



臺中榮民總醫院
Taichung Veterans General Hospital

醫學統計分析：輕鬆入門

醫學研究部 生統小組

徐倩儀



變項類型

- 分類資料(discrete variable)

- 名義尺度(nominal scale)
 - 類別尺度(categorical scale)
- 序位尺度(ordinal scale)
 - 大小程度順序之關係

疾病
性別

社經地位
教育程度

- 連續性資料(continuous scale)

- 等距尺度(interval scale)
 - 代表相對距離，沒有絕對的0
- 等比尺度(ratio scale)
 - 使用標準化的單位，有絕對的0

溫度

身高
體重
年齡

資料描述



- 分類資料(discrete variable)

- 比例或百分比(ratio or %)

	Group A	Group B
Male (n, %)	30 (81.8%)	31 (83.8%)
Smoking (n, %)		
Current smoker	18 (48.6%)	20 (54.1%)
Ex-smoker	8 (21.6%)	5 (13.5%)
Never smoker	11 (29.7%)	12 (32.4%)
Hypertension (n, %)	19 (52.8%)	18 (51.4%)
DM (n, %)	10 (27.8%)	11 (29.7%)

- 連續性資料(continuous scale)

- 集中量數

- 平均值(mean)、中位數(median)

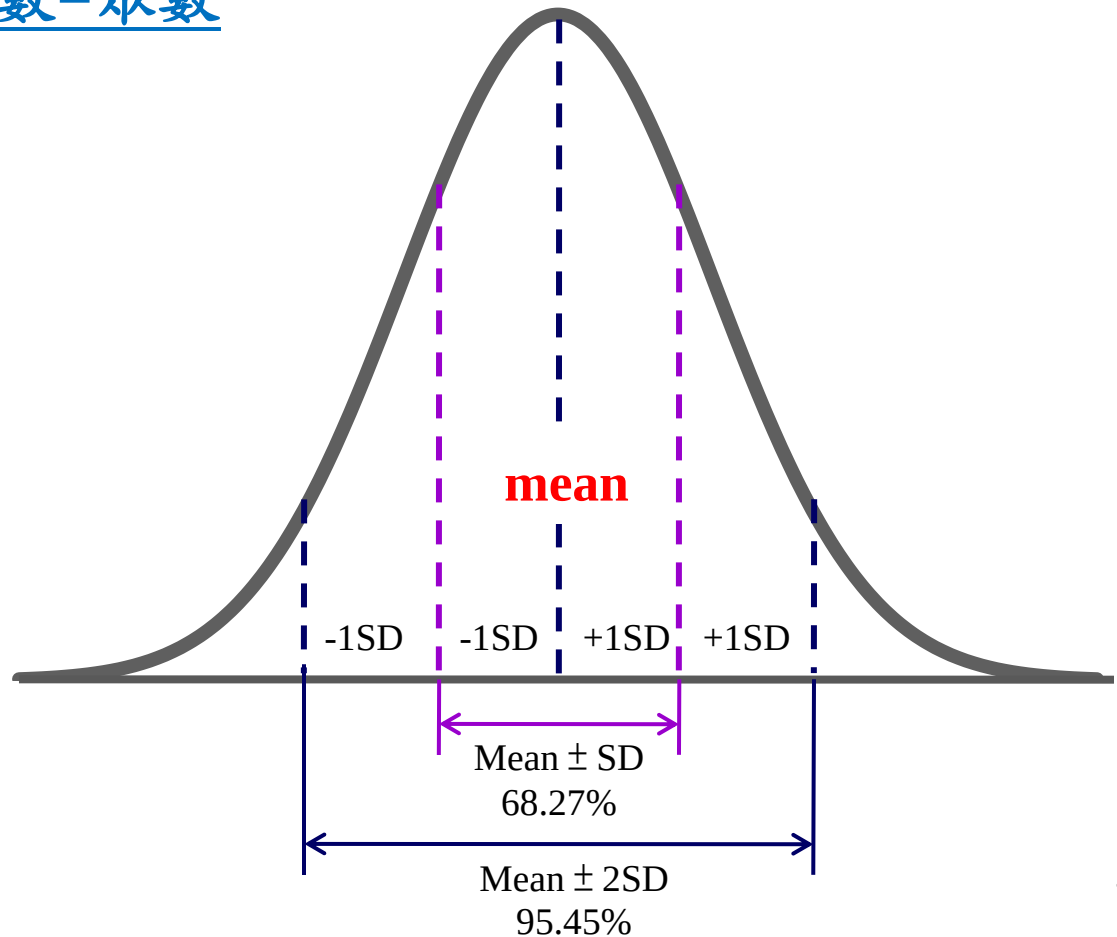
- 變異量數

- 標準差(SD)、四分位距 (差) (IQR)

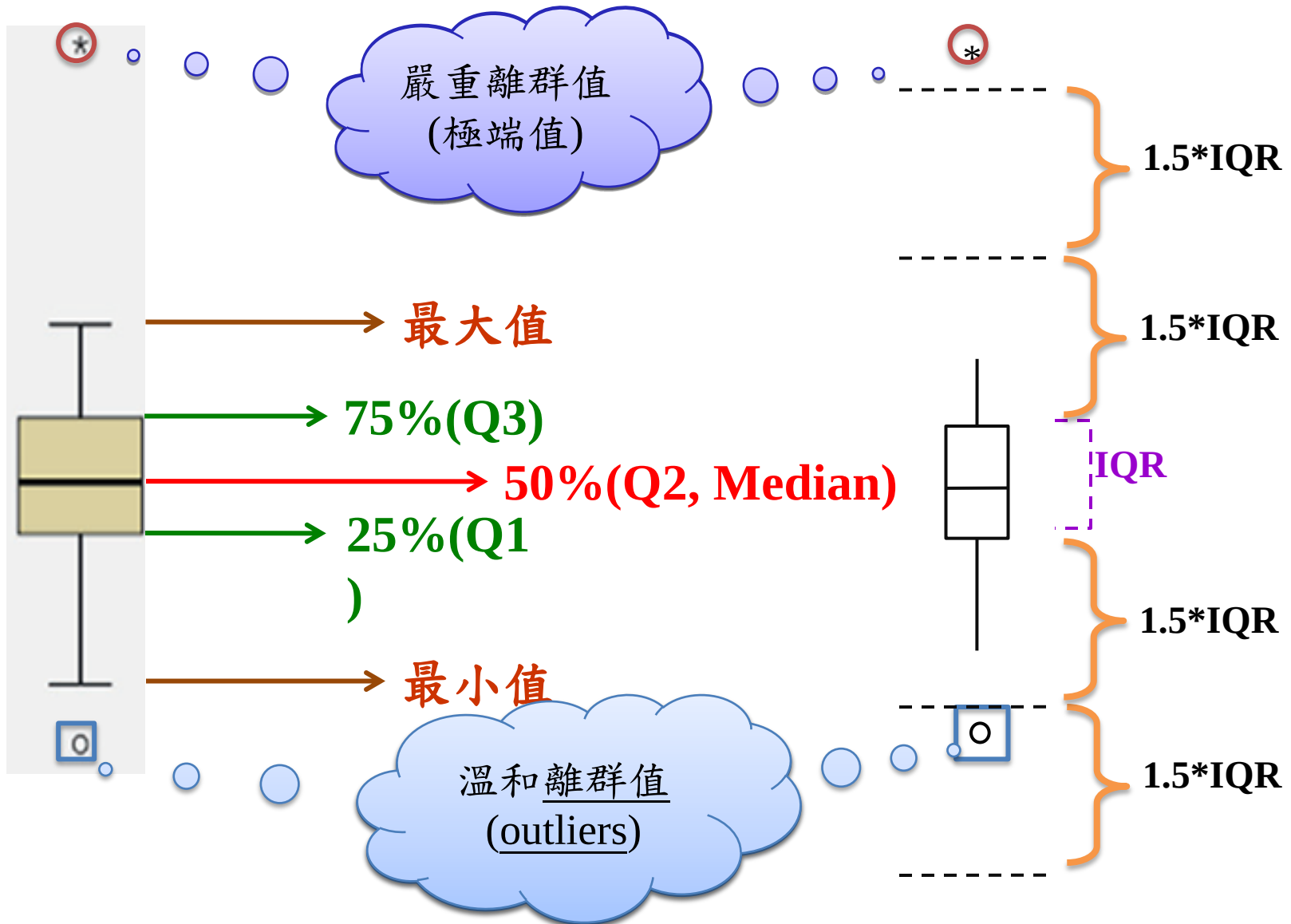
	Mean $\pm$ SD	Median (IQR)	
	SLE (n=20)	SLE (n=20)	SLE (n=20)
MDL-flow	53.6 $\pm$ 16.0	55.0(46.8-65.5)	55.0(18.8)
MDL-MFI	2.4 $\pm$ 1.2	2.3(1.5-3.4)	2.3(1.9)
granulocyte-MDL	75.3 $\pm$ 12.5	79.9(64.3-86.3)	79.9(22.0)
Granulocyte-MFI	3.4 $\pm$ 1.7	2.9(2-5)	2.9(3.0)

資料描述-常態分布

- 高斯分布(Gaussian shape)
 - 以平均值為中心的對稱曲線
 - 平均值=中位數=眾數



資料描述-箱型圖(Box plots)



統計分析

- 假設Hypothesis

- Null hypothesis(H_0)：虛無假設
 - 樣本之間沒有差異
- Alternative hypothesis (H_1)：對立假設
 - 樣本之間有差異
- α level(推翻虛無假設)
 - 可容忍的最大誤差
 - 通常設為0.1、0.05及0.01

A purple cloud bubble containing the text "臨界面積顯著水準".

臨界面積
顯著水準

A light green cloud bubble containing the text "寬鬆".

寬鬆

A light green cloud bubble containing the text "嚴格".

嚴格

統計方法(使用時機)



資料屬性	兩群 獨立樣本	三群以上 獨立樣本	相關	前後測 比較
連續資料	Independent t test	ANOVA	Pearson Correlation	Paired t test
序位資料 (連續無母數)	Mann-Whitney U test	Kruskal-Wallis test	Spearman's rho	Wilcoxon signed-rank test
類別資料	Chi-square (χ^2) test ➤ Fisher's exact ➤ Yate's 校正數	Chi-square (χ^2) test		McNemar's test

檢定-兩群/三群以上獨立樣本

- 三群以上能【重覆】使用兩群的檢定方式嗎？
 - A、B、C三群檢定
 - A/B、A/C、B/C
 - A、B、C、D四群檢定
 - A/B、A/C、A/D、B/C、B/D、C/D



Table of error types		Null hypothesis (H ₀)	
		True	False
Decision About Null Hypothesis (H ₀)	Reject	 Type I error (False Positive)	Correct inference (True Positive)
	Fail to reject	Correct inference (True Negative)	Type II error (False Negative)

SPSS使用介面



File Edit View Data Transform Analyze Direct Marketing Graphs Utilities Add-ons Window Help

