Worksheet for Workshop Series Basic Statistics for Eye Researchers and Clinicians
MERSEY POSTGRADUATE TRAINING PROGRAMME, 16 January 2013
All stas slides and worksheets can be found on: http://pcwww.liv.ac.uk/~czanner/

# Example:

We to investigate mfERG intensity of patients with diabetic maculopathy (DM) without clinical signs of macular oedema (CSMO) and who are 25 to 75 years old. A current paper is suggesting that the mean intensity is 29 in white USA population. We wish to see if our population of white UK patients is similar. We measured mfERG central intensity in 20 randomly chosen patients: 18.5, 19.5, 20.4, 20.7, 23.5, 23.8, 25.3, 26.7, 27.2, 28.0, 28.5, 29.5, 29.7, 30.7, 31.3, 31.8, 33.7, 33.9, 33.9 and 36.8.

Research question?

Population of interest?

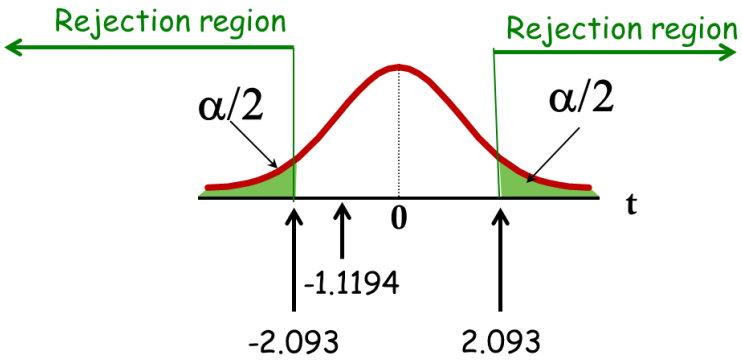
Hypotheses**?**

We use the sample data to obtain the sample mean and sample standard deviation (see Session 2): $\bar{x} = 27.67, s = 5.3135.$

We will use one sample t-test. It assumes that the distribution is to Normal, it assumes that we do not know population standard deviation sigma, but we estimate it by sample standard deviation, s. Let us use level of significance α =0.05.

**Test statistic**: $t = \dfrac{\bar{x} - \mu}{\dfrac{s}{\sqrt{n}}} = \dfrac{26.67 - 29}{\dfrac{5.3135}{\sqrt{20}}} = -1.1194$

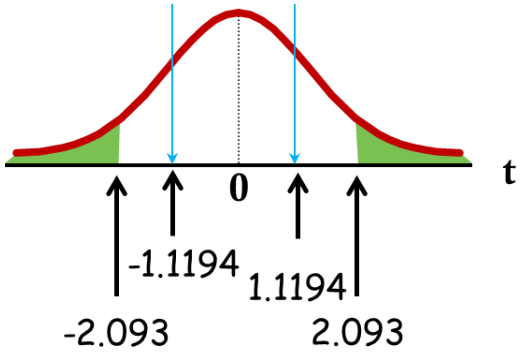
**Decision via rejection region:**




Do we reject H0?

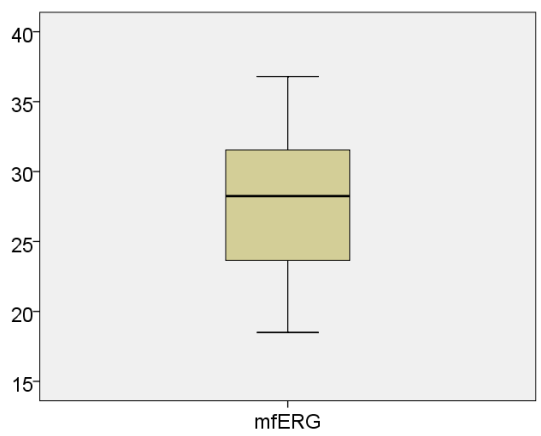
Do we accept H1?

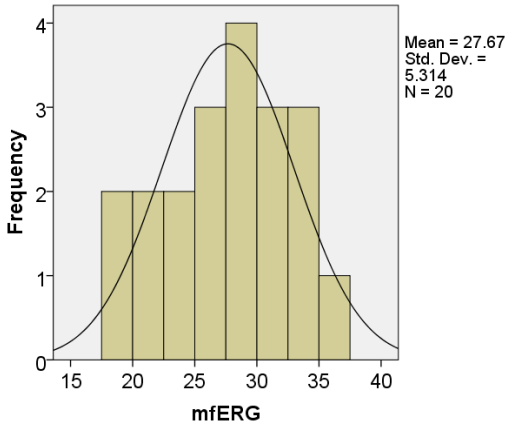
**Decision via p-value:**
We calculate (or get from stats software) the P-value = 2 x (area of tail up to -2.093) = 2x 0.13=0.26




How we use p-value to decide if we reject H0?

**Checking normality assumption of the t-test**
Is the distribution of mfERG Normal?
Other: outliers




Kolmogorov-Smirnov test of normality: In SPSS – Analyze – Nonparametric Tests – One Sample, then chose follow description on the menu. Here we chose "Automatically compare observed data to hypothesized". Then in Settings choose "Test observed distribution against hypothesized (KS test)."

**Hypothesis Test Summary**

| | Null Hypothesis | Test | Sig. | Decision |
|---|---|---|---|---|
| 1 | The distribution of mfERG is normal with mean 27.67 and standard deviation 5.31. | One-Sample Kolmogorov-Smirnov Test | .980 | Retain the null hypothesis. |

Asymptotic significances are displayed. The significance level is .05.

What are hypotheses of this test?

Is there evidence that distribution of the mfERG is not Normal?