

Statistical methods in genetics and chemometrics

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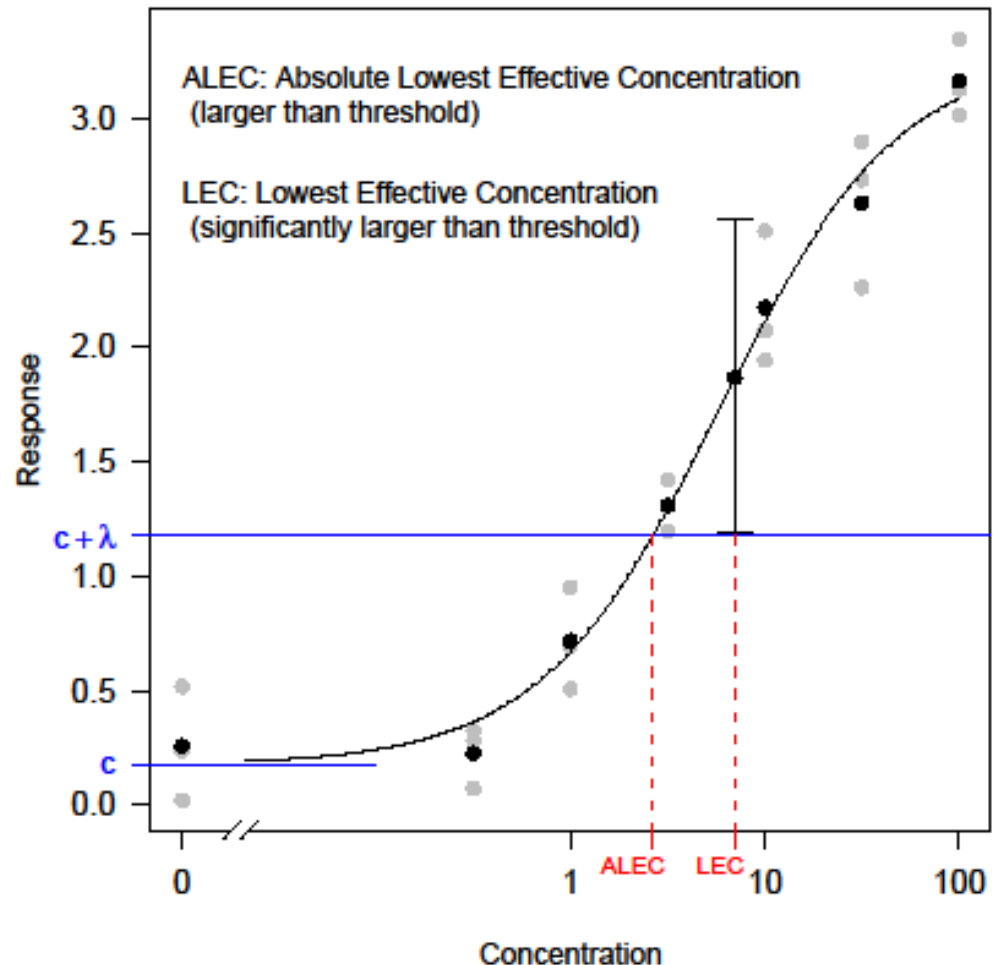
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Lectures

- [Statistics in toxicology II \(testing\)](#) (WiSe 2022/23)
 - Tuesday 8-10 (and Thursday 12-14), in presence and online
- [Statistical methods in genetics \(bioinformatics\)](#) (SoSe 2023)
 - Tuesday 8-10 and Thursday 12-14, in presence and online

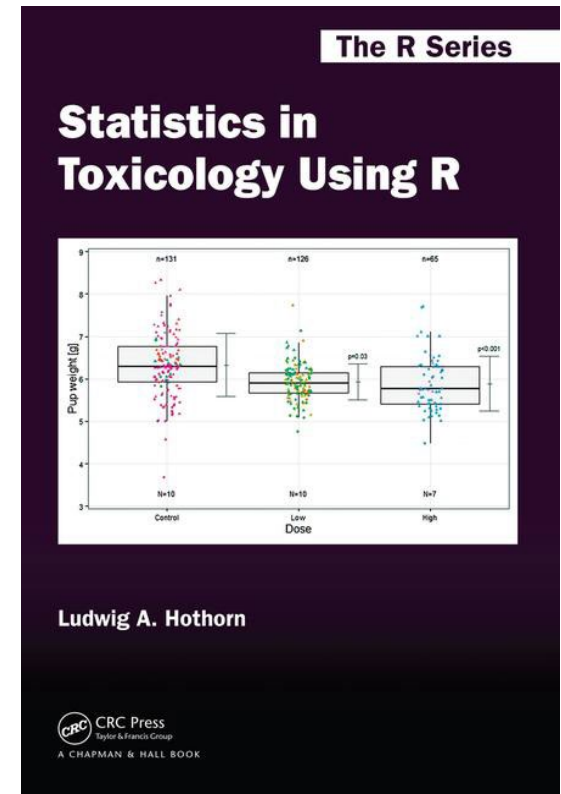
Statistics in toxicology I: Topics

- Modeling of relationships between dose and response
 - Parametric models
 - Model selection, model averaging
- Estimation of alert concentrations from
 - genetic data (gene expression)
 - classical assays (cytotoxicity)

