Instructions for carrying out statistical procedures and tests using SPSS

These instructions are closely linked to the author's book:

Essential Statistics for the Pharmaceutical Sciences
John Wiley & Sons Ltd **http://eu.wiley.com**
2007
ISBN: 978-0-470-03468-2

For all references to chapters or tables, see the above book.

Using SPSS to perform a one-sided two-sample t-test

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Example: Table 10.1 Clearance (ml/min/kg) of an amphetamine with and without urinary acidification

The method for conducting the 1-sided test is largely the same as that for the 2-sided version, so these instructions have been abbreviated. (See 2-sided two-sample t-test for full details.) The key changes required for a 1-sided test are shown emboldened.

Label column 1 as ' Clearance' and enter the control clearances into the first 15 rows and the acidified values into rows 16-30.

Label column 2 as 'Group' and enter 'Control' in the first 15 rows and 'Acidify' in rows 16-30.

Follow the menus

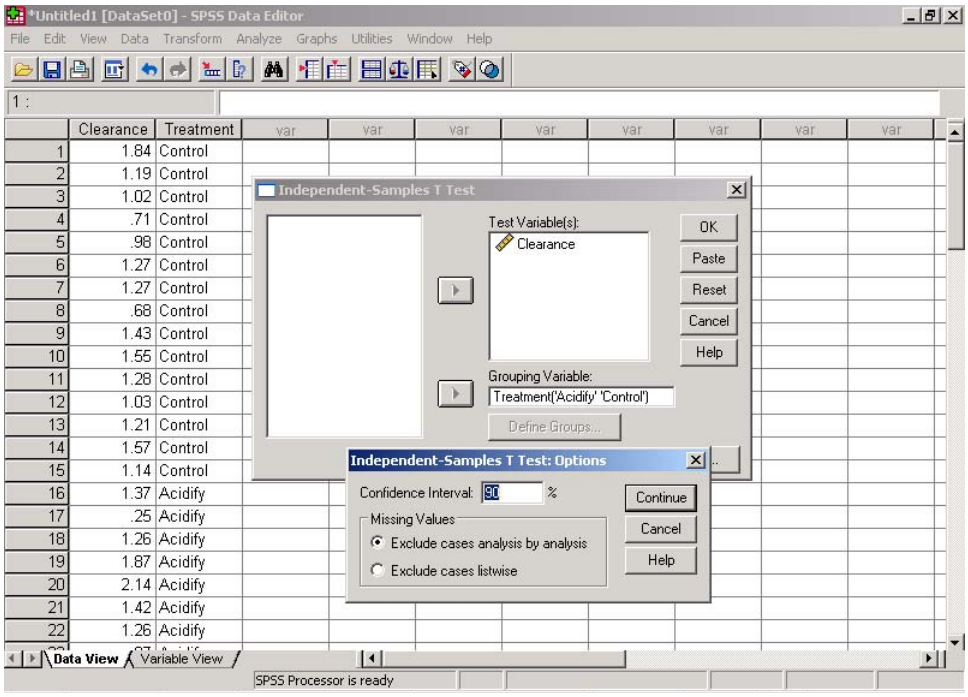
Analyze / Compare Means / Independent-Samples T Test …

Enter 'Clearance' in the 'Test Variable(s)' box and 'Group' in the 'Grouping Variable' box. Click the 'Define Groups…' button and enter 'Acidify' in the 'Group 1' box and 'Control' in the 'Group 2' box. Note that by entering the groups in this order, the change in clearance will register as positive (Which corresponds with the increase we see with active treatment.) Click 'Continue'.

To convert from the default 2-sided test to a 1-sided procedure, click on the 'Options…' button. Change the 'Confidence Interval' value to 90. Click 'Continue' and 'OK'.

SPSS should now appear as in Fig 1 on next page:

Fig 1: Ready for a 1-sided two-sample t-test



Click 'Continue' and 'OK'. Output will be:

Group Statistics

	Treatment	N	Mean	Std. Deviation	Std. Error Mean
Clearance	Acidify	15	1.4867	.48234	.12454
	Control	15	1.2113	.31170	.08048

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	90% Confidence Interval of the Difference	
									Lower	Upper
Clearance	Equal variances assumed	1.653	.209	1.857	28	.074	.27533	.14828	.02309	.52758
	Equal variances not assumed			1.857	23.956	.076	.27533	.14828	.02162	.52904

In Section 6.5.1 of the book, it was explained that the classical t-test assumes that the two samples are from populations with equal SDs, but that there is a

variant test (Welch's approximate t) which does not make this assumption. The second table has two rows of output, one labelled 'Equal variances assumed' and the other 'Equal variances not assumed'. Therefore, the upper figures correspond to the classic test and the lower to the Welch version. The rest of this document will assume that a classic test was required.

The first table provides basic descriptive statistics (Mean, SD, SEM) for the two groups.

In the second table, in the column headed 'Sig. (2-tailed)' there is a P value of 0.074. **Changing the confidence interval does not trigger a change in the P value, so this is the value for a two sided test. The one-sided P value is half this i.e. 0.037 (Yellow). There is statistically significant evidence of increased clearance.**

The point estimate for the difference in clearance between the two groups is then given as 0.27533 ml/min/kg (Blue).

Finally, there are lower and upper limits for a 90% C.I. for the difference. **We want to convert to a one-sided 95% confidence limit. As we are testing for an increase in clearance, the lower limit is the relevant one to inspect. (If it is greater than zero, there must be an increase in clearance.) The lower limit is +0.02309 ml/min/kg (Grey). This confirms that there is significant evidence of an increase in clearance. The upper confidence limit (Green) should be discarded.**