# R Module 7 Assignment – Power and Sample Size

After completing your statistical coursework at UC-Denver, you opened your very own statistical consulting firm. An investigator has come to you requesting your services as he designs a study (he is clearly a good investigator since he is thinking of this ahead of time…) .

He is trying to design an experiment where he measures Hispanic women’s serum cholesterol levels and compares them to the average women’s serum cholesterol level. His null hypothesis is that there will be no difference in serum cholesterol levels, and his alternative hypothesis is that there is a difference. His plan is to recruit a sample of Hispanic women and measure their change in serum cholesterol after 12 weeks and compare it to a known value for female serum cholesterol. This will be a one-sample, two-sided t-test.

#### Question 1:

#### Given the brief information above, do you concur with the statement that you should do a 2-sided statistical test? Why?

#### Why are we recommending that a one-sample statistical test is appropriate?

#### What information do you need from the investigator to complete the power calculations? (That is, in general, what information do we need to know or be able to approximate independently regarding the study and population - what is power a function of…?)

#### Question 2:

He tells you he wants a power of 90%. He gives you the following information: the average blood serum level for women is 170 mg/dl with a standard deviation of 10 mg/dl, the effect size he wishes to see is 0.8, he will be testing at the alpha=.05 level. How many women does he need to recruit into the study?

#### Question 3:

He comes back to you later, realizing his funding has been reduced. He can only recruit 10 women into the study. He wants to know how his power levels will change with different effect sizes. Make a table showing the different values of power for the following effect sizes: 0.1, 0.3, 0.5, 0.7, 0.9. (Construct a line plot of these findings!)

#### Question 4:

The investigator is now frustrated with his low power levels, and wishes to increase the power of his study.

1. List ALL the possible ways he could increase the power of his study.
2. Are these all good ideas?
3. Should we be arbitrarily changing all of these things just to increase power?
4. What else must we consider when looking at these variables?

#### Question 5:

The investigator confides in you that he doesn’t really understand power. He knows he must have a certain level of power, but not what it really means. Explain what power is and why it matters.