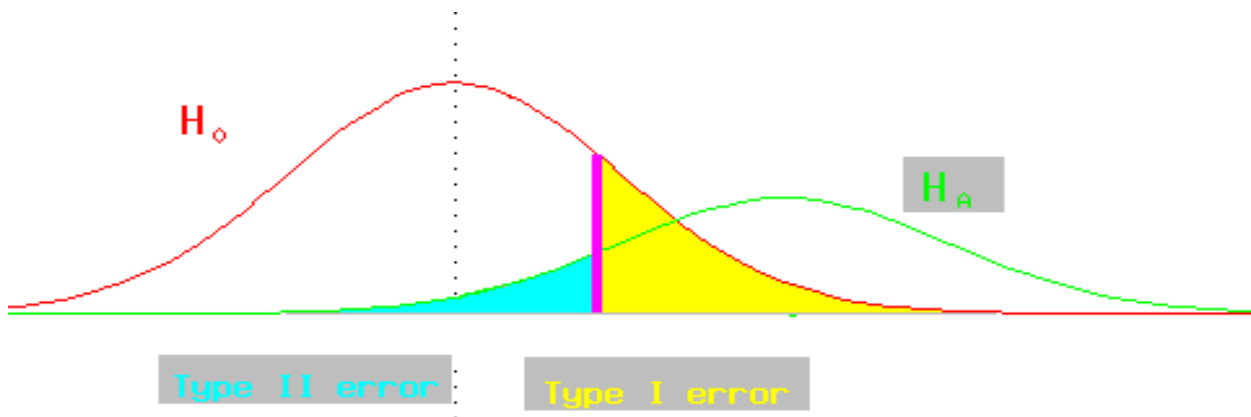


## Type I & II Error + Power



### **Type I error**

A type I error occurs when one rejects the null hypothesis when it is true. The probability of a type I error is the level of significance of the test of hypothesis, and is denoted by  $\alpha$ .

### **Type II error**

A type II error occurs when one rejects the alternative hypothesis (fails to reject the null hypothesis) when the alternative hypothesis is true. The probability of a type II error is denoted by  $\beta$ .

### **Power**

The power of a test is  $(1 - \beta)$ , the probability of choosing the alternative hypothesis when the alternative hypothesis is correct. Power measures how likely you are to find an effect (i.e., a difference between the null and alternative hypotheses) when it is truly there.

→ One way to remember it: If you want to see the nucleus of a cell under a microscope, you increase the microscope *power* (30x → 100x). If you don't increase the power enough, then you will not find the nucleus of the cell – even though you are certain it truly exists.

→ Take home message: the more power you have, the more likely you are to find an effect (in this example, the nucleus).