Visible: 9 of 9 Variables

	RAGE	DCR3	wbc	Hb	Plat	ESR	CRP	Ferritin	sIL2R
1	413.8	491.00	36300	6.2	21	135	17.4	526.0	661
2	1342.9	13617.00	5400	12.4	117	24	.1	136.0	95
3	529.3	7044.00	6600	12.1	300	54	1.2	27.8	121
4	1129.9	528.00	9000	12.9	226	22	3.2	265.0	162
5	556.3	4198.00	7700	13.4	188	19	.1	70.9	-9
6	270.5	722.00	11300	8.9	325	80	.1	23100.0	1595
7	796.3	3266.00	5400	12.0	183	17	.1	-9.0	-9
8	611.1	668.00	9700	13.1	295	8	.1	68.5	151
9	2228.7	22848.00	7400	11.1	288	16	.1	70.2	154
10	898.6	2239.00	5400	14.6	263	13	.3	79.5	123
11	763.8	281.00	8900	11.1	324	29	.6	32.1	144
12	634.5	281.00	11900	12.0	248	35	.2	130.0	253
13	483.8	8937.00	24500	8.3	628	123	6.9	432.0	230
14	2183.4	3996.00	4800	11.5	127	28	.7	768.0	-9
15	413.5	97.00	13800	10.9	351	72	4.8	772.0	296
16	537.8	1834.00	15000	10.2	170	35	4.3	25900.0	1383
17	1562.4	3719.00	9500	13.1	310	20	2.8	48.7	96
18	1314.4	1255.00	10300	13.9	251	20	.2	89.5	83
19	1191.5	1150.00	6400	13.0	282	14	.1	15.9	-9
20	566.0	473.00	4700	11.5	308	40	1.5	27.9	131
21	969.1	44.00	4670	12.7	140	26	2.6	1466.0	1404
22	866.7	3652.00	5700	12.9	270	52	.7	61.2	1349
23	1811.7	4231.00	3700	11.1	186	30	.1	-9.0	-9
24	889.8	585.00	16100	13.5	355	55	12.8	562.0	-9

Data View Variable View

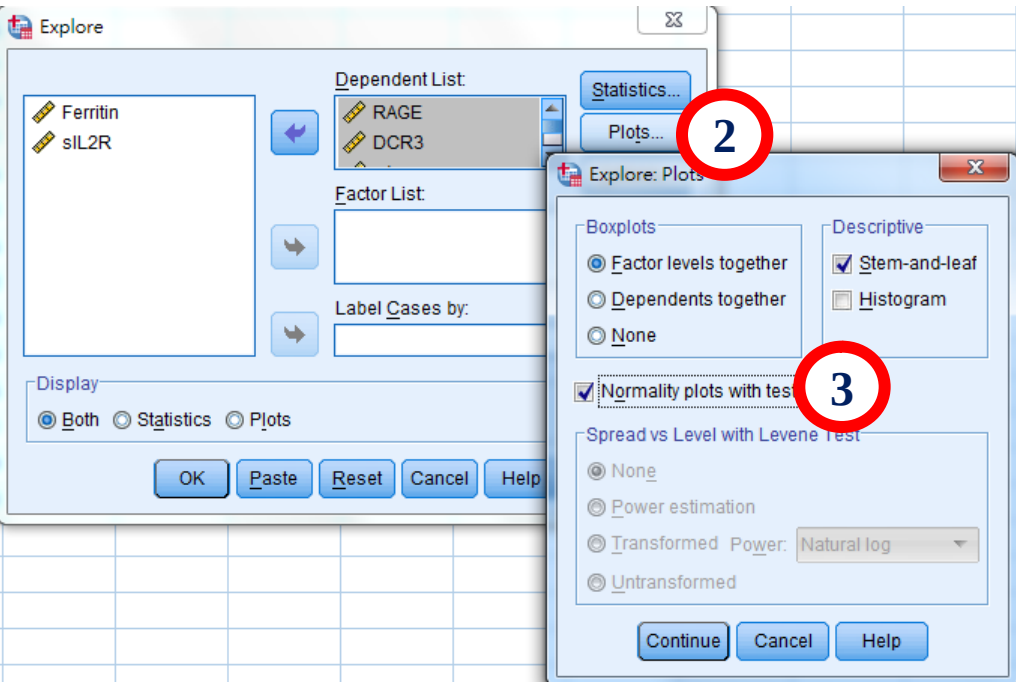
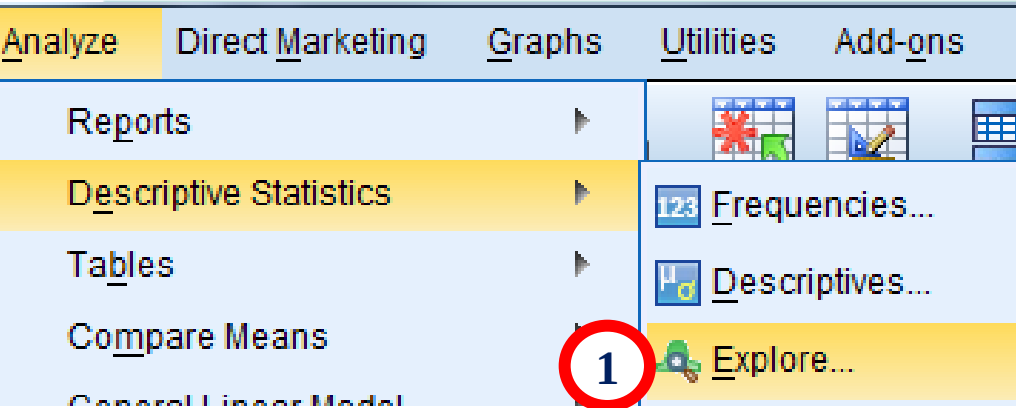
Edit View Data Transform Analyze Direct Marketing Graphs Utilities Add-ons Window Help

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	RAGE	Numeric	5	1		None	None	6	Right	Scale
2	DCR3	Numeric	5	2		None	None	7	Right	Scale
3	wbc	Numeric	6	0		None	None	6	Right	Scale
4	Hb	Numeric	2	1		None	None	4	Right	Scale
5	Plat	Numeric	6	0		None	None	6	Right	Scale
6	ESR	Numeric	3	0		None	-9	3	Right	Scale
7	CRP	Numeric	2	1		None	-9.0	4	Right	Scale
8	Ferritin	Numeric	5	1		None	-9.0	6	Right	Scale
9	sIL2R	Numeric	5	0		None	-9	6	Right	Scale

Variable View

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	DX	Numeric	3	0		{1, Active A...	None	3	Right	Nominal
2	HMGB	Numeric	3	2		None	-9.00	5	Right	Scale

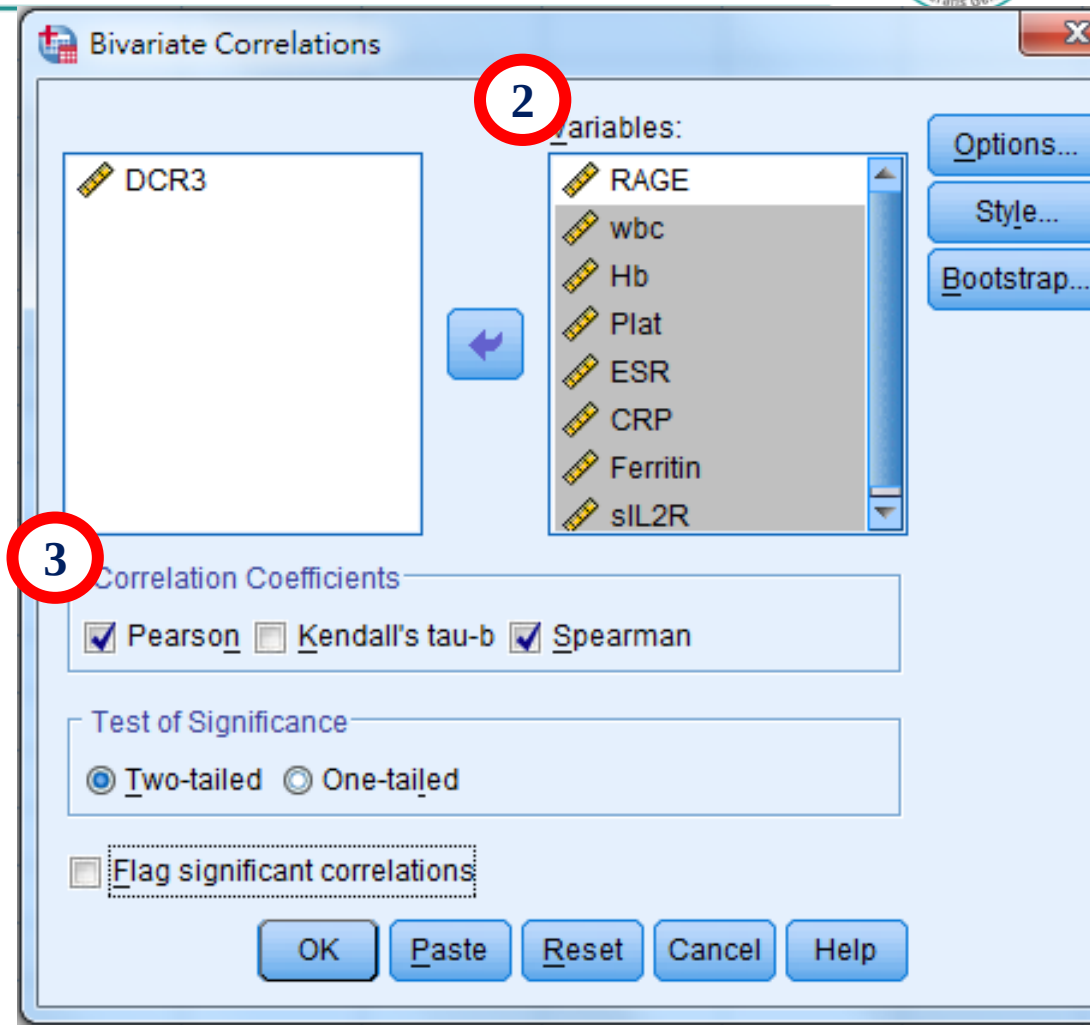
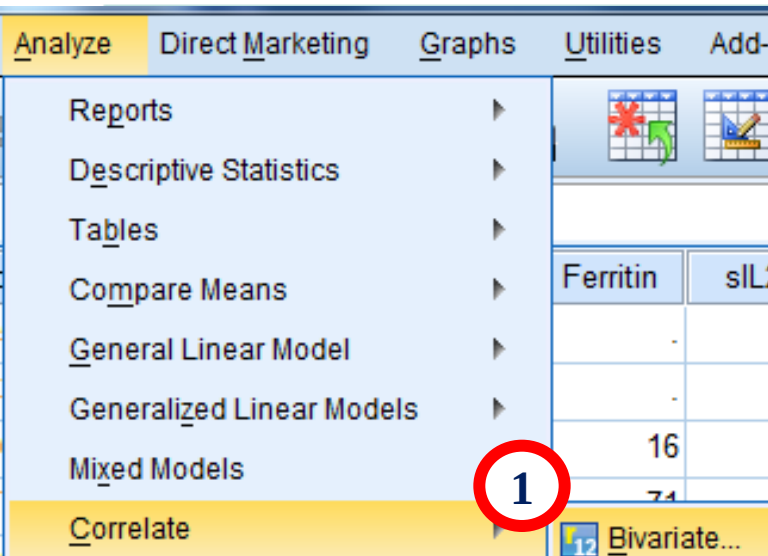
SPSS操作-常態檢定



Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
RAGE	.168	24	.080	.888	24	.012
DCR3	.285	24	.000	.665	24	.000
wbc	.201	24	.013	.736	24	.000
Hb	.158	24	.126	.903	24	.025
Plat	.155	24	.142	.901	24	.023
ESR	.230	24	.002	.781	24	.000
CRP	.285	24	.000	.629	24	.000

a. Lilliefors Significance Correction

SPSS操作-相關



Output-相關

		RAGE	DCR3	wbc	Hb	Plat	ESR	CRP	Ferritin	sIL2R
RAGE	Pearson Correlation	1	.515	-.428	.285	-.238	-.487	-.294	-.308	-.333
	Sig. (2-tailed)		.010	.037	.177	.262	.016	.164	.163	.177
	N	24	24	24	24	24	24	24	22	18
DCR3	Pearson Correlation	.515	1	-.127	-.076	.092	-.078	-.192	-.144	-.256
	Sig. (2-tailed)	.010		.555	.724	.669	.719	.368	.522	.304
	N	24	24	24	24	24	24	24	22	18
wbc	Pearson Correlation	-.428	-.127	1	-.716	.099	.826	.857	.121	.078
	Sig. (2-tailed)	.037	.555		.000	.647	.000	.000	.592	.758
	N	24	24	24	24	24	24	24	22	18
Hb	Pearson Correlation	.285	-.076	-.716	1	-.024	-.816	-.516	-.368	-.299
	Sig. (2-tailed)	.177	.724	.000		.912	.000	.010	.092	.228
	N	24	24	24	24	24	24	24	22	18
Plat	Pearson Correlation	-.238	.092	.099	-.024	1	.254	-.034	-.064	-.245
	Sig. (2-tailed)	.262	.669	.647	.912		.231	.875	.776	.327
	N	24	24	24	24	24	24	24	22	18
ESR	Pearson Correlation	-.487	-.078	.826	-.816	.254	1	.719	.150	.249
	Sig. (2-tailed)	.016	.719	.000	.000	.231		.000	.505	.320
	N	24	24	24	24	24	24	24	22	18
CRP	Pearson Correlation	-.294	-.192	.857	-.516	-.034	.719	1	-.014	.117
	Sig. (2-tailed)	.164	.368	.000	.010	.875	.000		.952	.645
	N	24	24	24	24	24	24	24	22	18
Ferritin	Pearson Correlation	-.308	-.144	.121	-.368	-.064	.150	-.014	1	.692
	Sig. (2-tailed)	.163	.522	.592	.092	.776	.505	.952		.001
	N	22	22	22	22	22	22	22	22	18
sIL2R	Pearson Correlation	-.333	-.256	.078	-.299	-.245	.249	.117	.692	1
	Sig. (2-tailed)	.177	.304	.758	.228	.327	.320	.645	.001	
	N	18	18	18	18	18	18	18	18	18

Spearman's rho

	RAGE			DCR3		
	n	r_s	p	n	r_s	p
wbc	24	-0.54	0.006**	24	-0.23	0.273
Hb	24	0.42	0.039*	24	0.03	0.880
Plat	24	-0.32	0.132	24	-0.11	0.619
ESR	24	-0.59	0.002**	24	-0.20	0.344
CRP	24	-0.31	0.139	24	-0.32	0.130
Ferritin	22	-0.24	0.280	22	-0.21	0.355
sIL2R	18	-0.51	0.030*	18	-0.39	0.107

Spearman's correlation. * $p < 0.05$, ** $p < 0.01$.

文章寫 r 及 r_s 的差別？

SPSS操作-Scatter Plot(散佈圖)

Graphs Utilities Add-ons Window Help

Chart Builder...
Graphboard Template Chooser...
Compare Subgroups
Regression Variable Plots
R Boxplot...

Legacy Dialogs

9	0	71	.
5	13	562	.
8	1	768	.
0	0	90	83
4	0	136	95
0	3	49	96
4	1	28	121
3	0	80	123
0	1	28	131
9	1	32	144

Bar...
3-D Bar...
Line...
Area...
Pie...
High-Low...
Boxplot...
Error Bar...
Population Pyramid...
Scatter/Dot...

Scatter/Dot

Simple Scatter
Matrix Scatter
Simple Dot
Overlay Scatter
3-D Scatter

Define... Ca...

Simple Scatterplot

Y Axis: RAGE
X Axis: wbc

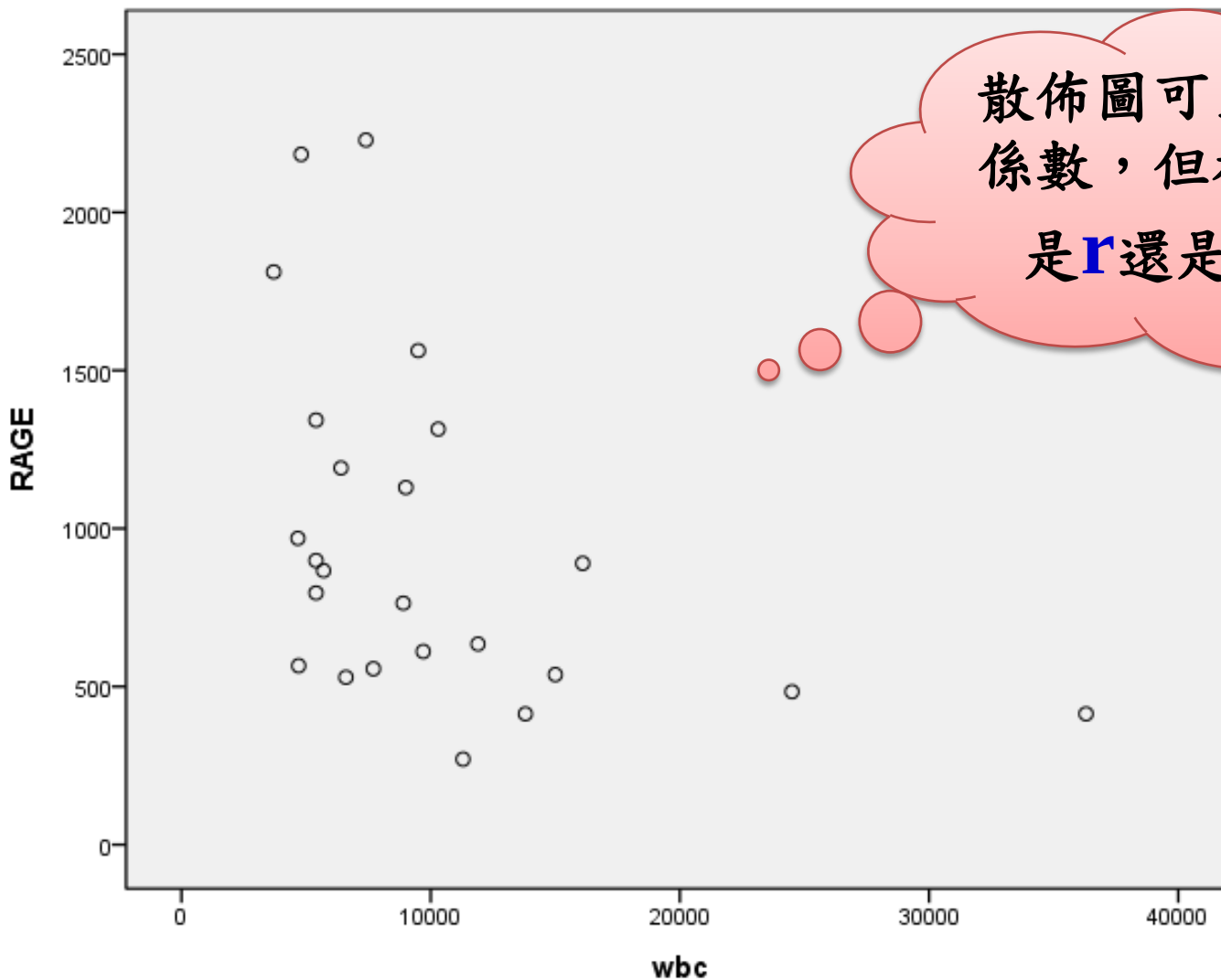
Set Markers by:
Label Cases by:

Panel by:
Rows:
Columns:

Template
Use chart specifications from:
File...

OK Paste Reset Cancel Help

Output-Scatter Plot(散佈圖)



散佈圖可呈現相關係數，但相關係數是**r**還是**r_s**呢？

SPSS操作-連續資料轉為序位資料



The image shows the SPSS Rank Cases dialog box. The 'Transform' menu is open, and the 'Rank Cases...' option is highlighted with a red circle and the number 1. The 'Rank Cases' dialog box is open, showing the 'Variable(s):' list with 'RAGE', 'DCR3', and 'whc' selected, indicated by a red circle and the number 2. The 'By:' field is empty. The 'Assign Rank 1 to:' section has 'Smallest value' selected, indicated by a red circle and the number 3. The 'Display summary tables' checkbox is checked. The 'Rank Types...' and 'Ties...' buttons are visible. The 'OK', 'Paste', 'Reset', 'Cancel', and 'Help' buttons are at the bottom.

SPSS操作-連續資料轉為序位資料



Fig_1.sav [DataSet46] - IBM SPSS Statistics Data Editor

	RAGE	DCR3	wbc	Hb	Plat	ESR	CRP	Ferritin	sIL2R	RRAGE	RDCR3	Rwbc	RHb	RPlat	RESR	RCRP	RFerriti	Rsil2R
1	270	722	11300	9	325	80	0	23100	1595	1	10	18	3	21	22	3	21	18
2	413	97	13800	11	351	72	5	772	296	2	2	20	5	22	21	21	19	13
3	414	491	36300	6	21	135	17	526	661	3	6	24	1	1	24	24	16	14
4	484	8937	24500	8	628	123	7	432	230	4	22	23	2	24	23	22	15	11
5	529	7044	6600	12	300	54	1	28	121	5	21	10	13	17	19	15	2	4
6	538	1834	15000	10	170	35	4	25900	1383	6	13	21	4	5	16	20	22	16
7	556	4198	7700	13	188	19	0	71	.	7	19	12	21	8	6	8	9	.
8	566	473	4700	12	308	40	1	28	131	8	5	3	10	18	17	16	3	6
9	611	668	9700	13	295	8	0	69	151	9	9	16	20	16	1	6	7	8
10	635	281	11900	12	248	35	0	130	253	10	4	19	12	10	16	9	12	12
11	764	281	8900	11	324	29	1	32	144	11	4	13	7	20	13	12	4	7
12	796	3266	5400	12	183	17	0	.	.	12	15	6	12	6	5	3	.	.
13	867	3652	5700	13	270	52	1	61	1349	13	16	8	17	13	18	13	6	15
14	890	585	16100	14	355	55	13	562	.	14	8	22	22	23	20	23	17	.
15	899	2239	5400	15	263	13	0	80	123	15	14	6	24	12	2	11	10	5
16	969	44	4670	13	140	26	3	1466	1404	16	1	2	15	4	11	17	20	17
17	1130	528	9000	13	226	22	3	265	162	17	7	14	17	9	9	19	14	10
18	1191	1150	6400	13	282	14	0	16	.	18	11	9	18	14	3	3	1	.
19	1314	1255	10300	14	251	20	0	90	83	19	12	17	23	11	8	10	11	1
20	1343	13617	5400	12	117	24	0	136	95	20	23	6	14	2	10	3	13	2
21	1562	3719	9500	13	310	20	3	49	96	21	17	15	20	19	8	18	5	3
22	1812	4231	3700	11	186	30	0	.	.	22	20	1	7	7	14	3	.	.
23	2183	3996	4800	12	127	28	1	768	.	23	18	4	10	3	12	14	18	.
24	2229	22848	7400	11	288	16	0	70	154	24	24	11	7	15	4	8	8	9

Scatter Plot(散佈圖)-Spearman

RAGE

DCR3

wbc

Hb

Plat

ESR

CRP

Ferritin

sIL2R

Rank of DCR3 [RD...]

Rank of Hb [RHb]

Rank of Plat [RPlat]

Rank of ESR [RESR]

Rank of CRP [RCRP]

Rank of Ferritin [RF...]

Rank of sIL2R [RsIL...]

