.8	65.0	8.76
F01004	637	12.8	38.3	60.1	20.1	33.4	125.2	12.9	22.6	90.8	40.5	0.8	0.0	4.0	54.7	8.04
F01005	696	13.7	39.9	57.3	19.7	34.3	125.2	12.6	22.6	73.5	41.1	1.6	0.0	5.2	52.1	7.19
F01007	721	13.2	38.4	53.3	18.3	34.4	102.1	12.8	21.4	156.1	32.5	1.1	0.1	3.5	62.8	6.57
F01009	654	12.7	37.6	57.5	19.4	33.8	126.1	12.8	22.0	94.7	27.8	0.5	0.0	3.1	68.6	8.87
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	681	13.2	39.0	57.4	19.4	33.9	119.5	12.8	21.6	119.1	34.7	0.9	0.0	3.7	60.6	7.89
S.D.	35	0.5	1.3	2.5	0.7	0.5	10.1	0.1	1.2	46.4	5.8	0.5	0.1	0.9	7.0	1.00

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 26-1-2. Hematological findings of female rats at the end of the dosing period

Und 100 mg/kg

Female No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
F02013	672	13.2	38.3	57.0	19.6	34.5	124.1	13.2	17.4	87.8	19.1	0.8	0.1	6.2	73.8	7.40
F02016	702	14.3	41.9	59.7	20.4	34.1	120.9	13.6	19.4	161.9	28.4	0.7	0.1	4.0	66.8	7.21
F02017	610	11.8	36.4	59.7	19.3	32.4	138.8	12.8	19.0	136.7	32.6	0.4	0.1	2.6	64.3	13.61
F02018	679	13.3	39.1	57.6	19.6	34.0	105.2	13.1	19.9	160.8	36.0	1.0	0.0	3.2	59.8	6.44
F02020	680	13.0	39.1	57.5	19.1	33.2	92.8	13.9	21.0	77.0	22.5	0.6	0.0	5.5	71.4	7.18
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	669	13.1	39.0	58.3	19.6	33.6	116.4	13.3	19.3	124.8	27.7	0.7	0.1	4.3	67.2	8.37
S.D.	35	0.9	2.0	1.3	0.5	0.8	17.8	0.4	1.3	40.2	7.0	0.2	0.1	1.5	5.6	2.95
Significance	NS	NS	NS	NS	NS	NS	NS	NS	*	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN	DU	AN	AN	AN	AN	AN	AN	AN

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way lay out).

DU: Analysis by Dunnett's test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 26-1-3. Hematological findings of female rats at the end of the dosing period

Und 300 mg/kg

Female No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
F03025	733	13.9	40.5	55.3	19.0	34.3	108.1	13.0	20.3	95.5	34.2	1.2	0.0	4.1	60.5	5.62
F03026	691	13.5	40.7	58.9	19.5	33.2	158.4	13.3	19.6	149.7	38.0	1.2	0.0	3.8	57.0	6.77
F03027	696	13.3	39.5	56.8	19.1	33.7	120.9	12.9	22.8	114.2	38.9	1.0	0.0	4.3	55.8	6.84
F03029	671	12.8	38.7	57.7	19.1	33.1	160.3	14.0	21.0	189.6	34.9	0.9	0.1	2.5	61.6	8.16
F03031	712	13.4	39.7	55.8	18.8	33.8	124.6	14.0	19.0	95.8	20.0	0.9	0.0	3.7	75.4	5.98
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	701	13.4	39.8	56.9	19.1	33.6	134.5	13.4	20.5	129.0	33.2	1.0	0.0	3.7	62.1	6.67
S.D.	23	0.4	0.8	1.5	0.3	0.5	23.5	0.5	1.5	40.4	7.6	0.2	0.0	0.7	7.8	0.98
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN	DU	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

DU: Analysis by Dunnett's test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 26-1-4. Hematological findings of female rats at the end of the dosing period

Und 1000 mg/kg

Female No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
F04037	717	14.0	41.6	58.0	19.5	33.7	109.2	13.3	18.7	164.9	30.5	0.7	0.1	3.9	64.8	6.37
F04040	708	13.5	39.5	55.8	19.1	34.2	136.3	13.4	19.6	116.0	35.0	1.6	0.0	3.6	59.8	6.06
F04041	714	13.9	40.1	56.2	19.5	34.7	137.2	12.0	20.1	62.5	18.3	1.8	0.0	5.3	74.6	5.96
F04044	676	13.1	39.6	58.6	19.4	33.1	92.2	12.7	20.3	106.5	44.9	0.5	0.0	4.1	50.5	10.21
F04045	691	13.4	39.3	56.9	19.4	34.1	117.6	12.8	19.4	152.4	37.0	0.8	0.1	3.9	58.2	4.92
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	701	13.6	40.0	57.1	19.4	34.0	118.5	12.8	19.6	120.5	33.1	1.1	0.0	4.2	61.6	6.70
S.D.	17	0.4	0.9	1.2	0.2	0.6	19.0	0.6	0.6	40.5	9.8	0.6	0.1	0.7	8.9	2.03
Significance	NS	NS	NS	NS	NS	NS	NS	NS	*	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN	DU	AN	AN	AN	AN	AN	AN	AN

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

DU: Analysis by Dunnett's test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 26-2-1. Hematological findings of female rats at the end of the dosing period, satellite group

Control (vehicle: corn oil)

Female No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
F05049	806	15.0	41.7	51.7	18.6	36.0	121.5	12.0 §	16.9 §	127.0	14.9	0.7	0.1	2.1	82.2	2.11
F05050	786	14.4	41.2	52.4	18.3	35.0	95.9	12.6	20.5	72.6	14.8	2.5	0.0	4.3	78.4	2.64
F05051	773	14.4	41.2	53.3	18.6	35.0	107.5	11.8	19.2	84.3	6.8	0.7	0.0	2.5	90.0	3.17
F05052	758	14.1	41.2	54.4	18.6	34.2	120.1	12.5	23.6	71.4	25.5	1.7	0.0	3.5	69.3	2.93
F05053	746	13.7	39.5	52.9	18.4	34.7	112.9	11.9	20.3	54.9	16.3	1.1	0.0	2.6	80.0	3.60
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	774	14.3	41.0	52.9	18.5	35.0	111.6	12.2	20.1	82.0	15.7	1.3	0.0	3.0	80.0	2.89
S.D.	23	0.5	0.8	1.0	0.1	0.7	10.4	0.4	2.4	27.2	6.7	0.8	0.0	0.9	7.4	0.56

§, The re-measurement was carried out because the difference between two measured values exceeded the permissible limit. The re-measured values were employed as the data.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 26-2-2. Hematological findings of female rats at the end of the dosing period, satellite group

Und 1000 mg/kg

Female No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
F06059	708	13.3	37.8	53.4	18.8	35.2	118.2	12.4	20.3	52.5	8.8	1.5	0.0	2.1	87.6	4.39
F06060	731	13.7	38.8	53.1	18.7	35.3	103.1	12.2	20.8	51.7	17.7	1.0	0.0	6.8	74.5	3.34
F06061	717	13.6	38.5	53.7	19.0	35.3	100.7	12.4	21.4	100.6	29.7	1.6	0.0	6.2	62.5	3.37
F06062	792	14.4	41.0	51.8	18.2	35.1	112.1	11.8	20.3	80.9	10.0	1.9	0.0	3.6	84.5	2.88
F06063	749	13.9	40.6	54.2	18.6	34.2	76.9	12.0	20.2	52.9	14.2	1.9	0.0	4.5	79.4	4.10
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	739	13.8	39.3	53.2	18.7	35.0	102.2	12.2	20.6	67.7	16.1	1.6	0.0	4.6	77.7	3.62
S.D.	33	0.4	1.4	0.9	0.3	0.5	15.8	0.3	0.5	22.2	8.4	0.4	0.0	1.9	9.9	0.61
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	AW	TT	TT	TT	TT	TT	TT	TT

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

AW: Analysis by Aspin-Welch t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 26-3-1. Hematological findings of female rats at the end of the recovery period

Control (vehicle: corn oil)

Female No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
F05054	759	14.2	40.7	53.6	18.7	34.9	108.5	12.9	18.6	27.2	23.9	2.2	0.0	2.9	71.0	3.38
F05055	807	14.9	41.5	51.4	18.5	35.9	103.0	12.4	18.9	41.8	17.2	3.3	0.0	2.9	76.6	2.49
F05056	791	14.8	43.0	54.4	18.7	34.4	100.9	13.0	21.1	43.0	26.5	2.6	0.0	3.0	67.9	2.87
F05057	896	15.4	42.7	47.7	17.2	36.1	124.6	12.5	19.2	62.0	16.0	2.9	0.0	6.9	74.2	2.54
F05058	812	14.8	42.1	51.8	18.2	35.2	96.3	11.3	19.2	35.7	16.2	2.0	0.0	3.1	78.7	2.73
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	813	14.8	42.0	51.8	18.3	35.3	106.7	12.4	19.4	41.9	20.0	2.6	0.0	3.8	73.7	2.80
S.D.	51	0.4	0.9	2.6	0.6	0.7	10.9	0.7	1.0	12.8	4.9	0.5	0.0	1.8	4.3	0.36

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 26-3-2. Hematological findings of female rats at the end of the recovery period

Und 1000 mg/kg

Female No.	RBC	HGB	Hematocrit	MCV	MCH	MCHC	Platelet	PT	APTT	WBC	Neutrophil	Eosinophil	Basophil	Monocyte	Lymphocyte	Reticulocyte
	10000/μL	g/dL	%	fL	pg	g/dL	10000/μL	sec.	sec.	100/μL	%	%	%	%	%	%
F06064	770	14.3	40.5	52.6	18.6	35.3	123.5	10.9	14.2	15.3	35.3	1.3	0.0	2.0	61.4	3.22
F06065	767	13.8	39.0	50.8	18.0	35.4	101.4	12.3	16.0	25.9	17.8	1.9	0.0	1.9	78.4	4.31
F06066	810	14.8	40.7	50.2	18.3	36.4	99.5	12.4	19.8	31.0	11.3	2.3	0.0	3.5	82.9	3.26
F06067	892	16.5	45.7	51.2	18.5	36.1	104.7	11.8	17.7	39.5	26.3	1.8	0.0	3.8	68.1	3.59
F06068	780	15.0	41.7	53.5	19.2	36.0	98.3	13.1	18.7	36.4	25.3	1.9	0.0	1.6	71.2	2.37
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	804	14.9	41.5	51.7	18.5	35.8	105.5	12.1	17.3	29.6	23.2	1.8	0.0	2.6	72.4	3.35
S.D.	52	1.0	2.5	1.4	0.4	0.5	10.4	0.8	2.2	9.5	9.1	0.4	0.0	1.0	8.5	0.70
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	*	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 27-1-1. Biochemical findings of male rats at the end of the dosing period

Control (vehicle: corn oil)

Male No.	Total protein g/dL	Albumin g/dL	A/G	Glucose mg/dL	Total cholesterol mg/dL	Triglyceride mg/dL	Phospholipid mg/dL	AST U/L	ALT U/L	γ-GTP U/L	LDH U/L	Bile acid μmol/L	BUN mg/dL	Creatinine mg/dL	Total bilirubin mg/dL	ALP U/L
M01001	5.4	3.5	1.84	149	48	34	79	62	26	0	91	12.6	18	0.5	0.06	538
M01002	5.6	3.6	1.80	136	59	47	93	67	25	0	87	8.6	14	0.5	0.06	459
M01003	5.1	3.4	2.00	134	49	31	77	54	24	0	79	6.5	15	0.5	0.04	543
M01004	5.1	3.4	2.00	129	42	33	69	83	31	0	230	13.5	15	0.5	0.06	497
M01005	5.0	3.2	1.78	141	43	21	68	49	20	0	78	4.6	11	0.4	0.05	599
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.2	3.4	1.88	138	48	33	77	63	25	0	113	9.2	15	0.5	0.05	527
S.D.	0.3	0.1	0.11	8	7	9	10	13	4	0	66	3.8	3	0.0	0.01	53

Control (vehicle: corn oil)

Male No.	Inorganic phosphorus mg/dL	Ca mg/dL	Na mEq/L	K mEq/L	Cl mEq/L
M01001	5.8	8.6	142.1	4.08	105.4
M01002	5.5	9.2	144.2	4.05	107.4
M01003	5.8	9.1	142.8 §	3.97 §	108.8 §
M01004	5.7	9.2	145.4	3.70	109.6
M01005	5.3	8.7	143.0	3.60	106.5 §
Number of males	5	5	5	5	5
Mean	5.6	9.0	143.5	3.88	107.5
S.D.	0.2	0.3	1.3	0.22	1.7

§, The re-measurement was carried out because the difference between two measured values exceeded the permissible limit. The re-measured values were employed as the data.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 27-1-2. Biochemical findings of male rats at the end of the dosing period

Und 100 mg/kg

Male No.	Total protein g/dL	Albumin g/dL	A/G	Glucose mg/dL	Total cholesterol mg/dL	Triglyceride mg/dL	Phospholipid mg/dL	AST U/L	ALT U/L	γ-GTP U/L	LDH U/L	Bile acid μmol/L	BUN mg/dL	Creatinine mg/dL	Total bilirubin mg/dL	ALP U/L
M02013	5.2	3.5	2.06	152	42	34	64	54	26	0	56	10.2	15	0.6	0.07	367
M02014	5.8	3.7	1.76	143	55	50	95	44	25	0	122	22.8	17	0.5	0.06	347
M02015	5.7	3.7	1.85	127	45	65	82	55	33	0	56	10.3	12	0.5	0.05	605
M02016	5.6	3.7	1.95	130	53	64	86	64	30	0	372	7.7	11	0.5	0.05	503
M02017	5.3	3.4	1.79	143	32	36	58	90	23	0	183	6.1	13	0.5	0.04	499
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.5	3.6	1.88	139	45	50	77	61	27	0	158	11.4	14	0.5	0.05	464
S.D.	0.3	0.1	0.12	10	9	15	15	17	4	0	131	6.6	2	0.0	0.01	107
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	DU	AN	KW

Und 100 mg/kg

Male No.	Inorganic phosphorus mg/dL	Ca mg/dL	Na mEq/L	K mEq/L	Cl mEq/L
M02013	5.4	8.9	144.1	3.91	107.7
M02014	6.0	9.3	143.5	3.86	106.9
M02015	5.6	9.3	143.8	3.82	107.8
M02016	5.4	9.3	145.4	3.95	109.6
M02017	5.6	9.0	145.8	3.63 §	109.2 §
Number of males	5	5	5	5	5
Mean	5.6	9.2	144.5	3.83	108.2
S.D.	0.2	0.2	1.0	0.12	1.1
Significance	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	DU

§, The re-measurement was carried out because the difference between two measured values exceeded the permissible limit. The re-measured values were employed as the data.

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

DU: Analysis by Dunnett's test.

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 27-1-3. Biochemical findings of male rats at the end of the dosing period

Und 300 mg/kg

Male No.	Total protein g/dL	Albumin g/dL	A/G	Glucose mg/dL	Total cholesterol mg/dL	Triglyceride mg/dL	Phospholipid mg/dL	AST U/L	ALT U/L	γ-GTP U/L	LDH U/L	Bile acid μmol/L	BUN mg/dL	Creatinine mg/dL	Total bilirubin mg/dL	ALP U/L
M03025	5.6	3.8	2.11	157	43	36	73	63	30	0	59	8.0	14	0.5	0.07	612
M03026	5.1	3.3	1.83	141	38	34	63	67	23	0	118	5.3	12	0.5	0.09	550
M03027	5.6	3.5	1.67	130	51	45	81	64	21	0	185	7.1	13	0.5	0.04	556
M03028	5.6	3.5	1.67	146	58	39	89	61	33	0	158	9.2	14	0.5	0.08	500
M03029	5.7	3.7	1.85	141	41	53	71	54	30	0	93	18.3	15	0.5	0.06	552
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.5	3.6	1.83	143	46	41	75	62	27	0	123	9.6	14	0.5	0.07	554
S.D.	0.2	0.2	0.18	10	8	8	10	5	5	0	50	5.1	1	0.0	0.02	40
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	DU	AN	KW

Und 300 mg/kg

Male No.	Inorganic phosphorus mg/dL	Ca mg/dL	Na mEq/L	K mEq/L	Cl mEq/L
M03025	5.9	9.3	144.8	4.08	109.2
M03026	5.9	9.0	145.2	3.79	110.1
M03027	5.6	9.2	145.4	3.74	109.3
M03028	5.4	9.4	144.2	4.08	108.7
M03029	6.4	9.4	144.5	4.43	109.8
Number of males	5	5	5	5	5
Mean	5.8	9.3	144.8	4.02	109.4
S.D.	0.4	0.2	0.5	0.28	0.5
Significance	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	DU

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

DU: Analysis by Dunnett's test.

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 27-1-4. Biochemical findings of male rats at the end of the dosing period

Und 1000 mg/kg

Male No.	Total protein g/dL	Albumin g/dL	A/G	Glucose mg/dL	Total cholesterol mg/dL	Triglyceride mg/dL	Phospholipid mg/dL	AST U/L	ALT U/L	γ-GTP U/L	LDH U/L	Bile acid μmol/L	BUN mg/dL	Creatinine mg/dL	Total bilirubin mg/dL	ALP U/L
M04037	5.2	3.5	2.06	167	44	54	80	50	25	0	61	8.2	13	0.5	0.11	906
M04038	5.1	3.2	1.68	131	44	42	73	61	26	0	193	6.2	15	0.5	0.05	502
M04039	5.4	3.6	2.00	133	40	26	71	48	25	0	104	7.7	13	0.4	0.09	503
M04040	5.3	3.6	2.12	132	58	36	91	60	21	0	49	7.1	12	0.4	0.06	661
M04041	5.2	3.5	2.06	136	50	56	88	77	27	0	215	9.8	14	0.4	0.08	595
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.2	3.5	1.98	140	47	43	81	59	25	0	124	7.8	13	0.4	0.08	633
S.D.	0.1	0.2	0.18	15	7	13	9	12	2	0	76	1.3	1	0.1	0.02	166
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	DU	AN	KW

Und 1000 mg/kg

Male No.	Inorganic phosphorus mg/dL	Ca mg/dL	Na mEq/L	K mEq/L	Cl mEq/L
M04037	5.9	9.3	144.1	3.95	107.6
M04038	6.8	8.7	144.8	4.09	110.4
M04039	5.3	9.2	146.2	3.80	109.7
M04040	5.8	9.3	145.6	3.97	110.1
M04041	6.5	9.4	145.0	4.12	110.7
Number of males	5	5	5	5	5
Mean	6.1	9.2	145.1	3.99	109.7
S.D.	0.6	0.3	0.8	0.13	1.2
Significance	NS	NS	NS	NS	*
Statistical method	AN	AN	AN	AN	DU

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

DU: Analysis by Dunnett's test.

