Clinical Trial (Permutations and Combinations) Calculations:

1) If the subjects are selected and treated in sequence, so that the trial is discontinued if anyone displays adverse effects, how many different sequential arrangements are possible if 7 people are selected from the 9 that are available?

Since the order is important (i.e. “in sequence”) we will be doing a **permutation** to answer this question:

We first need to identify the sample size – in this example the sample size is 9, yielding:

$$n = 9$$

The next item to identify is the number of arrangements (orders) in this calculation. For this example, there are 7 identified, hence:

$$r = 7$$

We now use the formula for **permutation** as:

$$P(n,r) = \frac{n!}{(n-r)!}$$

For this example, n = 9 and r = 7 – we plug in these values into the formula:

$$P(9,7) = \frac{9!}{(9-7)!}$$

Simplifying the denominator:

$$P(9,7) = \frac{9!}{2!}$$

Using a scientific calculator we find that 9! = 362,880 and 2! = 2 – this gives us the following:

$$P(9,7) = \frac{362880}{2}$$=181,440 permutations.

2) If 7 subjects are selected from the 10 that are available, and the 7 selected subjects are all treated at the same time, how many different treatment groups are possible?

Since the order is **NOT** important we will be doing a **combination** to answer this question:

We first need to identify the sample size – in this example the sample size is 9, yielding:

$$n = 9$$

The next item to identify is the number of arrangements (orders) in this calculation. For this example, there are 7 identified, hence:

$$r = 7$$

We now use the formula for **combination** as:

$$C(n,r) = \frac{n!}{r!\,(n-r)!}$$

For this example, n = 9 and r = 7 – we plug in these values into the formula:

$$C(9,7) = \frac{9!}{7!\,(9-7)!}$$

Simplifying the denominator:

$$C(9,7) = \frac{9!}{7!\,2!}$$

Using a scientific calculator, we find that 9! = 362,880, 7! = 5040, and 2! = 2 – this gives us the following:

$$P(9,7) = \frac{362880}{5040(2)}$$=36 combinations.