Y Axis:

Rank of RAGE [RRAGE]

X Axis:

Rank of wbc [Rwbc]

Set Markers by:

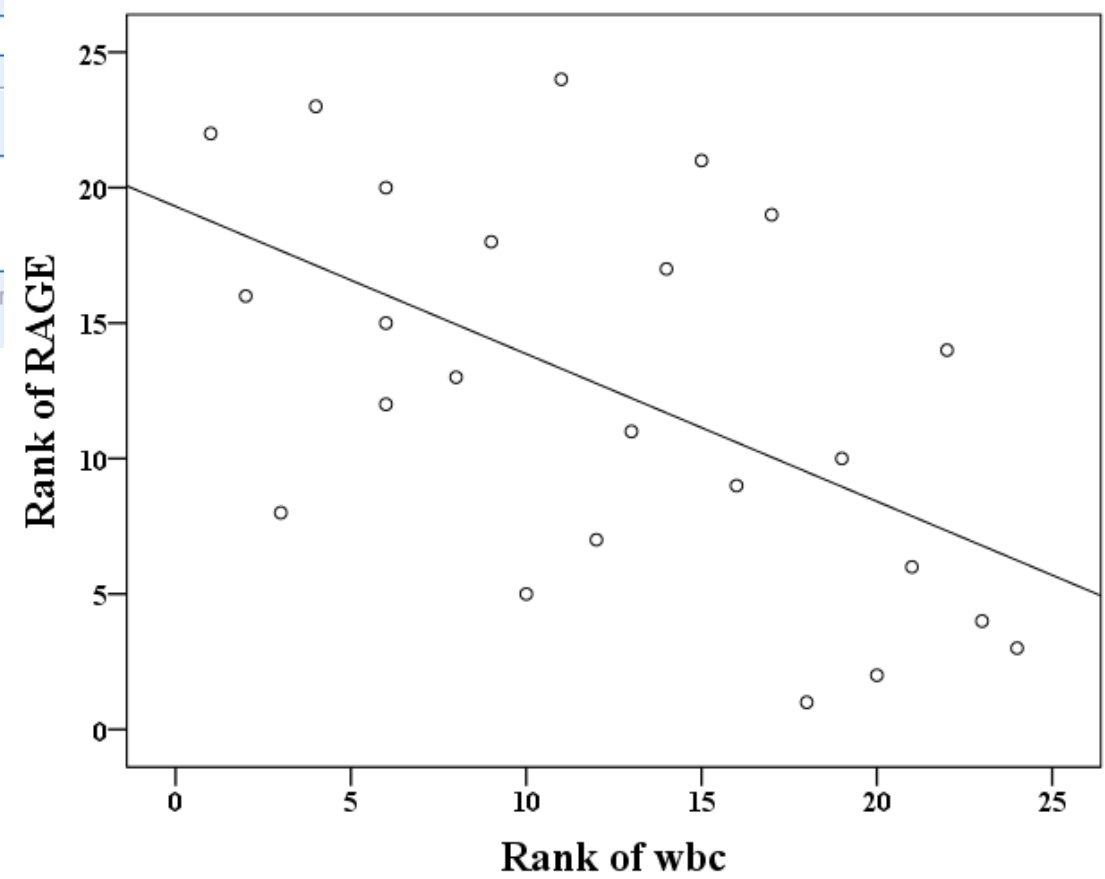
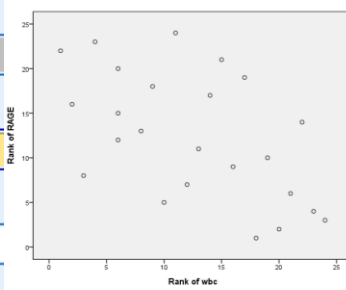
Label Cases by:

Panel by

Rows:

Columns:

Nest variables (no empty r



	RAGE		
	n	r_s	p
wbc	24	-0.54	0.006**

兩群獨立樣本

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AOSD	34	63.0	63.0	63.0
	SLE	20	37.0	37.0	100.0
	Total	54	100.0	100.0	

(MDL file，只挑前兩組當範本)

		MDL-flow	MDL-MFI	granulocyte-MDL	Granulocyte-MFI
N	Valid	54	54	54	54
	Missing	0	0	0	0
Mean		58.7394	3.0207	75.6372	3.6003

要用什麼檢定方法呢？

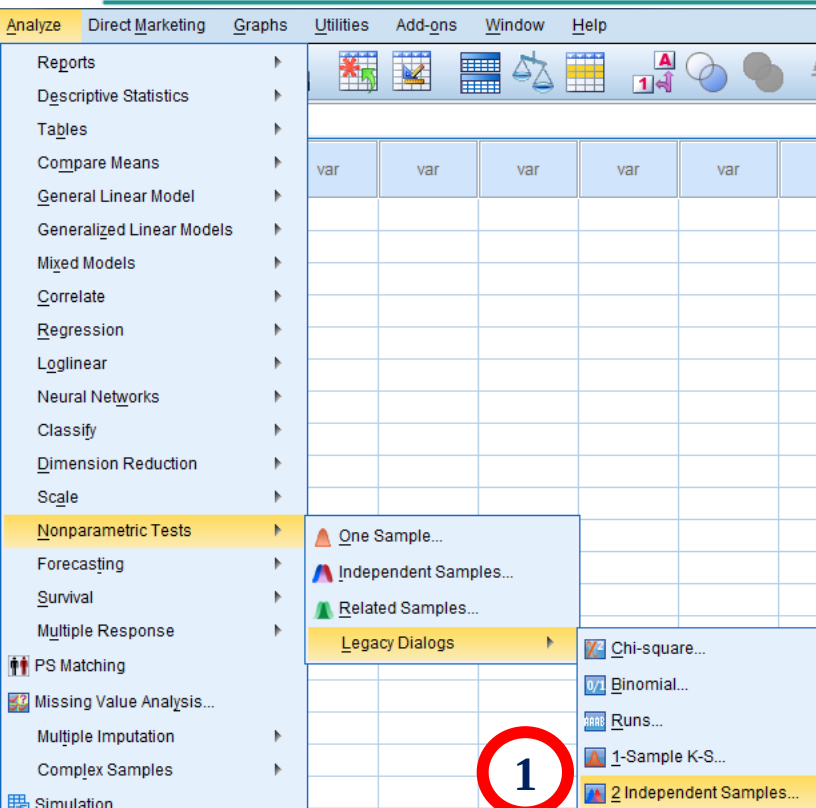
Tests of Normality

dx		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
MDL-flow	AOSD	.131	34	.146	.960	34	.239
	SLE	.152	20	.200 [*]	.951	20	.382
MDL-MFI	AOSD	.099	34	.200 [*]	.923	34	.020
	SLE	.115	20	.200 [*]	.965	20	.655
granulocyte-MDL	AOSD	.120	34	.200 [*]	.972	34	.527
	SLE	.211	20	.020	.876	20	.015
Granulocyte-MFI	AOSD	.256	34	.000	.676	34	.000
	SLE	.140	20	.200 [*]	.935	20	.196

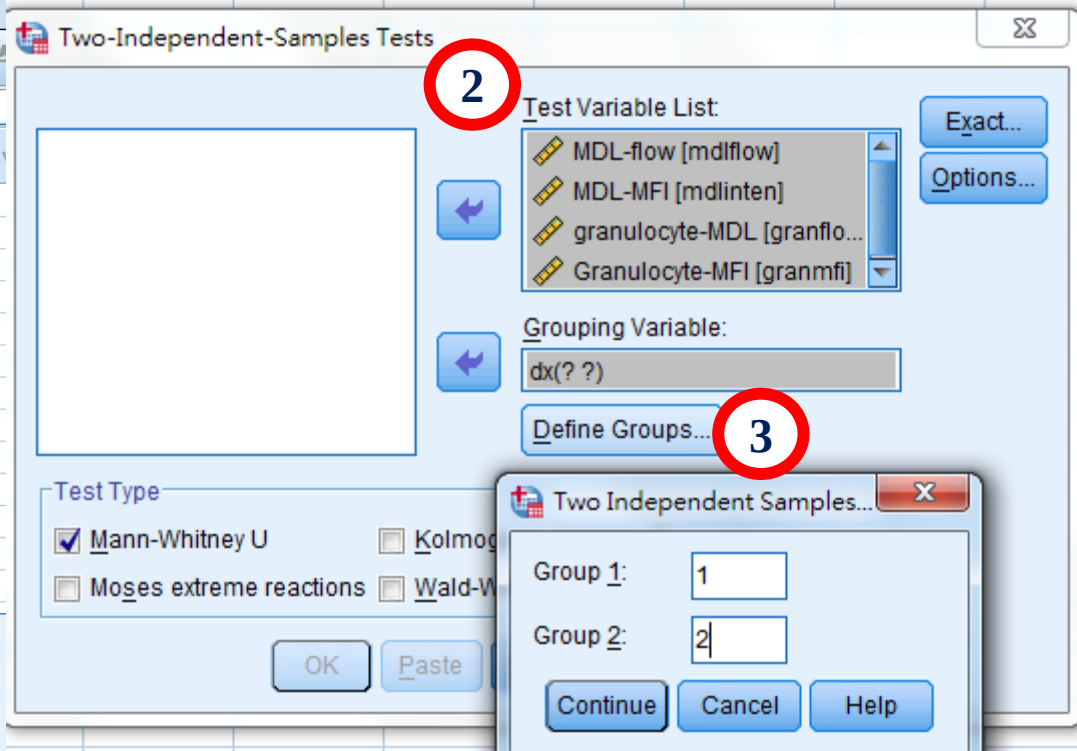
*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

SPSS操作-兩群獨立樣本



1



2

3

Mann-Whitney Test

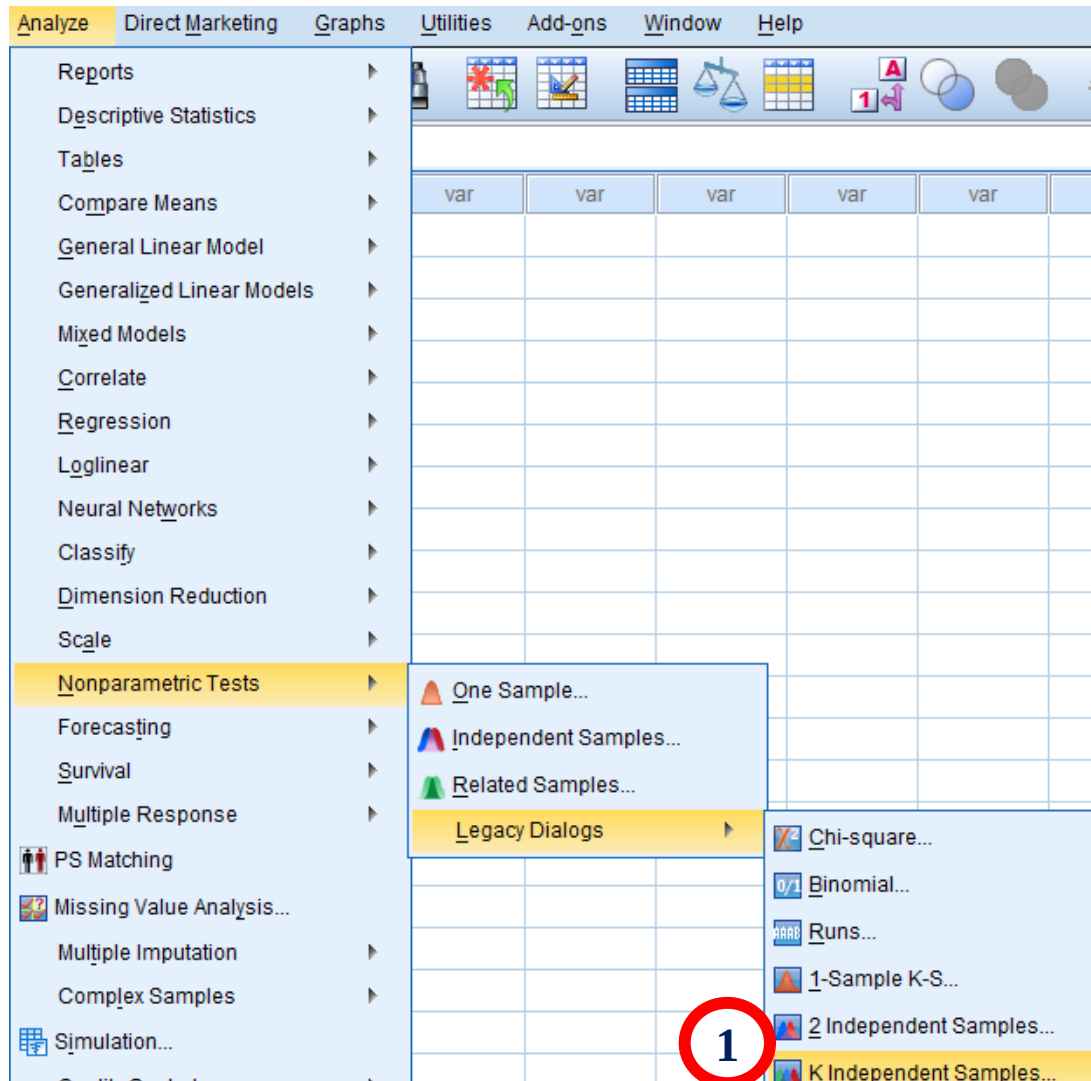
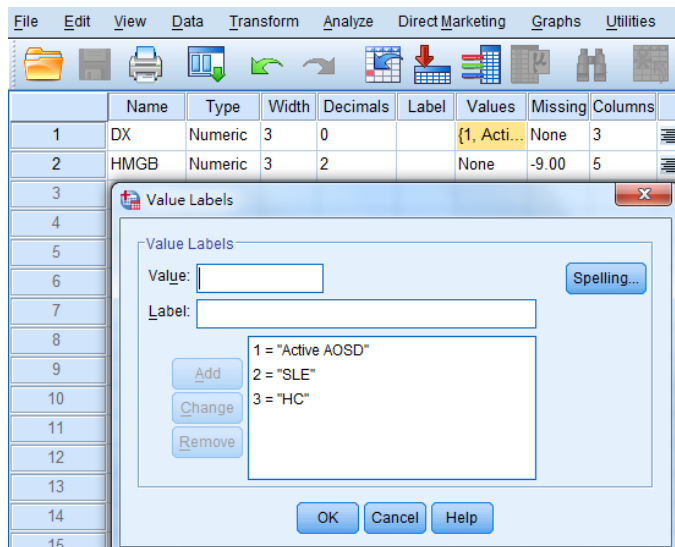
Ranks				
dx	N	Mean Rank	Sum of Ranks	
MDL-flow	AOSD	34	30.65	1042.00
	SLE	20	22.15	443.00
	Total	54		
MDL-MFI	AOSD	34	31.31	1064.50
	SLE	20	21.03	420.50
	Total	54		
granulocyte-MDL	AOSD	34	27.07	920.50
	SLE	20	28.23	564.50
	Total	54		
Granulocyte-MFI	AOSD	34	28.74	977.00
	SLE	20	25.40	508.00
	Total	54		