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 27-2-1. Biochemical findings of male rats at the end of the recovery period

Control (vehicle: corn oil)

Male No.	Total protein	Albumin	A/G	Glucose	Total cholesterol	Triglyceride	Phospholipid	AST	ALT	γ-GTP	LDH	Bile acid	BUN	Creatinine	Total bilirubin	ALP
	g/dL	g/dL		mg/dL	mg/dL	mg/dL	mg/dL	U/L	U/L	U/L	U/L	μmol/L	mg/dL	mg/dL	mg/dL	U/L
M01008	5.7	3.5	1.59	121	47	13	68	60	24	0	133	9.4	16	0.6	0.05	481
M01009	5.8	3.8	1.90	129	37	14	69	68	26	0	187	15.1	18	0.5	0.05	394
M01010	5.8	3.5	1.52	150	58	11	83	68	22	0	288	7.3	13	0.5	0.05	344
M01011	5.8	3.6	1.64	163	37	30	62	55	23	0	75	7.8	17	0.6	0.04	255
M01012	5.4	3.6	2.00	117	32	8	59	67	26	0	118	8.1	15	0.6	0.06	375
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.7	3.6	1.73	136	42	15	68	64	24	0	160	9.5	16	0.6	0.05	370
S.D.	0.2	0.1	0.21	20	10	9	9	6	2	0	82	3.2	2	0.1	0.01	82

Control (vehicle: corn oil)

Male No.	Inorganic phosphorus	Ca	Na	K	Cl
	mg/dL	mg/dL	mEq/L	mEq/L	mEq/L
M01008	5.6	8.5	145.0	4.10	105.2
M01009	5.2	8.4	145.5	4.06	106.6
M01010	5.2	8.6	146.2	3.86	106.9
M01011	5.2	8.9	145.2	3.85	105.9
M01012	5.6	8.4	146.6	3.83	107.7
Number of males	5	5	5	5	5
Mean	5.4	8.6	145.7	3.94	106.5
S.D.	0.2	0.2	0.7	0.13	1.0

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 27-2-2. Biochemical findings of male rats at the end of the recovery period

Und 1000 mg/kg

Male No.	Total protein g/dL	Albumin g/dL	A/G	Glucose mg/dL	Total cholesterol mg/dL	Triglyceride mg/dL	Phospholipid mg/dL	AST U/L	ALT U/L	γ-GTP U/L	LDH U/L	Bile acid μmol/L	BUN mg/dL	Creatinine mg/dL	Total bilirubin mg/dL	ALP U/L
M04044	5.7	3.7	1.85	141	24	21	51	61	27	0	167	13.9	16	0.7	0.06	492
M04045	5.9	3.8	1.81	130	63	15	93	66	22	0	275	5.8	14	0.5	0.04	398
M04046	5.5	3.5	1.75	149	37	20	63	68	26	0	305	13.5	16	0.6	0.05	424
M04047	5.2	3.5	2.06	123	37	20	64	59	26	0	56	6.6	11	0.4	0.04	452
M04048	5.8	3.7	1.76	121	70	10	92	67	25	0	307	7.5	13	0.5	0.07	337
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.6	3.6	1.85	133	46	17	73	64	25	0	222	9.5	14	0.5	0.05	421
S.D.	0.3	0.1	0.13	12	19	5	19	4	2	0	109	3.9	2	0.1	0.01	58
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT

Und 1000 mg/kg

Male No.	Inorganic phosphorus mg/dL	Ca mg/dL	Na mEq/L	K mEq/L	Cl mEq/L
M04044	6.2	8.8	147.3	4.01	107.1
M04045	4.9	8.7	146.2	4.09	107.4
M04046	5.1	8.6	145.8	4.11 §	108.1
M04047	4.5	8.4	147.5	3.87	109.5
M04048	5.5	8.9	146.9	3.88	109.7
Number of males	5	5	5	5	5
Mean	5.2	8.7	146.7	3.99	108.4
S.D.	0.6	0.2	0.7	0.11	1.2
Significance	NS	NS	*	NS	*
Statistical method	TT	TT	TT	TT	TT

§, The re-measurement was carried out because the difference between two measured values exceeded the permissible limit. The re-measured values were employed as the data.

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 28-1-1. Biochemical findings of female rats at the end of the dosing period

Control (vehicle: corn oil)

Female No.	Total protein	Albumin	A/G	Glucose	Total cholesterol	Triglyceride	Phospholipid	AST	ALT	γ-GTP	LDH	Bile acid	BUN	Creatinine	Total bilirubin	ALP
	g/dL	g/dL		mg/dL	mg/dL	mg/dL	mg/dL	U/L	U/L	U/L	U/L	μmol/L	mg/dL	mg/dL	mg/dL	U/L
F01001	5.9	4.0	2.11	132	46	49	98	146	60	0	193	35.4	13	0.5	0.08	605
F01004	5.8	4.0	2.22	113	39	22	81	167	49	0	56	12.9	15	0.5	0.13	182
F01005	5.8	3.8	1.90	132	58	45	104	62	46	0	102	6.5	16	0.6	0.05	124
F01007	5.5	3.8	2.24	127	37	35	79	85	38	0	97	16.5	14	0.6	0.13	218
F01009	5.7	3.8	2.00	129	54	29	103	107	47	0	196	11.4	15	0.5	0.05	183
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.7	3.9	2.09	127	47	36	93	113	48	0	129	16.5	15	0.5	0.09	262
S.D.	0.2	0.1	0.14	8	9	11	12	43	8	0	63	11.1	1	0.1	0.04	194

Control (vehicle: corn oil)

Female No.	Inorganic phosphorus	Ca	Na	K	Cl
	mg/dL	mg/dL	mEq/L	mEq/L	mEq/L
F01001	6.4	9.3	140.2	4.47	103.1
F01004	6.5	9.1	142.8	3.95	103.9
F01005	6.3	9.0	144.0	3.72	104.5
F01007	7.7	8.8	143.7	3.37	105.1
F01009	6.2	9.0	145.3	3.29	104.6
Number of females	5	5	5	5	5
Mean	6.6	9.0	143.2	3.76	104.2
S.D.	0.6	0.2	1.9	0.48	0.8

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 28-1-2. Biochemical findings of female rats at the end of the dosing period

Und 100 mg/kg

Female No.	Total protein g/dL	Albumin g/dL	A/G	Glucose mg/dL	Total cholesterol mg/dL	Triglyceride mg/dL	Phospholipid mg/dL	AST U/L	ALT U/L	γ-GTP U/L	LDH U/L	Bile acid μmol/L	BUN mg/dL	Creatinine mg/dL	Total bilirubin mg/dL	ALP U/L
F02013	5.7	3.9	2.17	114	36	43	81	124	44	0	160	19.4	15	0.5	0.11	185
F02016	5.7	4.0	2.35	117	48	16	99	86	36	0	49	7.5	17	0.5	0.08	230
F02017	5.3	3.7	2.31	130	63	29	111	97	47	0	164	9.0	9	0.5	0.09	300
F02018	5.8	3.7	1.76	104	58	24	99	105	44	0	285	13.5	15	0.6	0.06	469
F02020	6.1	4.0	1.90	121	50	32	103	122	50	0	505	16.5	12	0.5	0.10	239
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.7	3.9	2.10	117	51	29	99	107	44	0	233	13.2	14	0.5	0.09	285
S.D.	0.3	0.2	0.26	10	10	10	11	16	5	0	174	5.0	3	0.0	0.02	111
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	KW	DU	AN	KW	KW	AN	AN	AN	AN

Und 100 mg/kg

Female No.	Inorganic phosphorus mg/dL	Ca mg/dL	Na mEq/L	K mEq/L	Cl mEq/L
F02013	6.8	9.1	142.8	4.25	103.6
F02016	6.5	9.3	141.6	4.02	107.0
F02017	5.6	8.6	143.9	3.72	107.3
F02018	6.0	8.9	143.5	3.46	105.3
F02020	6.2	9.3	145.5	3.83	108.6
Number of females	5	5	5	5	5
Mean	6.2	9.0	143.5	3.86	106.4
S.D.	0.5	0.3	1.4	0.30	1.9
Significance	NS	NS	NS	NS	NS
Statistical method	KW	AN	AN	AN	DU

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

DU: Analysis by Dunnett's test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 28-1-3. Biochemical findings of female rats at the end of the dosing period

Und 300 mg/kg

Female No.	Total protein g/dL	Albumin g/dL	A/G	Glucose mg/dL	Total cholesterol mg/dL	Triglyceride mg/dL	Phospholipid mg/dL	AST U/L	ALT U/L	γ-GTP U/L	LDH U/L	Bile acid μmol/L	BUN mg/dL	Creatinine mg/dL	Total bilirubin mg/dL	ALP U/L
F03025	5.5	3.8	2.24	134	47	41	95	90	36	0	56	9.4	15	0.5	0.08	238
F03026	6.1	4.0	1.90	119	62	39	109	76	39	0	106	25.6	14	0.6	0.12	238
F03027	6.2	4.1	1.95	105	57	17	96	91	36	0	75	9.9	19	0.6	0.06	378
F03029	5.8	4.0	2.22	129	45	38	92	81	38	0	117	17.1	13	0.5	0.10	205
F03031	5.6	3.8	2.11	128	41	28	81	70	34	0	132	27.1	17	0.5	0.07	250
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.8	3.9	2.08	123	50	33	95	82	37	0	97	17.8	16	0.5	0.09	262
S.D.	0.3	0.1	0.15	11	9	10	10	9	2	0	31	8.4	2	0.1	0.02	67
Significance	NS	NS	NS	NS	NS	NS	NS	NS	*	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	KW	DU	AN	KW	KW	AN	AN	AN	AN

Und 300 mg/kg

Female No.	Inorganic phosphorus mg/dL	Ca mg/dL	Na mEq/L	K mEq/L	Cl mEq/L
F03025	5.9	9.0	143.0	3.99	106.3
F03026	5.9	9.1	144.0	3.95	105.1
F03027	6.0	8.9	143.8	4.00	106.3
F03029	6.1	9.1	145.1	3.54	106.0
F03031	6.1	9.0	143.9	3.65	108.0
Number of females	5	5	5	5	5
Mean	6.0	9.0	144.0	3.83	106.3
S.D.	0.1	0.1	0.8	0.22	1.1
Significance	NS	NS	NS	NS	NS
Statistical method	KW	AN	AN	AN	DU

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

DU: Analysis by Dunnett's test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 28-1-4. Biochemical findings of female rats at the end of the dosing period

Und 1000 mg/kg

Female No.	Total protein g/dL	Albumin g/dL	A/G	Glucose mg/dL	Total cholesterol mg/dL	Triglyceride mg/dL	Phospholipid mg/dL	AST U/L	ALT U/L	γ-GTP U/L	LDH U/L	Bile acid μmol/L	BUN mg/dL	Creatinine mg/dL	Total bilirubin mg/dL	ALP U/L
F04037	5.6	3.6	1.80	133	44	18	87	117	45	0	62	11.5	9	0.6	0.11	271
F04040	6.0	4.1	2.16	120	57	21	110	79	35	0	475	9.9	12	0.6	0.07	210
F04041	6.1	4.1	2.05	132	66	29	118	71	25	0	205	9.7	14	0.6	0.11	193
F04044	5.9	3.8	1.81	131	56	31	112	90	42	0	99	6.7	11	0.6	0.06	296
F04045	5.6	3.7	1.95	122	38	36	77	107	40	0	186	10.4	15	0.6	0.07	178
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.8	3.9	1.95	128	52	27	101	93	37	0	205	9.6	12	0.6	0.08	230
S.D.	0.2	0.2	0.16	6	11	7	18	19	8	0	162	1.8	2	0.0	0.02	51
Significance	NS	NS	NS	NS	NS	NS	NS	NS	*	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	KW	DU	AN	KW	KW	AN	AN	AN	AN

Und 1000 mg/kg

Female No.	Inorganic phosphorus mg/dL	Ca mg/dL	Na mEq/L	K mEq/L	Cl mEq/L
F04037	7.1	8.9	143.8	4.14	106.0
F04040	6.1	9.2	144.5	3.69	108.7
F04041	5.8	9.4	144.3	3.70	106.6
F04044	5.5	9.1	145.3	3.56	108.9
F04045	5.9	8.9	144.7	3.47 §	106.9
Number of females	5	5	5	5	5
Mean	6.1	9.1	144.5	3.71	107.4
S.D.	0.6	0.2	0.5	0.26	1.3
Significance	NS	NS	NS	NS	**
Statistical method	KW	AN	AN	AN	DU

§, The re-measurement was carried out because the difference between two measured values exceeded the permissible limit. The re-measured values were employed as the data.

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

DU: Analysis by Dunnett's test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 28-2-1. Biochemical findings of female rats at the end of the dosing period, satellite group

Control (vehicle: corn oil)

Female No.	Total protein g/dL	Albumin g/dL	A/G	Glucose mg/dL	Total cholesterol mg/dL	Triglyceride mg/dL	Phospholipid mg/dL	AST U/L	ALT U/L	γ-GTP U/L	LDH U/L	Bile acid μmol/L	BUN mg/dL	Creatinine mg/dL	Total bilirubin mg/dL	ALP U/L
F05049	6.0	4.1	2.16	121	62	16	104	63	31	1	72	11.2	18	0.6	0.11	328
F05050	5.9	4.2	2.47	112	72	13	115	55	21	0	53	11.8	15	0.6	0.15	176
F05051	5.6	4.2	3.00	132	67	21	119	52	20	0	97	10.9	16	0.6	0.09	246
F05052	6.6	4.7	2.47	148	71	29	135	66	19	0	65	15.0	16	0.6	0.13	313
F05053	5.1	3.7	2.64	129	72	15	120	94	28	0	63	7.5	13	0.6	0.07	198
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.8	4.2	2.55	128	69	19	119	66	24	0	70	11.3	16	0.6	0.11	252
S.D.	0.6	0.4	0.31	13	4	6	11	17	5	0	17	2.7	2	0.0	0.03	67

Control (vehicle: corn oil)

Female No.	Inorganic phosphorus mg/dL	Ca mg/dL	Na mEq/L	K mEq/L	Cl mEq/L
F05049	6.0	9.5	142.9	4.42	107.3
F05050	5.1	9.2	144.3	3.58	109.5
F05051	4.9	9.0	144.8	3.61	108.6
F05052	4.8	9.4	143.2	3.72	107.7
F05053	4.3	8.5	146.1	3.82	109.9
Number of females	5	5	5	5	5
Mean	5.0	9.1	144.3	3.83	108.6
S.D.	0.6	0.4	1.3	0.34	1.1

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 28-2-2. Biochemical findings of female rats at the end of the dosing period, satellite group

Und 1000 mg/kg

Female No.	Total protein	Albumin	A/G	Glucose	Total cholesterol	Triglyceride	Phospholipid	AST	ALT	γ-GTP	LDH	Bile acid	BUN	Creatinine	Total bilirubin	ALP
	g/dL	g/dL		mg/dL	mg/dL	mg/dL	mg/dL	U/L	U/L	U/L	U/L	μmol/L	mg/dL	mg/dL	mg/dL	U/L
F06059	5.8	4.1	2.41	112	66	9	123	195	34	0	104	18.4	17	0.5	0.11	228
F06060	6.2	4.0	1.82	146	74	20	119	108	26	1	93	6.9	14	0.6	0.06	263
F06061	5.9	3.9	1.95	130	62	23	112	384	59	0	259	12.5	15	0.6	0.10	210
F06062	6.5	4.8	2.82	155	80	60	154	76	26	0	62	29.1	18	0.6	0.11	228
F06063	5.8	4.1	2.41	151	60	9	109	190	39	0	119	11.5	13	0.7	0.12	209
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	6.0	4.2	2.28	139	68	24	123	191	37	0	127	15.7	15	0.6	0.10	228
S.D.	0.3	0.4	0.40	18	8	21	18	120	14	0	76	8.5	2	0.1	0.02	22
Significance	NS	NS	NS	NS	NS	NS	NS	*	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	AW	TT	AW	TT	TT	AW	AW	TT	TT	TT	TT

Und 1000 mg/kg

Female No.	Inorganic phosphorus	Ca	Na	K	Cl
	mg/dL	mg/dL	mEq/L	mEq/L	mEq/L
F06059	5.2	9.4	144.4	3.88	109.9
F06060	5.0	9.2	144.2	3.65	107.7
F06061	6.0	9.6	144.9	3.76	109.9
F06062	4.6	9.6	145.2	3.73	108.8
F06063	4.4	9.1	145.1	3.98	109.3
Number of females	5	5	5	5	5
Mean	5.0	9.4	144.8	3.80	109.1
S.D.	0.6	0.2	0.4	0.13	0.9
Significance	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

AW: Analysis by Aspin-Welch t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 28-3-1. Biochemical findings of female rats at the end of the recovery period

Control (vehicle: corn oil)

Female No.	Total protein g/dL	Albumin g/dL	A/G	Glucose mg/dL	Total cholesterol mg/dL	Triglyceride mg/dL	Phospholipid mg/dL	AST U/L	ALT U/L	γ-GTP U/L	LDH U/L	Bild acid μmol/L	BUN mg/dL	Creatinine mg/dL	Total bilirubin mg/dL	ALP U/L
F05054	5.5	3.8	2.24	102	53	12	97	62	25	0	78	8.9	16	0.6	0.07	227
F05055	5.6	3.9	2.29	104	62	8	106	68	32	0	51	10.2	15	0.7	0.10	205
F05056	5.9	3.9	1.95	97	51	8	92	61	22	0	51	6.3	20	0.7	0.06	172
F05057	5.8	4.0	2.22	101	66	9	110	147	94	0	80	11.3	20	0.7	0.09	172
F05058	6.2	4.3	2.26	123	72	18	132	69	30	0	50	14.8	11	0.6	0.08	165
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.8	4.0	2.19	105	61	11	107	81	41	0	62	10.3	16	0.7	0.08	188
S.D.	0.3	0.2	0.14	10	9	4	15	37	30	0	16	3.1	4	0.1	0.02	27

Control (vehicle: corn oil)

Female No.	Inorganic phosphorus mg/dL	Ca mg/dL	Na mEq/L	K mEq/L	Cl mEq/L
F05054	3.6	8.4	147.0	3.96	109.7
F05055	4.1	8.6	145.0	3.57	108.0
F05056	4.0	8.5	149.3 §	3.31	107.1
F05057	4.4	8.3	144.4	3.49	108.3
F05058	3.5	8.7	146.2	3.39	110.0 §
Number of females	5	5	5	5	5
Mean	3.9	8.5	146.4	3.54	108.6
S.D.	0.4	0.2	1.9	0.25	1.2

§, The re-measurement was carried out because the difference between two measured values exceeded the permissible limit. The re-measured values were employed as the data.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 28-3-2. Biochemical findings of female rats at the end of the recovery period

Und 1000 mg/kg

Female No.	Total protein g/dL	Albumin g/dL	A/G	Glucose mg/dL	Total cholesterol mg/dL	Triglyceride mg/dL	Phospholipid mg/dL	AST U/L	ALT U/L	γ-GTP U/L	LDH U/L	Bild acid μmol/L	BUN mg/dL	Creatinine mg/dL	Total bilirubin mg/dL	ALP U/L
F06064	6.3	4.1	1.86	127	66	7	106	89	53	0	170	9.2	12	0.7	0.09	243
F06065	5.5	3.6	1.89	115	58	17	102	65	29	0	59	11.5	21	0.6	0.07	223
F06066	6.1	4.2	2.21	102	77	8	125	109	55	0	93	15.3	19	0.7	0.13	293
F06067	5.9	3.9	1.95	100	56	9	99	79	32	0	170	7.7	18	0.7	0.07	189
F06068	5.2	3.7	2.47	102	41	9	80	61	22	0	65	8.9	19	0.7	0.14	214
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	5.8	3.9	2.08	109	60	10	102	81	38	0	111	10.5	18	0.7	0.10	232
S.D.	0.4	0.3	0.26	12	13	4	16	19	15	0	55	3.0	3	0.0	0.03	39
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	AW	TT	TT	TT	TT	TT

Und 1000 mg/kg

Female No.	Inorganic phosphorus mg/dL	Ca mg/dL	Na mEq/L	K mEq/L	Cl mEq/L
F06064	3.9	8.8	148.5	3.84	109.9
F06065	3.3	8.0	145.7	3.53	108.6
F06066	4.2	9.0	145.5	3.47	108.2
F06067	4.3	8.8	147.8	3.26	109.9
F06068	4.2	8.0	147.1	3.10	108.7
Number of females	5	5	5	5	5
Mean	4.0	8.5	146.9	3.44	109.1
S.D.	0.4	0.5	1.3	0.28	0.8
Significance	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

TT: Analysis by Student's t-test.

