WORKED EXAMPLE

Paclitaxel-Eluting or Sirolimus-Eluting Stents to Prevent Restenosis in Diabetic Patients.

Title: Paclitaxel-Eluting or Sirolimus-Eluting Stents to Prevent Restenosis in Diabetic Patients.

Objective: The study was designed to show noninferiority of the paclitaxel stent as compared with the sirolimus stent, defined as a difference in the extent of in-segment late luminal loss of no more than 0.16 mm.

Year: 2005

Source: The New England Journal of Medicine

Link: https://doi.org/10.1056/NEJMoa044372

Protocol: n/a

Clinical Area: Diabetes/Cardiology

Sample Size Section in Paper/Protocol:

"Calculation of the sample size was based on a **margin of noninferiority for in-segment late luminal loss of 0.16 mm**. This value is equal to 35 percent of an assumed mean (**±SD**) late luminal loss of 0.46**±0.45 mm** in diabetic patients after the implantation of a sirolimus stent"

"Using a **one-sided α level of 0.05**, we estimated that **99 patients per group** were needed to demonstrate noninferiority of the paclitaxel stent with a statistical **power of 80 percent**. Expecting that up to **20 percent of the patients would not return** for follow-up coronary angiography, we included **250 patients in the study**."

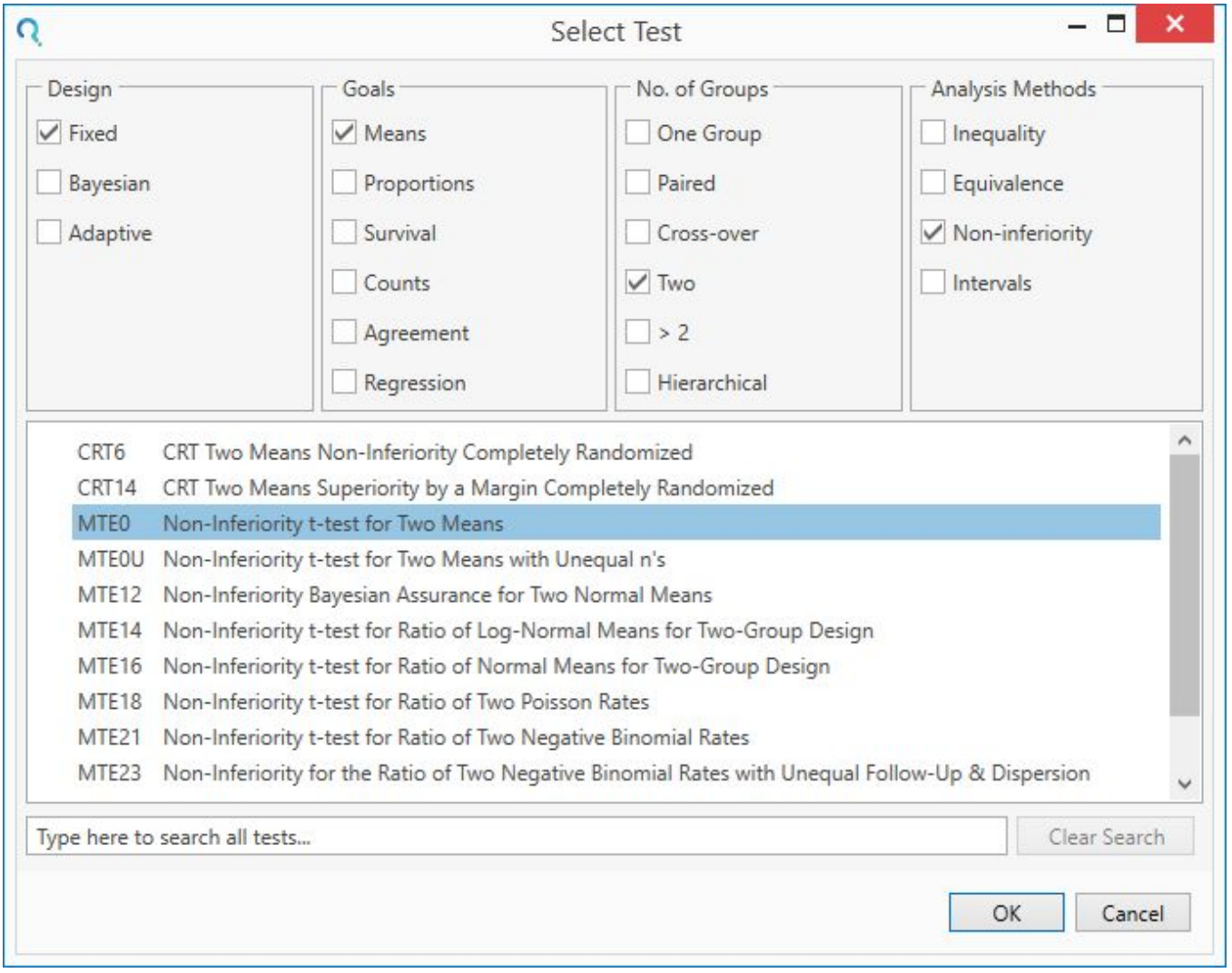
Summary of Necessary Parameter Estimates for Sample Size Calculation

