

Iterations and Functions homework

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```
library(ggplot2)
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## v dplyr      1.1.4      v readr      2.1.5
## v forcats    1.0.0      v stringr   1.5.1
## v lubridate  1.9.3      v tibble    3.2.1
## v purrr      1.0.2      v tidyr     1.3.1
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(drc)
```

```
## Loading required package: MASS

##
## Attaching package: 'MASS'

## The following object is masked from 'package:dplyr':
##
##      select

##
## 'drc' has been loaded.

## Please cite R and 'drc' if used for a publication,

## for references type 'citation()' and 'citation('drc')'.

##
## Attaching package: 'drc'

## The following objects are masked from 'package:stats':
##
##      gaussian, getInitial

##convert Fahrenheit to Celsius
```

```
(5*(82 - 32)/9)
```

```
## [1] 27.77778
```

converting Fahrenheit to Celsius to a function.

```
F_to_C <- function(fahrenheit_temp){  
  celsius <- (5*(fahrenheit_temp - 32)/9)  
  return(celsius)  
}
```

```
# these do the same thing  
F_to_C(79)
```

```
## [1] 26.11111
```

```
##practice
```

```
C_to_F <- function(celsius){  
  fahrenheit_temp <- ((celsius)*(9/5)+32)  
  return(fahrenheit_temp)  
}  
C_to_F(25)
```

```
## [1] 77
```

```
###iteration function in base R
```

```
rep("A",3)
```

```
## [1] "A" "A" "A"
```

```
rep(c(1,2),3)
```

```
## [1] 1 2 1 2 1 2
```

```
rep(c("a","b"),3, each = 2)
```

```
## [1] "a" "a" "b" "b" "a" "a" "b" "b" "a" "a" "b" "b"
```

```
seq(from = 1, to = 7)
```

```
## [1] 1 2 3 4 5 6 7
```

```
seq(from = 2, to = 12, by = 2)
```

```
## [1]  2  4  6  8 10 12
```

```
LETTERS
```

```
## [1] "A" "B" "C" "D" "E" "F" "G" "H" "I" "J" "K" "L" "M" "N" "O" "P" "Q" "R" "S"  
## [20] "T" "U" "V" "W" "X" "Y" "Z"
```

```
seq_along(LETTERS)
```

```
## [1]  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  
## [26] 26
```

```
###the for loop
```

```
for(i in 1:10){  
  print(i*2)  
}
```

```
## [1] 2  
## [1] 4  
## [1] 6  
## [1] 8  
## [1] 10  
## [1] 12  
## [1] 14  
## [1] 16  
## [1] 18  
## [1] 20
```

```
for (i in -30:100){  
  result <- F_to_C(i)  
  print(result)  
}
```

```
## [1] -34.44444  
## [1] -33.88889  
## [1] -33.33333  
## [1] -32.77778  
## [1] -32.22222  
## [1] -31.66667  
## [1] -31.11111  
## [1] -30.55556  
## [1] -30  
## [1] -29.44444  
## [1] -28.88889  
## [1] -28.33333  
## [1] -27.77778  
## [1] -27.22222
```

```
## [1] -26.66667
## [1] -26.11111
## [1] -25.55556
## [1] -25
## [1] -24.44444
## [1] -23.88889
## [1] -23.33333
## [1] -22.77778
## [1] -22.22222
## [1] -21.66667
## [1] -21.11111
## [1] -20.55556
## [1] -20
## [1] -19.44444
## [1] -18.88889
## [1] -18.33333
## [1] -17.77778
## [1] -17.22222
## [1] -16.66667
## [1] -16.11111
## [1] -15.55556
## [1] -15
## [1] -14.44444
## [1] -13.88889
## [1] -13.33333
## [1] -12.77778
## [1] -12.22222
## [1] -11.66667
## [1] -11.11111
## [1] -10.55556
## [1] -10
## [1] -9.444444
## [1] -8.88889
## [1] -8.333333
## [1] -7.77778
## [1] -7.22222
## [1] -6.66667
## [1] -6.11111
## [1] -5.55556
## [1] -5
## [1] -4.44444
## [1] -3.88889
## [1] -3.33333
## [1] -2.77778
## [1] -2.22222
## [1] -1.66667
## [1] -1.11111
## [1] -0.555556
## [1] 0
## [1] 0.555556
## [1] 1.11111
## [1] 1.66667
## [1] 2.22222
## [1] 2.77778
```

```
## [1] 3.333333
## [1] 3.888889
## [1] 4.444444
## [1] 5
## [1] 5.555556
## [1] 6.111111
## [1] 6.666667
## [1] 7.222222
## [1] 7.777778
## [1] 8.333333
## [1] 8.888889
## [1] 9.444444
## [1] 10
## [1] 10.555556
## [1] 11.111111
## [1] 11.666667
## [1] 12.222222
## [1] 12.777778
## [1] 13.333333
## [1] 13.888889
## [1] 14.444444
## [1] 15
## [1] 15.555556
## [1] 16.111111
## [1] 16.666667
## [1] 17.222222
## [1] 17.777778
## [1] 18.333333
## [1] 18.888889
## [1] 19.444444
## [1] 20
## [1] 20.555556
## [1] 21.111111
## [1] 21.666667
## [1] 22.222222
## [1] 22.777778
## [1] 23.333333
## [1] 23.888889
## [1] 24.444444
## [1] 25
## [1] 25.555556
## [1] 26.111111
## [1] 26.666667
## [1] 27.222222
## [1] 27.777778
## [1] 28.333333
## [1] 28.888889
## [1] 29.444444
## [1] 30
## [1] 30.555556
## [1] 31.111111
## [1] 31.666667
## [1] 32.222222
## [1] 32.777778
```

```
## [1] 33.33333
## [1] 33.88889
## [1] 34.44444
## [1] 35
## [1] 35.55556
## [1] 36.11111
## [1] 36.66667
## [1] 37.22222
## [1] 37.77778
```

```
celcius.df <- NULL
for(i in -30:10){
  result <- data.frame(F_to_C(i), i)
  celcius.df <- rbind.data.frame(celcius.df, result)
  print(celcius.df)
}
```

```
##   F_to_C.i.   i
## 1 -34.44444 -30
##   F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
##   F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
##   F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
##   F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
##   F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
##   F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
##   F_to_C.i.   i
## 1 -34.44444 -30
```

