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Documentation of power for comparing two means

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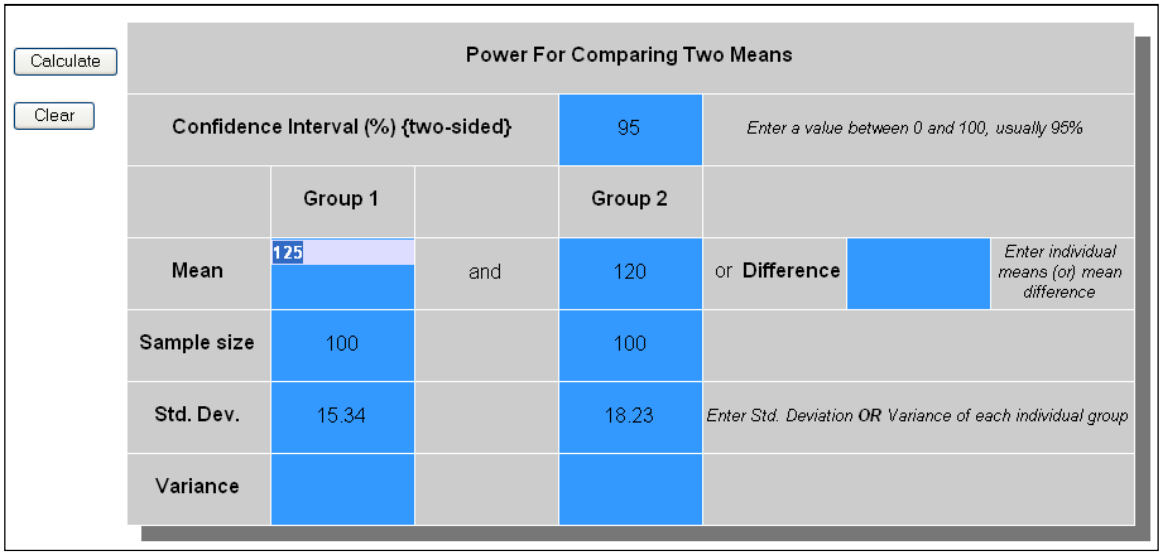
In several situations, a predetermined sample size is available for a study, and how much power the study will have for detecting a specific difference of means needs to be estimated. This module estimates the power for studies that compare two sample means. The data input screen is as follows:



The input values requested are:

- Confidence intervals (%) that can be chosen are 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 98, 99, 99.5, 99.8, 99.9, 99.95, 99.98 & 99.99, and they are two-sided.
- Enter individual means (or) difference between 2 group means.
- Enter the available sample sizes for two groups.
- Enter standard deviation (or) variance of individual sample mean.

The result of the calculation is shown next:

Power For Comparing Two Means

Input Data

Two-sided Confidence Interval	95%		
	Group 1	**Group 2**	**Mean Difference [1]**
Mean	125	120	5
Sample size	100	100	
Standard deviation	15.34	18.23	
Variance	235.316	332.333	

Power based on

Normal approximation method 55.52%

[1] Mean difference= (Group 1 mean) - (Group 2 mean)

Results from OpenEpi open source calculator--PowerMean

file:///C:/OpenEpi/July,%202005/Power/PowerMean.htm
Source file last modified on 07/11/2005 16:10:38

Print from the browser, or select all or part of the text and then copy and paste to other programs.
Many browsers have an optional setting to print background colors.

The interpretation of power in this study is as follows: If, in truth, mean of Group 1 differs from that of Group 2 given the above values, this study would have 55.52% chance of detecting a difference without the continuity correction.

The formula for the estimation of power is as follows:

$$Power = \Phi\left(-Z_{1-\alpha/2} + \frac{\sqrt{n_1}\Delta}{\sqrt{\sigma_1^2 + \sigma_2^2/\kappa}} \right)$$

The notation for the formulae are:

n_1 = sample size of Group 1

σ_1 = standard deviation of Group 1

σ_2 = standard deviation of Group 2

Δ = difference of group means

κ = ratio of sample size: Group 2/ Group 1

$Z_{1-\alpha/2}$ = the two-sided Z value (eg. Z=1.96 for 95% confidence interval).

Reference:
Bernard Rosner. Fundamentals of Biostatistics (5th edition). (based on equation 8.28)

Acknowledgement:
Default values were obtained from example 8.32 (pg. 309) described in 'Fundamentals of Biostatistics' (5th edition) by Bernard Rosner.