Parameter	Value
Significance Level (1-Sided)	0.05
Non-Inferiority Limit Difference	0.16
Expected Difference	0
Standard Deviation	0.45
Power	80%
Dropout Rate	20%

Note: By entering a non-inferiority limit difference greater than the expected difference, we are assuming that higher differences are worse. i.e. Low values of late luminal loss are desirable.

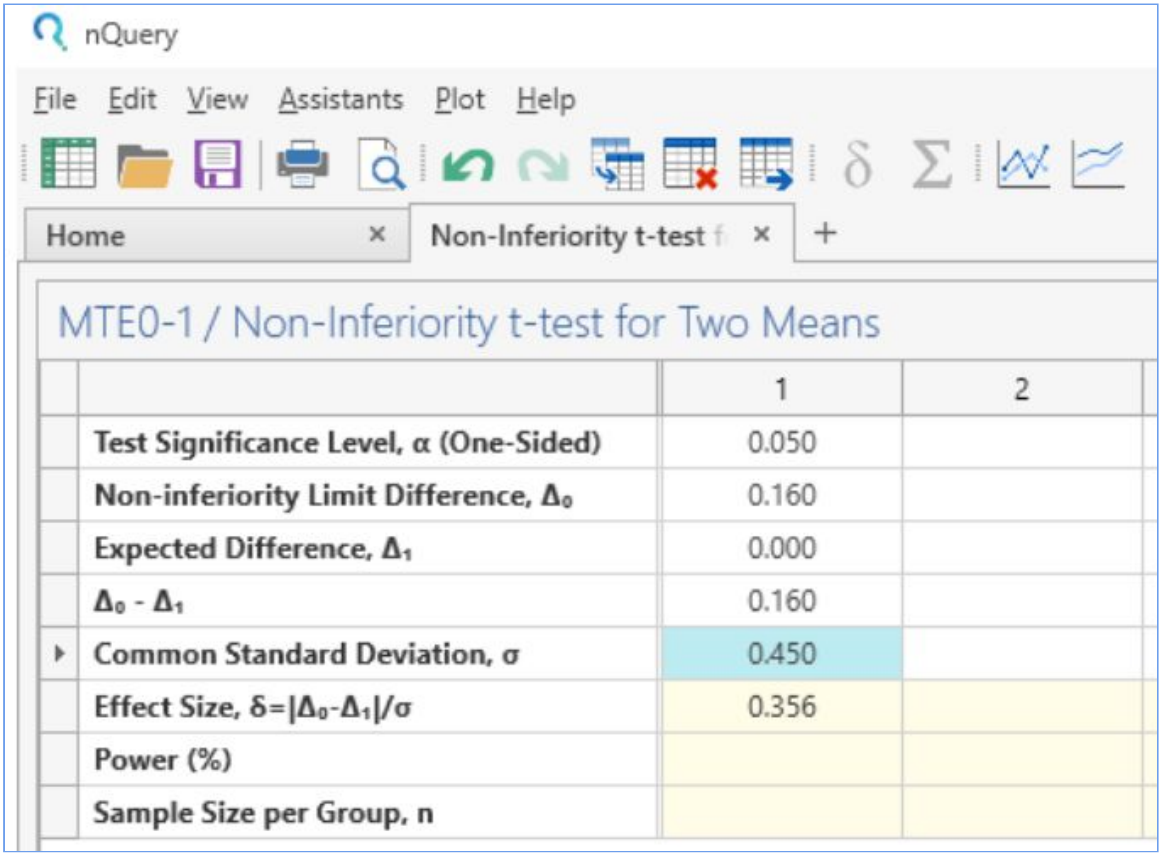
Step 1:
Select the **MTE0 Non-inferiority t-test for Two Means** table from the Study Design Pane.