AW: Analysis by Aspin-Welch t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 29-1-1. Organ weights of male rats at the end of the dosing period

Control (vehicle: corn oil)

Male No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M01001	501.3	1995.3	3.980	224.1	0.447	1364.5	2.722	13923.2	27.774	1496.7	2.986	1426.5	2.846	2923.2	5.831	808.3	1.612
M01002	472.3	2035.4	4.310	266.6	0.564	1743.0	3.690	12644.8	26.773	1720.0	3.642	1763.6	3.734	3483.6	7.376	712.3	1.508
M01003	487.9	2104.6	4.314	388.8	0.797	1493.5	3.061	14593.1	29.910	1669.6	3.422	1725.3	3.536	3394.9	6.958	1217.0	2.494
M01004	499.0	1981.7	3.971	213.0	0.427	1363.0	2.731	12430.0	24.910	1698.6	3.404	1644.6	3.296	3343.2	6.700	811.8	1.627
M01005	477.0	2067.5	4.334	274.4	0.575	1342.1	2.814	13297.6	27.878	1577.8	3.308	1579.1	3.310	3156.9	6.618	897.8	1.882
M01006	519.9	2077.6	3.996	341.3	0.656	1590.9	3.060	16244.3	31.245	1792.0	3.447	1875.2	3.607	3667.2	7.054	1020.0	1.962
M01007	546.1	2029.7	3.717	546.3	1.000	1513.8	2.772	14240.4	26.077	1793.2	3.284	1639.1	3.001	3432.3	6.285	894.6	1.638
Number of males	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Mean	500.5	2041.7	4.089	322.1	0.638	1487.3	2.979	13910.5	27.795	1678.3	3.356	1664.8	3.333	3343.0	6.689	908.8	1.818
S.D.	25.7	44.4	0.235	116.9	0.203	146.3	0.346	1303.3	2.187	109.1	0.200	143.1	0.323	240.3	0.514	166.2	0.339

Control (vehicle: corn oil)

Male No.	Testis (R)		Testis (L)		Testes		Epididymis (R)		Epididymis (L)		Epididymides	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M01001	1688.5	3.368	1563.8	3.119	3252.3	6.488	712.6	1.422	700.1	1.397	1412.7	2.818
M01002	1847.4	3.911	1865.2	3.949	3712.6	7.861	827.3	1.752	837.6	1.773	1664.9	3.525
M01003	1527.6	3.131	1568.2	3.214	3095.8	6.345	604.9	1.240	637.3	1.306	1242.2	2.546
M01004	1605.9	3.218	1616.3	3.239	3222.2	6.457	636.7	1.276	626.8	1.256	1263.5	2.532
M01005	1811.6	3.798	1895.4	3.974	3707.0	7.771	603.7	1.266	666.8	1.398	1270.5	2.664
M01006	1640.0	3.154	1607.1	3.091	3247.1	6.246	548.3	1.055	544.1	1.047	1092.4	2.101
M01007	1625.0	2.976	1590.7	2.913	3215.7	5.888	627.5	1.149	587.7	1.076	1215.2	2.225
Number of males	7	7	7	7	7	7	7	7	7	7	7	7
Mean	1678.0	3.365	1672.4	3.357	3350.4	6.722	651.6	1.309	657.2	1.322	1308.8	2.630
S.D.	114.5	0.355	143.5	0.426	251.0	0.773	91.8	0.226	94.4	0.243	183.1	0.465

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 29-1-1 (continued). Organ weights of male rats at the end of the dosing period

Control (vehicle: corn oil)

Male No.	Prostate, ventral		Seminal vesicles		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M01001	444.9	0.887	1553.6	3.099	20.2	0.040	23.8	0.047	25.6	0.051	49.4	0.099
M01002	391.8	0.830	1929.1	4.084	15.8	0.033	27.0	0.057	30.6	0.065	57.6	0.122
M01003	316.4	0.648	2049.1	4.200	24.8	0.051	28.4	0.058	29.2	0.060	57.6	0.118
M01004	632.3	1.267	1716.3	3.439	16.1	0.032	28.0	0.056	30.5	0.061	58.5	0.117
M01005	610.7	1.280	1848.1	3.874	17.8	0.037	28.5	0.060	30.9	0.065	59.4	0.125
M01006	799.9	1.539	1602.0	3.081	21.1	0.041	24.7	0.048	26.9	0.052	51.6	0.099
M01007	644.4	1.180	2007.7	3.676	16.5	0.030	34.2	0.063	34.3	0.063	68.5	0.125
Number of males	7	7	7	7	7	7	7	7	7	7	7	7
Mean	548.6	1.090	1815.1	3.636	18.9	0.038	27.8	0.056	29.7	0.060	57.5	0.115
S.D.	169.5	0.311	195.6	0.449	3.3	0.007	3.4	0.006	2.9	0.006	6.1	0.011

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 29-1-2. Organ weights of male rats at the end of the dosing period

Und 100 mg/kg

Male No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M02013	464.6	1937.5	4.170	357.7	0.770	1299.0	2.796	11988.8	25.805	1544.1	3.324	1441.3	3.102	2985.4	6.426	924.6	1.990
M02014	492.0	1991.7	4.048	380.4	0.773	1384.4	2.814	15039.2	30.567	1593.0	3.238	1705.8	3.467	3298.8	6.705	688.7	1.400
M02015	515.9	1962.1	3.803	434.4	0.842	1545.9	2.997	14034.5	27.204	1535.9	2.977	1555.1	3.014	3091.0	5.991	681.2	1.320
M02016	548.1	2023.6	3.692	409.2	0.747	1638.4	2.989	15623.8	28.505	1693.2	3.089	1630.0	2.974	3323.2	6.063	904.6	1.650
M02017	490.7	2069.5	4.217	256.6	0.523	1411.2	2.876	13323.2	27.151	1599.6	3.260	1641.8	3.346	3241.4	6.606	804.7	1.640
M02018	529.9	2009.2	3.792	327.8	0.619	1504.0	2.838	16408.3	30.965	1679.2	3.169	1736.9	3.278	3416.1	6.447	1053.0	1.987
M02019	506.1	1979.0	3.910	332.9	0.658	1527.9	3.019	14819.3	29.281	1790.6	3.538	1782.6	3.522	3573.2	7.060	964.1	1.905
M02020	459.3	2082.6	4.534	279.5	0.609	1192.7	2.597	12337.5	26.862	1399.8	3.048	1385.1	3.016	2784.9	6.063	717.6	1.562
M02021	472.4	1957.3	4.143	434.6	0.920	1419.1	3.004	13074.0	27.676	1628.8	3.448	1625.3	3.441	3254.1	6.888	831.3	1.760
M02022	477.0	1891.7	3.966	354.4	0.743	1592.1	3.338	13411.7	28.117	1726.7	3.620	1680.7	3.523	3407.4	7.143	720.8	1.511
M02023	469.4	2156.0	4.593	296.1	0.631	1522.5	3.244	12968.4	27.628	1789.2	3.812	1747.3	3.722	3536.5	7.534	693.7	1.478
M02024	484.0	2028.9	4.192	261.0	0.539	1465.2	3.027	12087.4	24.974	1781.7	3.681	1851.8	3.826	3633.5	7.507	887.6	1.834
Number of males	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Mean	492.5	2007.4	4.088	343.7	0.698	1458.5	2.962	13759.7	27.895	1646.8	3.350	1648.6	3.353	3295.5	6.703	822.7	1.670
S.D.	27.6	71.5	0.280	63.0	0.121	125.9	0.199	1436.2	1.759	119.9	0.269	135.9	0.283	248.7	0.537	124.6	0.226
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Und 100 mg/kg

Male No.	Testis (R)		Testis (L)		Testes		Epididymis (R)		Epididymis (L)		Epididymides	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M02013	1534.5	3.303	1478.8	3.183	3013.3	6.486	540.1	1.163	521.7	1.123	1061.8	2.285
M02014	1741.2	3.539	1665.0	3.384	3406.2	6.923	610.5	1.241	620.5	1.261	1231.0	2.502
M02015	1568.9	3.041	1643.0	3.185	3211.9	6.226	635.5	1.232	597.7	1.159	1233.2	2.390
M02016	1687.3	3.078	1599.8	2.919	3287.1	5.997	689.2	1.257	607.9	1.109	1297.1	2.367
M02017	1510.3	3.078	1525.8	3.109	3036.1	6.187	636.1	1.296	612.8	1.249	1248.9	2.545
M02018	1619.9	3.057	1635.2	3.086	3255.1	6.143	638.1	1.204	646.8	1.221	1284.9	2.425
M02019	1819.0	3.594	1839.7	3.635	3658.7	7.229	632.5	1.250	624.9	1.235	1257.4	2.484
M02020	1487.4	3.238	1511.2	3.290	2998.6	6.529	552.8	1.204	531.1	1.156	1083.9	2.360
M02021	1332.4	2.820	1340.9	2.838	2673.3	5.659	570.4	1.207	565.2	1.196	1135.6	2.404
M02022	1797.6	3.769	1745.5	3.659	3543.1	7.428	638.8	1.339	602.7	1.264	1241.5	2.603
M02023	1676.8	3.572	1589.8	3.387	3266.6	6.959	632.1	1.347	657.1	1.400	1289.2	2.746
M02024	1729.9	3.574	1778.7	3.675	3508.6	7.249	638.9	1.320	635.1	1.312	1274.0	2.632
Number of males	12	12	12	12	12	12	12	12	12	12	12	12
Mean	1625.4	3.305	1612.8	3.279	3238.2	6.585	617.9	1.255	602.0	1.224	1219.9	2.479
S.D.	143.8	0.297	138.6	0.279	276.9	0.566	42.7	0.059	42.6	0.083	80.6	0.133
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	KW	AN	KW	AN	KW

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

DT: Analysis by Dunnett type mean rank test.

DU: Analysis by Dunnett's test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 29-1-2(continued). Organ weights of male rats at the end of the dosing period

Und 100 mg/kg

Male No.	Prostate, ventral		Seminal vesicles		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M02013	521.6	1.123	1477.2	3.180	21.7	0.047	24.7	0.053	25.5	0.055	50.2	0.108
M02014	636.4	1.293	1423.0	2.892	26.7	0.054	26.2	0.053	29.0	0.059	55.2	0.112
M02015	684.5	1.327	1718.7	3.331	20.9	0.041	20.9	0.041	23.1	0.045	44.0	0.085
M02016	508.1	0.927	1576.1	2.876	17.5	0.032	33.5	0.061	32.5	0.059	66.0	0.120
M02017	589.2	1.201	1672.3	3.408	15.6	0.032	29.1	0.059	31.9	0.065	61.0	0.124
M02018	510.5	0.963	1608.4	3.035	23.0	0.043	24.1	0.045	26.7	0.050	50.8	0.096
M02019	531.8	1.051	1885.8	3.726	21.9	0.043	33.7	0.067	33.6	0.066	67.3	0.133
M02020	458.6	0.998	939.7	2.046	16.4	0.036	19.8	0.043	18.7	0.041	38.5	0.084
M02021	551.7	1.168	1521.3	3.220	20.9	0.044	27.6	0.058	29.2	0.062	56.8	0.120
M02022	560.7	1.175	1524.7	3.196	18.4	0.039	28.7	0.060	28.8	0.060	57.5	0.121
M02023	560.2	1.193	1896.4	4.040	14.8	0.032	34.9	0.074	33.6	0.072	68.5	0.146
M02024	512.9	1.060	2126.9	4.394	20.1	0.042	29.0	0.060	33.0	0.068	62.0	0.128
Number of males	12	12	12	12	12	12	12	12	12	12	12	12
Mean	552.2	1.123	1614.2	3.279	19.8	0.040	27.7	0.056	28.8	0.059	56.5	0.115
S.D.	61.4	0.126	295.3	0.600	3.4	0.007	4.9	0.010	4.6	0.009	9.3	0.019
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	DT	DU	DU	AN	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

DT: Analysis by Dunnett type mean rank test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 29-1-3. Organ weights of male rats at the end of the dosing period

Und 300 mg/kg

Male No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M03025	483.3	2151.4	4.451	275.8	0.571	1390.9	2.878	12475.4	25.813	1605.7	3.322	1561.0	3.230	3166.7	6.552	639.1	1.322
M03026	546.3	2029.5	3.715	222.6	0.407	1329.0	2.433	14176.4	25.950	1662.8	3.044	1547.9	2.833	3210.7	5.877	709.7	1.299
M03027	497.8	2026.9	4.072	396.7	0.797	1540.5	3.095	15854.9	31.850	1705.4	3.426	1657.0	3.329	3362.4	6.755	708.7	1.424
M03028	477.1	2067.4	4.333	251.4	0.527	1316.7	2.760	13345.4	27.972	1502.2	3.149	1490.2	3.123	2992.4	6.272	859.6	1.802
M03029	503.2	2065.9	4.106	263.7	0.524	1432.0	2.846	13730.8	27.287	1723.2	3.424	1736.4	3.451	3459.6	6.875	898.4	1.785
M03030	488.2	2114.6	4.331	383.5	0.786	1489.1	3.050	12962.9	26.552	1485.0	3.042	1579.4	3.235	3064.4	6.277	642.9	1.317
M03032	469.8	1953.5	4.158	362.0	0.771	1615.7	3.439	13794.0	29.361	1513.9	3.222	1484.5	3.160	2998.4	6.382	881.8	1.877
M03033	522.2	2201.5	4.216	328.2	0.628	1515.6	2.902	14325.3	27.433	1946.9	3.728	1868.0	3.577	3814.9	7.305	890.7	1.706
M03034	570.8	2076.3	3.638	501.8	0.879	1656.3	2.902	16284.1	28.529	1862.1	3.262	1919.4	3.363	3781.5	6.625	888.7	1.557
M03035	485.2	2014.2	4.151	379.4	0.782	1340.1	2.762	14701.8	30.300	1690.3	3.484	1615.9	3.330	3306.2	6.814	815.1	1.680
M03036	454.9	1916.0	4.212	265.4	0.583	1609.3	3.538	11332.6	24.912	1697.2	3.731	1709.4	3.758	3406.6	7.489	914.1	2.009
Number of males	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Mean	499.9	2056.1	4.126	330.0	0.660	1475.9	2.964	13907.6	27.814	1672.2	3.349	1651.7	3.308	3324.0	6.657	804.4	1.616
S.D.	34.3	82.3	0.249	83.4	0.150	122.6	0.312	1423.1	2.081	144.8	0.239	144.4	0.243	282.5	0.467	107.8	0.248
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Und 300 mg/kg

Male No.	Testis (R)		Testis (L)		Testes		Epididymis (R)		Epididymis (L)		Epididymides	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M03025	1658.4	3.431	1696.5	3.510	3354.9	6.942	604.9	1.252	618.7	1.280	1223.6	2.532
M03026	1621.6	2.968	1659.1	3.037	3280.7	6.005	622.3	1.139	652.2	1.194	1274.5	2.333
M03027	1784.2	3.584	1714.6	3.444	3498.8	7.029	603.2	1.212	615.0	1.235	1218.2	2.447
M03028	1595.4	3.344	1579.3	3.310	3174.7	6.654	581.4	1.219	563.2	1.180	1144.6	2.399
M03029	1968.9	3.913	2020.0	4.014	3988.9	7.927	683.4	1.358	708.1	1.407	1391.5	2.765
M03030	1906.8	3.906	1925.2	3.943	3832.0	7.849	681.3	1.396	657.9	1.348	1339.2	2.743
M03032	1681.8	3.580	1652.2	3.517	3334.0	7.097	682.4	1.453	659.7	1.404	1342.1	2.857
M03033	1817.0	3.480	1803.2	3.453	3620.2	6.933	596.5	1.142	545.4	1.044	1141.9	2.187
M03034	1689.6	2.960	1649.0	2.889	3338.6	5.849	637.8	1.117	628.9	1.102	1266.7	2.219
M03035	1749.9	3.607	1733.6	3.573	3483.5	7.180	716.2	1.476	611.7	1.261	1327.9	2.737
M03036	1632.3	3.588	1613.5	3.547	3245.8	7.135	625.6	1.375	592.6	1.303	1218.2	2.678
Number of males	11	11	11	11	11	11	11	11	11	11	11	11
Mean	1736.9	3.487	1731.5	3.476	3468.4	6.964	639.5	1.285	623.0	1.251	1262.6	2.536
S.D.	121.3	0.312	135.2	0.330	254.2	0.638	44.3	0.131	46.3	0.116	82.0	0.234
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	KW	AN	KW	AN	KW

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 29-1-3(continued). Organ weights of male rats at the end of the dosing period

Und 300 mg/kg

Male No.	Prostate, ventral		Seminal vesicles		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M03025	722.1	1.494	1659.8	3.434	24.2	0.050	27.8	0.058	33.7	0.070	61.5	0.127
M03026	595.6	1.090	1551.8	2.841	20.2	0.037	31.4	0.057	29.0	0.053	60.4	0.111
M03027	727.3	1.461	1694.1	3.403	23.2	0.047	30.1	0.060	32.3	0.065	62.4	0.125
M03028	801.4	1.680	2006.0	4.205	15.1	0.032	22.5	0.047	23.8	0.050	46.3	0.097
M03029	517.4	1.028	1889.7	3.755	25.0	0.050	24.5	0.049	24.6	0.049	49.1	0.098
M03030	610.1	1.250	1779.4	3.645	22.1	0.045	22.3	0.046	24.1	0.049	46.4	0.095
M03032	709.3	1.510	1839.1	3.915	21.7	0.046	29.6	0.063	32.6	0.069	62.2	0.132
M03033	654.2	1.253	2286.7	4.379	23.5	0.045	25.0	0.048	26.1	0.050	51.1	0.098
M03034	921.9	1.615	2106.8	3.691	25.0	0.044	24.3	0.043	24.6	0.043	48.9	0.086
M03035	688.4	1.419	1984.6	4.090	16.3	0.034	32.8	0.068	35.4	0.073	68.2	0.141
M03036	627.3	1.379	1789.7	3.934	23.6	0.052	23.5	0.052	23.3	0.051	46.8	0.103
Number of males	11	11	11	11	11	11	11	11	11	11	11	11
Mean	688.6	1.380	1871.6	3.754	21.8	0.044	26.7	0.054	28.1	0.057	54.8	0.110
S.D.	109.2	0.206	213.0	0.429	3.3	0.007	3.8	0.008	4.6	0.011	8.1	0.018
Significance	NS	*	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	DT	DU	DU	AN	AN	AN	AN	AN	AN	AN	AN	AN

Significantly different from the control group (*: P<0.05, **: P<0.01).

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

DT: Analysis by Dunnett type mean rank test.

DU: Analysis by Dunnett's test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 29-1-4. Organ weights of male rats at the end of the dosing period

Und 1000 mg/kg

Male No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M04037	532.0	1922.1	3.613	271.7	0.511	1402.9	2.637	14258.4	26.802	1553.8	2.921	1601.5	3.010	3155.3	5.931	756.4	1.422
M04038	509.3	2166.1	4.253	268.0	0.526	1503.3	2.952	13316.7	26.147	1627.4	3.195	1657.8	3.255	3285.2	6.450	788.5	1.548
M04039	453.0	2096.2	4.627	282.6	0.624	1378.7	3.043	13008.1	28.715	1473.6	3.253	1486.6	3.282	2960.2	6.535	644.4	1.423
M04040	475.2	1891.5	3.980	321.2	0.676	1475.2	3.104	12634.5	26.588	1616.6	3.402	1572.1	3.308	3188.7	6.710	821.9	1.730
M04041	511.0	2026.7	3.966	354.3	0.693	1592.2	3.116	14710.2	28.787	1735.2	3.396	1763.2	3.450	3498.4	6.846	836.7	1.637
M04042	471.0	2003.7	4.254	333.9	0.709	1452.9	3.085	12514.6	26.570	1519.9	3.227	1445.2	3.068	2965.1	6.295	1108.0	2.352
M04043	474.5	2049.4	4.319	301.5	0.635	1599.7	3.371	13146.8	27.707	1575.2	3.320	1508.0	3.178	3083.2	6.498	833.4	1.756
Number of males	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Mean	489.4	2022.2	4.145	304.7	0.625	1486.4	3.044	13369.9	27.331	1586.0	3.245	1576.3	3.222	3162.3	6.466	827.0	1.695
S.D.	28.2	95.2	0.324	33.0	0.079	85.8	0.220	820.7	1.079	84.7	0.164	109.6	0.150	189.2	0.296	140.8	0.319
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Und 1000 mg/kg

Male No.	Testis (R)		Testis (L)		Testes		Epididymis (R)		Epididymis (L)		Epididymides	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M04037	1524.2	2.865	1570.9	2.953	3095.1	5.818	548.2	1.030	512.8	0.964	1061.0	1.994
M04038	1698.7	3.335	1641.9	3.224	3340.6	6.559	599.0	1.176	640.6	1.258	1239.6	2.434
M04039	1582.3	3.493	1561.5	3.447	3143.8	6.940	567.5	1.253	533.0	1.177	1100.5	2.429
M04040	1632.0	3.434	1559.1	3.281	3191.1	6.715	569.0	1.197	606.9	1.277	1175.9	2.475
M04041	1873.0	3.665	1813.4	3.549	3686.4	7.214	656.0	1.284	637.0	1.247	1293.0	2.530
M04042	1738.4	3.691	1822.9	3.870	3561.3	7.561	626.1	1.329	640.9	1.361	1267.0	2.690
M04043	1616.1	3.406	1696.9	3.576	3313.0	6.982	605.3	1.276	624.6	1.316	1229.9	2.592
Number of males	7	7	7	7	7	7	7	7	7	7	7	7
Mean	1666.4	3.413	1666.7	3.414	3333.0	6.827	595.9	1.221	599.4	1.229	1195.3	2.449
S.D.	115.4	0.275	114.9	0.294	219.8	0.552	37.5	0.099	53.9	0.130	86.8	0.221
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	AN	AN	KW	AN	KW	AN	KW

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 29-1-4 (continued). Organ weights of male rats at the end of the dosing period

Und 1000 mg/kg

Male No.	Prostate, ventral		Seminal vesicles		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M04037	660.2	1.241	1614.6	3.035	19.3	0.036	17.1	0.032	22.0	0.041	39.1	0.073
M04038	840.4	1.650	1684.0	3.306	24.2	0.048	29.1	0.057	31.0	0.061	60.1	0.118
M04039	521.6	1.151	1816.2	4.009	20.7	0.046	22.3	0.049	22.5	0.050	44.8	0.099
M04040	649.0	1.366	1576.7	3.318	23.7	0.050	26.6	0.056	25.8	0.054	52.4	0.110
M04041	566.5	1.109	1689.5	3.306	22.0	0.043	29.7	0.058	30.1	0.059	59.8	0.117
M04042	534.8	1.135	1428.1	3.032	15.5	0.033	26.1	0.055	23.4	0.050	49.5	0.105
M04043	549.2	1.157	1738.0	3.663	23.4	0.049	23.5	0.050	28.5	0.060	52.0	0.110
Number of males	7	7	7	7	7	7	7	7	7	7	7	7
Mean	617.4	1.258	1649.6	3.381	21.3	0.044	24.9	0.051	26.2	0.054	51.1	0.105
S.D.	112.4	0.193	125.1	0.349	3.1	0.007	4.4	0.009	3.7	0.007	7.6	0.015
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	DT	DU	DU	AN	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

DT: Analysis by Dunnett type mean rank test.

