n-of-1 trials

Wei Pan

Division of Biostatistics, School of Public Health, University of Minnesota,
Minneapolis, MN 55455
Email: weip@biostat.umn.edu

T32 JC
Nov 11, 2016

Why/What?

- ▶ Refs: Schork (2015, *Nature*); Lillie et al (2011, *Personalized Medine*)
- ▶ Motivation: among the top 10 most-widely used drugs in US, only effective for **1/25 to 1/4** patients!
  Crestor (rosuvastatin) for high cholestrol: only 1/20
- ▶ Cancer: targeted therapy
  Erbitus (cetuximab) improves the survival of coloractal cancer patients whose tumor cells have a mutated *EGFR* gene but not a mutated *KRAS* gene.
- ▶ (multiple) $n = 1$ trials:
  Some examples in education, pains, anticoagulation ($n = 7$ for generic vs brand warfarin), COPD ($n = 26$ for ambulatory oxygen use, $n = 27$ for Eformoteral), ADHD ($n = 86$, $n = 43$), ...

How?

- ▶ Cross-over trials: multiple treatments; wash-out periods between. e.g., A-B-B-A
- ▶ Design Qs: treatment order; length of a wash-out period;
- ▶ Not feasible for some outcomes: e.g. short ones; expensive/invasive procedures; ...
- ▶ Analysis Qs: serial correlations in a long time series; carry-over effects; ...
  vs multiple shorter time series in typicla longitudinal studies.
  power, generalizability?
- ▶ Meta-analysis of multiple n-of-1 trials (and RCTs): generalize to a subpopulation.
  Q: finding **genetic and environmental** predictors.
  high-dim and multiple types of genomic, proteomic and metabolomic data; wearable devices;
  related to *subgroup analysis* in RCTs?