```

## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
##   F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
##   F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
##   F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
##   F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
##   F_to_C.i.   i

```

```

## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
##      F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
##      F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
##      F_to_C.i.   i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22

```



```

## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
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## 16 -26.11111 -15
##      F_to_C.i.    i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
##      F_to_C.i.    i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
##      F_to_C.i.    i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22

```

```

## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
##      F_to_C.i.    i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
##      F_to_C.i.    i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
##      F_to_C.i.    i

```

```

## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
##    F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
##    F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24

```

```

## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
##      F_to_C.i.    i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
##      F_to_C.i.    i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21

```

```

## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
##      F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
##      F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22

```

```

## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
##      F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
## 29 -18.88889 -2
##      F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27

```

```

## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
##      F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4

```

```

## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
## 31 -17.77778 0
##      F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
## 31 -17.77778 0
## 32 -17.22222 1
##      F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15

```



```

## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
## 31 -17.77778 0
## 32 -17.22222 1
## 33 -16.66667 2
##      F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
## 31 -17.77778 0
## 32 -17.22222 1
## 33 -16.66667 2
## 34 -16.11111 3
##      F_to_C.i.   i
## 1  -34.44444 -30

```

```

## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
## 31 -17.77778 0
## 32 -17.22222 1
## 33 -16.66667 2
## 34 -16.11111 3
## 35 -15.55556 4
## F_to_C.i. i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12

```

```

## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
## 31 -17.77778 0
## 32 -17.22222 1
## 33 -16.66667 2
## 34 -16.11111 3
## 35 -15.55556 4
## 36 -15.00000 5
##      F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
## 31 -17.77778 0
## 32 -17.22222 1
## 33 -16.66667 2
## 34 -16.11111 3
## 35 -15.55556 4
## 36 -15.00000 5

```

```

## 37 -14.44444 6
## F_to_C.i. i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
## 31 -17.77778 0
## 32 -17.22222 1
## 33 -16.66667 2
## 34 -16.11111 3
## 35 -15.55556 4
## 36 -15.00000 5
## 37 -14.44444 6
## 38 -13.88889 7
## F_to_C.i. i
## 1 -34.44444 -30
## 2 -33.88889 -29
## 3 -33.33333 -28
## 4 -32.77778 -27
## 5 -32.22222 -26
## 6 -31.66667 -25
## 7 -31.11111 -24
## 8 -30.55556 -23
## 9 -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18

```

```

## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
## 31 -17.77778 0
## 32 -17.22222 1
## 33 -16.66667 2
## 34 -16.11111 3
## 35 -15.55556 4
## 36 -15.00000 5
## 37 -14.44444 6
## 38 -13.88889 7
## 39 -13.33333 8
##      F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4

```

```

## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
## 31 -17.77778 0
## 32 -17.22222 1
## 33 -16.66667 2
## 34 -16.11111 3
## 35 -15.55556 4
## 36 -15.00000 5
## 37 -14.44444 6
## 38 -13.88889 7
## 39 -13.33333 8
## 40 -12.77778 9
##      F_to_C.i.   i
## 1  -34.44444 -30
## 2  -33.88889 -29
## 3  -33.33333 -28
## 4  -32.77778 -27
## 5  -32.22222 -26
## 6  -31.66667 -25
## 7  -31.11111 -24
## 8  -30.55556 -23
## 9  -30.00000 -22
## 10 -29.44444 -21
## 11 -28.88889 -20
## 12 -28.33333 -19
## 13 -27.77778 -18
## 14 -27.22222 -17
## 15 -26.66667 -16
## 16 -26.11111 -15
## 17 -25.55556 -14
## 18 -25.00000 -13
## 19 -24.44444 -12
## 20 -23.88889 -11
## 21 -23.33333 -10
## 22 -22.77778 -9
## 23 -22.22222 -8
## 24 -21.66667 -7
## 25 -21.11111 -6
## 26 -20.55556 -5
## 27 -20.00000 -4
## 28 -19.44444 -3
## 29 -18.88889 -2
## 30 -18.33333 -1
## 31 -17.77778 0
## 32 -17.22222 1
## 33 -16.66667 2
## 34 -16.11111 3
## 35 -15.55556 4
## 36 -15.00000 5
## 37 -14.44444 6
## 38 -13.88889 7
## 39 -13.33333 8
## 40 -12.77778 9

```

```
## 41 -12.22222 10
```

```
library(drc)
EC50.data <- read.csv("EC50_all.csv")
isolate1 <- drm(100 * EC50.data$relgrowth[EC50.data$is == "ILS0_5-41c"] ~
  EC50.data$conc[EC50.data$is == "ILS0_5-41c"],
  fct = LL.4(fixed = c(NA, NA, NA, NA),
    names = c("Slope", "Lower", "Upper", "EC50")),
  na.action = na.omit)
# outputs the summary of the paramters including the estimate, standard
# error, t-value, and p-value outputs it into a data frame called
# summary.mef.fit for 'summary of fit'
summary.fit <- data.frame(summary(isolate1)[[3]])
# outputs the summary of just the EC50 data including the estimate, standard
# error, upper and lower bounds of the 95% confidence intervals around the
# EC50
EC50 <- ED(isolate1, respLev = c(50), type = "relative",
  interval = "delta")[[1]]
```

```
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1070318  0.0055365 0.0957543 0.1183094
```

```
nm <- unique(EC50.data$is)
for (i in seq_along(nm)) {
  isolate1 <- drm(100 * EC50.data$relgrowth[EC50.data$is == nm[[i]]] ~
    EC50.data$conc[EC50.data$is == nm[[i]]],
    fct = LL.4(fixed = c(NA, NA, NA, NA),
      names = c("Slope", "Lower", "Upper", "EC50")),
    na.action = na.omit)
  # outputs the summary of the paramters including the estimate, standard
  # error, t-value, and p-value outputs it into a data frame called
  # summary.mef.fit for 'summary of fit'
  summary.fit <- data.frame(summary(isolate1)[[3]])
  # outputs the summary of just the EC50 data including the estimate, standard
  # error, upper and lower bounds of the 95% confidence intervals around the
  # EC50
  EC50 <- ED(isolate1, respLev = c(50), type = "relative",
    interval = "delta")[[1]]
  EC50
}
```