DU: Analysis by Dunnett's test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 29-2-1. Organ weights of male rats at the end of the recovery period

Control (vehicle: corn oil)

Male No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M01008	495.4	1959.2	3.955	316.2	0.638	1323.9	2.672	12414.8	25.060	1475.1	2.978	1653.9	3.339	3129.0	6.316	658.5	1.329
M01009	529.5	2010.9	3.798	328.2	0.620	1743.7	3.293	15571.1	29.407	1697.1	3.205	1749.5	3.304	3446.6	6.509	737.6	1.393
M01010	530.6	1990.8	3.752	301.5	0.568	1619.6	3.052	14415.9	27.169	1739.2	3.278	1753.2	3.304	3492.4	6.582	825.1	1.555
M01011	596.3	2165.1	3.631	290.4	0.487	1427.5	2.394	15485.8	25.970	1482.8	2.487	1537.3	2.578	3020.1	5.065	760.9	1.276
M01012	490.9	2095.3	4.268	446.9	0.910	1450.0	2.954	11396.3	23.215	1532.1	3.121	1530.8	3.118	3062.9	6.239	801.3	1.632
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	528.5	2044.3	3.881	336.6	0.645	1512.9	2.873	13856.8	26.164	1585.3	3.014	1644.9	3.129	3230.2	6.142	756.7	1.437
S.D.	42.2	84.3	0.246	63.3	0.160	167.1	0.348	1873.4	2.317	124.2	0.315	108.8	0.320	222.5	0.618	64.6	0.151

Control (vehicle: corn oil)

Male No.	Testis (R)		Testis (L)		Testes		Epididymis (R)		Epididymis (L)		Epididymides	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M01008	1648.9	3.328	1591.8	3.213	3240.7	6.542	644.8	1.302	620.1	1.252	1264.9	2.553
M01009	1478.0	2.791	1531.8	2.893	3009.8	5.684	628.5	1.187	633.8	1.197	1262.3	2.384
M01010	1571.2	2.961	1620.1	3.053	3191.3	6.015	601.8	1.134	593.2	1.118	1195.0	2.252
M01011	1560.6	2.617	1530.8	2.567	3091.4	5.184	590.5	0.990	569.5	0.955	1160.0	1.945
M01012	1850.6	3.770	1821.1	3.710	3671.7	7.480	681.3	1.388	687.5	1.400	1368.8	2.788
Number of males	5	5	5	5	5	5	5	5	5	5	5	5
Mean	1621.9	3.093	1619.1	3.087	3241.0	6.181	629.4	1.200	620.8	1.184	1250.2	2.384
S.D.	141.5	0.461	119.3	0.422	256.8	0.878	36.1	0.154	44.8	0.165	80.0	0.317

Control (vehicle: corn oil)

Male No.	Prostate, ventral		Seminal vesicles		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M01008	524.5	1.059	1910.8	3.857	37.9	0.077	19.8	0.040	23.4	0.047	43.2	0.087
M01009	544.3	1.028	1793.3	3.387	23.4	0.044	28.1	0.053	29.2	0.055	57.3	0.108
M01010	518.9	0.978	1253.0	2.361	27.7	0.052	22.0	0.041	24.5	0.046	46.5	0.088
M01011	731.0	1.226	1694.0	2.841	20.1	0.034	23.3	0.039	23.6	0.040	46.9	0.079
M01012	743.3	1.514	2667.7	5.434	24.2	0.049	30.3	0.062	30.2	0.062	60.5	0.123
Number of males	5	5	5	5	5	5	5	5	5	5	5	5
Mean	612.4	1.161	1863.8	3.576	26.7	0.051	24.7	0.047	26.2	0.050	50.9	0.097
S.D.	114.4	0.218	513.6	1.181	6.8	0.016	4.4	0.010	3.3	0.009	7.5	0.018

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 29-2-2. Organ weights of male rats at the end of the recovery period

Und 1000 mg/kg

Male No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M04044	477.6	2043.9	4.280	177.8	0.372	1270.5	2.660	11473.1	24.022	1460.8	3.059	1464.4	3.066	2925.2	6.125	700.7	1.467
M04045	542.1	2084.0	3.844	347.5	0.641	1545.7	2.851	15021.5	27.710	1690.0	3.118	1630.3	3.007	3320.3	6.125	911.3	1.681
M04046	531.0	2081.8	3.921	272.1	0.512	1348.8	2.540	13389.9	25.216	1599.4	3.012	1605.3	3.023	3204.7	6.035	849.3	1.599
M04047	463.0	2070.3	4.471	398.0	0.860	1320.9	2.853	11065.9	23.900	1664.4	3.595	1698.9	3.669	3363.3	7.264	781.3	1.687
M04048	573.2	2234.9	3.899	450.7	0.786	1649.8	2.878	14161.8	24.707	1724.7	3.009	1715.3	2.992	3440.0	6.001	887.1	1.548
Number of males	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	517.4	2103.0	4.083	329.2	0.634	1427.1	2.756	13022.4	25.111	1627.9	3.159	1622.8	3.151	3250.7	6.310	825.9	1.596
S.D.	46.0	75.4	0.277	107.3	0.199	162.5	0.149	1707.2	1.548	104.0	0.248	99.8	0.291	200.9	0.536	85.5	0.093
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT

Und 1000 mg/kg

Male No.	Testis (R)		Testis (L)		Testes		Epididymis (R)		Epididymis (L)		Epididymides	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M04044	1558.1	3.262	1603.0	3.356	3161.1	6.619	647.1	1.355	700.1	1.466	1347.2	2.821
M04045	1803.4	3.327	1785.3	3.293	3588.7	6.620	695.5	1.283	684.3	1.262	1379.8	2.545
M04046	1591.3	2.997	1631.3	3.072	3222.6	6.069	599.2	1.128	593.4	1.118	1192.6	2.246
M04047	1589.7	3.433	1643.1	3.549	3232.8	6.982	634.6	1.371	640.7	1.384	1275.3	2.754
M04048	1728.7	3.016	1691.2	2.950	3419.9	5.966	647.4	1.129	639.2	1.115	1286.6	2.245
Number of males	5	5	5	5	5	5	5	5	5	5	5	5
Mean	1654.2	3.207	1670.8	3.244	3325.0	6.451	644.8	1.253	651.5	1.269	1296.3	2.522
S.D.	106.3	0.193	71.5	0.237	176.3	0.424	34.5	0.119	42.1	0.157	72.2	0.272
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT

NS: Not significantly different from the control group.
TT: Analysis by Student's t-test.

Und 1000 mg/kg

Male No.	Prostate, ventral		Seminal vesicles		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
M04044	445.1	0.932	1768.7	3.703	23.3	0.049	22.7	0.048	26.2	0.055	48.9	0.102
M04045	416.5	0.768	1499.4	2.766	20.5	0.038	30.1	0.056	30.8	0.057	60.9	0.112
M04046	870.8	1.640	1759.5	3.314	16.4	0.031	25.8	0.049	28.4	0.053	54.2	0.102
M04047	514.3	1.111	2070.1	4.471	20.4	0.044	19.9	0.043	21.1	0.046	41.0	0.089
M04048	624.3	1.089	2011.5	3.509	24.5	0.043	26.2	0.046	27.4	0.048	53.6	0.094
Number of males	5	5	5	5	5	5	5	5	5	5	5	5
Mean	574.2	1.108	1821.8	3.553	21.0	0.041	24.9	0.048	26.8	0.052	51.7	0.100
S.D.	184.1	0.328	228.2	0.621	3.1	0.007	3.9	0.005	3.6	0.005	7.4	0.009
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT

NS: Not significantly different from the control group.
TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 30-1-1. Organ weights of female rats at the end of the dosing period

Control (vehicle: corn oil)

Female No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F01001	301.3	1909.3	6.337	338.9	1.125	1085.1	3.601	10228.6	33.948	1056.3	3.506	989.0	3.282	2045.3	6.788	711.8	2.362
F01002	303.3	1983.7	6.540	172.3	0.568	1031.2	3.400	10020.6	33.039	1092.1	3.601	1016.9	3.353	2109.0	6.954	857.5	2.827
F01003	336.1	2049.5	6.098	284.9	0.848	1177.7	3.504	12111.8	36.036	1185.8	3.528	1163.6	3.462	2349.4	6.990	954.6	2.840
F01004	313.5	1812.2	5.781	142.3	0.454	1037.4	3.309	10121.9	32.287	955.9	3.049	944.2	3.012	1900.1	6.061	806.5	2.573
F01005	327.1	1829.8	5.594	183.1	0.560	1022.6	3.126	11277.7	34.478	956.2	2.923	966.9	2.956	1923.1	5.879	712.7	2.179
F01006	350.2	1940.3	5.541	312.5	0.892	1059.5	3.025	10565.6	30.170	1054.7	3.012	1062.6	3.034	2117.3	6.046	833.1	2.379
F01007	308.8	1953.2	6.325	286.9	0.929	992.9	3.215	9845.3	31.882	983.5	3.185	954.3	3.090	1937.8	6.275	754.0	2.442
F01008	300.4	1996.5	6.646	164.9	0.549	1085.8	3.615	11265.0	37.500	1117.6	3.720	1089.6	3.627	2207.2	7.348	649.4	2.162
F01009	326.8	1958.2	5.992	181.9	0.557	1066.5	3.263	10626.6	32.517	950.3	2.908	969.1	2.965	1919.4	5.873	816.8	2.499
F01010	323.1	1881.8	5.824	192.3	0.595	1008.2	3.120	9966.2	30.846	965.0	2.987	919.0	2.844	1884.0	5.831	889.9	2.754
F01011	317.0	1815.7	5.728	195.3	0.616	1003.7	3.166	10783.7	34.018	1005.1	3.171	1011.4	3.191	2016.5	6.361	752.6	2.374
F01012	299.8	1855.7	6.190	152.1	0.507	1061.9	3.542	8933.1	29.797	935.0	3.119	896.1	2.989	1831.1	6.108	686.1	2.289
Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Mean	317.3	1915.5	6.050	217.3	0.683	1052.7	3.324	10478.8	33.043	1021.5	3.226	998.6	3.150	2020.0	6.376	785.4	2.473
S.D.	15.9	77.3	0.366	68.4	0.210	50.1	0.204	825.6	2.305	79.5	0.286	76.2	0.236	152.7	0.515	90.2	0.233

Control (vehicle: corn oil)

Female No.	Ovary (R)		Ovary (L)		Ovaries		Uterus		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F01001	45.5	0.151	47.7	0.158	93.2	0.309	567.5	1.884	23.0	0.076	33.0	0.110	37.0	0.123	70.0	0.232
F01002	61.6	0.203	59.4	0.196	121.0	0.399	871.0	2.872	22.5	0.074	31.7	0.105	37.3	0.123	69.0	0.227
F01003	80.3	0.239	41.0	0.122	121.3	0.361	671.0	1.996	20.3	0.060	45.7	0.136	49.3	0.147	95.0	0.283
F01004	64.5	0.206	55.7	0.178	120.2	0.383	626.6	1.999	16.6	0.053	34.7	0.111	36.7	0.117	71.4	0.228
F01005	56.5	0.173	59.7	0.183	116.2	0.355	581.9	1.779	15.6	0.048	35.0	0.107	35.1	0.107	70.1	0.214
F01006	38.5	0.110	41.8	0.119	80.3	0.229	592.4	1.692	12.6	0.036	38.5	0.110	39.8	0.114	78.3	0.224
F01007	62.7	0.203	37.3	0.121	100.0	0.324	600.3	1.944	18.6	0.060	35.2	0.114	39.9	0.129	75.1	0.243
F01008	46.5	0.155	66.9	0.223	113.4	0.377	658.7	2.193	12.0	0.040	41.4	0.138	41.5	0.138	82.9	0.276
F01009	61.5	0.188	46.9	0.144	108.4	0.332	520.0	1.591	17.0	0.052	37.5	0.115	34.4	0.105	71.9	0.220
F01010	42.9	0.133	49.7	0.154	92.6	0.287	570.7	1.766	16.9	0.052	33.2	0.103	33.6	0.104	66.8	0.207
F01011	56.4	0.178	58.1	0.183	114.5	0.361	642.4	2.026	16.9	0.053	34.1	0.108	40.6	0.128	74.7	0.236
F01012	72.2	0.241	63.9	0.213	136.1	0.454	557.0	1.858	19.1	0.064	45.1	0.150	50.6	0.169	95.7	0.319
Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Mean	57.4	0.182	52.3	0.166	109.8	0.348	621.6	1.967	17.6	0.056	37.1	0.117	39.7	0.125	76.7	0.242
S.D.	12.4	0.040	9.6	0.036	15.6	0.058	90.1	0.329	3.4	0.012	4.7	0.015	5.4	0.019	9.7	0.033

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 30-1-2. Organ weights of female rats at the end of the dosing period

Und 100 mg/kg

Female No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F02013	278.9	1778.8	6.378	177.4	0.636	944.1	3.385	9455.6	33.903	943.6	3.383	1051.7	3.771	1995.3	7.154	654.5	2.347
F02014	330.3	1915.3	5.799	179.3	0.543	1038.1	3.143	10682.5	32.342	1144.4	3.465	1111.3	3.365	2255.7	6.829	685.9	2.077
F02015	296.5	1760.9	5.939	204.0	0.688	1027.0	3.464	10107.9	34.091	1006.3	3.394	1018.5	3.435	2024.8	6.829	721.1	2.432
F02016	300.2	1925.1	6.413	266.9	0.889	1017.7	3.390	8691.9	28.954	852.4	2.839	862.7	2.874	1715.1	5.713	689.5	2.297
F02017	301.0	1936.8	6.435	197.4	0.656	972.6	3.231	10248.1	34.047	956.7	3.178	969.4	3.221	1926.1	6.399	591.0	1.963
F02018	345.4	2069.2	5.991	267.2	0.774	1019.0	2.950	10501.8	30.405	1074.2	3.110	1058.5	3.065	2132.7	6.175	654.8	1.896
F02019	332.2	2152.8	6.480	268.4	0.808	1128.7	3.398	9225.8	27.772	1129.7	3.401	1060.0	3.191	2189.7	6.592	576.9	1.737
F02020	323.4	1935.6	5.985	237.7	0.735	1055.4	3.263	11081.8	34.267	1026.9	3.175	1009.7	3.122	2036.6	6.297	581.5	1.798
F02021	336.8	1985.3	5.895	220.2	0.654	1255.9	3.729	11195.7	33.241	1140.6	3.387	1130.5	3.357	2271.1	6.743	631.0	1.874
F02022	312.6	1913.2	6.120	237.0	0.758	1159.4	3.709	11150.9	35.671	1069.9	3.423	1050.6	3.361	2120.5	6.783	748.9	2.396
F02023	326.1	1851.8	5.679	197.2	0.605	1014.1	3.110	11191.5	34.319	1145.8	3.514	1189.3	3.647	2335.1	7.161	772.1	2.368
F02024	315.1	1879.6	5.965	232.3	0.737	1045.2	3.317	10469.5	33.226	1066.2	3.384	1053.0	3.342	2119.2	6.725	743.4	2.359
Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Mean	316.5	1925.4	6.090	223.8	0.707	1056.4	3.341	10333.6	32.687	1046.4	3.304	1047.1	3.313	2093.5	6.617	670.9	2.129
S.D.	19.4	109.8	0.271	33.2	0.095	86.0	0.228	832.7	2.400	93.1	0.192	82.0	0.245	169.8	0.415	67.4	0.263
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.
AN: Analysis by variance (one-way layout).
KW: Analysis by Kruskal-Wallis' test (one-way layout).

Und 100 mg/kg

Female No.	Ovary (R)		Ovary (L)		Ovaries		Uterus		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F02013	53.0	0.190	35.9	0.129	88.9	0.319	743.3	2.665	9.5	0.034	29.5	0.106	28.4	0.102	57.9	0.208
F02014	64.3	0.195	58.4	0.177	122.7	0.371	605.6	1.833	14.7	0.045	29.9	0.091	33.1	0.100	63.0	0.191
F02015	47.7	0.161	44.5	0.150	92.2	0.311	438.3	1.478	15.6	0.053	34.3	0.116	34.9	0.118	69.2	0.233
F02016	50.7	0.169	54.9	0.183	105.6	0.352	506.1	1.686	19.2	0.064	36.8	0.123	40.7	0.136	77.5	0.258
F02017	52.9	0.176	54.6	0.181	107.5	0.357	611.2	2.031	14.4	0.048	32.2	0.107	35.2	0.117	67.4	0.224
F02018	58.4	0.169	66.6	0.193	125.0	0.362	633.7	1.835	17.9	0.052	48.4	0.140	51.1	0.148	99.5	0.288
F02019	70.1	0.211	40.9	0.123	111.0	0.334	800.1	2.408	20.2	0.061	35.6	0.107	38.6	0.116	74.2	0.223
F02020	65.6	0.203	49.5	0.153	115.1	0.356	751.1	2.323	18.5	0.057	33.3	0.103	38.8	0.120	72.1	0.223
F02021	55.5	0.165	53.1	0.158	108.6	0.322	701.8	2.084	22.3	0.066	41.9	0.124	46.9	0.139	88.8	0.264
F02022	47.8	0.153	50.8	0.163	98.6	0.315	616.1	1.971	15.4	0.049	42.1	0.135	45.7	0.146	87.8	0.281
F02023	43.5	0.133	65.6	0.201	109.1	0.335	519.3	1.592	19.2	0.059	29.2	0.090	28.1	0.086	57.3	0.176
F02024	58.9	0.187	62.8	0.199	121.7	0.386	531.9	1.688	17.2	0.055	40.2	0.128	42.1	0.134	82.3	0.261
Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Mean	55.7	0.176	53.1	0.168	108.8	0.343	621.5	1.966	17.0	0.054	36.1	0.114	38.6	0.122	74.8	0.236
S.D.	8.0	0.022	9.5	0.026	11.5	0.024	111.1	0.357	3.4	0.009	6.0	0.016	7.1	0.019	13.0	0.035
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.
AN: Analysis by variance (one-way layout).
KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 30-1-3. Organ weights of female rats at the end of the dosing period

Und 300 mg/kg

Female No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F03025	306.6	1909.6	6.228	201.1	0.656	872.2	2.845	10080.8	32.879	966.5	3.152	932.0	3.040	1898.5	6.192	700.4	2.284
F03026	330.6	2000.6	6.051	211.0	0.638	984.6	2.978	9312.3	28.168	1012.7	3.063	961.8	2.909	1974.5	5.972	751.8	2.274
F03027	304.8	1990.1	6.529	306.9	1.007	968.8	3.178	9822.8	32.227	1039.6	3.411	991.6	3.253	2031.2	6.664	599.9	1.968
F03028	327.2	1996.4	6.101	185.5	0.567	1006.8	3.077	10434.0	31.889	1174.9	3.591	1086.5	3.321	2261.4	6.911	688.4	2.104
F03029	309.4	1949.9	6.302	287.2	0.928	993.3	3.210	9536.8	30.824	1047.0	3.384	1007.4	3.256	2054.4	6.640	731.2	2.363
F03030	324.0	1994.4	6.156	362.6	1.119	974.6	3.008	10323.4	31.862	1075.9	3.321	1095.3	3.381	2171.2	6.701	707.0	2.182
F03031	318.4	1916.8	6.020	219.3	0.689	1041.0	3.269	9387.4	29.483	1008.3	3.167	1056.1	3.317	2064.4	6.484	746.3	2.344
F03032	320.9	1849.3	5.763	359.7	1.121	885.2	2.758	9942.3	30.983	1124.6	3.505	1106.7	3.449	2231.3	6.953	618.1	1.926
F03033	313.6	2031.9	6.479	180.8	0.577	1121.9	3.577	10911.4	34.794	1128.9	3.600	1048.4	3.343	2177.3	6.943	973.0	3.103
F03034	325.7	1883.6	5.783	211.4	0.649	1081.6	3.321	10466.9	32.137	1073.7	3.297	1126.5	3.459	2200.2	6.755	688.0	2.112
F03035	288.8	1961.8	6.793	178.3	0.617	968.6	3.354	9573.1	33.148	959.7	3.323	922.9	3.196	1882.6	6.519	971.9	3.365
F03036	314.4	1809.4	5.755	161.9	0.515	995.4	3.166	9503.2	30.226	974.7	3.100	1007.8	3.205	1982.5	6.306	592.5	1.885
Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Mean	315.4	1941.2	6.163	238.8	0.757	991.2	3.145	9941.2	31.552	1048.9	3.326	1028.6	3.261	2077.5	6.587	730.7	2.326
S.D.	11.8	68.3	0.325	71.4	0.222	70.5	0.228	507.5	1.762	69.2	0.182	68.7	0.160	129.3	0.308	124.9	0.456
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.
AN: Analysis by variance (one-way layout).
KW: Analysis by Kruskal-Wallis' test (one-way layout).