Test Statistics^a

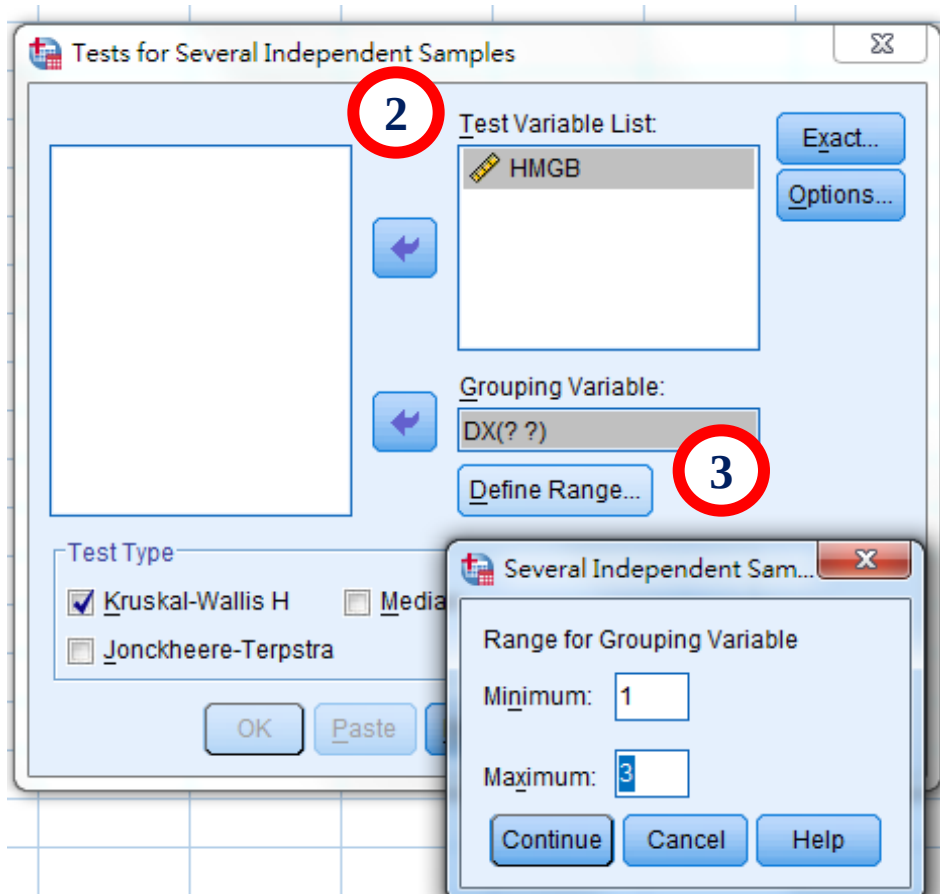
	MDL-flow	MDL-MFI	granulocyte-MDL	Granulocyte-MFI
Mann-Whitney U	233.000	210.500	325.500	298.000
Wilcoxon W	443.000	420.500	920.500	508.000
Z	-1.917	-2.320	-.260	-.752
Asymp. Sig. (2-tailed)	.055	.020	.795	.452

a. Grouping Variable: dx

SPSS操作-三群以上獨立樣本



SPSS操作-三群以上獨立樣本



Kruskal-Wallis Test

Ranks

DX	N	Mean Rank
HMGB Active AOSD	12	32.92
SLE	18	22.17
HC	13	11.69
Total	43	

Test Statistics^{a,b}

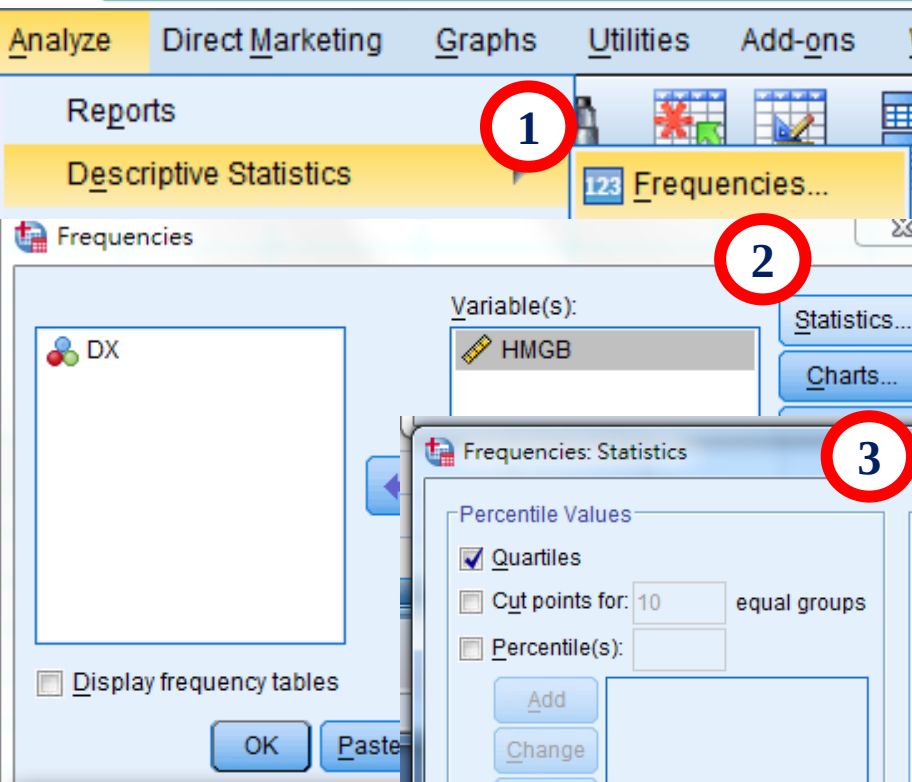
	HMGB
Chi-Square	17.843
df	2
Asymp. Sig.	.000

a. Kruskal Wallis Test

b. Grouping Variable:
DX

資料描述
平均值?
or
中位數?

SPSS操作-連續型資料敘述-1

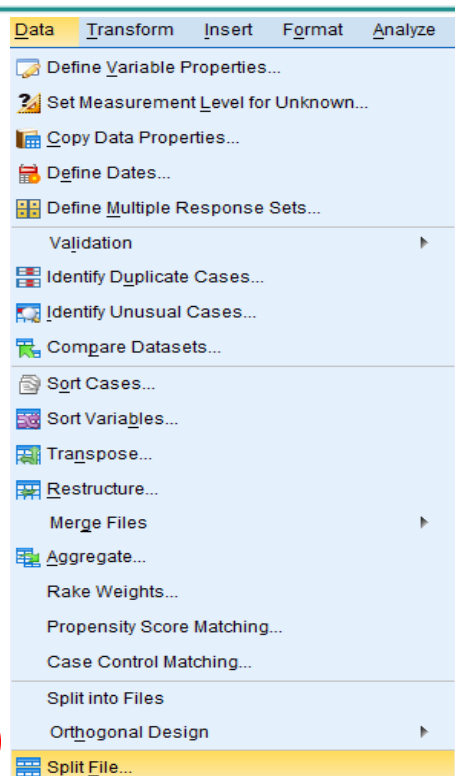


HMGB

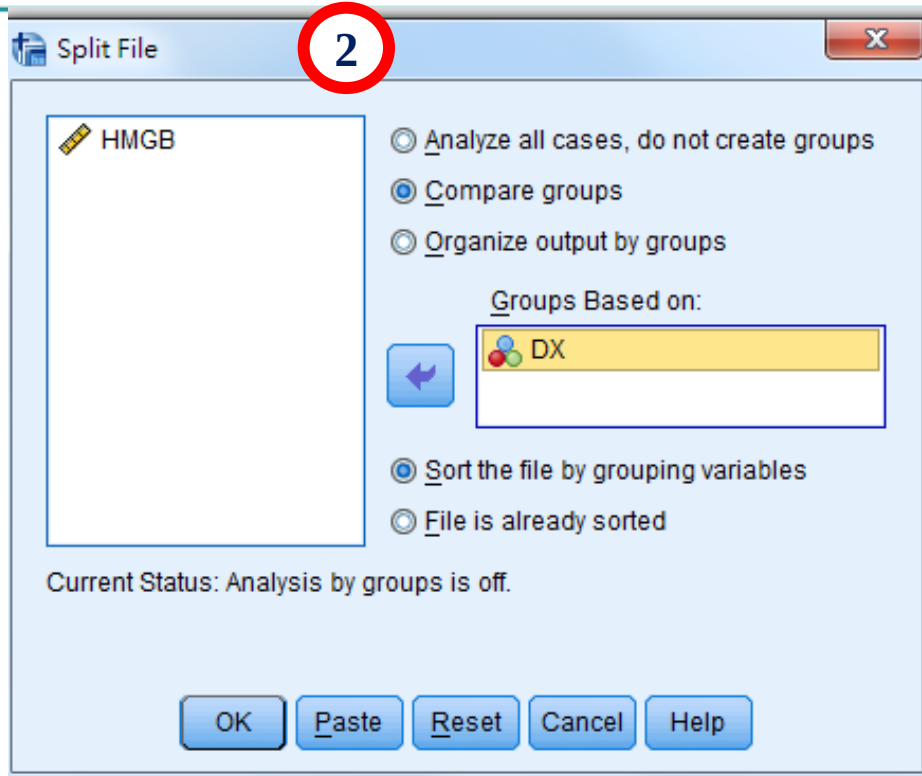
N	Valid	43
	Missing	0
Mean		10.4793
Std. Deviation		12.66993
Minimum		1.36
Maximum		61.80
Percentiles	25	2.4700
	50	6.7200
	75	10.8000