```
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1070318  0.0055365 0.0957543 0.1183094
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
```

```

## e:1:50 0.248655 0.028485 0.190633 0.306678
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.167592 0.010197 0.146821 0.188362
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.1082677 0.0051459 0.0977858 0.1187495
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.184271 0.036047 0.110846 0.257695
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.227432 0.040614 0.144704 0.310160
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.101863 0.003487 0.094760 0.108965
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.1102721 0.0033354 0.1034780 0.1170661
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.123288 0.014018 0.094735 0.151841
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.0998727 0.0044787 0.0907498 0.1089956
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.69465 0.39164 -0.10310 1.49240
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.113975 0.012773 0.087958 0.139993
##
## Estimated effective doses
##

```



```

##           Estimate Std. Error   Lower   Upper
## e:1:50 0.217436    0.027934 0.160536 0.274335
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1432333   0.0093132 0.1242629 0.1622036
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.18336     0.01293 0.15695 0.20977
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.186929    0.034023 0.117626 0.256232
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.0299288   0.0017812 0.0263007 0.0335569
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.200379    0.020104 0.159429 0.241329
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.30812     0.24033 -0.18142 0.79765
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.227103    0.019697 0.186983 0.267224
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.20009     0.01448 0.17059 0.22958
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.223966    0.058089 0.105642 0.342290
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.288001    0.074597 0.136052 0.439951
##
## Estimated effective doses

```

```

##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.369422   0.077015 0.212549 0.526296
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.118335   0.011733 0.094404 0.142265
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.189945   0.013146 0.163097 0.216793
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0483296  0.0022658 0.0437143 0.0529448
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.190146   0.027182 0.134779 0.245514
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.16580    0.01082 0.14376 0.18784
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.183297   0.017237 0.148187 0.218407
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.130147   0.010705 0.108342 0.151951
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1915200  0.0077369 0.1757605 0.2072795
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.123034   0.006696 0.109395 0.136673
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1935594  0.0094277 0.1743559 0.2127629
##

```

```

## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.198000   0.019219 0.158853 0.237148
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1114482   0.0070542 0.0970793 0.1258172
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.159440   0.010423 0.138209 0.180671
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1372654   0.0070847 0.1228343 0.1516965
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.427766   0.230327 -0.041395 0.896926
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0991738   0.0040323 0.0909603 0.1073874
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.106855   0.022010 0.062022 0.151687
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.156127   0.021551 0.112229 0.200025
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.308127   0.019233 0.268951 0.347304
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.117014   0.012255 0.092052 0.141977
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.177036   0.011915 0.152767 0.201305

```

```

##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.234268   0.017095 0.199447 0.269088
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0172659   0.0012838 0.0146508 0.0198809
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.201737   0.012113 0.176998 0.226476
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.306968   0.078617 0.146831 0.467105
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.289597   0.081347 0.123464 0.455730
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.213191   0.024013 0.164278 0.262104
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.42728    0.28840 -0.16016 1.01472
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0900834   0.0021351 0.0857344 0.0944324
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1573077   0.0065037 0.1440602 0.1705553
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.16319    0.01761 0.12732 0.19906
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper

```

```

## e:1:50  0.20914    0.01403 0.18056 0.23772
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.17905    0.00849 0.16171 0.19639
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1587569  0.0098007 0.1387411 0.1787727
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1352667  0.0074545 0.1200824 0.1504511
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.247784   0.036714 0.173000 0.322567
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.235268   0.026532 0.181223 0.289313
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.066926   0.010213 0.046123 0.087728
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.174492   0.010501 0.153102 0.195882
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.181951   0.028336 0.124233 0.239669
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.195576   0.013476 0.168125 0.223027
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.168410   0.010795 0.146421 0.190399
##
## Estimated effective doses
##

```

```

##           Estimate Std. Error      Lower      Upper
## e:1:50 0.1546980   0.0093702 0.1354373 0.1739588
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.162666   0.011066 0.140126 0.185206
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.147113   0.008233 0.130343 0.163883
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.1376907   0.0077899 0.1218232 0.1535582
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.118886   0.004502 0.109716 0.128057
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.206342   0.016866 0.171988 0.240696
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.175509   0.013954 0.147086 0.203932
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.65376    0.63282 -0.63525 1.94277
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.211026   0.012571 0.185419 0.236633

```

```

library(ggplot2)
EC50.114 <- NULL # create a null object
for (i in seq_along(nm)) {
  isolate1 <- drm(100 * EC50.data$relgrowth[EC50.data$is == nm[[i]]] ~
    EC50.data$conc[EC50.data$is == nm[[i]]],
    fct = LL.4(fixed = c(NA, NA, NA, NA),
      names = c("Slope", "Lower", "Upper", "EC50")),
    na.action = na.omit)
  # outputs the summary of the paramters including the estimate, standard
  # error, t-value, and p-value outputs it into a data frame called
  # summary.mef.fit for 'summary of fit'

```

```

summary.fit <- data.frame(summary(isolate1)[[3]])
# outputs the summary of just the EC50 data including the estimate, standard
# error, upper and lower bounds of the 95% confidence intervals around the
# EC50
EC50 <- ED(isolate1, respLev = c(50), type = "relative",
  interval = "delta")[[1]]
EC50
isolate.ec_i <- data.frame(nm[[i]], EC50) # create a one row dataframe containing just the isolate
colnames(isolate.ec_i) <- c("Isolate", "EC50") # change the column names

# Then we need to append our one row dataframe to our null dataframe we created before
# and save it as EC50.ll4.
EC50.ll4 <- rbind.data.frame(EC50.ll4, isolate.ec_i)
}

```

```

##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1070318   0.0055365 0.0957543 0.1183094
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.248655    0.028485 0.190633 0.306678
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.167592    0.010197 0.146821 0.188362
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1082677   0.0051459 0.0977858 0.1187495
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.184271    0.036047 0.110846 0.257695
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.227432    0.040614 0.144704 0.310160
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.101863    0.003487 0.094760 0.108965
##
## Estimated effective doses
##

```