Und 300 mg/kg

Female No.	Ovary (R)		Ovary (L)		Ovaries		Uterus		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F03025	61.8	0.202	53.0	0.173	114.8	0.374	626.5	2.043	16.0	0.052	32.0	0.104	31.2	0.102	63.2	0.206
F03026	67.4	0.204	53.2	0.161	120.6	0.365	731.8	2.214	18.8	0.057	37.7	0.114	41.4	0.125	79.1	0.239
F03027	60.0	0.197	52.6	0.173	112.6	0.369	636.2	2.087	14.5	0.048	42.0	0.138	45.9	0.151	87.9	0.288
F03028	55.2	0.169	54.2	0.166	109.4	0.334	563.4	1.722	12.2	0.037	35.5	0.108	42.1	0.129	77.6	0.237
F03029	50.2	0.162	58.5	0.189	108.7	0.351	700.5	2.264	20.4	0.066	39.6	0.128	41.0	0.133	80.6	0.261
F03030	72.3	0.223	50.2	0.155	122.5	0.378	672.9	2.077	19.4	0.060	33.7	0.104	35.9	0.111	69.6	0.215
F03031	53.6	0.168	60.0	0.188	113.6	0.357	624.4	1.961	18.8	0.059	25.7	0.081	29.0	0.091	54.7	0.172
F03032	56.7	0.177	43.6	0.136	100.3	0.313	689.0	2.147	13.4	0.042	36.5	0.114	40.3	0.126	76.8	0.239
F03033	44.3	0.141	58.7	0.187	103.0	0.328	766.5	2.444	11.7	0.037	38.7	0.123	38.2	0.122	76.9	0.245
F03034	58.7	0.180	63.7	0.196	122.4	0.376	708.4	2.175	17.3	0.053	39.2	0.120	40.3	0.124	79.5	0.244
F03035	51.4	0.178	47.4	0.164	98.8	0.342	558.1	1.932	21.2	0.073	27.4	0.095	30.4	0.105	57.8	0.200
F03036	61.9	0.197	53.9	0.171	115.8	0.368	726.3	2.310	9.5	0.030	31.6	0.101	32.7	0.104	64.3	0.205
Number of females	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Mean	57.8	0.183	54.1	0.172	111.9	0.355	667.0	2.115	16.1	0.051	35.0	0.111	37.4	0.119	72.3	0.229
S.D.	7.7	0.022	5.6	0.017	8.1	0.021	66.0	0.191	3.8	0.013	5.0	0.015	5.4	0.017	10.2	0.031
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.
AN: Analysis by variance (one-way layout).
KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 30-1-4. Organ weights of female rats at the end of the dosing period

Und 1000 mg/kg

Female No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F04037	301.8	1983.2	6.571	187.3	0.621	958.6	3.176	8979.2	29.752	957.6	3.173	922.1	3.055	1879.7	6.228	693.4	2.298
F04038	346.7	1857.1	5.357	270.9	0.781	1236.8	3.567	11435.2	32.983	1158.8	3.342	1131.1	3.262	2289.9	6.605	981.6	2.831
F04039	308.2	1879.6	6.099	214.1	0.695	944.2	3.064	9684.2	31.422	1172.0	3.803	1142.0	3.705	2314.0	7.508	658.3	2.136
F04040	310.2	1895.2	6.110	153.4	0.495	918.1	2.960	9782.4	31.536	1043.4	3.364	1071.5	3.454	2114.9	6.818	621.0	2.002
F04041	311.8	2004.6	6.429	285.8	0.917	1090.9	3.499	10138.1	32.515	1062.2	3.407	955.5	3.064	2017.7	6.471	768.7	2.465
F04043	353.3	1999.1	5.658	275.3	0.779	1129.2	3.196	11205.5	31.717	1067.0	3.020	1116.7	3.161	2183.7	6.181	893.1	2.528
F04044	325.8	1987.3	6.100	150.5	0.462	1052.6	3.231	11064.8	33.962	997.7	3.062	1031.0	3.165	2028.7	6.227	684.4	2.101
F04045	332.2	2077.1	6.253	214.0	0.644	1009.8	3.040	10830.8	32.603	1157.5	3.484	1049.4	3.159	2206.9	6.643	711.5	2.142
F04046	353.0	1950.3	5.525	280.4	0.794	1069.3	3.029	11548.7	32.716	1145.8	3.246	1090.2	3.088	2236.0	6.334	651.0	1.844
F04048	324.8	1839.7	5.664	212.2	0.653	1095.5	3.373	10939.1	33.679	1111.2	3.421	1095.9	3.374	2207.1	6.795	758.1	2.334
Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Mean	326.8	1947.3	5.977	224.4	0.684	1050.5	3.214	10560.8	32.289	1087.3	3.332	1060.5	3.249	2147.9	6.581	742.1	2.268
S.D.	19.1	76.5	0.404	51.5	0.140	96.5	0.207	861.6	1.230	73.8	0.227	73.2	0.207	136.6	0.401	114.4	0.287
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.
AN: Analysis by variance (one-way layout).
KW: Analysis by Kruskal-Wallis' test (one-way layout).

Und 1000 mg/kg

Female No.	Ovary (R)		Ovary (L)		Ovaries		Uterus		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F04037	44.4	0.147	47.5	0.157	91.9	0.305	669.1	2.217	14.1	0.047	39.8	0.132	44.0	0.146	83.8	0.278
F04038	52.2	0.151	60.8	0.175	113.0	0.326	560.1	1.616	21.7	0.063	31.0	0.089	33.2	0.096	64.2	0.185
F04039	55.4	0.180	44.6	0.145	100.0	0.324	661.5	2.146	17.1	0.055	38.0	0.123	41.8	0.136	79.8	0.259
F04040	49.7	0.160	52.1	0.168	101.8	0.328	705.0	2.273	14.3	0.046	30.4	0.098	33.3	0.107	63.7	0.205
F04041	56.5	0.181	57.6	0.185	114.1	0.366	644.1	2.066	22.9	0.073	28.6	0.092	29.6	0.095	58.2	0.187
F04043	74.4	0.211	54.3	0.154	128.7	0.364	602.0	1.704	17.3	0.049	32.3	0.091	34.3	0.097	66.6	0.189
F04044	59.7	0.183	55.9	0.172	115.6	0.355	598.9	1.838	21.9	0.067	40.1	0.123	44.6	0.137	84.7	0.260
F04045	52.0	0.157	57.3	0.172	109.3	0.329	600.4	1.807	12.7	0.038	36.0	0.108	39.0	0.117	75.0	0.226
F04046	63.6	0.180	55.7	0.158	119.3	0.338	721.3	2.043	15.6	0.044	34.0	0.096	35.3	0.100	69.3	0.196
F04048	44.6	0.137	37.9	0.117	82.5	0.254	566.1	1.743	15.0	0.046	35.1	0.108	36.3	0.112	71.4	0.220
Number of females	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Mean	55.3	0.169	52.4	0.160	107.6	0.329	632.9	1.945	17.3	0.053	34.5	0.106	37.1	0.114	71.7	0.221
S.D.	9.1	0.022	7.0	0.019	13.7	0.033	56.0	0.232	3.7	0.011	4.0	0.015	5.0	0.019	9.0	0.034
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	KW	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN

NS: Not significantly different from the control group.
AN: Analysis by variance (one-way layout).
KW: Analysis by Kruskal-Wallis' test (one-way layout).

Appendix 30-1-4 (continued). Organ weights of female rats at the end of the dosing period

Und 1000 mg/kg

Female No.		Body weight (g)	Brain (mg)	Brain (mg/g)	Thymus (mg)	Thymus (mg/g)	Heart (mg)	Heart (mg/g)	Liver (mg)	Liver (mg/g)	Kidney (R) (mg)	Kidney (R) (mg/g)	Kidney (L) (mg)	Kidney (L) (mg/g)	Kidneys (mg)	Kidneys (mg/g)	Spleen (mg)	Spleen (mg/g)
F04042	a)	313.8	1930.3	6.151	268.4	0.855	957.3	3.051	10336.0	32.938	917.3	2.923	894.2	2.850	1811.5	5.773	619.3	1.974
F04047	b)	327.2	1817.9	5.556	211.7	0.647	1136.0	3.472	12475.2	38.127	1270.5	3.883	1217.0	3.719	2487.5	7.602	644.5	1.970

a) Excluded from data analysis (not pregnant).
b) Excluded from data analysis (not copulated).

Und 1000 mg/kg

Female No.		Ovary (R) (mg)	Ovary (R) (mg/g)	Ovary (L) (mg)	Ovary (L) (mg/g)	Ovaries (mg)	Ovaries (mg/g)	Uterus (mg)	Uterus (mg/g)	Thyroid gland (mg)	Thyroid gland (mg/g)	Adrenal gland (R) (mg)	Adrenal gland (R) (mg/g)	Adrenal gland (L) (mg)	Adrenal gland (L) (mg/g)	Adrenal glands (mg)	Adrenal glands (mg/g)
F04042	a)	50.8	0.162	57.9	0.185	108.7	0.346	1156.1	3.684	13.4	0.043	32.1	0.102	35.9	0.114	68.0	0.217
F04047	b)	44.0	0.134	35.4	0.108	79.4	0.243	434.5	1.328	14.4	0.044	30.1	0.092	32.5	0.099	62.6	0.191

a) Excluded from data analysis (not pregnant).
b) Excluded from data analysis (not copulated).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 30-2-1. Organ weights of female rats at the end of the dosing period, satellite group

Control (vehicle: corn oil)

Female No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F05049	317.5	1886.0	5.940	249.3	0.785	916.4	2.886	7313.5	23.035	960.2	3.024	999.5	3.148	1959.7	6.172	696.8	2.195
F05050	298.3	1954.6	6.552	246.3	0.826	959.4	3.216	7907.7	26.509	868.9	2.913	889.6	2.982	1758.5	5.895	689.9	2.313
F05051	269.5	1831.2	6.795	154.4	0.573	904.0	3.354	6702.4	24.870	721.2	2.676	735.4	2.729	1456.6	5.405	592.9	2.200
F05052	311.1	1836.9	5.905	298.2	0.959	985.1	3.167	9176.3	29.496	1183.9	3.806	1134.9	3.648	2318.8	7.454	633.2	2.035
F05053	301.8	1842.6	6.105	334.5	1.108	1065.2	3.529	8060.7	26.709	977.5	3.239	1000.5	3.315	1978.0	6.554	609.8	2.021
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	299.6	1870.3	6.259	256.5	0.850	966.0	3.230	7832.1	26.124	942.3	3.132	952.0	3.164	1894.3	6.296	644.5	2.153
S.D.	18.5	51.9	0.395	67.8	0.200	64.3	0.238	923.3	2.397	169.0	0.428	149.1	0.346	316.8	0.771	46.9	0.123

Control (vehicle: corn oil)

Female No.	Ovary (R)		Ovary (L)		Ovaries		Uterus		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F05049	35.7	0.112	47.2	0.149	82.9	0.261	472.4	1.488	17.3	0.054	22.8	0.072	23.3	0.073	46.1	0.145
F05050	43.7	0.146	34.2	0.115	77.9	0.261	407.5	1.366	11.8	0.040	30.7	0.103	32.7	0.110	63.4	0.213
F05051	46.3	0.172	40.7	0.151	87.0	0.323	700.5	2.599	19.1	0.071	29.4	0.109	27.8	0.103	57.2	0.212
F05052	33.3	0.107	25.3	0.081	58.6	0.188	818.8	2.632	10.4	0.033	26.6	0.086	29.9	0.096	56.5	0.182
F05053	51.7	0.171	61.3	0.203	113.0	0.374	1091.9	3.618	15.2	0.050	38.4	0.127	45.5	0.151	83.9	0.278
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	42.1	0.142	41.7	0.140	83.9	0.281	698.2	2.341	14.8	0.050	29.6	0.099	31.8	0.107	61.4	0.206
S.D.	7.6	0.031	13.6	0.045	19.6	0.070	276.2	0.930	3.6	0.015	5.8	0.021	8.4	0.028	14.0	0.049

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 30-2-2. Organ weights of female rats at the end of the dosing period, satellite group

Und 1000 mg/kg

Female No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F06059	261.0	1994.2	7.641	302.9	1.161	928.3	3.557	7126.9	27.306	988.9	3.789	997.8	3.823	1986.7	7.612	473.1	1.813
F06060	282.8	1871.3	6.617	194.0	0.686	901.5	3.188	8196.0	28.982	844.9	2.988	832.2	2.943	1677.1	5.930	346.2	1.224
F06061	288.5	1734.5	6.012	281.6	0.976	911.2	3.158	8074.7	27.989	901.0	3.123	875.4	3.034	1776.4	6.157	600.5	2.081
F06062	320.2	1830.8	5.718	231.1	0.722	981.9	3.067	9914.4	30.963	1033.5	3.228	1061.0	3.314	2094.5	6.541	551.7	1.723
F06063	253.8	1873.5	7.382	205.1	0.808	935.5	3.686	7207.0	28.396	837.7	3.301	744.6	2.934	1582.3	6.234	477.4	1.881
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	281.3	1860.9	6.674	242.9	0.871	931.7	3.331	8103.8	28.727	921.2	3.286	902.2	3.210	1823.4	6.495	489.8	1.744
S.D.	26.2	93.4	0.835	47.6	0.197	31.1	0.273	1123.2	1.391	87.2	0.305	127.3	0.376	213.3	0.662	96.4	0.319
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	*	*
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT

Significantly different from the control group (*: P<0.05, **: P<0.01).
NS: Not significantly different from the control group.
TT: Analysis by Student's t-test.

Und 1000 mg/kg

Female No.	Ovary (R)		Ovary (L)		Ovaries		Uterus		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F06059	36.0	0.138	42.3	0.162	78.3	0.300	1122.5	4.301	13.2	0.051	38.4	0.147	44.2	0.169	82.6	0.316
F06060	62.6	0.221	63.3	0.224	125.9	0.445	555.4	1.964	20.2	0.071	39.1	0.138	42.5	0.150	81.6	0.289
F06061	58.9	0.204	47.5	0.165	106.4	0.369	497.6	1.725	18.1	0.063	32.7	0.113	30.9	0.107	63.6	0.220
F06062	38.1	0.119	34.3	0.107	72.4	0.226	492.9	1.539	18.1	0.057	36.7	0.115	38.6	0.121	75.3	0.235
F06063	55.8	0.220	47.9	0.189	103.7	0.409	437.6	1.724	14.0	0.055	30.8	0.121	29.9	0.118	60.7	0.239
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	50.3	0.180	47.1	0.169	97.3	0.350	621.2	2.251	16.7	0.059	35.5	0.127	37.2	0.133	72.8	0.260
S.D.	12.3	0.048	10.6	0.043	21.9	0.088	283.3	1.156	3.0	0.008	3.6	0.015	6.6	0.026	10.1	0.041
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	*	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT

Significantly different from the control group (*: P<0.05, **: P<0.01).
NS: Not significantly different from the control group.
TT: Analysis by Student's t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 30-3-1. Organ weights of female rats at the end of the recovery period

Control (vehicle: corn oil)

Female No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F05054	283.0	1886.8	6.667	199.4	0.705	845.9	2.989	6434.9	22.738	873.3	3.086	854.9	3.021	1728.2	6.107	468.8	1.657
F05055	251.4	1852.1	7.367	208.6	0.830	852.6	3.391	6078.8	24.180	848.9	3.377	853.4	3.395	1702.3	6.771	522.0	2.076
F05056	266.6	1998.0	7.494	277.9	1.042	754.7	2.831	6490.9	24.347	863.0	3.237	834.9	3.132	1697.9	6.369	535.6	2.009
F05057	277.7	2004.1	7.217	173.9	0.626	911.9	3.284	6703.5	24.139	868.9	3.129	846.7	3.049	1715.6	6.178	484.0	1.743
F05058	271.6	1909.5	7.031	165.8	0.610	915.1	3.369	6975.3	25.682	825.1	3.038	819.0	3.015	1644.1	6.053	481.4	1.772
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	270.1	1930.1	7.155	205.1	0.763	856.0	3.173	6536.7	24.217	855.8	3.173	841.8	3.122	1697.6	6.296	498.4	1.851
S.D.	12.1	68.0	0.323	44.3	0.179	65.2	0.250	332.5	1.044	19.5	0.136	15.0	0.159	32.2	0.291	28.8	0.181

Control (vehicle: corn oil)

Female No.	Ovary (R)		Ovary (L)		Ovaries		Uterus		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F05054	28.4	0.100	38.1	0.135	66.5	0.235	821.0	2.901	24.3	0.086	27.6	0.098	29.5	0.104	57.1	0.202
F05055	50.2	0.200	43.3	0.172	93.5	0.372	512.3	2.038	19.6	0.078	30.9	0.123	30.9	0.123	61.8	0.246
F05056	47.5	0.178	41.7	0.156	89.2	0.335	391.3	1.468	21.0	0.079	29.3	0.110	29.2	0.110	58.5	0.219
F05057	46.4	0.167	50.8	0.183	97.2	0.350	418.3	1.506	11.4	0.041	37.2	0.134	36.5	0.131	73.7	0.265
F05058	30.6	0.113	44.1	0.162	74.7	0.275	464.0	1.708	20.0	0.074	40.5	0.149	43.6	0.161	84.1	0.310
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	40.6	0.152	43.6	0.162	84.2	0.313	521.4	1.924	19.3	0.072	33.1	0.123	33.9	0.126	67.0	0.248
S.D.	10.3	0.043	4.6	0.018	13.1	0.057	173.7	0.591	4.8	0.018	5.5	0.020	6.2	0.022	11.6	0.042

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 30-3-2. Organ weights of female rats at the end of the recovery period

Und 1000 mg/kg

Female No.	Body	Brain		Thymus		Heart		Liver		Kidney (R)		Kidney (L)		Kidneys		Spleen	
	weight (g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F06064	264.4	1935.4	7.320	262.1	0.991	820.5	3.103	6544.2	24.751	810.2	3.064	781.9	2.957	1592.1	6.022	404.1	1.528
F06065	304.3	1892.6	6.220	239.7	0.788	843.9	2.773	7435.8	24.436	878.3	2.886	889.6	2.923	1767.9	5.810	438.7	1.442
F06066	292.3	1978.9	6.770	263.2	0.900	859.6	2.941	6928.1	23.702	934.0	3.195	920.3	3.148	1854.3	6.344	454.0	1.553
F06067	284.5	1884.2	6.623	272.3	0.957	837.0	2.942	6955.1	24.447	877.5	3.084	848.0	2.981	1725.5	6.065	586.7	2.062
F06068	252.1	1950.6	7.737	200.6	0.796	761.4	3.020	6026.6	23.906	879.7	3.489	837.8	3.323	1717.5	6.813	468.4	1.858
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	279.5	1928.3	6.934	247.6	0.886	824.5	2.956	6778.0	24.248	875.9	3.144	855.5	3.066	1731.5	6.211	470.4	1.689
S.D.	21.1	39.8	0.597	28.9	0.092	38.0	0.122	525.8	0.431	43.9	0.223	52.8	0.168	95.0	0.387	69.3	0.261
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	AW	TT	TT	TT	TT	TT

NS: Not significantly different from the control group.
TT: Analysis by Student's t-test.
AW: Analysis by Aspin-Welch t-test.

