Snaga istraživanja

Primjer: testiranje hipoteze

usporedba
H_0: nema razlike

- uzorak A
- N = 7 miševa
- kontrolna skupina
- urea nakon 24 h
  10,2 ± 2,2 mmol/L

- uzorak B
- N = 7 miševa
- terapija u t_0
- urea nakon 24 h
  12,9 ± 2,3 mmol/L

Primjer, značajnost razlike

- urea:
  - A: 10,2 ± 2,2 mmol/L, N = 7
  - B: 12,9 ± 2,3 mmol/L, N = 7
- testiranje hipoteze:
  - H_0: nema razlike, t-test, $\alpha = 0,05$
- izračun:
  http://www.graphpad.com/quickcalcs/ttest1/

Primjer, značajnost razlike

1. Choose data entry format
- Enter up to 50 rows.
- Enter or paste up to 2000 rows.
- Enter mean, SEM and N.
- Enter mean, SD and N.
Caution: Changing format w

3. Choose a test
- Unpaired *t* test.
- Welch's unpaired *t* test (used rarely). (You can only choose a paired *t* test if you enter individual values.)

2. Enter data

Help me arrange the data.

Label: Group One
Mean: 10.2
SD: 2.2
N: 7

GraphPad Software

Scientific Software   Data Analysis Resource Center

QuickCalcs

1. Select category   2. Choose calculator   3. Enter data   4. View results

Unpaired *t* test results

P value and statistical significance:
The two-tailed P value equals 0.0444
By conventional criteria, this difference is considered to be statistically significant.

Confidence interval:
The mean of Group One minus Group Two equals -2.700
95% confidence interval of this difference: From -5.321 to -0.079

Intermediate values used in calculations:
t = 2.2444
df = 12
standard error of difference = 1.203

Primjer, snaga testa

- urea:
  - A: 10,2 ± 2,2 mmol/L, N = 7
  - B: 12,9 ± 2,3 mmol/L, N = 7
  - $\alpha = 0,05$, P = 0,044
- određivanje snage studije $(1 - \beta)$
- izračun: http://www.stat.ubc.ca/~rollin/stats/ssize/

Primjer, snaga testa

Inference for Means: Comparing Two Independent Samples

(To use this page, your browser must recognize JavaScript.)

Choose which calculation you desire, enter the relevant population values for mu1 (mean of population 1), mu2 (mean of population 2), and sigma (common standard deviation) and, if calculating power, a sample size (assumed the same for each sample). You may also modify α (type I error rate) and the power, if relevant. After making your entries, hit the calculate button at the bottom.

- Calculate Sample Size (for specified Power)
- Calculate Power (for specified Sample Size)

Enter a value for mu1: 10.2
Enter a value for mu2: 12.9
Enter a value for sigma: 2.3
- 1 Sided Test
- 2 Sided Test
Enter a value for α (default is .05): .05
Enter a value for desired power (default is .80):
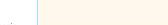The sample size (for each sample separately) is: 7

Enter a value for α (default is .05): .05
Enter a value for desired power (default is .80): 0.59
The sample size (for each sample separately) is: 7

Calculate

Reference: The calculations are the customary ones based on normal distributions. See for example *Hypothesis Testing: Two-Sample Inference - Estimation of Sample Size and Power for Comparing Two Means* in Bernard Rosner's **Fundamentals of Biostatistics**.

1

Primjer, veličina uzorka

- urea:
  - A: 10,2 ± 2,2 mmol/L
  - B: 12,9 ± 2,3 mmol/L
- određivanje veličine uzorka (N)
  - $\alpha = 0{,}05$, $\beta = 0{,}2$
- izračun: http://www.stat.ubc.ca/~rollin/stats/ssize/

Primjer, veličina uzorka

Inference for Means: Comparing Two Independent Samples

(To use this page, your browser must recognize JavaScript.)

Choose which calculation you desire, enter the relevant population values for mu1 (mean of population 1), mu2 (mean of population 2), and sigma (common standard deviation) and, if calculating power, a sample size (assumed the same for each sample). You may also modify α (type I error rate) and the power, if relevant. After making your entries, hit the calculate button at the bottom.

- Calculate Sample Size (for specified Power)
- Calculate Power (for specified Sample Size)

Enter a value for mu1: 10.2
Enter a value for mu2: 12.9
Enter a value for sigma: 2.3
- 1 Sided Test
- 2 Sided Test

Enter a value for α (default is .05): 05
Enter a value for desired power (default is .80): 80
The sample size (for each sample separately) is:

Enter a value for α (default is .05): .05
Enter a value for desired power (default is .80): .80
The sample size (for each sample separately) is: 12

Calculate

Reference: The calculations are the customary ones based on normal distributions. See for example *Hypothesis Testing: Two-Sample Inference - Estimation of Sample Size and Power for Comparing Two Means* in Bernard Rosner's **Fundamentals of Biostatistics**.

Oblikovanje studije

Table 1 Statistical errors and deficiencies related to the design of a study.	
	Study aims and primary outcome measures not clearly stated or unclear
	Failure to report number of participants or observations (sample size)
	Failure to report withdrawals from the study
	No a priori sample size calculation/effect-size estimation (power calculation)
	No clear a priori statement or description of the Null-Hypothesis under investigation
	Failure to use and report randomisation
	Method of randomisation not clearly stated
	Failure to use and report blinding if possible
	Failure to report initial equality of baseline characteristics and comparability of study groups
	Use of an inappropriate control group
	Inappropriate testing for equality of baseline characteristics

Strasak AM, Zaman Q, Pfeiffer KP, Göbel G, Ulmer H. Statistical errors in medical research – a review of common pitfalls. Swiss Med Wkly 2007;137:44-9.