```

##           Estimate Std. Error      Lower      Upper
## e:1:50 0.1102721   0.0033354 0.1034780 0.1170661
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.123288    0.014018 0.094735 0.151841
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.0998727   0.0044787 0.0907498 0.1089956
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.69465     0.39164 -0.10310 1.49240
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.113975    0.012773 0.087958 0.139993
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.217436    0.027934 0.160536 0.274335
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.1432333   0.0093132 0.1242629 0.1622036
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.18336     0.01293 0.15695 0.20977
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.186929    0.034023 0.117626 0.256232
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.0299288   0.0017812 0.0263007 0.0335569
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.200379    0.020104 0.159429 0.241329
##
## Estimated effective doses

```



```

##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.30812    0.24033 -0.18142  0.79765
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.227103   0.019697 0.186983 0.267224
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.20009    0.01448 0.17059 0.22958
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.223966   0.058089 0.105642 0.342290
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.288001   0.074597 0.136052 0.439951
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.369422   0.077015 0.212549 0.526296
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.118335   0.011733 0.094404 0.142265
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.189945   0.013146 0.163097 0.216793
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.0483296  0.0022658 0.0437143 0.0529448
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.190146   0.027182 0.134779 0.245514
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.16580    0.01082 0.14376 0.18784
##

```

```

## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.183297   0.017237 0.148187 0.218407
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.130147   0.010705 0.108342 0.151951
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1915200  0.0077369 0.1757605 0.2072795
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.123034   0.006696 0.109395 0.136673
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1935594  0.0094277 0.1743559 0.2127629
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.198000   0.019219 0.158853 0.237148
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1114482  0.0070542 0.0970793 0.1258172
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.159440   0.010423 0.138209 0.180671
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1372654  0.0070847 0.1228343 0.1516965
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.427766   0.230327 -0.041395 0.896926
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0991738  0.0040323 0.0909603 0.1073874

```

```

##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.106855   0.022010 0.062022 0.151687
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.156127   0.021551 0.112229 0.200025
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.308127   0.019233 0.268951 0.347304
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.117014   0.012255 0.092052 0.141977
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.177036   0.011915 0.152767 0.201305
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.234268   0.017095 0.199447 0.269088
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0172659   0.0012838 0.0146508 0.0198809
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.201737   0.012113 0.176998 0.226476
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.306968   0.078617 0.146831 0.467105
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.289597   0.081347 0.123464 0.455730
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper

```

```

## e:1:50 0.213191 0.024013 0.164278 0.262104
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.42728 0.28840 -0.16016 1.01472
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.0900834 0.0021351 0.0857344 0.0944324
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.1573077 0.0065037 0.1440602 0.1705553
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.16319 0.01761 0.12732 0.19906
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.20914 0.01403 0.18056 0.23772
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.17905 0.00849 0.16171 0.19639
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.1587569 0.0098007 0.1387411 0.1787727
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.1352667 0.0074545 0.1200824 0.1504511
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.247784 0.036714 0.173000 0.322567
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.235268 0.026532 0.181223 0.289313
##
## Estimated effective doses
##

```

```

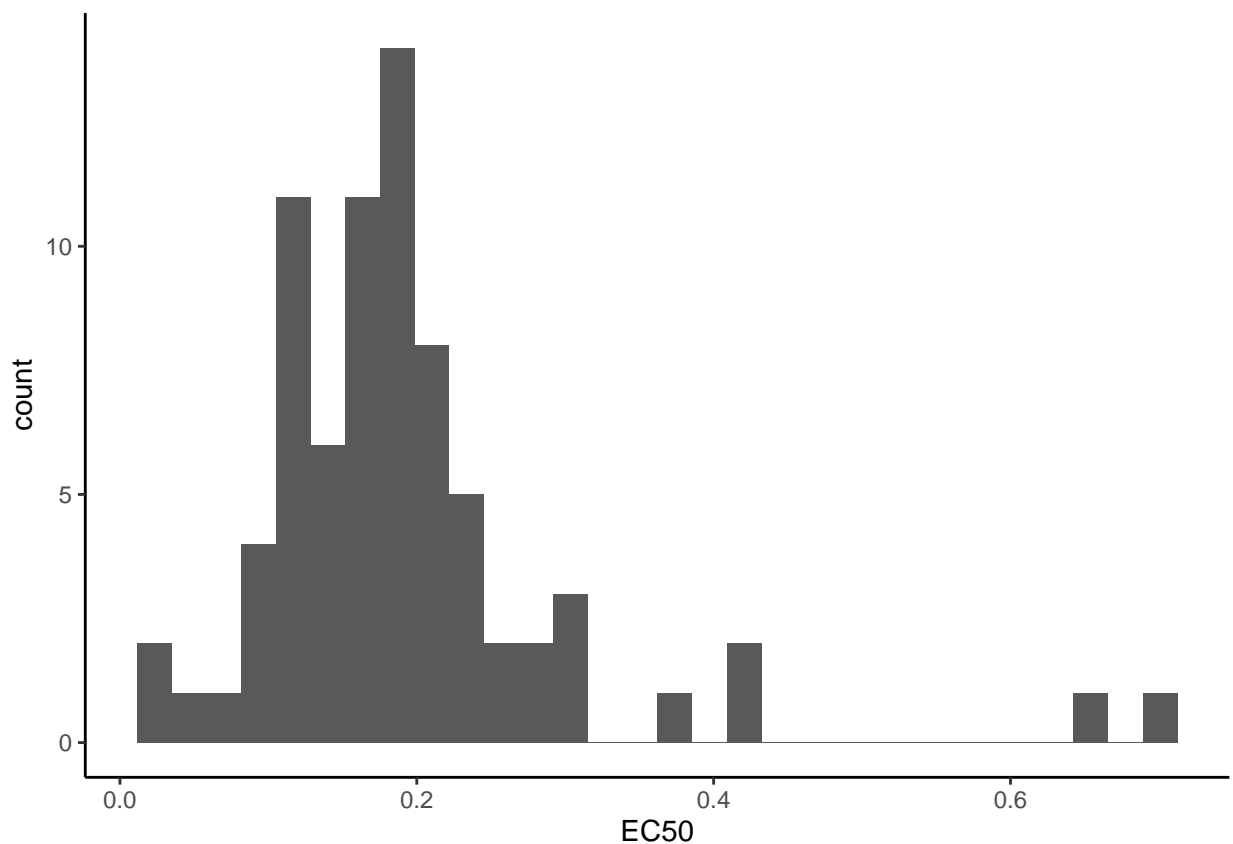
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.066926   0.010213 0.046123 0.087728
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.174492   0.010501 0.153102 0.195882
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.181951   0.028336 0.124233 0.239669
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.195576   0.013476 0.168125 0.223027
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.168410   0.010795 0.146421 0.190399
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1546980  0.0093702 0.1354373 0.1739588
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.162666   0.011066 0.140126 0.185206
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.147113   0.008233 0.130343 0.163883
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1376907  0.0077899 0.1218232 0.1535582
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.118886   0.004502 0.109716 0.128057
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.206342   0.016866 0.171988 0.240696
##
## Estimated effective doses

```