Und 1000 mg/kg

Female No.	Ovary (R)		Ovary (L)		Ovaries		Uterus		Thyroid gland		Adrenal gland (R)		Adrenal gland (L)		Adrenal glands	
	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)	(mg)	(mg/g)
F06064	56.8	0.215	46.2	0.175	103.0	0.390	952.7	3.603	20.9	0.079	33.9	0.128	35.1	0.133	69.0	0.261
F06065	32.2	0.106	34.1	0.112	66.3	0.218	882.7	2.901	14.0	0.046	26.8	0.088	29.4	0.097	56.2	0.185
F06066	43.0	0.147	37.6	0.129	80.6	0.276	486.1	1.663	17.9	0.061	28.8	0.099	33.2	0.114	62.0	0.212
F06067	36.0	0.127	34.8	0.122	70.8	0.249	529.5	1.861	14.8	0.052	31.0	0.109	33.0	0.116	64.0	0.225
F06068	46.5	0.184	50.3	0.200	96.8	0.384	537.0	2.130	10.2	0.040	28.0	0.111	31.3	0.124	59.3	0.235
Number of females	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mean	42.9	0.156	40.6	0.148	83.5	0.303	677.6	2.432	15.6	0.056	29.7	0.107	32.4	0.117	62.1	0.224
S.D.	9.6	0.044	7.3	0.038	16.0	0.079	221.4	0.806	4.1	0.015	2.8	0.015	2.2	0.013	4.8	0.028
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT	TT

NS: Not significantly different from the control group.
TT: Analysis by Student's t-test.
AW: Analysis by Aspin-Welch t-test.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 31-1. Macroscopic findings of male rats at the end of the dosing period

Findings	Group	Control (vehicle: corn oil)							Und 100 mg/kg											Und 300 mg/kg											Und 1000 mg/kg						
	Animal No.	M01	M01	M01	M01	M01	M01	M01	M02	M02	M02	M02	M02	M02	M02	M02	M02	M02	M02	M03	M03	M03	M03	M03	M03	M03	M03	M03	M03	M03	M04	M04	M04	M04	M04	M04	M04
		001	002	003	004	005	006	007	013	014	015	016	017	018	019	020	021	022	023	024	025	026	027	028	029	030	031	032	033	034	035	036	037	038	039	040	041	042	043
	Fate																										D											
Epididymis																																						
Nodule, yellowish white, caudal, bilateral		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kidney																																						
Recessed area, unilateral		-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liver																																						
Diaphragmatic nodule, partial adhesion with diaphragm		-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Skin																																						
Alopecia, right forelimb		-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes) - : No abnormal changes P : Non-graded change

Fate : blanks, Subjected to autopsy at the end of the dosing period; D, Died during the dosing period.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 31-2. Macroscopic findings of male rats at the end of the recovery period

Findings	Group	Control (vehicle: corn oil)					Und 1000 mg/kg				
	Animal No.	M01 008	M01 009	M01 010	M01 011	M01 012	M04 044	M04 045	M04 046	M04 047	M04 048
All organs		-	-	-	-	-	-	-	-	-	-

Notes) - : No abnormal changes P : Non-graded change

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 32-1. Macroscopic findings of female rats at the end of the dosing period

Findings	Group	Control (vehicle: corn oil)												Und 100 mg/kg												Und 300 mg/kg												Und 1000 mg/kg											
	Animal No.	F01 001	F01 002	F01 003	F01 004	F01 005	F01 006	F01 007	F01 008	F01 009	F01 010	F01 011	F01 012	F02 013	F02 014	F02 015	F02 016	F02 017	F02 018	F02 019	F02 020	F02 021	F02 022	F02 023	F02 024	F03 025	F03 026	F03 027	F03 028	F03 029	F03 030	F03 031	F03 032	F03 033	F03 034	F03 035	F03 036	F04 037	F04 038	F04 039	F04 040	F04 041	F04 042	F04 043	F04 044	F04 045	F04 046	F04 047	F04 048
	Fate																																									NP									NC	
Ileum																																																	
Diverticulum		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lung																																																	
Dark colored spot, left lobe, ventral aspect		-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ovary																																																	
Cyst, unilateral		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spleen																																																	
Enlargement		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-
Stomach																																																	
Dark colored area, mucosa, glandular stomach		-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-

Notes) - : No abnormal changes P : Non-graded change

Fate : blanks, Subjected to autopsy on day 5 of lactation; NP, Not pregnant; NC, Not copulated.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 32-2. Macroscopic findings of female rats at the end of the dosing period, satellite group

Findings	Group	Control (vehicle: corn oil)					Und 1000 mg/kg				
	Animal No.	F05 049	F05 050	F05 051	F05 052	F05 053	F06 059	F06 060	F06 061	F06 062	F06 063
Stomach											
Dark colored area, mucosa, glandular stomach		-	P	-	-	-	-	-	-	-	-
Uterus											
Dilatation, lumen, left horn, partially		-	-	-	-	P	-	-	-	-	-

Notes) - : No abnormal changes P : Non-graded change

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 32-3. Macroscopic findings of female rats at the end of the recovery period

Findings	Group	Control (vehicle: corn oil)					Und 1000 mg/kg				
	Animal No.	F05 054	F05 055	F05 056	F05 057	F05 058	F06 064	F06 065	F06 066	F06 067	F06 068
All organs		-	-	-	-	-	-	-	-	-	-

Notes) - : No abnormal changes P : Non-graded change

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 33. Histopathological findings of male rats at the end of the dosing period [H.E. staining]

Findings	Group	Control (vehicle: corn oil)					Und 100 mg/kg		Und 300 mg/kg	Und 1000 mg/kg				
	Animal No.	M01	M01	M01	M01	M01	M02	M02	M03	M04	M04	M04	M04	M04
		001	002	003	004	005	014	023	031	037	038	039	040	041
	Fate								D					
Brain		-	-	-	-	-			-	-	-	-	-	-
Spinal cord		-	-	-	-	-			-	-	-	-	-	-
Pituitary gland														
Cyst		-	-	-	P	-			-	-	-	-	-	-
Submandibular gland		-	-	-	-	-			-	-	-	-	-	-
Sublingual gland		-	-	-	-	-			-	-	-	-	-	-
Lymph node, submandibular		-	-	-	-	-			-	-	-	-	-	-
Thyroid gland														
Ectopic thymic tissue		-	P	P	P	-			-	-	-	-	-	-
Ultimobranchial body		-	-	-	-	-			-	-	-	-	-	P
Parathyroid gland		-	-	-	-	-			-	-	-	-	-	-
Thymus		-	-	-	-	-			-	-	-	-	-	-
Heart														
Degeneration/fibrosis, myocardial, focal		-	-	±	-	±			-	±	±	-	-	±
Trachea		-	-	-	-	-			-	-	-	-	-	-
Lung														
Accumulation, foam cell, alveolus		-	±	-	-	-			-	-	-	-	±	±
Hemorrhage, focal		-	-	-	-	-			-	-	-	-	±	-

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked

P : Non-graded change NE: Not examined M: Missing A: Autolysis

Fate : blanks, Subjected to autopsy at the end of the dosing period; D, Died during the dosing period.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 33 (continued). Histopathological findings of male rats at the end of the dosing period [H.E. staining]

Findings	Group	Control (vehicle: corn oil)					Und 100 mg/kg		Und 300 mg/kg	Und 1000 mg/kg				
	Animal No.	M01	M01	M01	M01	M01	M02	M02	M03	M04	M04	M04	M04	M04
		001	002	003	004	005	014	023	031	037	038	039	040	041
	Fate								D					
Bronchus														
		-	-	-	-	-			-	-	-	-	-	-
Liver														
Fatty change, hepatocyte, periportal		±	±	-	-	+	-		±	±	+	+	±	±
Hematopoiesis, extramedullary		-	-	±	-	-	-		-	-	-	-	-	-
Microgranuloma		-	-	-	-	-	-		-	-	±	-	-	-
Necrosis, focal		-	-	-	-	-	-		-	±	-	-	-	-
Nodule, hepatodiaphragmatic		-	-	-	-	-	P		-	-	-	-	-	-
Pancreas														
		-	-	-	-	-			-	-	-	-	-	-
Stomach														
		-	-	-	-	-			-	-	-	-	-	-
Duodenum														
		-	-	-	-	-			-	-	-	-	-	-
Jejunum														
		-	-	-	-	-			-	-	-	-	-	-
Ileum														
		-	-	-	-	-			-	-	-	-	-	-
Cecum														
		-	-	-	-	-			-	-	-	-	-	-
Colon														
		-	-	-	-	-			-	-	-	-	-	-
Rectum														
		-	-	-	-	-			-	-	-	-	-	-
Lymph node, mesenteric														
		-	-	-	-	-			-	-	-	-	-	-

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked

P : Non-graded change NE: Not examined M : Missing A: Autolysis

Fate : blanks, Subjected to autopsy at the end of the dosing period; D, Died during the dosing period.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 33 (continued). Histopathological findings of male rats at the end of the dosing period [H.E. staining]

Findings	Group	Control (vehicle: corn oil)					Und 100 mg/kg		Und 300 mg/kg	Und 1000 mg/kg				
	Animal No.	M01	M01	M01	M01	M01	M02	M02	M03	M04	M04	M04	M04	M04
		001	002	003	004	005	014	023	031	037	038	039	040	041
	Fate								D					
Spleen														
Deposit, pigment, brown		±	+	±	+	+			±	+	+	±	+	+
Hematopoiesis, extramedullary		+	+	3+	+	+			+	+	+	+	+	+
Kidney														
Basophilic tubule, cortex		-	-	±	-	±	+		-	±	-	-	±	-
Cellular infiltration, lymphocyte, interstitial		-	-	-	±	-	-		-	-	-	-	-	-
Cyst, medulla		P	-	P	-	-	-		-	P	-	-	-	-
Fibrosis, focal, subserosa		-	-	-	-	-	±		-	-	-	-	-	-
Mineralization, medulla		-	-	-	-	±	-		-	-	-	-	-	-
Urinary bladder														
		-	-	-	-	-			-	-	-	-	-	-
Adrenal gland														
		-	-	-	-	-			-	-	-	-	-	-
Testis														
Atrophy, seminiferous tubule, bilateral		±	-	-	-	-			-	-	-	-	-	-
Vacuolation, cytoplasmic, sertoli cell, focal, bilateral		-	-	-	-	-			-	±	-	-	-	-
Epididymis														
Cell debris, lumen, bilateral		-	-	-	-	-		-	-	±	-	-	-	-
Cellular infiltration, lymphocyte, interstitial, unilateral		±	-	-	-	-		-	-	-	-	-	-	±
Granuloma, spermatic, bilateral		-	-	-	-	-		+	-	-	-	-	-	-
Prostate														
Cellular infiltration, lymphocyte, interstitial		+	-	±	-	+			+	-	-	-	±	±
Seminal vesicle														
		-	-	-	-	-			-	-	-	-	-	-

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked

P : Non-graded change NE: Not examined M: Missing A: Autolysis

Fate : blanks, Subjected to autopsy at the end of the dosing period; D, Died during the dosing period.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 33 (continued). Histopathological findings of male rats at the end of the dosing period [H.E. staining]

Findings	Group	Control (vehicle: corn oil)					Und 100 mg/kg		Und 300 mg/kg	Und 1000 mg/kg				
	Animal No.	M01	M01	M01	M01	M01	M02	M02	M03	M04	M04	M04	M04	M04
		001	002	003	004	005	014	023	031	037	038	039	040	041
	Fate								D					
Coagulating gland														
		-	-	-	-	-			-	-	-	-	-	-
Eyeball														
Dysplasia, retina, unilateral		-	-	-	-	-			-	P	-	-	-	-
Harderian gland														
		-	-	-	-	-			-	-	-	-	-	-
Sciatic nerve														
		-	-	-	-	-			-	-	-	-	-	-
Skeletal muscle														
		-	-	-	-	-			-	-	-	-	-	-
Femur														
		-	-	-	-	-			-	-	-	-	-	-
Marrow, femur														
Increase, hematopoiesis		-	-	+	-	-			-	-	-	-	-	-

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked

P : Non-graded change NE: Not examined M: Missing A: Autolysis

Fate : blanks, Subjected to autopsy at the end of the dosing period; D, Died during the dosing period.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 34-1. Histopathological findings of female rats at the end of the dosing period [H.E. staining]

Findings	Group	Control (vehicle: corn oil)							Und 100 mg/kg	Und 300 mg/kg		Und 1000 mg/kg					
	Animal No.	F01	F01	F01	F01	F01	F01	F01	F02	F03	F03	F04	F04	F04	F04	F04	F04
		001	003	004	005	007	008	009	020	028	030	037	038	040	041	044	045
	Fate																
Brain			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Spinal cord			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Pituitary gland			NE				NE						NE				
Cyst		P		-	-	-		P				-		-	-	-	-
Submandibular gland			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Sublingual gland			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Lymph node, submandibular			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Thyroid gland			NE				NE						NE				
Ectopic thymic tissue		P		-	-	-		P				-		-	-	-	P
Ultimobranchial body		-		-	-	-		-				-		P	-	-	-
Parathyroid gland			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Thymus			NE				NE						NE				
Atrophy		-		-	-	-		-				±		-	-	-	-
Heart			NE				NE						NE				
Degeneration/fibrosis, myocardial, focal		-		-	-	-		-				-		-	-	-	±
Trachea			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked

P : Non-graded change NE: Not examined M: Missing A: Autolysis

Fate : blanks, Subjected to autopsy on day 5 of lactation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 34-1 (continued). Histopathological findings of female rats at the end of the dosing period [H.E. staining]

Findings	Group	Control (vehicle: corn oil)							Und 100 mg/kg	Und 300 mg/kg		Und 1000 mg/kg					
	Animal No.	F01	F01	F01	F01	F01	F01	F01	F02	F03	F03	F04	F04	F04	F04	F04	F04
	Fate	001	003	004	005	007	008	009	020	028	030	037	038	040	041	044	045
Lung							NE						NE				
Accumulation, foam cell, alveolus		±	±	-	-	-		-				±		-	-	-	±
Hemorrhage, focal		±	-	-	-	-		-				-		-	-	-	-
Mineralization, arterial wall		-	-	-	±	-		-				-		-	-	-	-
Thickening, alveolar wall, focal		-	±	-	-	-		-				-		-	-	-	-
Bronchus			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Liver			NE				NE						NE				
Fatty change, hepatocyte, periportal		-		-	-	-		-				-		-	±	-	-
Necrosis, focal		-		-	-	-		+				-		-	-	-	-
Pancreas			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Stomach			NE										NE				
Hemorrhage, focal, glandular stomach		-		-	-	-	±	-				-		-	-	-	-
Ulcer, with mineralization, glandular stomach		-		-	-	-	+	-				-		-	-	-	-
Duodenum			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Jejunum			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Ileum			NE				NE						NE				
Thinning, muscular layer, focal, diverticulum site		-		-	-	-		-		P		-		-	-	-	-
Cecum			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Colon			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined M: Missing A: Autolysis
Fate : blanks, Subjected to autopsy on day 5 of lactation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 34-1 (continued). Histopathological findings of female rats at the end of the dosing period [H.E. staining]

Findings	Group	Control (vehicle: corn oil)							Und 100 mg/kg	Und 300 mg/kg		Und 1000 mg/kg					
	Animal No.	F01	F01	F01	F01	F01	F01	F01	F02	F03	F03	F04	F04	F04	F04	F04	F04
		001	003	004	005	007	008	009	020	028	030	037	038	040	041	044	045
	Fate																
Rectum			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Lymph node, mesenteric			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Spleen			NE				NE										
Deposit, pigment, brown		+		+	2+	+		2+				+	2+	+	+	+	2+
Hematopoiesis, extramedullary		2+		+	2+	2+		2+				+	2+	2+	+	2+	+
Kidney			NE				NE						NE				
Basophilic tubule, cortex		±		-	-	-		-				-		±	-	-	-
Cellular infiltration, lymphocyte, interstitial		-		-	-	-		-				-		±	-	-	-
Hyperplasia, transitional cell, focal		-		-	-	-		-				-		-	±	-	-
Urinary bladder			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Adrenal gland			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Ovary			NE				NE						NE				
Cyst, follicular, unilateral		-		-	-	-		-	P		P	-		-	-	-	-
Mineralization, interstitial gland, unilateral		-		-	-	±		-	-		-	-		-	-	-	-
Uterus			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Vagina			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Eyeball			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Harderian gland			NE				NE						NE				
Cellular infiltration, lymphocyte, interstitial		-		-	-	-		-				-		-	±	-	-

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined M: Missing A: Autolysis
Fate : blanks, Subjected to autopsy on day 5 of lactation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 34-1 (continued). Histopathological findings of female rats at the end of the dosing period [H.E. staining]

Findings	Group	Control (vehicle: corn oil)							Und 100 mg/kg	Und 300 mg/kg		Und 1000 mg/kg					
	Animal No.	F01	F01	F01	F01	F01	F01	F01	F02	F03	F03	F04	F04	F04	F04	F04	F04
		001	003	004	005	007	008	009	020	028	030	037	038	040	041	044	045
	Fate																
Sciatic nerve			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Skeletal muscle			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Femur			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-
Marrow, femur			NE				NE						NE				
		-		-	-	-		-				-		-	-	-	-

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked

P : Non-graded change NE: Not examined M: Missing A: Autolysis

Fate : blanks, Subjected to autopsy on day 5 of lactation.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 34-2. Histopathological findings of female rats at the end of the dosing period, satellite group [H.E. staining]

Findings	Group	Control (vehicle: corn oil)					Und 1000 mg/kg				
	Animal No.	F05 049	F05 050	F05 051	F05 052	F05 053	F06 059	F06 060	F06 061	F06 062	F06 063
Brain		-	-	-	-	-	-	-	-	-	-
Spinal cord		-	-	-	-	-	-	-	-	-	-
Pituitary gland											
Aberrant craniopharyngeal tissue		-	-	-	-	P	-	-	-	-	-
Cyst		-	-	-	P	-	-	-	-	-	-
Submandibular gland		-	-	-	-	-	-	-	-	-	-
Sublingual gland		-	-	-	-	-	-	-	-	-	-
Lymph node, submandibular		-	-	-	-	-	-	-	-	-	-
Thyroid gland											
Ectopic thymic tissue		P	-	-	-	-	-	-	-	P	-
Parathyroid gland		-	-	-	-	-	-	-	-	-	-
Thymus		-	-	-	-	-	-	-	-	-	-
Heart											
Degeneration/fibrosis, myocardial, focal		-	-	-	-	-	-	±	-	-	-
Trachea		-	-	-	-	-	-	-	-	-	-
Lung											
Accumulation, foam cell, alveolus		±	-	-	-	-	±	-	±	±	-

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined M: Missing A: Autolysis

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 34-2 (continued). Histopathological findings of female rats at the end of the dosing period, satellite group [H.E. staining]

