Supplemental Statistical Details

Derivation of the equation [3].

The within subject standard deviation (on the log-scale) wSD_{ln} could be derived from the standard deviation = SD_{dln} of the difference $dln=lnX_2-lnX_1$, and assuming that the two repeated log-SUV measurements X_1 and X_2 follow a distribution with the same total (between + within) subject variance σ^2 as follows: $SD_{dln}=SD(lnX_2-lnX_1)=$

$\sqrt{(var(lnX_2)+Var(lnX_1)-2cov(X_1,X_2))}=\sqrt{(\sigma^2+\sigma^2-2\rho\sigma^2)}=\sqrt{(2(1-\rho)\sigma^2)}=(\sqrt{2})wSD_{ln}$, as by definition the quantity $(1-\rho)\sigma^2$ is the within subject variance, assuming ρ is the within subject correlation.

Calculation of confidence intervals (CI) for the repeatability coefficients.

These CI can be calculated by using the χ^2 distribution for constructing confidence intervals for sample variance, as described in Hogg and Craig, using the following equation:

$$1.96\cdot SD_{dln}\cdot(\sqrt{((n-1)}/\sqrt{(\chi^2_{n-1,\,0.,975,}}),\ 1.96\cdot SD_{dln}\cdot\sqrt{(n-1)}/\sqrt{(\chi^2_{n-1,\,0.,025})}) \qquad [1]$$

on the standard deviation of differences of the log-transformed data. The results from the log-transformed data are then exponentiated to express the confidence intervals for the lower and upper repeatability coefficients as ratios and subsequently as percents, similar to the way described in the text for the calculations of the repeatability coefficients.

1. Hogg RV, Craig AT. Introduction to Mathematical Statistics Third Edition. McMillan, 1971