```
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.175509   0.013954 0.147086 0.203932
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50  0.65376   0.63282 -0.63525  1.94277
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.211026   0.012571 0.185419 0.236633
```

```
ggplot(EC50.ll14, aes(x = EC50)) + geom_histogram() + theme_classic()
```

```
## 'stat_bin()' using 'bins = 30'. Pick better value with 'binwidth'.
```



```
library(tidyverse)
EC50.data %>%
  group_by(is) %>%
  nest() %>%
  mutate(ll.4.mod = map(data, ~drm(.$relgrowth ~ .$conc,
                                   fct = LL.4(fixed = c(NA, NA, NA, NA),
                                   names = c("Slope", "Lower", "Upper", "EC50"))))) %>%
```

```
mutate(ec50 = map(11.4.mod, ~ED(.,
                             respLev = c(50),
                             type = "relative",
                             interval = "delta")[[1]])) %>%
unnest(ec50)
```

```
## Warning: There were 19 warnings in 'mutate()'.
## The first warning was:
## i In argument: '11.4.mod = map(...)'.
```

```
## i In group 4: 'is = "C-MNS02_2-10"'.
```

```
## Caused by warning in 'log()':
## ! NaNs produced
## i Run 'dplyr::last_dplyr_warnings()' to see the 18 remaining warnings.
```

```
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.106855   0.022010 0.062022 0.151687
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.177036   0.011915 0.152767 0.201305
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.234268   0.017095 0.199447 0.269088
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0172659 0.0012838 0.0146508 0.0198809
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.117014   0.012255 0.092052 0.141977
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.147113   0.008233 0.130343 0.163883
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1376907 0.0077899 0.1218232 0.1535582
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
```

```

## e:1:50 0.118886 0.004502 0.109716 0.128057
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.206342 0.016866 0.171988 0.240696
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.175509 0.013954 0.147086 0.203932
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.65376 0.63282 -0.63525 1.94277
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.118335 0.011733 0.094404 0.142265
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.189945 0.013146 0.163097 0.216793
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.0483296 0.0022658 0.0437143 0.0529448
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.190146 0.027182 0.134779 0.245514
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.16580 0.01082 0.14376 0.18784
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.183297 0.017237 0.148187 0.218407
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.130147 0.010705 0.108342 0.151951
##
## Estimated effective doses
##

```



```

##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1915200   0.0077369 0.1757605 0.2072795
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.123034   0.006696 0.109395 0.136673
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1935594   0.0094277 0.1743559 0.2127629
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.198000   0.019219 0.158853 0.237148
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1114482   0.0070542 0.0970793 0.1258172
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.159440   0.010423 0.138209 0.180671
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1372654   0.0070847 0.1228343 0.1516965
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1070318   0.0055365 0.0957543 0.1183094
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.248655   0.028485 0.190633 0.306678
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.167592   0.010197 0.146821 0.188362
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1082677   0.0051459 0.0977858 0.1187495
##
## Estimated effective doses

```

```

##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.184271   0.036047 0.110846 0.257695
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.123288   0.014018 0.094735 0.151841
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0998727   0.0044787 0.0907498 0.1089956
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.227432   0.040614 0.144704 0.310160
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.101863   0.003487 0.094760 0.108965
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.69465    0.39164 -0.10310 1.49240
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.113975   0.012773 0.087958 0.139993
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.217436   0.027934 0.160536 0.274335
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1102721   0.0033354 0.1034780 0.1170661
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1432333   0.0093132 0.1242629 0.1622036
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.18336    0.01293 0.15695 0.20977
##

```

```

## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.186929   0.034023 0.117626 0.256232
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0299288   0.0017812 0.0263007 0.0335569
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.200379   0.020104 0.159429 0.241329
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.30812    0.24033 -0.18142 0.79765
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.227103   0.019697 0.186983 0.267224
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.20009    0.01448 0.17059 0.22958
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.223966   0.058089 0.105642 0.342290
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.288001   0.074597 0.136052 0.439951
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.369422   0.077015 0.212549 0.526296
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.427766   0.230327 -0.041395 0.896926
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0991738   0.0040323 0.0909603 0.1073874

```

```

##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.156127   0.021551 0.112229 0.200025
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.308127   0.019233 0.268951 0.347304
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.201737   0.012113 0.176998 0.226476
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.306968   0.078617 0.146831 0.467105
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.289597   0.081347 0.123464 0.455730
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.213191   0.024013 0.164278 0.262104
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1352667   0.0074545 0.1200824 0.1504511
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.247784   0.036714 0.173000 0.322567
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.235268   0.026532 0.181223 0.289313
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.066926   0.010213 0.046123 0.087728
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper

```

```

## e:1:50 0.174492 0.010501 0.153102 0.195882
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.181951 0.028336 0.124233 0.239669
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.195576 0.013476 0.168125 0.223027
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.168410 0.010795 0.146421 0.190399
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.1546980 0.0093702 0.1354373 0.1739588
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.162666 0.011066 0.140126 0.185206
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.42728 0.28840 -0.16016 1.01472
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.0900834 0.0021351 0.0857344 0.0944324
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.1573077 0.0065037 0.1440602 0.1705553
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.16319 0.01761 0.12732 0.19906
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.20914 0.01403 0.18056 0.23772
##
## Estimated effective doses
##

```

```
##           Estimate Std. Error   Lower   Upper
## e:1:50  0.17905      0.00849 0.16171 0.19639
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1587569    0.0098007 0.1387411 0.1787727
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.211026     0.012571 0.185419 0.236633