SPSS操作-連續型資料敘述-2

1



2



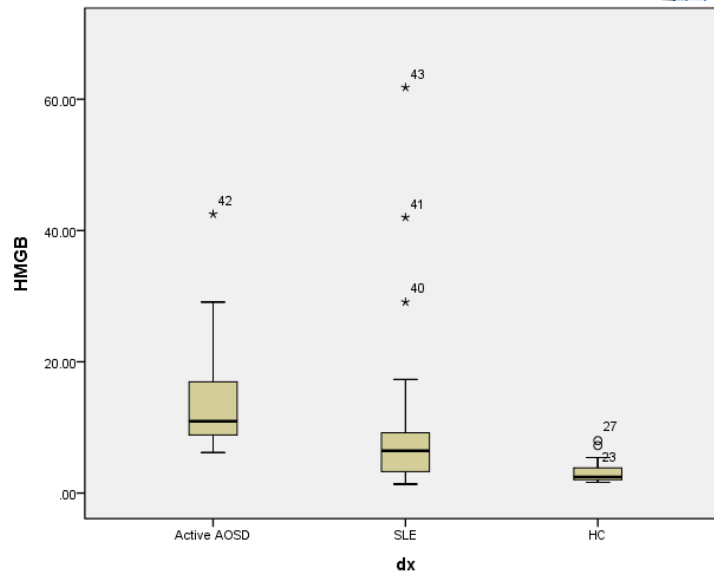
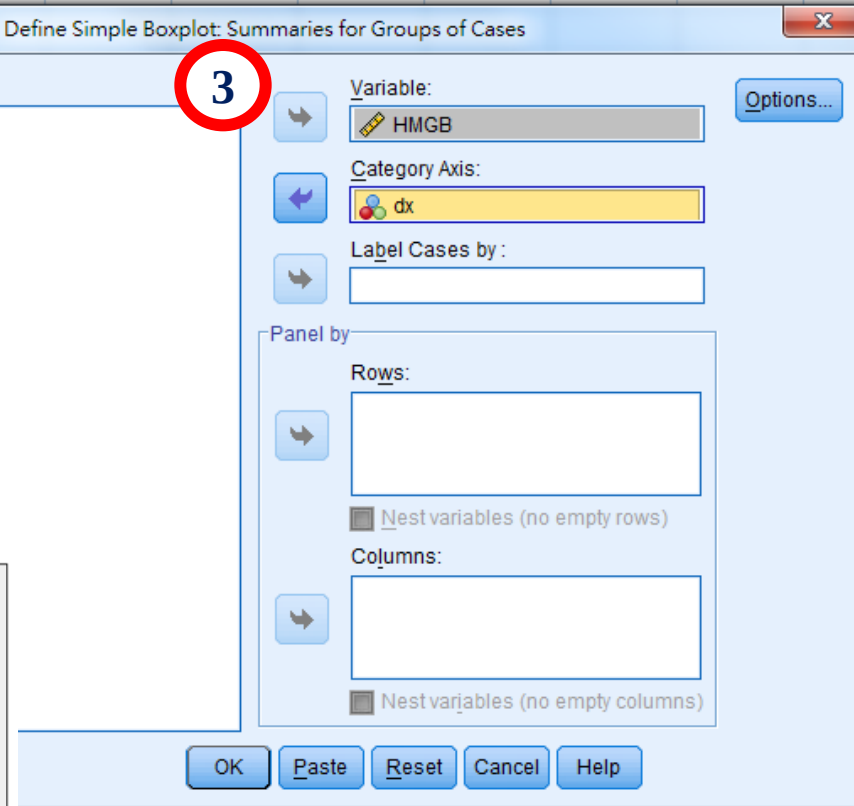
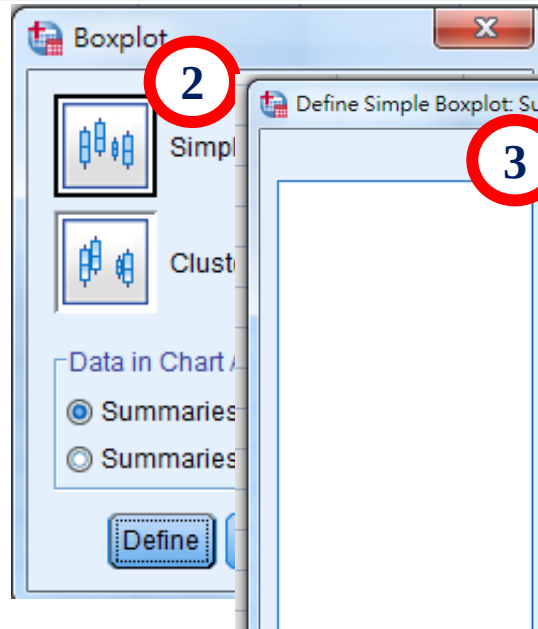
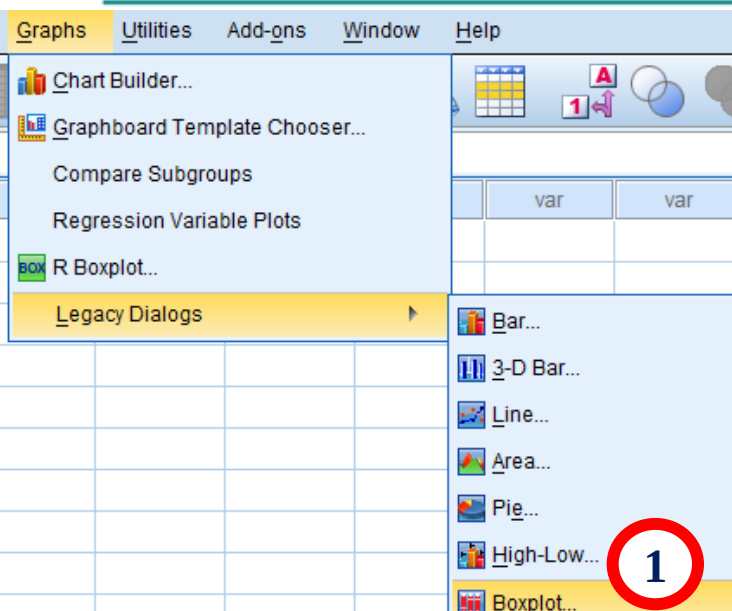
HMGB			
Active AOSD	N	Valid	12
		Missing	0
	Mean		15.4467
	Std. Deviation		10.53057
	Minimum		6.17
	Maximum		42.50
Percentiles	25		8.5475
	50		10.9500
	75		17.5250
SLE	N	Valid	18
		Missing	0
	Mean		12.2700
	Std. Deviation		16.20788
	Minimum		1.36
	Maximum		61.80
Percentiles	25		3.0650
	50		6.4450
	75		11.2175
HC	N	Valid	13
		Missing	0
	Mean		3.4146
	Std. Deviation		2.11846
	Minimum		1.62
	Maximum		8.00
Percentiles	25		1.9850
	50		2.4700
	75		4.6150

Table.

	n	Mean	SD	Median	Minimum	Maximum	P25	P75	p value
HMGB									<0.001**
Active AOSD	12	15.45	10.53	10.95	6.17	42.50	8.55	17.53	
SLE	18	12.27	16.21	6.45	1.36	61.80	3.07	11.22	
HC	13	3.41	2.12	2.47	1.62	8.00	1.99	4.62	

Kruskal Wallis Test. * $p < 0.05$, ** $p < 0.01$.

SPSS操作-Box Plot



GraphPad操作-點狀圖



Welcome to GraphPad Prism

GraphPad PRISM®

Version

Available analyses

- t test (one-sample, paired and unpaired)
- Mann-Whitney
- Wilcoxon
- Column statistics (including normality tests)
- Correlation matrix
- One-way ANOVA (followed by Newman-Keuls or Bonferroni post hoc)
- Kruskal-Wallis
- Friedman

Organization of data table

Sample data

☒ Start with an empty data table

☐ Use sample data

How is a Column data table organized?

Choose a graph

Selected graph: **Scatter plot, vertical**

Graphing replicates or error bars

Plot: Median

GraphPad Prism - [Project1:Data 1]

File Edit View Insert Change Arrange Window Help

Prism File Sheet Undo Clipboard Analysis Change

Family

Data Tables

Data 1

Info

Project info 1

Results

Graphs

Data 1

Layouts

	A	B	C
	Active AOSD	SLE	HQ
	Y	Y	Y
1	6.17	1.36	1.62
2	8.00	1.96	1.87
3	8.25	2.30	1.93
4	9.44	2.42	2.04
5	10.50	3.28	2.13
6	10.80	3.45	2.47
7	11.10	4.93	2.47
8	15.60	5.15	2.68
9	15.80	6.17	2.72
10	18.10	6.72	3.83
11	29.10	7.27	5.40
12	42.50	8.00	7.23
13		8.46	8.00
14		9.19	
15		17.30	
16		29.10	
17		42.00	
18		61.80	

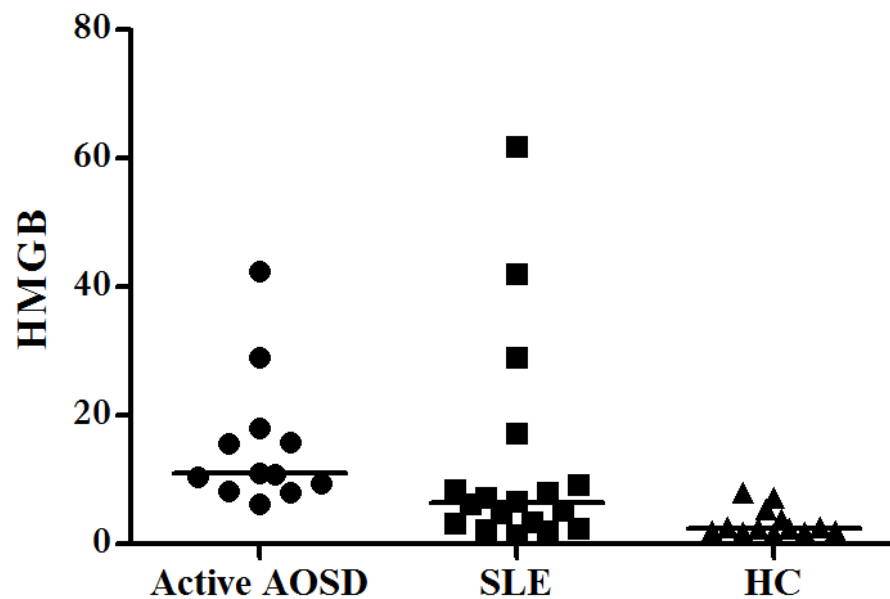
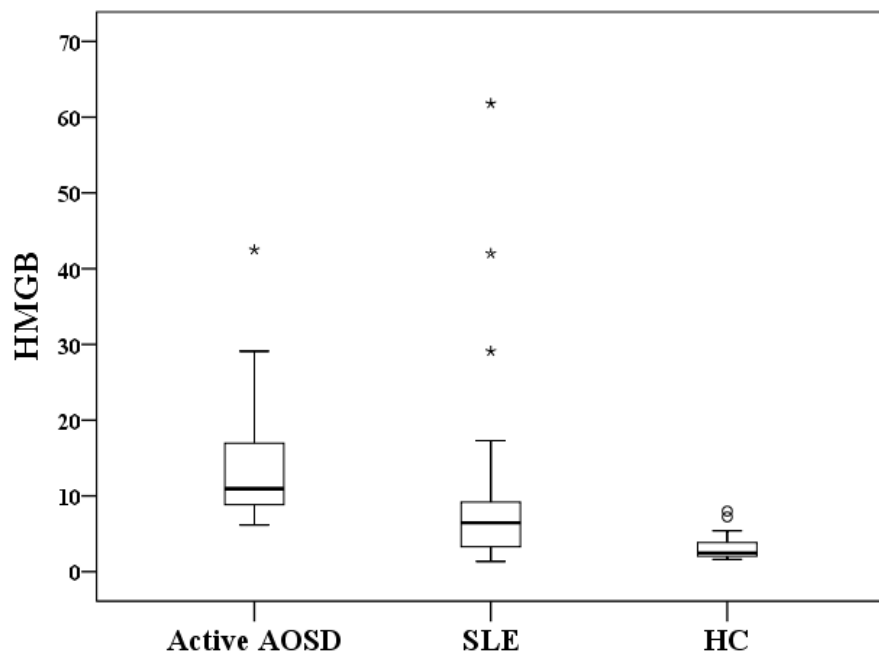
SPSS與GraphPad建檔差異