Findings	Group	Control (vehicle: corn oil)					Und 1000 mg/kg				
	Animal No.	F05 049	F05 050	F05 051	F05 052	F05 053	F06 059	F06 060	F06 061	F06 062	F06 063
Bronchus		-	-	-	-	-	-	-	-	-	-
Liver											
Fatty change, hepatocyte, periportal		-	-	-	±	±	-	±	±	-	±
Microgranuloma		-	-	-	-	±	±	-	-	-	-
Pancreas											
Atrophy, acinar cell, focal		-	-	-	-	-	-	-	-	-	±
Stomach		-	-	-	-	-	-	-	-	-	-
Duodenum		-	-	-	-	-	-	-	-	-	-
Jejunum		-	-	-	-	-	-	-	-	-	-
Ileum		-	-	-	-	-	-	-	-	-	-
Cecum		-	-	-	-	-	-	-	-	-	-
Colon		-	-	-	-	-	-	-	-	-	-
Rectum		-	-	-	-	-	-	-	-	-	-
Lymph node, mesenteric		-	-	-	-	-	-	-	-	-	-
Spleen											
Deposit, pigment, brown		+	2+	+	+	2+	2+	2+	+	+	2+
Hematopoiesis, extramedullary		+	+	+	+	+	+	+	+	+	+

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined M: Missing A: Autolysis

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 34-2 (continued). Histopathological findings of female rats at the end of the dosing period, satellite group [H.E. staining]

Findings	Group	Control (vehicle: cornoil)					Und 1000 mg/kg				
	Animal No.	F05 049	F05 050	F05 051	F05 052	F05 053	F06 059	F06 060	F06 061	F06 062	F06 063
Kidney											
Basophilic tubule, cortex		-	-	-	±	±	-	-	-	±	-
Mineralization, medulla		±	±	-	-	-	±	-	-	-	-
Urinary bladder		-	-	-	-	-	-	-	-	-	-
Adrenal gland		-	-	-	-	-	-	-	-	-	-
Ovary											
Atretic follicle, increased number, bilateral		-	-	-	3+	-	-	-	±	±	-
Decreased number, corpus luteum, bilateral		-	-	-	3+	-	-	-	-	-	-
Mineralization, interstitial gland, unilateral		-	±	-	-	-	-	±	-	-	-
Uterus											
Dilatation, lumen, focal		-	-	-	-	+	-	-	-	-	-
Metaplasia, squamous cell, epithelium, corpus		-	-	-	-	+	-	-	-	-	-
Vagina		-	-	-	-	-	-	-	-	-	-
Eyeball											
Degeneration, lens fiber, unilateral		-	-	-	-	±	-	-	-	-	-
Dysplasia, retina, unilateral		-	-	-	-	P	-	-	-	-	-
Harderian gland		-	-	-	-	-	-	-	-	-	-
Sciatic nerve		-	-	-	-	-	-	-	-	-	-
Skeletal muscle		-	-	-	-	-	-	-	-	-	-
Femur		-	-	-	-	-	-	-	-	-	-
Marrow, femur		-	-	-	-	-	-	-	-	-	-

Notes) - : No abnormal changes ±: Very slight + : Slight 2+: Moderate 3+: Marked
P : Non-graded change NE: Not examined M: Missing A: Autolysis

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 35-1. Results of observations about estrous cycle

Control (vehicle :corn oil)

Animal no.	Pre-mating period						Mating period	
	Pre-treatment period							Times of vaginal estrus observed
	Stage	Type	Mean length (days)		Type	Mean length (days)	Stage	
F01001	E E D D D P E D D D P E D	5-day	5.0	D P E D D P E D D P E D D P	4-day	4.0	PL	1
F01002	E E D D D E D D P E D D P	4-day	4.0	E D D P E D D P E D D P E D	4-day	4.0	D P PL	1
F01003	P E D D D E D D P E D D P	4-day	4.0	E D D P E D D P E D D P E D	4-day	4.0	D P PL	1
F01004	D D P E D D P E D D P E D	4-day	4.0	D P E D D P E D D P E D D P	4-day	4.0	PL	1
F01005	D D P E D D P E D D P E D	4-day	4.0	D P E D D P E D D P E D D P	4-day	4.0	PL	1
F01006	P E D D P E D D P E D D P	4-day	4.0	E D D P E D D P E D D D E D	4-day	4.0	D P PL	1
F01007	D D P E D D P E D D D E D	4-day	4.0	D P E D D P E D D P E D D P	4-day	4.0	PL	1
F01008	E D D P E D D P E D D P E	4-day	4.0	D D P E D D P E D D P E D D	4-day	4.0	D PL	1
F01009	D D E D D D D E D D D P E	5-day	5.0	D D D E D D D D D D E D D D	irregular	7.0	SP	1
F01010	D D P E D D P E D D D E D	4-day	4.0	D P E D D P E D D P E D D P	4-day	4.0	PL	1
F01011	P E D D P E D D P E D D P	4-day	4.0	E D D P E D D P E D D P E D	4-day	4.0	D P PL	1
F01012	P E D D D P E D D D P E D	5-day	5.0	D P E D D P E D D D E D D D	4-day	4.0	PL	1
Mean			4.3			4.3		1.0
S.D.			0.5			0.9		0.0
(N)			(12)			(12)		(12)

D, diestrus; P, proestrus; E, estrus; PL, vaginal plug; SP, sperm positive

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 35-2. Results of observations about estrous cycle

Und (100 mg/kg)

Animal no.	Pre-mating period						Mating period	
	Pre-treatment period							Times of vaginal estrus observed
	Stage	Type	Mean length (days)		Type	Mean length (days)	Stage	
F02013	E D D D E D D P E D D P E	4-day	4.0	D D P E D D P E D D P E D D	4-day	4.0	P PL	1
F02014	D D E D D D E E D D D E E	5-day	5.0	D D D E D D D P E D D D E D	4/5-day	4.5	D D D PL	1
F02015	D D P E D D D E E D D D E	4/5-day	4.5	D D D P E D D D P E E D D D	irregular	6.0	E E D D D D PL	2
F02016	E D D P E D D P E D D D E	4-day	4.0	D D P E D D P E D D P E D D	4-day	4.0	P PL	1
F02017	E E D D D D E D D D P E D	5-day	5.0	D P E E D D P E D D D E D D	4-day	4.0	D P PL	1
F02018	E D D D E E D D D P E D D	5-day	5.0	D P E D D P E D D D E E D D	4/5-day	4.5	D P PL	1
F02019	D D E D D D E D D P E D D	4-day	4.0	P E D D P E D D P E D D P E	4-day	4.0	D D P PL	1
F02020	E D D D E D D D E D D P E	4-day	4.0	D D P E D D D D D D D D D D	uncycle		D P PL	1
F02021	E D D P E D D P E D D P E	4-day	4.0	D D P E D D P E D D P E D D	4-day	4.0	P E D D P PL	2
F02022	E D D D E E D D D P E D D	5-day	5.0	P E D D D E D D P E D D P E	4-day	4.0	D D P PL	1
F02023	D P E D D P E D D P E D D	4-day	4.0	P E D D P E D D P E D D P E	4-day	4.0	D D D D D D D D D D D D D PL	1
F02024	P E D D D P E D D D P E D	5-day	5.0	D P E E D D P E E D D D E E	5-day	5.0	D D P PL	1
Mean			4.5			4.4		1.2
S.D.			0.5			0.6		0.4
(N)			(12)			(11)		(12)

D, diestrus; P, proestrus; E, estrus; PL, vaginal plug; SP, sperm positive

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 35-3. Results of observations about estrous cycle

Und (300 mg/kg)

Animal no.	Pre-mating period						Mating period	
	Pre-treatment period							Times of vaginal estrus observed
	Stage	Type	Mean length (days)		Type	Mean length (days)	Stage	
F03025	D D E D D D P E D D D P E	5-day	5.0	D D P E D D D D E E D D D P	irregular	6.0	PL	1
F03026	P E D D P E D D P E D D P	4-day	4.0	E D D P E D D P E D D P E D	4-day	4.0	D P PL	1
F03027	D D D E D D D D E D D D E	4/5-day	4.5	E D D P E D D P E E D D P E	4/5-day	4.5	PL	1
F03028	D D E D D P E D D P E D D	4-day	4.0	P E D D P E D D P E D D P E	4-day	4.0	D D P PL	1
F03029	D P E D D P E D D P E D D	4-day	4.0	P E D D P E D D P E D D P E	4-day	4.0	D D P PL	1
F03030	D D P E D D D E E D D D E	4/5-day	4.5	E D D D E D D D P E D D P E	4/5-day	4.3	D D P PL	1
F03031	E E D D D E D D D P E D D	4/5-day	4.5	P E D D P E D D P E D D P E	4-day	4.0	D D P PL	1
F03032	E D D P E D D D P E D D D	4/5-day	4.5	E E D D D E D D D E D D P E	4-day	4.0	D D P PL	1
F03033	D D D P E D D D P E D D D	5-day	5.0	P E D D P E D D P E D D P E	4-day	4.0	D D D PL	1
F03034	P E D D D E D D D D E D D	4/5-day	4.5	D D E E D D D P E D D D E E	5-day	5.0	D D D PL	1
F03035	E D D D P E D D D E D D D	4/5-day	4.5	E D D P E D D P E D D P E D	4-day	4.0	D P PL	1
F03036	D D D E D D P E D D D P E	4/5-day	4.5	E D D P E D D P E D D D P E	4/5-day	4.3	D D P PL	1
Mean			4.5			4.3		1.0
S.D.			0.3			0.6		0.0
(N)			(12)			(12)		(12)

D, diestrus; P, proestrus; E, estrus; PL, vaginal plug; SP, sperm positive

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 35-4. Results of observations about estrous cycle

Und (1000 mg/kg)

Animal no.	Pre-mating period						Mating period	
	Pre-treatment period							Times of vaginal estrus observed
	Stage	Type	Mean length (days)	Stage	Type	Mean length (days)	Stage	
F04037	D D P E D D D E D D D E D	4-day	4.0	D P E D D P E D D P E D D P	4-day	4.0	PL	1
F04038	D D E D D P E D D P E D D	4-day	4.0	P E D D P E D D P E D D P E	4-day	4.0	D D P PL	1
F04039	E D D P E D D P E D D P E	4-day	4.0	D D P E D D P E D D D P E E	irregular	5.0	D D P PL	1
F04040	P E D D P E D D P E D D P	4-day	4.0	E D D P E D D P E D D P E D	4-day	4.0	D P PL	1
F04041	E D D P E D D P E D D P E	4-day	4.0	D D P E D D P E D D P E E D	4/5-day	4.5	D PL	1
F04042	D D P E D D P E D D P E D	4-day	4.0	D P E D D P E D D D E D D D	4-day	4.0	PL	1
F04043	E D D P E E D D D P E D D	5-day	5.0	D P E D D D P E D D D P E D	5-day	5.0	D P E PL	1
F04044	D D P E D D P E D D D E D	4-day	4.0	D P E D D P E D D P E D D P	4-day	4.0	PL	1
F04045	D D D E D D D E E D D D E	4/5-day	4.5	D D D E D D P E D D P E D D	4-day	4.0	P PL	1
F04046	D P E D D P E E D D P E E	5-day	5.0	D D D E E D D P E D D D D E	4/5-day	4.5	D D P PL	1
F04047	D D E D D P E D D P E D D	4-day	4.0	P E D D P E D D P E D D P E	4-day	4.0	D D P D D D D D D D D D D D	
F04048	D D E D D P E D D P E D D	4-day	4.0	P E D D P E D D P E D D P E	4-day	4.0	D D P PL	1
Mean			4.2			4.3		1.0
S.D.			0.4			0.4		0.0
(N)			(12)			(12)		(11)

D, diestrus; P, proestrus; E, estrus; PL, vaginal plug; SP, sperm positive

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 36-1. Results of observations about reproductive performance

Control (vehicle: corn oil)

Male no.	Female no.	Copulation	Conception	Pairing days until copulation
M01001	F01001	+	+	1
M01002	F01002	+	+	3
M01003	F01003	+	+	3
M01004	F01004	+	+	1
M01005	F01005	+	+	1
M01006	F01006	+	+	3
M01007	F01007	+	+	1
M01008	F01008	+	+	2
M01009	F01009	+	+	1
M01010	F01010	+	+	1
M01011	F01011	+	+	3
M01012	F01012	+	+	1
Total		+: 12, -: 0	+: 12, -: 0	
Mean				1.8
S.D.				1.0
(N)				(12)

+, confirmed

-, not confirmed

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 36-2. Results of observations about reproductive performance

Und (100 mg/kg)

Male no.	Female no.	Copulation	Conception	Pairing days until copulation
M02013	F02013	+	+	2
M02014	F02014	+	+	4
M02015	F02015	+	+	7
M02016	F02016	+	+	2
M02017	F02017	+	+	3
M02018	F02018	+	+	3
M02019	F02019	+	+	4
M02020	F02020	+	+	3
M02021	F02021	+	+	6
M02022	F02022	+	+	4
M02023	F02023	+	+	14
M02024	F02024	+	+	4
Total		+: 12, -: 0	+: 12, -: 0	
Mean				4.7 **
S.D.				3.3
(N)				(12)

+, confirmed

-, not confirmed

Significantly different from the control group (*: $p<0.05$, **: $p<0.01$).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 36-3. Results of observations about reproductive performance

Und (300 mg/kg)

Male no.	Female no.	Copulation	Conception	Pairing days until copulation
M03025	F03025	+	+	1
M03026	F03026	+	+	3
M03027	F03027	+	+	1
M03028	F03028	+	+	4
M03029	F03029	+	+	4
M03030	F03030	+	+	4
M03025	F03031	+	+	4
M03032	F03032	+	+	4
M03033	F03033	+	+	4
M03034	F03034	+	+	4
M03035	F03035	+	+	3
M03036	F03036	+	+	4
Total		+: 12, -: 0	+: 12, -: 0	
Mean				3.3 **
S.D.				1.2
(N)				(12)

+, confirmed

-, not confirmed

Significantly different from the control group (*: $p<0.05$, **: $p<0.01$).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 36-4. Results of observations about reproductive performance

Und (1000 mg/kg)

Male no.	Female no.	Copulation	Conception	Pairing days until copulation
M04037	F04037	+	+	1
M04038	F04038	+	+	4
M04039	F04039	+	+	4
M04040	F04040	+	+	3
M04041	F04041	+	+	2
M04042	F04042	+	-	1
M04043	F04043	+	+	4
M04044	F04044	+	+	1
M04045	F04045	+	+	2
M04037	F04046	+	+	4
M04047	F04047	-		
M04048	F04048	+	+	4
Total		+: 11, -: 1	+: 10, -: 1	
Mean				2.7
S.D.				1.3
(N)				(11)

+, confirmed

-, not confirmed

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 37-1. Observation of offspring (F_1)

Control (vehicle: corn oil)

Dam No.	Gestation length	Number of corpora lutea	Number of implantation scars	Implantation index	Delivery index (dams)	Number of offspring at birth						Delivery index (offspring)	Birth index	Live birth index	Number of live offspring			
						Number of offspring	Live			Sex ratio	Dead offspring				4 days		Sex ratio	Viability index
	(days)			(%)	(%)		Male	Female	Total			(%)	(%)	(%)	Male	Female		(%)
F01001	22	14	14	100.0	+	14	7	7	14	0.50	0	100.0	100.0	100.0	7	7	0.50	100.0
F01002	22	18	18	100.0	+	15	10	4	14	0.71	1	83.3	77.8	93.3	10	4	0.71	100.0
F01003	22	16	16	100.0	+	15	7	7	14	0.50	1	93.8	87.5	93.3	7	7	0.50	100.0
F01004	22	18	18	100.0	+	15	4	7	11	0.36	4	83.3	61.1	73.3	4	7	0.36	100.0
F01005	22	19	19	100.0	+	17	9	7	16	0.56	1	89.5	84.2	94.1	9	7	0.56	100.0
F01006	22	15	15	100.0	+	15	9	6	15	0.60	0	100.0	100.0	100.0	8	6	0.57	93.3
F01007	22	15	15	100.0	+	14	6	8	14	0.43	0	93.3	93.3	100.0	6	8	0.43	100.0
F01008	22	18	17	94.4	+	15	11	4	15	0.73	0	88.2	88.2	100.0	10	4	0.71	93.3
F01009	22	15	15	100.0	+	15	5	10	15	0.33	0	100.0	100.0	100.0	5	10	0.33	100.0
F01010	22	17	16	94.1	+	15	6	9	15	0.40	0	93.8	93.8	100.0	5	9	0.36	93.3
F01011	22	17	17	100.0	+	17	5	12	17	0.29	0	100.0	100.0	100.0	5	12	0.29	100.0
F01012	22	17	17	100.0	+	17	9	8	17	0.53	0	100.0	100.0	100.0	9	8	0.53	100.0
Number of dams	12	12	12	12	12 [a)]	12			12	12	12	12	12	12			12	12
Total		199	197			184	88	89	177		7				85	89		
Mean	22.0	16.6	16.4	99.0		15.3	7.3	7.4	14.8	0.50	0.6	93.8	90.5	96.2	7.1	7.4	0.49	98.3
S.D.	0.0	1.6	1.5	2.2		1.1	2.2	2.3	1.6	0.14	1.2	6.5	11.9	7.8	2.1	2.3	0.14	3.0
%					100.0													

+: Dams with live offspring, -: dams without live offspring.

a): Number of dams with live offspring.

b): Number of external abnormalities in live offspring at birth.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 37-2. Observation of offspring (F_1)

Und 100 mg/kg

Dam No.	Gestation length	Number of corpora lutea	Number of implantation scars	Implantation index	Delivery index (dams)	Number of offspring at birth						Delivery index (offspring)	Birth index	Live birth index	Number of live offspring			
						Number of offspring	Live			Sex ratio	Dead offspring				4 days		Sex ratio	Viability index
	(days)			(%)	(%)		Male	Female	Total			(%)	(%)	(%)	Male	Female		(%)
F02013	22	16	15	93.8	+	14	8	5	13	0.62	1	93.3	86.7	92.9	8	4	0.67	92.3
F02014	22	17	17	100.0	+	15	3	11	14	0.21	1	88.2	82.4	93.3	3	11	0.21	100.0
F02015	22	15	15	100.0	+	11	6	5	11	0.55	0	73.3	73.3	100.0	6	5	0.55	100.0
F02016	21	14	12	85.7	+	11	7	4	11	0.64	0	91.7	91.7	100.0	7	4	0.64	100.0
F02017	22	16	16	100.0	+	15	2	12	14	0.14	1	93.8	87.5	93.3	2	12	0.14	100.0
F02018	22	15	15	100.0	+	15	6	9	15	0.40	0	100.0	100.0	100.0	6	9	0.40	100.0
F02019	22	16	15	93.8	+	12	4	7	11	0.36	1	80.0	73.3	91.7	3	7	0.30	90.9
F02020	22	17	17	100.0	+	17	10	7	17	0.59	0	100.0	100.0	100.0	10	7	0.59	100.0
F02021	22	20	19	95.0	+	17	8	8	16	0.50	1	89.5	84.2	94.1	8	8	0.50	100.0
F02022	22	14	14	100.0	+	13	4	9	13	0.31	0	92.9	92.9	100.0	4	9	0.31	100.0
F02023	22	17	16	94.1	+	14	9	5	14	0.64	0	87.5	87.5	100.0	9	5	0.64	100.0
F02024	22	15	15	100.0	+	15	1	14	15	0.07	0	100.0	100.0	100.0	1	14	0.07	100.0
Number of dams	12	12	12	12	12 [a)]	12			12	12	12	12	12	12			12	12
Total		192	186			169	68	96	164		5				67	95		
Mean	21.9	16.0	15.5	96.9		14.1	5.7	8.0	13.7	0.42	0.4	90.9	88.3	97.1	5.6	7.9	0.42	98.6
S.D.	0.3	1.7	1.7	4.5		2.0	2.9	3.1	2.0	0.20	0.5	8.1	9.3	3.6	2.9	3.2	0.21	3.3
%					100.0													
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	KW	AN	AN	KW	AN	KW	AN	AN	KW	AN	AN	AN	AN

+: Dams with live offspring, -: dams without live offspring.

a): Number of dams with live offspring.

b): Number of external abnormalities in live offspring at birth.