## # A tibble: 75 x 4
## # Groups:   is [75]
##    is      data          ll.4.mod   ec50
##   <chr>    <list>        <list>   <dbl>
## 1 ILS0_5-41c <tibble [36 x 11]> <drc>    0.107
## 2 ILS0_5-42c <tibble [36 x 11]> <drc>    0.249
## 3 ILS0_5-49b <tibble [36 x 11]> <drc>    0.168
## 4 ILS0_6-1   <tibble [36 x 11]> <drc>    0.108
## 5 ILS0_6-12B <tibble [36 x 11]> <drc>    0.184
## 6 ILS0_6-2b  <tibble [36 x 11]> <drc>    0.227
## 7 ILS0_6-33C <tibble [36 x 11]> <drc>    0.102
## 8 ILS0_6-39C <tibble [36 x 11]> <drc>    0.110
## 9 ILS0_6-15b <tibble [36 x 11]> <drc>    0.123
## 10 ILS0_6-28C <tibble [36 x 11]> <drc>    0.0999
## # i 65 more rows
```

```
EC50.data %>%
  group_by(is)
```

```
## # A tibble: 2,681 x 12
## # Groups:   is [75]
##    is      location trial   set batch   lat  conc   rep measure coldiam
##   <chr>    <chr>    <int> <int> <int> <dbl> <dbl> <int>   <int>   <dbl>
## 1 ILS0_5-41c Illinois     1     1     2 39.1  0       1     1    71.5
## 2 ILS0_5-41c Illinois     1     1     2 39.1  0       1     2    70.0
## 3 ILS0_5-41c Illinois     1     1     2 39.1  0       2     1    72.9
## 4 ILS0_5-41c Illinois     1     1     2 39.1  0       2     2    70.5
## 5 ILS0_5-41c Illinois     1     1     2 39.1  0       3     1    68.5
## 6 ILS0_5-41c Illinois     1     1     2 39.1  0       3     2    69.1
## 7 ILS0_5-41c Illinois     1     1     2 39.1 0.01     1     1    65.4
## 8 ILS0_5-41c Illinois     1     1     2 39.1 0.01     1     2    64.3
## 9 ILS0_5-41c Illinois     1     1     2 39.1 0.01     2     1    65.3
## 10 ILS0_5-41c Illinois     1     1     2 39.1 0.01     2     2    65.7
## # i 2,671 more rows
## # i 2 more variables: coldiamplug <dbl>, relgrowth <dbl>
```

```
EC50.data %>%
  group_by(is) %>%
  nest()
```

```
## # A tibble: 75 x 2
## # Groups:   is [75]
##   is      data
##   <chr>    <list>
## 1 ILS0_5-41c <tibble [36 x 11]>
## 2 ILS0_5-42c <tibble [36 x 11]>
## 3 ILS0_5-49b <tibble [36 x 11]>
## 4 ILS0_6-1   <tibble [36 x 11]>
## 5 ILS0_6-12B <tibble [36 x 11]>
## 6 ILS0_6-2b  <tibble [36 x 11]>
## 7 ILS0_6-33C <tibble [36 x 11]>
## 8 ILS0_6-39C <tibble [36 x 11]>
## 9 ILS0_6-15b <tibble [36 x 11]>
## 10 ILS0_6-28C <tibble [36 x 11]>
## # i 65 more rows
```

```
EC50.data %>%
  group_by(is) %>%
  nest() %>%
  mutate(ll.4.mod = map(data, ~drm(.$relgrowth ~ .$conc,
                                fct = LL.4(fixed = c(NA, NA, NA, NA),
                                names = c("Slope", "Lower", "Upper", "EC50")))))
```

```
## Warning: There were 19 warnings in 'mutate()'.
## The first warning was:
## i In argument: 'll.4.mod = map(...)'
## i In group 4: 'is = "C-MNS02_2-10"'
## Caused by warning in 'log()':
## ! NaNs produced
## i Run 'dplyr::last_dplyr_warnings()' to see the 18 remaining warnings.
```

```
## # A tibble: 75 x 3
## # Groups:   is [75]
##   is      data      ll.4.mod
##   <chr>    <list>    <list>
## 1 ILS0_5-41c <tibble [36 x 11]> <drc>
## 2 ILS0_5-42c <tibble [36 x 11]> <drc>
## 3 ILS0_5-49b <tibble [36 x 11]> <drc>
## 4 ILS0_6-1   <tibble [36 x 11]> <drc>
## 5 ILS0_6-12B <tibble [36 x 11]> <drc>
## 6 ILS0_6-2b  <tibble [36 x 11]> <drc>
## 7 ILS0_6-33C <tibble [36 x 11]> <drc>
## 8 ILS0_6-39C <tibble [36 x 11]> <drc>
## 9 ILS0_6-15b <tibble [36 x 11]> <drc>
## 10 ILS0_6-28C <tibble [36 x 11]> <drc>
## # i 65 more rows
```

```
EC50.data %>%
  group_by(is) %>%
  nest() %>%
  mutate(ll.4.mod = map(data, ~drm(.$relgrowth ~ .$conc,
                                fct = LL.4(fixed = c(NA, NA, NA, NA),
                                names = c("Slope", "Lower", "Upper", "EC50"))))) %>%
```

```
mutate(ec50 = map(11.4.mod, ~ED(.,
                           respLev = c(50),
                           type = "relative",
                           interval = "delta"))[[1]]))
```

```
## Warning: There were 19 warnings in 'mutate()'.
## The first warning was:
## i In argument: '11.4.mod = map(...)'.
```

```
## i In group 4: 'is = "C-MNS02_2-10"'.
```

```
## Caused by warning in 'log()':
```

```
## ! NaNs produced
```

```
## i Run 'dplyr::last_dplyr_warnings()' to see the 18 remaining warnings.
```

```
##
```

```
## Estimated effective doses
```

```
##
```

	Estimate	Std. Error	Lower	Upper
e:1:50	0.106855	0.022010	0.062022	0.151687

```
##
```

```
## Estimated effective doses
```

```
##
```

	Estimate	Std. Error	Lower	Upper
e:1:50	0.177036	0.011915	0.152767	0.201305

