

# Consistency check for Age-dependent Reference Intervals

## Installation:

Download the Zip-File from GitHub under [https://github.com/SandraKla/Zlog\\_AdRI](https://github.com/SandraKla/Zlog_AdRI). Unzip the file and set your working direction to the path of the folder. The package shiny must be installed before using the Shiny app.

```
1. if("shiny" %in% rownames(installed.packages())){  
2.   library(shiny)}  
3. else{  
4.   install.packages("shiny")}
```

And then start the app with the following code:

```
1. library(shiny)  
2. runApp("app.R")
```

Or use the function runGitHub() from the package shiny:

```
1. library(shiny)  
2. runGitHub("Zlog_AdRI", "SandraKla")
```

The package DT is downloaded or imported when starting this app. The used R-Version must be  $\geq 3.6.1$ . The package DT must be  $\geq 0.13$  and shiny  $\geq 1.4.0$ .

## Data:

### Preloaded dataset:

The CALIPER-Dataset with age-dependent reference intervals has been preloaded into this Shiny App. For this purpose, the data was brought into the appropriate shape for the analysis from the Supplemental Table from Age-Specific and Sex-Specific Pediatric Reference Intervals for 40 Biochemical Markers.

### New data:

For new data use the CALIPER-Dataset as template with the columns:

1. **CODE:** Name of the analyte ("Calcium")
2. **LABUNIT:** Unit of the analyte ("mmol/L")
3. **SEX:** "M" for male and "F" for female
4. **UNIT:** Unit of the age range in "year", "month", "week" or "day"
5. **AgeFrom:** Start of the age range
6. **AgeUntil:** End of the age range
7. **LowerLimit:** Start of the reference interval (LL)
8. **UpperLimit:** Start of the reference interval (UL)

## Consistency check for Age-dependent Reference Intervals

### Guide:

### Settings:

**Tool for Plausibility Checks of Reference Interval Limits**

Upload CSV File:  

Browse... No file selected

☐ Replacement values for reference limits

Select the sex:  

Female

Settings for the plot:  
Select the lab parameter:  

Direct Bilirubin

☐ Logarithmic scale for the x-axis

Maximum zlog value:  

10

3 zlog values above 10 from these lab parameters:  
Direct Bilirubin, Gamma-Glutamyl Transferase,  
Immunoglobulin A

Download the zlog values

- Upload CSV File:** Upload own datasets with reference intervals
- Replacement values:** If the lower reference limit is zero, it will be set to 0.001 and the upper reference limit to 100 or by the given reference limits.
- Select the Sex:** Important for the plot
- Select the lab parameter:** Important for the plot
- Logarithmic scale for the x-axis:** Important for the plot
- Maximum zlog value:** Quick determination of very high zlog values
- Download the data:** Download the data-table with the zlog values

### Determination of the zlog values and analysis:

#### Table:

With the help of the table, find high zlog values and the appropriate laboratory parameters. These can be visualized in step 3. The table shows the zlog values. Zlog values under -1.96 in blue and above 1.96 in orange. The zlog value should be optimally between -1.96 and 1.96 in white.

**Tool for Plausibility Checks of Reference Interval Limits**

Upload CSV File:  

Browse... No file selected

☐ Replacement values for reference limits

Select the sex:  

Female

Settings for the plot:  
Select the lab parameter:  

Direct Bilirubin

☐ Logarithmic scale for the x-axis

Maximum zlog value:  

10

3 zlog values above 10 from these lab parameters: Direct Bilirubin,  
Gamma-Glutamyl Transferase, Immunoglobulin A

Download the zlog values

Table Plot

This Shiny App computes the zlog values of the preceding and the subsequent age group for each lab parameter. Zlog values far below -1.96 are in blue and far above 1.96 in red. The zlog value should be optimally between -1.96 and 1.96 and values above -4 or 4 should be checked and minimized by adding an additional age group with new calculated reference intervals. New data must be in CSV-format. If the lower or upper reference limit is zero, it will be set with the default replacement values. For further information please visit our [Website](#).

Caution with these lab parameters! The lower limit for these lab parameters is zero: Antistreptolysin-O, Haptoglobin, Immunoglobulin A. And the upper reference limit for these lab parameters: Antistreptolysin-O

Show 15 entries

Search:

Code	Sex	Unit	Lower Limit	Upper Limit	Age	Prev.lower zlog	Prev.upper zlog	Next.lower zlog	Next.upper zlog	Max zlog
Direct Bilirubin	F	day	5.7	12.1	0	0	0	-12.165	-2.438	12.166
Direct Bilirubin	F	day	0.8	5.2	15	2.152	3.729	-1.96	1.07	3.729
Direct Bilirubin	F	year	0.8	3.4	365	-1.96	3.111	-1.96	3.005	3.111
Direct Bilirubin	F	year	0.8	5	3285	-1.96	1.135	-0.348	2.586	2.586
Direct Bilirubin	F	year	1.7	6.7	4745	-4.114	1.123	0	0	4.114
Total Bilirubin	F	day	3.3	283.8	0	0	0	-3.207	-0.846	3.207
Total Bilirubin	F	day	0.8	11.7	15	0.111	6.619	-1.96	1.167	6.619
Total Bilirubin	F	year	0.8	6.8	365	-1.96	2.954	-1.96	2.553	2.954
Total Bilirubin	F	year	0.8	9.4	3285	-1.96	1.445	-0.761	2.335	2.335
Total Bilirubin	F	year	1.7	11.9	4380	-3.478	1.485	-1.96	2.344	3.478
Total Bilirubin	F	year	1.7	14.4	5475	-1.96	1.61	0	0	1.96
Calcium	F	year	2.13	2.74	0	0	0	-0.833	1.322	1.322
Calcium	F	year	2.29	2.63	365	-4.011	3.12	0	0	4.011
Carbon Dioxide	F	day	5	20	0	0	0	0	2.476	2.476
Carbon Dioxide	F	day	10	24	15	-5.064	1.144	-0.453	1.96	5.064

Table: Dataset with the zlog values

Showing 1 to 15 of 167 entries

Previous 1 2 3 4 5 ... 12 Next

## Consistency check for Age-dependent Reference Intervals

Plot:

This Shiny App computes for each lab parameter and each age group the zlog values of the preceding and the subsequent age group. This is the left plot. The zlog value should be optimally in the middle of the green lines between 1.96 and -1.96. Zlog values above 4 or -4 should be checked and minimized by adding an additional age group with new calculated reference intervals. The right plot shows the current used reference intervals. The upper reference limit is in red and the lower limit in blue. Legend: ■ Zlog to the preceding age group, • Zlog to the subsequent age group and ▲ stands for the reference intervals.

