Bumpy road to virtual control groups

In systemic toxicity studies replacement of concurrent control animals by so-called Virtual Control Groups (VCGs) may reduce the use of animals thus contributing to the 3R's principle of animal experimentation: Reduce, Refine, Replace.

Although VCGs are an established concept in clinical trials, the idea of replacing living beings with virtual data from historical data sets has so far not been introduced into the design of regulatory animal studies1. However, major steps facilitating review of methodology for derivation of ViCoGs from historical control data and performance testing in statistical analysis, are the collection, curation and sharing of suitable sets of historical control data from preclinical toxicity studies.

This talk will summarize accomplished and ongoing efforts for cross-industry provision of data resources, standardization and curation activities. A line out of both general ideas and specific methodology for derivation of ViCoGs shall serve the discussion of advantages and pitfalls.

Real-world examples and case studies2 will illustrate how certain methods impact the study results of toxicity studies. Further, ideas for transferring these insights into regulations and guidelines, especially possibilities for reaching out for regulatory advice to gain acceptance of this concept as early as possible1 will be discussed.

[1] Steger-Hartmann, T., Kreuchwig, A., Vaas, L., Wichard, J., Bringezu, F., Amberg, A., Muster, W., Pognan, F. and Barber, C. (2020) Introducing the concept of virtual control groups into preclinical toxicology testing, ALTEX - Alternatives to animal experimentation, 37(3), pp. 343–349. doi: 10.14573/altex.2001311.

[2] Gurjanov, A., Steger-Hartmann, T., Kreuchwig, A., and Vaas, L.A.I.(2023) Hurdles and Signposts on the Road to Virtual Control Groups -A Case study illustrating the Influence of Anesthesia Protocols on Electrolyte Levels in Rats, Front. Pharmacol. Sec. Predictive Toxicology 2023 Vol 14. doi: 10.3389/fphar.2023.1142534