```
##
```

```
## Estimated effective doses
```

```
##
```

	Estimate	Std. Error	Lower	Upper
e:1:50	0.234268	0.017095	0.199447	0.269088

```
##
```

```
## Estimated effective doses
```

```
##
```

	Estimate	Std. Error	Lower	Upper
e:1:50	0.0172659	0.0012838	0.0146508	0.0198809

```
##
```

```
## Estimated effective doses
```

```
##
```

	Estimate	Std. Error	Lower	Upper
e:1:50	0.117014	0.012255	0.092052	0.141977

```
##
```

```
## Estimated effective doses
```

```
##
```

	Estimate	Std. Error	Lower	Upper
e:1:50	0.147113	0.008233	0.130343	0.163883

```
##
```

```
## Estimated effective doses
```

```
##
```

	Estimate	Std. Error	Lower	Upper
e:1:50	0.1376907	0.0077899	0.1218232	0.1535582

```
##
```

```
## Estimated effective doses
```

```
##
```

	Estimate	Std. Error	Lower	Upper
e:1:50	0.118886	0.004502	0.109716	0.128057


```

##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.206342   0.016866 0.171988 0.240696
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.175509   0.013954 0.147086 0.203932
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.65376    0.63282 -0.63525 1.94277
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.118335   0.011733 0.094404 0.142265
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.189945   0.013146 0.163097 0.216793
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0483296  0.0022658 0.0437143 0.0529448
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.190146   0.027182 0.134779 0.245514
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.16580    0.01082 0.14376 0.18784
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.183297   0.017237 0.148187 0.218407
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.130147   0.010705 0.108342 0.151951
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper

```

```

## e:1:50 0.1915200 0.0077369 0.1757605 0.2072795
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.123034 0.006696 0.109395 0.136673
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1935594 0.0094277 0.1743559 0.2127629
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.198000 0.019219 0.158853 0.237148
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1114482 0.0070542 0.0970793 0.1258172
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.159440 0.010423 0.138209 0.180671
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1372654 0.0070847 0.1228343 0.1516965
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1070318 0.0055365 0.0957543 0.1183094
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.248655 0.028485 0.190633 0.306678
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.167592 0.010197 0.146821 0.188362
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1082677 0.0051459 0.0977858 0.1187495
##
## Estimated effective doses
##

```

```

##           Estimate Std. Error   Lower   Upper
## e:1:50 0.184271    0.036047 0.110846 0.257695
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.123288    0.014018 0.094735 0.151841
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.0998727   0.0044787 0.0907498 0.1089956
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.227432    0.040614 0.144704 0.310160
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.101863    0.003487 0.094760 0.108965
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.69465     0.39164 -0.10310 1.49240
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.113975    0.012773 0.087958 0.139993
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.217436    0.027934 0.160536 0.274335
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1102721   0.0033354 0.1034780 0.1170661
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.1432333   0.0093132 0.1242629 0.1622036
##
## Estimated effective doses
##
##           Estimate Std. Error   Lower   Upper
## e:1:50 0.18336     0.01293 0.15695 0.20977
##
## Estimated effective doses

```

```

##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.186929   0.034023 0.117626 0.256232
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0299288  0.0017812 0.0263007 0.0335569
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.200379   0.020104 0.159429 0.241329
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.30812    0.24033  -0.18142 0.79765
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.227103   0.019697 0.186983 0.267224
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.20009    0.01448 0.17059 0.22958
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.223966   0.058089 0.105642 0.342290
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.288001   0.074597 0.136052 0.439951
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.369422   0.077015 0.212549 0.526296
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.427766   0.230327 -0.041395 0.896926
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0991738  0.0040323 0.0909603 0.1073874
##

```

```

## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.156127   0.021551 0.112229 0.200025
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.308127   0.019233 0.268951 0.347304
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.201737   0.012113 0.176998 0.226476
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.306968   0.078617 0.146831 0.467105
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.289597   0.081347 0.123464 0.455730
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.213191   0.024013 0.164278 0.262104
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1352667   0.0074545 0.1200824 0.1504511
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.247784   0.036714 0.173000 0.322567
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.235268   0.026532 0.181223 0.289313
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.066926   0.010213 0.046123 0.087728
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.174492   0.010501 0.153102 0.195882

```

```

##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.181951   0.028336 0.124233 0.239669
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.195576   0.013476 0.168125 0.223027
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.168410   0.010795 0.146421 0.190399
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1546980  0.0093702 0.1354373 0.1739588
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.162666   0.011066 0.140126 0.185206
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.42728    0.28840 -0.16016 1.01472
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0900834  0.0021351 0.0857344 0.0944324
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1573077  0.0065037 0.1440602 0.1705553
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.16319    0.01761 0.12732 0.19906
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.20914    0.01403 0.18056 0.23772
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper

```

```
## e:1:50 0.17905 0.00849 0.16171 0.19639
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.1587569 0.0098007 0.1387411 0.1787727
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.211026 0.012571 0.185419 0.236633
```

```
## # A tibble: 75 x 4
## # Groups: is [75]
## is data ll.4.mod ec50
## <chr> <list> <list> <list>
## 1 ILS0_5-41c <tibble [36 x 11]> <drc> <dbl [1]>
## 2 ILS0_5-42c <tibble [36 x 11]> <drc> <dbl [1]>
## 3 ILS0_5-49b <tibble [36 x 11]> <drc> <dbl [1]>
## 4 ILS0_6-1 <tibble [36 x 11]> <drc> <dbl [1]>
## 5 ILS0_6-12B <tibble [36 x 11]> <drc> <dbl [1]>
## 6 ILS0_6-2b <tibble [36 x 11]> <drc> <dbl [1]>
## 7 ILS0_6-33C <tibble [36 x 11]> <drc> <dbl [1]>
## 8 ILS0_6-39C <tibble [36 x 11]> <drc> <dbl [1]>
## 9 ILS0_6-15b <tibble [36 x 11]> <drc> <dbl [1]>
## 10 ILS0_6-28C <tibble [36 x 11]> <drc> <dbl [1]>
## # i 65 more rows
```