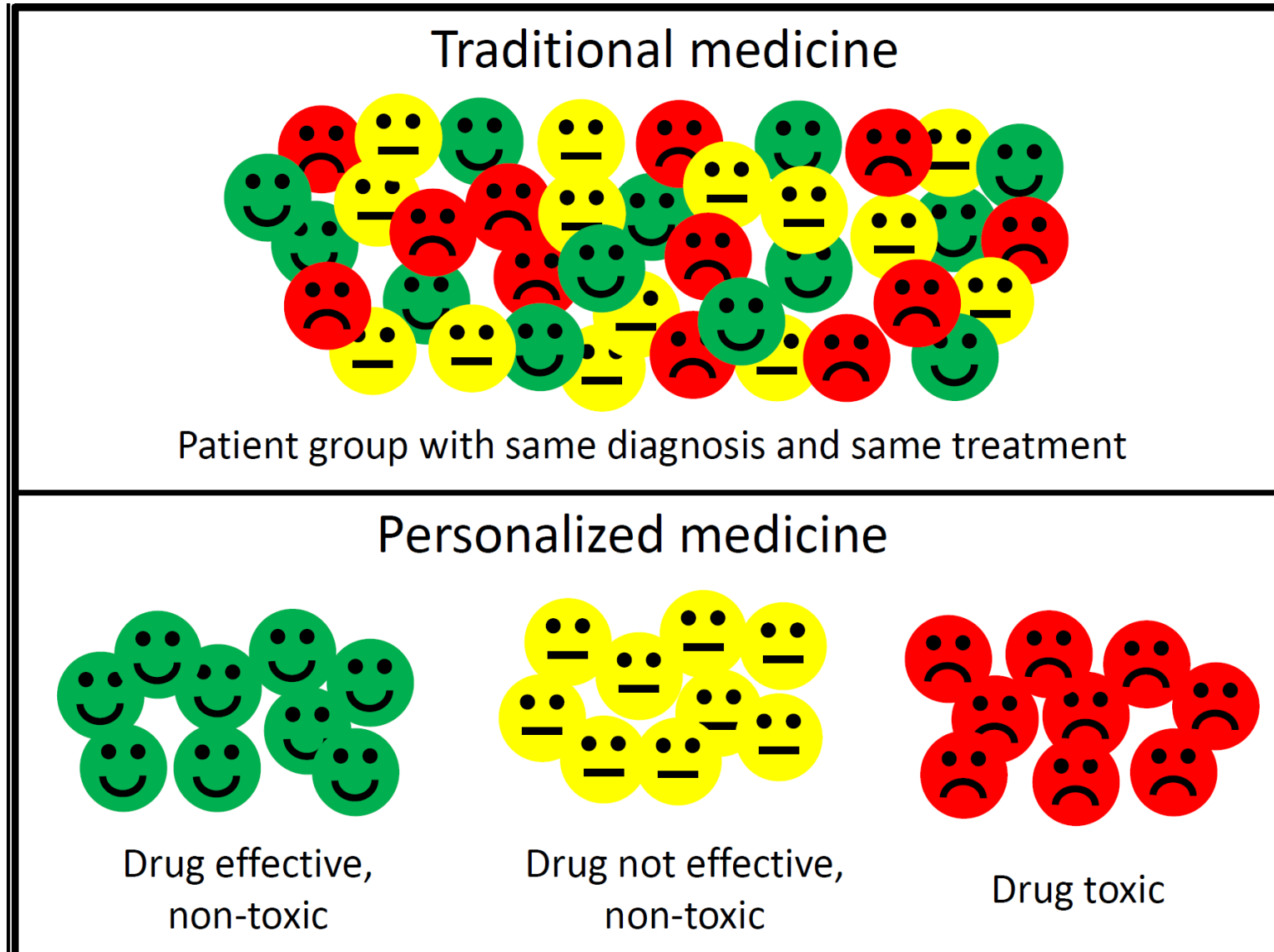


Statistics in toxicology II: Topics

- **Proof of hazard using multiple comparisons with negative control**
 - Multiple testing
 - Tests for normally distributed endpoints and for proportions
- **Trend tests**
 - Analysis of long-term effects in cancer studies
 - Survival analysis, tests for survival endpoint
- **Analysis of effects in mutagenicity assays**
 - Mixture distributions, EM algorithm
- **Dose-finding in Phase I clinical trials**



Statistical methods in genetics (bioinformatics)



Traditional medicine

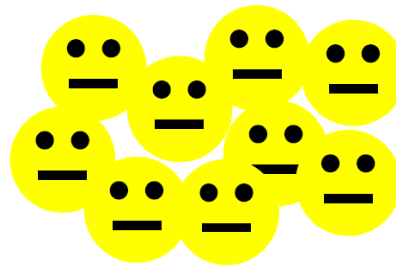


Patient group with same diagnosis and same treatment

Personalized medicine



Drug effective,
non-toxic



Drug not effective,
non-toxic



Drug toxic

Statistics in genetics (bioinformatics): Topics

- **Sequence analysis**
 - Sequence modeling: Markov chains and Markov processes
 - Sequence alignments, phylogeny
- **Analysis of omics data (expression data)**
 - Preprocessing, normalization
 - Classification (cluster analysis, discriminant analysis, ...)
 - Finding "active" genes, variable selection
 - Biological interpretation (combination of different data types, networks, toxicology...)
 - Time series
- **Disease progression**
- **Proteomics**