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Title: Statistical approach to the analysis of sensitivity to CNS oxygen toxicity in rats

Authors: Benjamini, Y
Bitterman, N

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Abstract: Animal models are widely used for the study of CNS oxygen toxicity, but confusion still exists regarding the proper statistical approach to the analysis of the data. This paper is based on data collected from unanesthetized, free-moving rats with chronically implanted cortical electrodes for continuous EEG monitoring, exposed to 5 or 6 ATA oxygen. The index measured for CNS oxygen toxicity is the duration of the latent period preceding the appearance of well-defined electrical discharges in the EEG. At both oxygen pressures studied, the duration of the latent period is not distributed normally, and variability within the groups is not homogeneous. Transformations of the latent period data were found to enhance normality, and the speed of appearance of the discharges in the EEG, which is the reciprocal of the time, seems to be a simple, useful index for CNS oxygen toxicity in rats. Two experimental designs were compared: repeated measurements vs. single exposure. No advantage was demonstrated for the use of each rat as its own control as against the comparison between data from groups of rats. Rats can be used more than once in such research, but not more than once in a single study where individual observations are assumed to be independent, since there is some positive correlation between the first and second exposures to hyperbaric oxygen in individual rats; however, the level of sensitivity of the groups is not significantly different.

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