```
EC50.data %>%
  group_by(is) %>%
  nest() %>%
  mutate(ll.4.mod = map(data, ~drm(.$relgrowth ~ .$conc,
                                fct = LL.4(fixed = c(NA, NA, NA, NA),
                                names = c("Slope", "Lower", "Upper", "EC50"))))) %>%
  mutate(ec50 = map(ll.4.mod, ~ED(.,
                                respLev = c(50),
                                type = "relative",
                                interval = "delta")[[1]])) %>%
  unnest(ec50)
```

```
## Warning: There were 19 warnings in 'mutate()'.
## The first warning was:
## i In argument: 'll.4.mod = map(...)'
## i In group 4: 'is = "C-MNS02_2-10"'
## Caused by warning in 'log()':
## ! NaNs produced
## i Run 'dplyr::last_dplyr_warnings()' to see the 18 remaining warnings.
```

```
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.106855 0.022010 0.062022 0.151687
```

```

##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.177036   0.011915 0.152767 0.201305
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.234268   0.017095 0.199447 0.269088
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0172659   0.0012838 0.0146508 0.0198809
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.117014   0.012255 0.092052 0.141977
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.147113   0.008233 0.130343 0.163883
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1376907   0.0077899 0.1218232 0.1535582
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.118886   0.004502 0.109716 0.128057
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.206342   0.016866 0.171988 0.240696
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.175509   0.013954 0.147086 0.203932
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.65376    0.63282 -0.63525 1.94277
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper

```



```

## e:1:50 0.118335 0.011733 0.094404 0.142265
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.189945 0.013146 0.163097 0.216793
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.0483296 0.0022658 0.0437143 0.0529448
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.190146 0.027182 0.134779 0.245514
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.16580 0.01082 0.14376 0.18784
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.183297 0.017237 0.148187 0.218407
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.130147 0.010705 0.108342 0.151951
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.1915200 0.0077369 0.1757605 0.2072795
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.123034 0.006696 0.109395 0.136673
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.1935594 0.0094277 0.1743559 0.2127629
##
## Estimated effective doses
##
## Estimate Std. Error Lower Upper
## e:1:50 0.198000 0.019219 0.158853 0.237148
##
## Estimated effective doses
##

```

```

##           Estimate Std. Error      Lower      Upper
## e:1:50 0.1114482   0.0070542 0.0970793 0.1258172
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.159440    0.010423 0.138209 0.180671
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.1372654   0.0070847 0.1228343 0.1516965
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.1070318   0.0055365 0.0957543 0.1183094
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.248655    0.028485 0.190633 0.306678
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.167592    0.010197 0.146821 0.188362
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.1082677   0.0051459 0.0977858 0.1187495
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.184271    0.036047 0.110846 0.257695
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.123288    0.014018 0.094735 0.151841
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.0998727   0.0044787 0.0907498 0.1089956
##
## Estimated effective doses
##
##           Estimate Std. Error      Lower      Upper
## e:1:50 0.227432    0.040614 0.144704 0.310160
##
## Estimated effective doses

```

```

##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.101863   0.003487 0.094760 0.108965
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.69465   0.39164 -0.10310 1.49240
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.113975   0.012773 0.087958 0.139993
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.217436   0.027934 0.160536 0.274335
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1102721 0.0033354 0.1034780 0.1170661
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1432333 0.0093132 0.1242629 0.1622036
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.18336   0.01293 0.15695 0.20977
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.186929 0.034023 0.117626 0.256232
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0299288 0.0017812 0.0263007 0.0335569
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.200379 0.020104 0.159429 0.241329
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.30812   0.24033 -0.18142 0.79765
##

```

```

## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.227103   0.019697 0.186983 0.267224
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.20009   0.01448 0.17059 0.22958
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.223966   0.058089 0.105642 0.342290
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.288001   0.074597 0.136052 0.439951
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.369422   0.077015 0.212549 0.526296
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.427766   0.230327 -0.041395 0.896926
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0991738   0.0040323 0.0909603 0.1073874
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.156127   0.021551 0.112229 0.200025
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.308127   0.019233 0.268951 0.347304
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.201737   0.012113 0.176998 0.226476
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.306968   0.078617 0.146831 0.467105

```

```

##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.289597   0.081347 0.123464 0.455730
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.213191   0.024013 0.164278 0.262104
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1352667   0.0074545 0.1200824 0.1504511
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.247784   0.036714 0.173000 0.322567
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.235268   0.026532 0.181223 0.289313
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.066926   0.010213 0.046123 0.087728
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.174492   0.010501 0.153102 0.195882
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.181951   0.028336 0.124233 0.239669
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.195576   0.013476 0.168125 0.223027
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.168410   0.010795 0.146421 0.190399
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper

```

```

## e:1:50 0.1546980 0.0093702 0.1354373 0.1739588
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.162666 0.011066 0.140126 0.185206
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.42728 0.28840 -0.16016 1.01472
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.0900834 0.0021351 0.0857344 0.0944324
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1573077 0.0065037 0.1440602 0.1705553
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.16319 0.01761 0.12732 0.19906
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.20914 0.01403 0.18056 0.23772
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.17905 0.00849 0.16171 0.19639
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.1587569 0.0098007 0.1387411 0.1787727
##
## Estimated effective doses
##
##      Estimate Std. Error   Lower   Upper
## e:1:50 0.211026 0.012571 0.185419 0.236633

## # A tibble: 75 x 4
## # Groups:   is [75]
##   is      data          ll.4.mod  ec50
##   <chr>    <list>        <list>    <dbl>
## 1 ILS0_5-41c <tibble [36 x 11]> <drc>    0.107
## 2 ILS0_5-42c <tibble [36 x 11]> <drc>    0.249
## 3 ILS0_5-49b <tibble [36 x 11]> <drc>    0.168

```

```
## 4 ILS0_6-1 <tibble [36 x 11]> <drc> 0.108
## 5 ILS0_6-12B <tibble [36 x 11]> <drc> 0.184
## 6 ILS0_6-2b <tibble [36 x 11]> <drc> 0.227
## 7 ILS0_6-33C <tibble [36 x 11]> <drc> 0.102
## 8 ILS0_6-39C <tibble [36 x 11]> <drc> 0.110
## 9 ILS0_6-15b <tibble [36 x 11]> <drc> 0.123
## 10 ILS0_6-28C <tibble [36 x 11]> <drc> 0.0999
## # i 65 more rows
```