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 37-3. Observation of offspring (F_1)

Und 300 mg/kg

Dam No.	Gestation length	Number of corpora lutea	Number of implantation scars	Implantation index	Delivery index (dams)	Number of offspring at birth				Sex ratio	Dead offspring	Delivery index (offspring)	Birth index	Live birth index	Number of live offspring			
						Number of offspring	Live								4 days		Sex ratio	Viability index
	(days)			(%)	(%)		Male	Female	Total			(%)	(%)	(%)	Male	Female		(%)
F03025	22	15	15	100.0	+	13	6	7	13	0.46	0	86.7	86.7	100.0	6	7	0.46	100.0
F03026	21	18	18	100.0	+	16	6	10	16	0.38	0	88.9	88.9	100.0	6	9	0.40	93.8
F03027	22	13	13	100.0	+	10	5	5	10	0.50	0	76.9	76.9	100.0	5	5	0.50	100.0
F03028	22	19	19	100.0	+	17	6	11	17	0.35	0	89.5	89.5	100.0	6	11	0.35	100.0
F03029	21	17	17	100.0	+	16	8	8	16	0.50	0	94.1	94.1	100.0	8	8	0.50	100.0
F03030	22	15	15	100.0	+	12	3	8	11	0.27	1	80.0	73.3	91.7	3	8	0.27	100.0
F03031	21	16	16	100.0	+	15	7	8	15	0.47	0	93.8	93.8	100.0	7	8	0.47	100.0
F03032	22	14	13	92.9	+	12	8	4	12	0.67	0	92.3	92.3	100.0	8	4	0.67	100.0
F03033	22	16	16	100.0	+	16	7	9	16	0.44	0	100.0	100.0	100.0	7	8	0.47	93.8
F03034	22	16	16	100.0	+	14	9	5	14	0.64	0	87.5	87.5	100.0	9	5	0.64	100.0
F03035	22	18	15	83.3	+	14	5	9	14	0.36	0	93.3	93.3	100.0	5	9	0.36	100.0
F03036	22	16	16	100.0	+	16	5	10	15	0.33	1	100.0	93.8	93.8	5	10	0.33	100.0
Number of dams	12	12	12	12	12 [a)]	12			12	12	12	12	12	12			12	12
Total		193	189			171	75	94	169		2				75	92		
Mean	21.8	16.1	15.8	98.0		14.3	6.3	7.8	14.1	0.45	0.2	90.3	89.2	98.8	6.3	7.7	0.45	99.0
S.D.	0.5	1.7	1.8	5.1		2.1	1.7	2.2	2.2	0.12	0.4	7.0	7.5	2.9	1.7	2.1	0.12	2.4
%					100.0													
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	KW	AN	AN	KW	AN	KW	AN	AN	KW	AN	AN	AN	AN

+: Dams with live offspring, -: dams without live offspring.

a): Number of dams with live offspring.

b): Number of external abnormalities in live offspring at birth.

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 37-4. Observation of offspring (F_1)

Und 1000 mg/kg

Dam No.	Gestation length	Number of corpora lutea	Number of implantation scars	Implantation index	Delivery index (dams)	Number of offspring at birth						Delivery index (offspring)	Birth index	Live birth index	Number of live offspring			
						Number of offspring	Live			Sex ratio	Dead offspring				4 days		Sex ratio	Viability index
	(days)			(%)	(%)		Male	Female	Total			(%)	(%)	(%)	Male	Female		(%)
F04037	22	17	17	100.0	+	14	7	7	14	0.50	0	82.4	82.4	100.0	6	7	0.46	92.9
F04038	22	16	16	100.0	+	14	6	8	14	0.43	0	87.5	87.5	100.0	6	8	0.43	100.0
F04039	22	15	15	100.0	+	15	6	8	14	0.43	1	100.0	93.3	93.3	6	8	0.43	100.0
F04040	21	18	16	88.9	+	15	8	7	15	0.53	0	93.8	93.8	100.0	8	7	0.53	100.0
F04041	23	8	7	87.5	+	4	2	1	3	0.67	1	57.1	42.9	75.0	2	1	0.67	100.0
F04042	Not pregnant																	
F04043	22	15	15	100.0	+	14	6	7	13	0.46	1	93.3	86.7	92.9	6	7	0.46	100.0
F04044	22	18	18	100.0	+	18	11	7	18	0.61	0	100.0	100.0	100.0	10	7	0.59	94.4
F04045	22	16	16	100.0	+	15	4	11	15	0.27	0	93.8	93.8	100.0	4	11	0.27	100.0
F04046	22	14	14	100.0	+	13	7	6	13	0.54	0	92.9	92.9	100.0	7	6	0.54	100.0
F04048	22	18	18	100.0	+	17	8	9	17	0.47	0	94.4	94.4	100.0	8	9	0.47	100.0
Number of dams	10	10	10	10	10 [a]	10			10	10	10	10	10	10			10	10
Total		155	152			139	65	71	136		3				63	71		
Mean	22.0	15.5	15.2	97.6		13.9	6.5	7.1	13.6	0.49	0.3	89.5	86.8	96.1	6.3	7.1	0.49	98.7
S.D.	0.5	3.0	3.2	5.0		3.8	2.4	2.6	4.1	0.11	0.5	12.5	16.2	8.0	2.2	2.6	0.11	2.7
%					100.0													
Significance	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Statistical method	AN	AN	AN	AN	AN	KW	AN	AN	KW	AN	KW	AN	AN	KW	AN	AN	AN	AN

+: Dams with live offspring, -: dams without live offspring.

a): Number of dams with live offspring.

b): Number of external abnormalities in live offspring at birth.

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

KW: Analysis by Kruskal-Wallis' test (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 38-1. Body weights of offspring (F_1) before weaning

Control (vehicle: corn oil)

Dam No.	Days after birth							
	Male body weight				Female body weight			
	0		4		0		4	
F01001	7.1	(7)	12.0	(7)	6.3	(7)	11.4	(7)
F01002	6.6	(10)	10.3	(10)	6.3	(4)	9.8	(4)
F01003	6.6	(7)	13.3	(7)	7.3	(7)	12.1	(7)
F01004	6.9	(4)	12.4	(4)	6.1	(7)	11.2	(7)
F01005	6.7	(9)	11.1	(9)	6.1	(7)	10.4	(7)
F01006	6.9	(9)	11.8	(8)	6.5	(6)	11.9	(6)
F01007	6.2	(6)	10.7	(6)	5.9	(8)	10.4	(8)
F01008	6.4	(11)	11.1	(10)	6.0	(4)	10.6	(4)
F01009	7.0	(5)	11.4	(5)	6.6	(10)	11.2	(10)
F01010	6.5	(6)	11.0	(5)	6.4	(9)	10.8	(9)
F01011	6.0	(5)	9.5	(5)	5.7	(12)	9.0	(12)
F01012	6.5	(9)	9.0	(9)	5.8	(8)	9.4	(8)
Number of dams	12		12		12		12	
Mean	6.6		11.1		6.3		10.7	
S.D.	0.3		1.2		0.4		1.0	

Each value shows mean per dam (g).

Figures in parentheses indicate number of offspring.

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 38-2. Body weights of offspring (F_1) before weaning

Und 100 mg/kg

Dam No.	Days after birth							
	Male body weight				Female body weight			
	0		4		0		4	
F02013	6.8	(8)	10.7	(8)	5.9	(5)	10.2	(4)
F02014	6.5	(3)	11.1	(3)	6.1	(11)	10.3	(11)
F02015	6.8	(6)	12.0	(6)	6.6	(5)	11.9	(5)
F02016	5.7	(7)	10.1	(7)	5.5	(4)	9.8	(4)
F02017	7.0	(2)	10.5	(2)	6.7	(12)	10.0	(12)
F02018	7.4	(6)	12.3	(6)	6.8	(9)	11.5	(9)
F02019	7.5	(4)	14.2	(3)	7.3	(7)	13.5	(7)
F02020	6.3	(10)	9.5	(10)	6.2	(7)	8.7	(7)
F02021	6.4	(8)	10.4	(8)	5.9	(8)	9.8	(8)
F02022	7.2	(4)	11.7	(4)	6.5	(9)	11.1	(9)
F02023	6.4	(9)	11.0	(9)	5.9	(5)	10.4	(5)
F02024	5.6	(1)	10.3	(1)	5.9	(14)	11.2	(14)
Number of dams	12		12		12		12	
Mean	6.6		11.2		6.3		10.7	
S.D.	0.6		1.3		0.5		1.2	
Significance	NS		NS		NS		NS	
Statistical method	AN		AN		AN		AN	

Each value shows mean per dam (g).

Figures in parentheses indicate number of offspring.

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 38-3. Body weights of offspring (F_1) before weaning

Und 300 mg/kg

Dam No.	Days after birth							
	Male body weight				Female body weight			
	0		4		0		4	
F03025	6.8	(6)	11.4	(6)	6.4	(7)	11.0	(7)
F03026	5.4	(6)	7.7	(6)	5.1	(10)	7.3	(9)
F03027	7.3	(5)	12.4	(5)	7.2	(5)	11.9	(5)
F03028	6.1	(6)	10.3	(6)	5.8	(11)	9.4	(11)
F03029	6.5	(8)	8.5	(8)	6.2	(8)	8.9	(8)
F03030	7.4	(3)	12.4	(3)	6.6	(8)	11.9	(8)
F03031	5.8	(7)	8.9	(7)	5.5	(8)	9.0	(8)
F03032	6.5	(8)	10.9	(8)	6.9	(4)	11.0	(4)
F03033	6.8	(7)	11.4	(7)	5.9	(9)	10.7	(8)
F03034	6.7	(9)	10.0	(9)	6.3	(5)	8.8	(5)
F03035	6.6	(5)	10.3	(5)	6.0	(9)	10.3	(9)
F03036	6.0	(5)	10.4	(5)	5.9	(10)	10.2	(10)
Number of dams	12		12		12		12	
Mean	6.5		10.4		6.2		10.0	
S.D.	0.6		1.5		0.6		1.4	
Significance	NS		NS		NS		NS	
Statistical method	AN		AN		AN		AN	

Each value shows mean per dam (g).

Figures in parentheses indicate number of offspring.

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 38-4. Body weights of offspring (F_1) before weaning

Und 1000 mg/kg

Dam No.	Days after birth							
	Male body weight				Female body weight			
	0		4		0		4	
F04037	6.8	(7)	11.5	(6)	6.1	(7)	10.7	(7)
F04038	6.8	(6)	11.3	(6)	6.3	(8)	10.7	(8)
F04039	7.1	(6)	11.0	(6)	6.8	(8)	10.4	(8)
F04040	6.1	(8)	9.6	(8)	5.5	(7)	8.9	(7)
F04041	7.4	(2)	13.6	(2)	7.2	(1)	12.3	(1)
F04042	Not pregnant							
F04043	7.5	(6)	12.8	(6)	6.6	(7)	12.5	(7)
F04044	6.4	(11)	10.4	(10)	6.7	(7)	10.5	(7)
F04045	6.1	(4)	9.8	(4)	5.6	(11)	8.5	(11)
F04046	6.6	(7)	12.4	(7)	6.5	(6)	11.8	(6)
F04048	6.4	(8)	9.1	(8)	6.2	(9)	9.2	(9)
Number of dams	10		10		10		10	
Mean	6.7		11.2		6.4		10.6	
S.D.	0.5		1.5		0.5		1.4	
Significance	NS		NS		NS		NS	
Statistical method	AN		AN		AN		AN	

Each value shows mean per dam (g).

Figures in parentheses indicate number of offspring.

NS: Not significantly different from the control group.

AN: Analysis by variance (one-way layout).

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 39-1. General conditions in offspring (F_1) before weaning

Control (vehicle: corn oil)

Dam No.	Number of offspring and general conditions	Days after birth				
		0	1	2	3	4
F01001	Number of offspring	14	14	14	14	14
	General appearance, No abnormality	14	14	14	14	14
F01002	Number of offspring	14	14	14	14	14
	General appearance, No abnormality	14	14	14	14	14
F01003	Number of offspring	14	14	14	14	14
	General appearance, No abnormality	14	14	14	14	14
F01004	Number of offspring	11	11	11	11	11
	General appearance, No abnormality	11	11	11	11	11
F01005	Number of offspring	16	16	16	16	16
	General appearance, No abnormality	16	16	16	16	16
F01006	Number of offspring	15	15	15	15	14
	General appearance, No abnormality	15	15	15	14	14
	General appearance, Death	0	0	0	1	0
F01007	Number of offspring	14	14	14	14	14
	General appearance, No abnormality	14	14	14	14	14
F01008	Number of offspring	15	15	14	14	14
	General appearance, No abnormality	15	14	14	14	14
	General appearance, Death	0	1	0	0	0
F01009	Number of offspring	15	15	15	15	15
	General appearance, No abnormality	15	15	15	15	15
F01010	Number of offspring	15	15	15	14	14
	General appearance, No abnormality	15	15	14	14	14
	General appearance, Death	0	0	1	0	0
F01011	Number of offspring	17	17	17	17	17
	General appearance, No abnormality	17	17	17	17	17
F01012	Number of offspring	17	17	17	17	17
	General appearance, No abnormality	17	17	17	17	17
	Number of offspring	177	177	176	175	174
	General appearance, No abnormality	177	176	175	174	174
	General appearance, Death		1	1	1	

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 39-2. General conditions in offspring (F_1) before weaning

Und 100 mg/kg

Dam No.	Number of offspring and general conditions	Days after birth				
		0	1	2	3	4
F02013	Number of offspring	13	13	12	12	12
	General appearance, No abnormality	13	12	12	12	12
	General appearance, Death	0	1	0	0	0
F02014	Number of offspring	14	14	14	14	14
	General appearance, No abnormality	14	14	14	14	14
F02015	Number of offspring	11	11	11	11	11
	General appearance, No abnormality	11	11	11	11	11
F02016	Number of offspring	11	11	11	11	11
	General appearance, No abnormality	11	11	11	11	11
F02017	Number of offspring	14	14	14	14	14
	General appearance, No abnormality	14	14	14	14	14
F02018	Number of offspring	15	15	15	15	15
	General appearance, No abnormality	15	15	15	15	15
F02019	Number of offspring	11	11	10	10	10
	General appearance, No abnormality	11	10	10	10	10
	General appearance, Death	0	1	0	0	0
F02020	Number of offspring	17	17	17	17	17
	General appearance, No abnormality	17	17	17	17	17
F02021	Number of offspring	16	16	16	16	16
	General appearance, No abnormality	16	16	16	16	16
F02022	Number of offspring	13	13	13	13	13
	General appearance, No abnormality	13	13	13	13	13
F02023	Number of offspring	14	14	14	14	14
	General appearance, No abnormality	14	14	14	14	14
F02024	Number of offspring	15	15	15	15	15
	General appearance, No abnormality	15	15	15	15	15
	Number of offspring	164	164	162	162	162
	General appearance, No abnormality	164	162	162	162	162
	General appearance, Death		2			

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 39-3. General conditions in offspring (F_1) before weaning

Und 300 mg/kg

Dam No.	Number of offspring and general conditions	Days after birth				
		0	1	2	3	4
F03025	Number of offspring	13	13	13	13	13
	General appearance, No abnormality	13	13	13	13	13
F03026	Number of offspring	16	16	16	15	15
	General appearance, No abnormality	16	16	15	15	15
	General appearance, Death	0	0	1	0	0
F03027	Number of offspring	10	10	10	10	10
	General appearance, No abnormality	10	10	10	10	10
F03028	Number of offspring	17	17	17	17	17
	General appearance, No abnormality	17	17	17	17	17
F03029	Number of offspring	16	16	16	16	16
	General appearance, No abnormality	16	16	16	16	16
F03030	Number of offspring	11	11	11	11	11
	General appearance, No abnormality	11	11	11	11	11
F03031	Number of offspring	15	15	15	15	15
	General appearance, No abnormality	15	15	15	15	15
F03032	Number of offspring	12	12	12	12	12
	General appearance, No abnormality	12	12	12	12	12
F03033	Number of offspring	16	16	15	15	15
	General appearance, No abnormality	16	15	15	15	15
	General appearance, Death	0	1	0	0	0
F03034	Number of offspring	14	14	14	14	14
	General appearance, No abnormality	14	14	14	14	14
F03035	Number of offspring	14	14	14	14	14
	General appearance, No abnormality	14	14	14	14	14
F03036	Number of offspring	15	15	15	15	15
	General appearance, No abnormality	15	15	15	15	15
	Number of offspring	169	169	168	167	167
	General appearance, No abnormality	169	168	167	167	167
	General appearance, Death		1	1		

Combined repeat dose and reproductive/developmental toxicity screening test of Undecanal by oral administration in rats

Appendix 39-4. General conditions in offspring (F_1) before weaning

Und 1000 mg/kg

Dam No.	Number of offspring and general conditions	Days after birth				
		0	1	2	3	4
F04037	Number of offspring	14	14	13	13	13
	General appearance, No abnormality	14	13	13	13	13
	General appearance, Death	0	1	0	0	0
F04038	Number of offspring	14	14	14	14	14
	General appearance, No abnormality	14	14	14	14	14
F04039	Number of offspring	14	14	14	14	14
	General appearance, No abnormality	14	14	14	14	14
F04040	Number of offspring	15	15	15	15	15
	General appearance, No abnormality	15	15	15	15	15
F04041	Number of offspring	3	3	3	3	3
	General appearance, No abnormality	3	3	3	3	3
F04042	Not pregnant					
F04043	Number of offspring	13	13	13	13	13
	General appearance, No abnormality	13	13	13	13	13
F04044	Number of offspring	18	18	17	17	17
	General appearance, No abnormality	18	17	17	17	17
	General appearance, Death	0	1	0	0	0
F04045	Number of offspring	15	15	15	15	15
	General appearance, No abnormality	15	15	15	15	15
F04046	Number of offspring	13	13	13	13	13
	General appearance, No abnormality	13	13	13	13	13
F04047	Not copulated					
F04048	Number of offspring	17	17	17	17	17
	General appearance, No abnormality	17	17	17	17	17
	Number of offspring	136	136	134	134	134
	General appearance, No abnormality	136	134	134	134	134
	General appearance, Death		2			

信頼性保証書

表題　　Undecanal のラットを用いる反復投与毒性・生殖発生毒性併合試験

試験番号　　R-13-006

この試験に関する信頼性保証部門による査察および監査状況等は下記のとおりであった。

査察・監査項目	査察・監査年月日	運営管理者および試験責任者への報告年月日
試験計画書	2013 年 9 月 18 日	2013 年 9 月 18 日
試験計画書変更書		
R-13-006-No.1	2013 年 10 月 3 日	2013 年 10 月 3 日
R-13-006-No.2	2013 年 10 月 15 日	2013 年 10 月 15 日
R-13-006-No.3	2013 年 10 月 24 日	2013 年 10 月 24 日
動物の受入れおよび検疫	2013 年 9 月 25 日	2013 年 9 月 25 日
検体調製および含量試験	2013 年 10 月 4 日	2013 年 10 月 4 日
群分け	2013 年 10 月 7 日	2013 年 10 月 7 日
体重測定、給餌量測定、投与および一般状態の観察	2013 年 10 月 8 日	2013 年 10 月 8 日
性周期観察	2013 年 10 月 9 日	2013 年 10 月 9 日
詳細な症状観察	2013 年 10 月 15 日	2013 年 10 月 15 日
交尾確認	2013 年 10 月 23 日	2013 年 10 月 23 日
尿検査	2013 年 11 月 13、14 日	2013 年 11 月 14 日
分娩状態および出生児の観察	2013 年 11 月 14 日	2013 年 11 月 14 日
機能検査	2013 年 11 月 15、18 日	2013 年 11 月 18 日
出生児剖検、雄動物剖検、血液学的検査、血液生化学的検査、器官重量測定および固定	2013 年 11 月 19 日	2013 年 11 月 19 日
病理組織学検査(標本作製:切り出し)	2013 年 12 月 4 日	2013 年 12 月 4 日
報告書草案および生データ	2014 年 2 月 17～19 日	2014 年 2 月 19 日
最終報告書	2014 年 3 月 25 日	2014 年 3 月 25 日

試験は、「新規化学物質等に係る試験を実施する試験施設に関する基準」(平成 23 年 3 月 31 日、薬食発 0331 第 8 号、平成 23・03・29 製局第 6 号、環保企発第 110331010 号)を遵守して実施され、また、この報告書は試験に使用された方法および手順を正確に記載し、記載された結果は試験の生データを正確に反映していることを保証する。

2014 年 3 月 25 日

一般財団法人食品薬品安全センター 秦野研究所
信頼性保証部門責任者 [redacted]