	dx	HMGB		dx	HMGB
1	1	6.17	21	2	6.17
2	1	8.00	22	2	6.72
3	1	8.25	23	2	7.27
4	1	9.44	24	2	8.00
5	1	10.50	25	2	8.46
6	1	10.80	26	2	9.19
7	1	11.10	27	2	17.30
8	1	15.60	28	2	29.10
9	1	15.80	29	2	42.00
10	1	18.10	30	2	61.80
11	1	29.10	31	3	1.62
12	1	42.50	32	3	1.87
13	2	1.36	33	3	1.93
14	2	1.96	34	3	2.04
15	2	2.30	35	3	2.13
16	2	2.42	36	3	2.47
17	2	3.28	37	3	2.47
18	2	3.45	38	3	2.68
19	2	4.93	39	3	2.72
20	2	5.15	40	3	3.83
			41	3	5.40
			42	3	7.23
			43	3	8.00

	A	B	C
	Active AOSD	SLE	HC
	Y	Y	Y
1	6.17	1.36	1.62
2	8.00	1.96	1.87
3	8.25	2.30	1.93
4	9.44	2.42	2.04
5	10.50	3.28	2.13
6	10.80	3.45	2.47
7	11.10	4.93	2.47
8	15.60	5.15	2.68
9	15.80	6.17	2.72
10	18.10	6.72	3.83
11	29.10	7.27	5.40
12	42.50	8.00	7.23
13		8.46	8.00
14		9.19	
15		17.30	
16		29.10	
17		42.00	
18		61.80	

Box Plot & 點狀圖



Chi-square (χ^2) test

- 檢定類別變項間，是否有關聯？

觀察值(O)			預期值(E)		
	有病	沒病		有病	沒病
抽菸	A	B	A+B	$\frac{(A+B)(A+C)}{N}$	$\frac{(A+B)(B+D)}{N}$
不菸	C	D	C+D	$\frac{(A+C)(C+D)}{N}$	$\frac{(B+D)(C+D)}{N}$
	A+C	B+D	N		

- ◎ 每格觀察值偏離預期值的程度 $= (O-E)/E$
- ◎ 避免負號， $\chi^2 = \sum (O-E)^2/E$
- ◎ 2×2列聯表注意事項
 - >20%的預期值 < 5，看 Fisher's Exact test 結果
 - Yate's 校正 (continuity correction)

SPSS操作- χ^2 test



	Name	Type	Width	Deci...	Label	Values	Missing	Colu...	Align	Measure	Role
1	DM	Numeric	11	0	DM	{0, No}...	None	5	Right	Nominal	Input
2	Gender	Numeric	11	0	Gender	{0, Fem...	None	5	Right	Nominal	Input
3	Alcohol	Numeric	11	0	Alcohol	{0, No}...	None	5	Right	Nominal	Input
4	test	Numeric	11	0	Alcohol	None	None	5	Right	Nominal	Input

Analyze Direct Marketing Graphs Utilities Add-ons

- Reports
- Descriptive Statistics
- Tables
- Compare Means
- General Linear Model

1

- Frequencies...
- Descriptives...
- Explore...
- Crosstabs...

Crosstabs

2

Row(s):

- Gender [Gender]
- Alcohol [Alcohol]
- Alcohol [test]

3

Column(s):

- DM [DM]

Layer 1 of 1

Previous Next

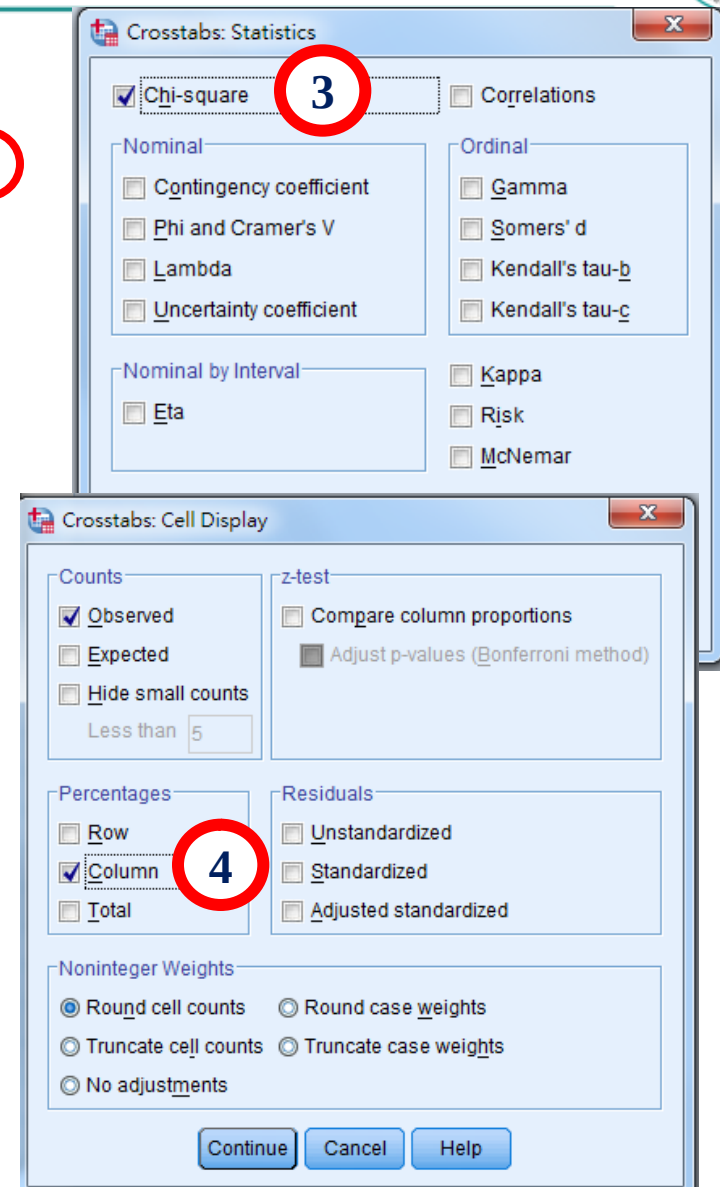
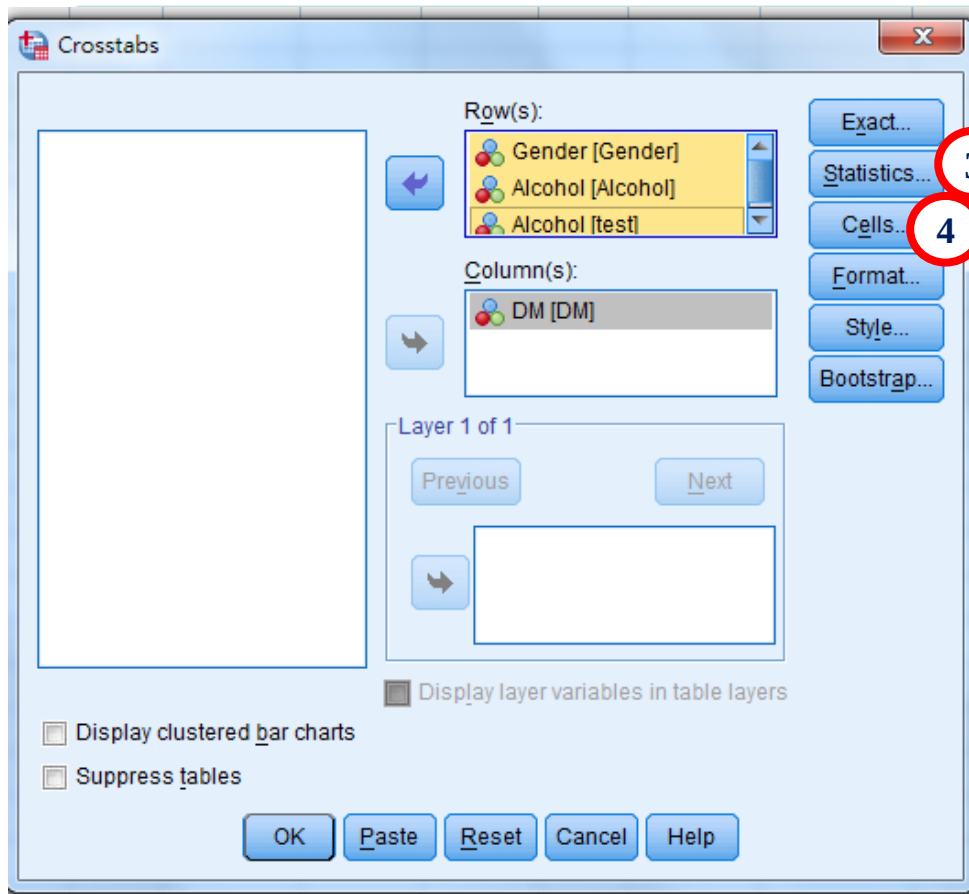
☐ Display layer variables in table layers

☐ Display clustered bar charts

☐ Suppress tables

OK Paste Reset Cancel Help

SPSS操作- χ^2 test



Output- χ^2 test



Gender * DM

Crosstab

			DM		Total
			No	Yes	
Gender	Female	Count	47	10	57
		% within DM	43.5%	37.0%	42.2%
	Male	Count	61	17	78
		% within DM	56.5%	63.0%	57.8%
Total		Count	108	27	135
		% within DM	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	.372 ^a	1	.542	.664
Continuity Correction ^b	.154	1	.695	
Likelihood Ratio	.376	1	.540	
Fisher's Exact Test				
Linear-by-Linear Association	.369	1	.543	
N of Valid Cases	135			

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.40.

b. Computed only for a 2x2 table

Alcohol * DM

Crosstab

			DM		Total
			No	Yes	
Alcohol	No	Count	90	22	112
		% within DM	83.3%	81.5%	83.0%
	Yes	Count	18	5	23
		% within DM	16.7%	18.5%	17.0%
Total		Count	108	27	135
		% within DM	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.052 ^a	1	.819	.780	.507
Continuity Correction ^b	.000	1	1.000		
Likelihood Ratio	.052	1	.820		
Fisher's Exact Test					
Linear-by-Linear Association	.052	1	.820		
N of Valid Cases	135				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.60.

b. Computed only for a 2x2 table

Output- χ^2 test



Alcohol * DM

Crosstab

			DM		Total
			No	Yes	
Alcohol	0	Count	80	6	86
		% within DM	74.1%	22.2%	63.7%
	1	Count	18	10	28
		% within DM	16.7%	37.0%	20.7%
	2	Count	10	11	21
		% within DM	9.3%	40.7%	15.6%
Total	Count	108	27	135	
	% within DM	100.0%	100.0%	100.0%	

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	27.200 ^a	2	.000
Likelihood Ratio	26.023	2	.000
Linear-by-Linear Association	26.551	1	.000
N of Valid Cases	135		

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.20.