This can be done **using the radio buttons** or alternatively, you can **use the search bar** at the end of the Select Test Design & Goal window.



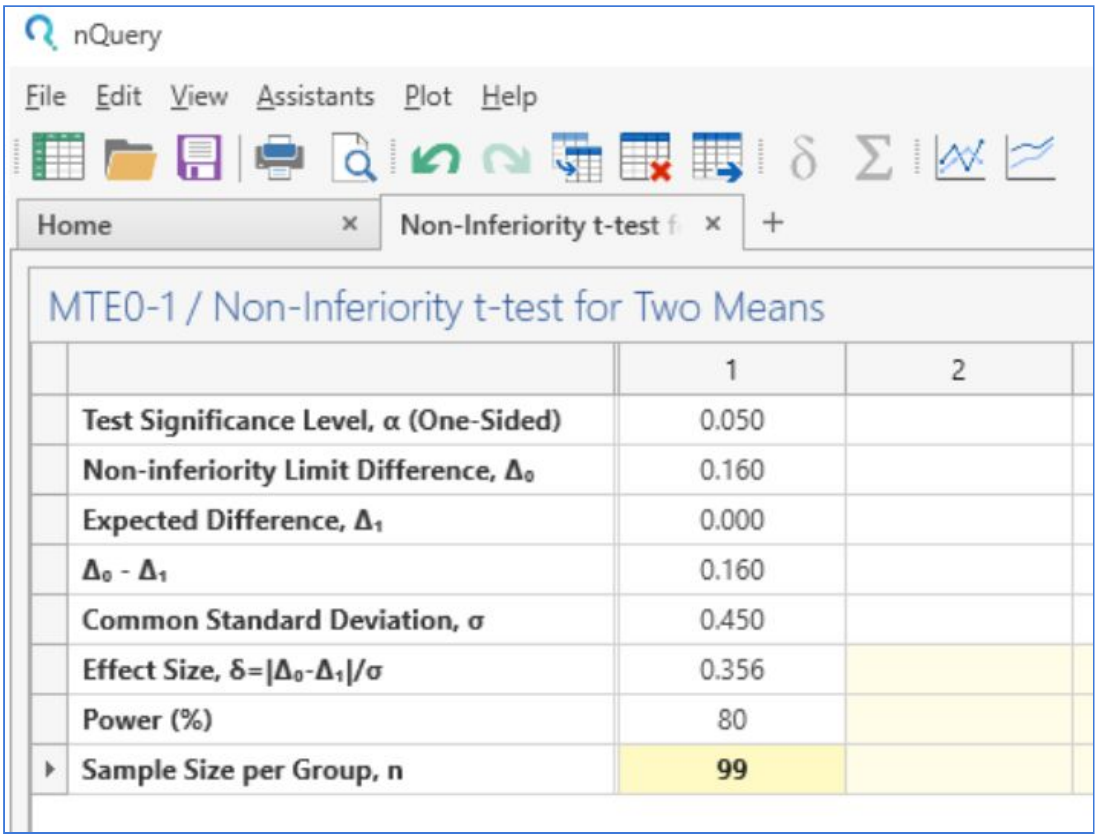
Step 2:
Enter the parameter values for sample size calculation taken from the study description.

