One-sided efficient score test of random effect's quantile: evaluation of intrasubject parallelism in balanced ex-vivo bioassay

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Summary

In the relative potency assessment, the similarities between substances regarding the dose-response profile are the necessary assumptions. For example, in the parallel line bioassay which uses the dose-response data within the linear range, we need to demonstrate the parallelism between the dose-response slopes of study substances. When using multiple animals, it is also crucial to retain the parallelism not only on the average but also within each animal [2].

Meanwhile, applying the linear mixed effect model to the analysis of parallel line assay, the between-substance difference of slopes can be deemed as one of the random effect parameters and, under the balanced assay design, we may deduce the efficient score test regarding the quantile of the slope difference [1].

We applied this approach to the assessment of intrasubject parallelism with the intention of ameliorating the conservatism of our previous method [3]. We present the example use of the proposed method, along with the results of simulation studies.

Reference

[1] McCulloch CE. et al. (2008) Generalized, Linear, and Mixed Models, 2nd Ed. Wiley-Interscience, New Jersey.

[2] Uehara H. et al., (2016). Combinability of animal data in relative potency estimations. Japanese Journal of Biometrics, 37, 45–65.

[3] Uehara H. et al., (2016). Assessment of Intrasubject Parallelism in Ex Vivo Bioassay Using Two One-Sided Tolerance Limits. Japanese Journal of Biometrics, 37, 101–118.