**Description:** Application of freqentist power and sample size estimation methods.

# Overview

Frequentist statistical methods for power and sample size are based in hypothesis testing, typically for a single hypothesis, and rely on the specification of parameters for specificity (α, statistical standard of evidence) and sensitivity (β, power). Hypothesis testing theory recommends 'full coverage' for tests with β set to 1-α, although this recommendation is rarely followed in practice even in the context of clinical trials. The specificity parameter, α, is traditionally set to 0.05 and multiple hypotheses are evaluated using α-spending: assigning a proportion of the total α to each hypothesis based on the priority given to the test in the statistical design. An additional parameter, the estimate of the effect size, is also required for power and sample estimation. A basic example of effect size is the difference between two group means in standard deviation units and requires estimates of the group means and an estimate of the variance of the difference between the means.

Applying these techniques over a large number of tests with α-spending reduced to an application of Bonferroni methods (dividing 0.05 by the number of tests) results in straightforward calculation of power and sample size estimates. A critical caveat should be noted: statistical testing over a large number of tests is typically a hypothesis generating exercise and fundamental assumptions in frequentist hypothesis testing are violated.

# Sample size estimates

Disregarding the complexities of exploratory, hypothesis generating experiments and forging ahead to apply frequentist power and sample size estimation methods for a basic experiment: two independent groups, *x* and *y*, with equal variance using frequently calculated parameters.

**Formulation:**  N per group:

**Assumptions:** Equal variance:

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Independent groups:

**Calculate Estimates:** Distance:

Coefficient of variation for *y*:

**Secondary Formulation:** for calculating sample size with common

assumptions and parameters:

# Suggested Usage

# References

**SOP6903** Generation and Release of SOMAscan™ Study Data and Reports

**SSM-020–Rev 2** Data Standardization and File Specification Technical Note

**Appendix 1**