The "Difference of Deltas" parameter is automatically calculated from the non-inferiority and expected differences, while the "Effect Size" parameter is automatically calculated from the difference of deltas and the standard deviation.



	1	2
Test Significance Level, α (One-Sided)	0.050	
Non-inferiority Limit Difference, Δ_0	0.160	
Expected Difference, Δ_1	0.000	
Δ_0 - Δ_1	0.160	
Common Standard Deviation, σ	0.450	
Effect Size, $\delta=\lvert\Delta_0-\Delta_1\rvert/\sigma$	0.356	
Power (%)		
Sample Size per Group, n		

Enter the desired power and the required sample size will automatically calculate.



	1	2
Test Significance Level, α (One-Sided)	0.050	
Non-inferiority Limit Difference, Δ_0	0.160	
Expected Difference, Δ_1	0.000	
Δ_0 - Δ_1	0.160	
Common Standard Deviation, σ	0.450	
Effect Size, $\delta=\lvert\Delta_0-\Delta_1\rvert/\sigma$	0.356	
Power (%)	80	
Sample Size per Group, n	**99**	

The analysis calculates a sample size of 99 subjects per group (198 total) with a power of 80% as per the study design statement.

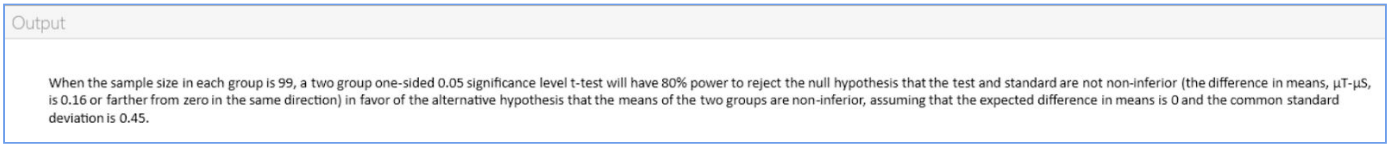
The study design required a total sample size of 250 after anticipating a drop-out rate of up to 20%. This sample size was calculated as follows:

$$NAdjusted = \frac{NUnadjusted}{1-P(dropout)} = \frac{198}{1-0.2} = 247.5\ (rounded\ up\ to\ 250)$$

Output Statement:

"When the sample size in each group is 99, a two group one-sided 0.05 significance level t-test will have 80% power to reject the null hypothesis that the test and standard are not non-inferior (the difference in means, μT-μS, is 0.16 or farther from zero in the same direction) in favor of the alternative hypothesis that the means of the two groups are non-inferior, assuming that the expected difference in means is 0 and the common standard deviation is 0.45."

The output statement appears at the bottom of nQuery. This can be printed or copy and pasted into any document.

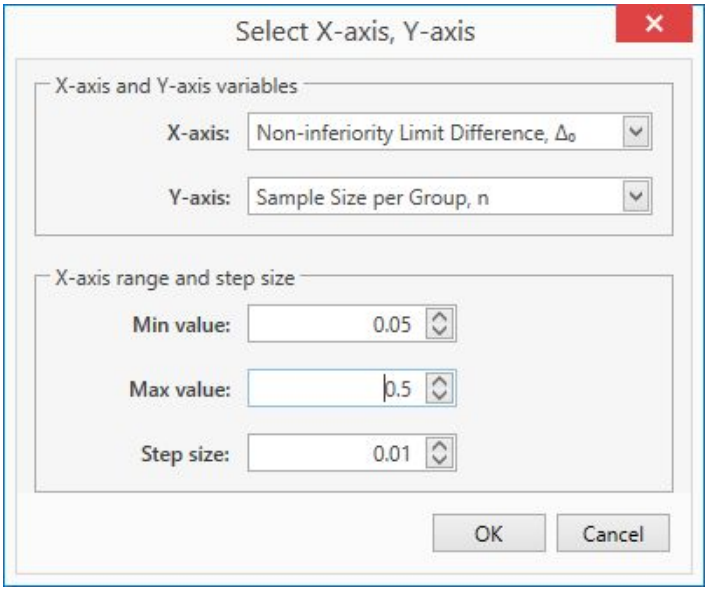


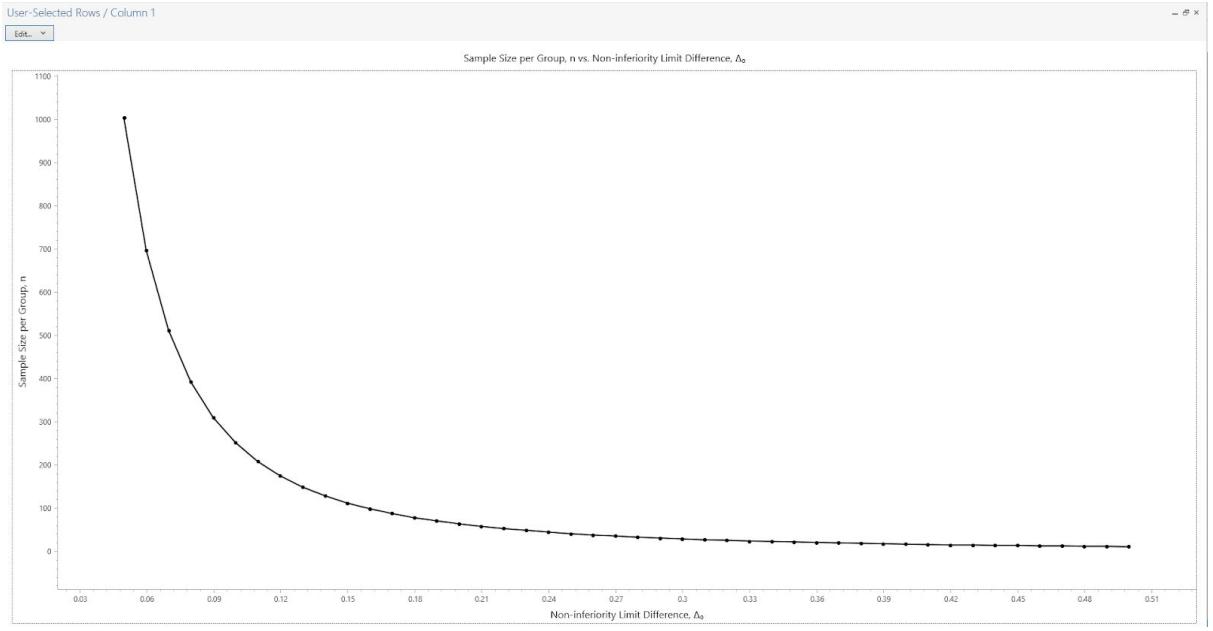
How the output statement appears in nQuery.

Step 3:

nQuery also provides plotting options. To access the plotting tools, highlight the completed columns that you wish to work with, go to the menu and select: **Plot > User-Selected Rows.**

In this case, we will demonstrate how the sample size pr group is affected when the non-inferiority limit difference varies between 0.05 and 0.5, keeping all other parameters constant.





The **Edit** button at the top of the output allows users to customise the appearance of the plot.