前後測比較-連續

前後測.sav [DataSet7] - IBM SPSS Statistics Data Editor

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure
1	TNF0	Numeric	6	0	TNF Before	None	None	6	Right	Scale
2	TNF1	Numeric	6	0	TNF After	None	None	6	Right	Scale

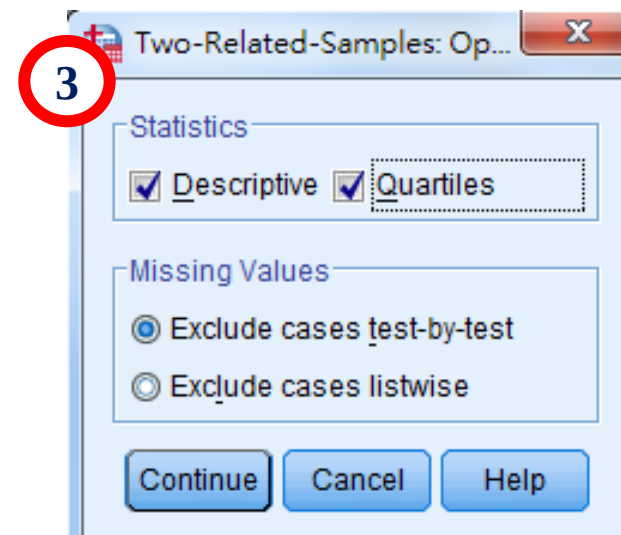
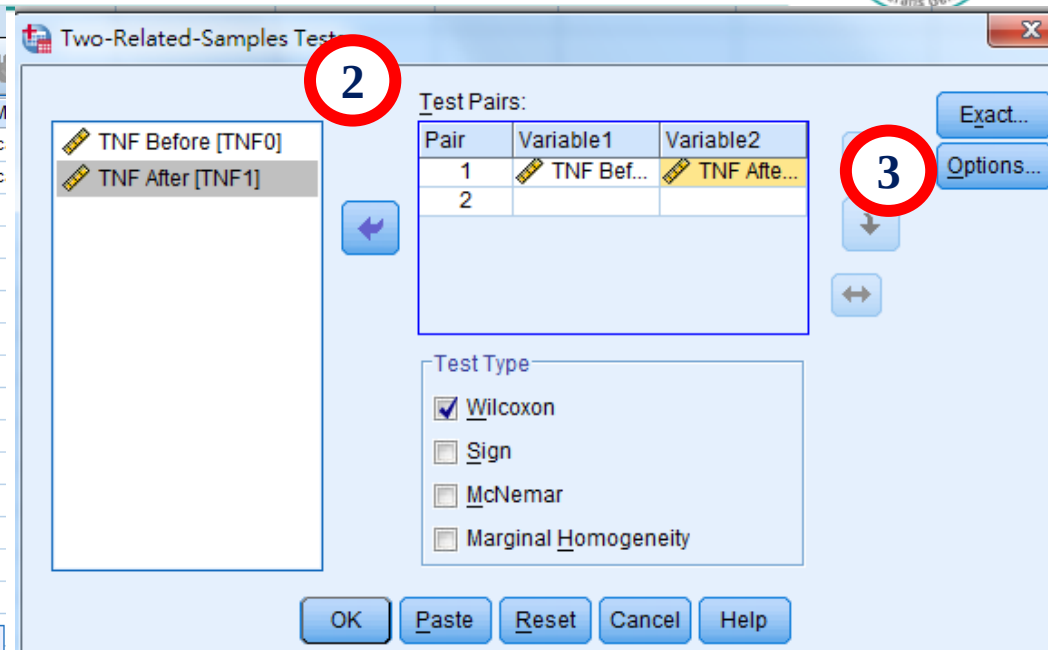
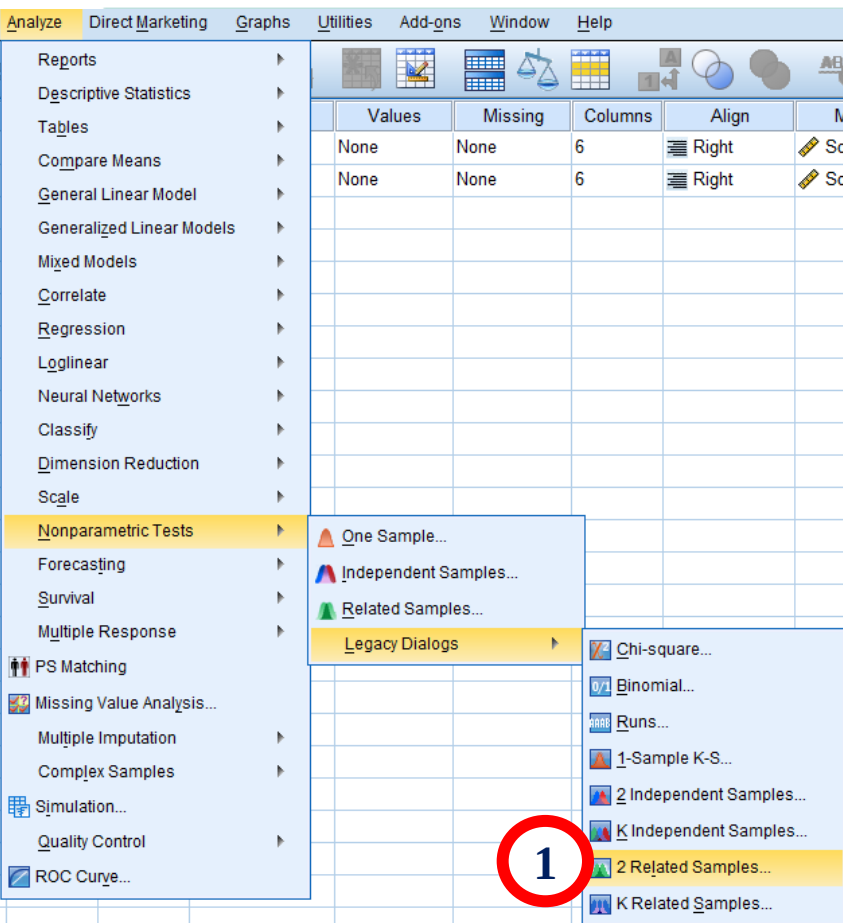
@ 第一步：常態檢定確定檢定方法

	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
TNF Before	.249	60	.000
TNF After	.264	60	.000

a. Lilliefors Significance Correction

Paired t test ?
or
Wilcoxon signed-rank test ?

SPSS操作-Wilcoxon signed-rank test



Output-Wilcoxon signed-rank test



Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
TNF Before	60	261.93	316.142	29	2185	118.31	168.49	274.88
TNF After	60	119.71	193.424	7	1464	36.54	80.67	145.51

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
TNF After - TNF Before	Negative Ranks	50 ^a	32.24	1612.00
	Positive Ranks	9 ^b	17.56	158.00
	Ties	1 ^c		
	Total	60		

a. TNF After < TNF Before

b. TNF After > TNF Before

c. TNF After = TNF Before

Test Statistics^a

	TNF After - TNF Before
Z	-5.487 ^b
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

前後測比較-類別

• McNemar's test

- 2*2列聯表
- 配對或成對資料

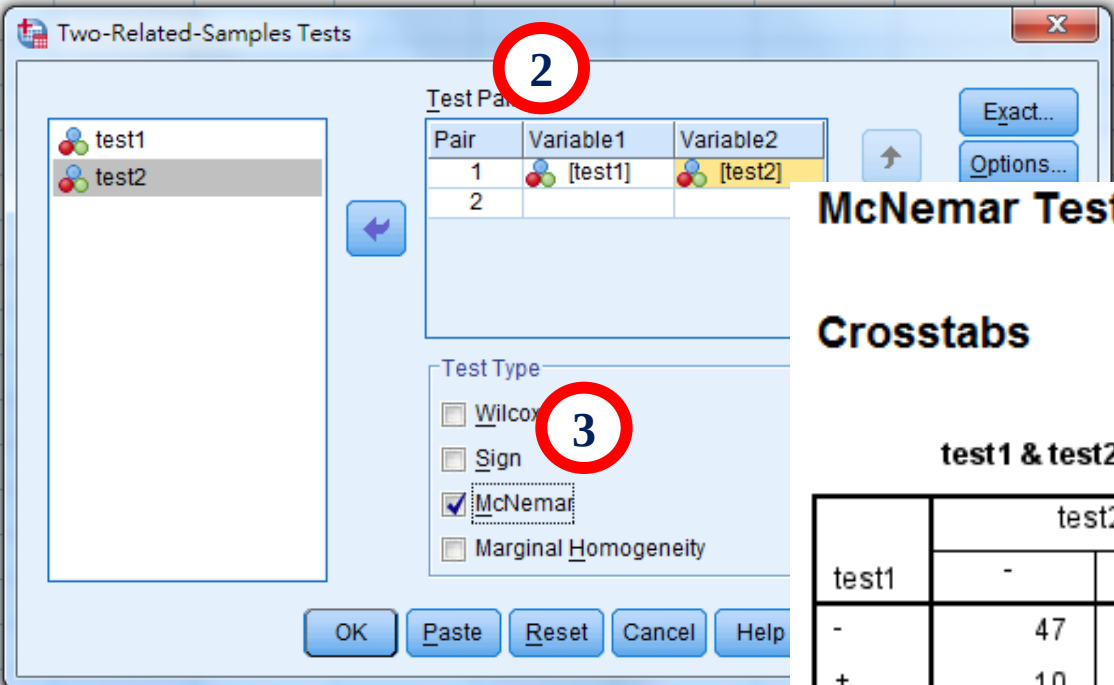
test1			test2		
	n	%		n	%
-	108	80.0	-	57	42.2
+	27	20.0	+	78	57.8
Total	135	100.0	Total	135	100.0

			test2		Total
			-	+	
test1	-	Count	47	61	108
		% of Total	34.8%	45.2%	80.0%
	+	Count	10	17	27
		% of Total	7.4%	12.6%	20.0%
Total	Count	57	78	135	
	% of Total	42.2%	57.8%	100.0%	

@McNemar's test注意事項

- 非一致觀察值加總 <25
- binomial test

SPSS操作-McNemar's test



The image shows the SPSS 'Two-Related-Samples Tests' dialog box. On the left, the 'Nonparametric Tests' menu is open, and '2 Related Samples...' is selected (labeled with a red circle 1). In the main dialog, 'test1' and 'test2' are listed in the variable list (labeled with a red circle 2). In the 'Test Type' section, the 'McNemar' checkbox is checked (labeled with a red circle 3). Buttons for 'Exact...' and 'Options...' are visible on the right.

McNemar Test

Crosstabs

test1 & test2

	test2	
	-	+
test1		
-	47	61
+	10	17

Test Statistics^a

	test1 & test2
N	135
Chi-Square ^b	35.211
Asymp. Sig.	.000

a. McNemar Test

b. Continuity Corrected

Output-McNemar's test

Crosstabs

A0 * A1 Crosstabulation

Count

		A1		Total
		0	1	
A0	0	16	61	77
	1	32	10	42
Total		48	71	119

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.003 ^a
N of Valid Cases	119	

a. Binomial distribution used.

NPar Tests

McNemar Test Crosstabs

A0 & A1

A0	A1	
	0	1
0	16	61
1	32	10

Test Statistics^a

	A0 & A1
N	119
Chi-Square ^b	8.430
Asymp. Sig.	.004

a. McNemar Test

b. Continuity Corrected

Crosstabs

A0 * A1 Crosstabulation

Count

		A1		Total
		0	1	
A0	0	0	12	12
	1	10	5	15
Total		10	17	27

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.832 ^a
N of Valid Cases	27	

a. Binomial distribution used.

NPar Tests

McNemar Test Crosstabs

A0 & A1

A0	A1	
	0	1
0	0	12
1	10	5

Test Statistics^a

	A0 & A1
N	27
Exact Sig. (2-tailed)	.832 ^b

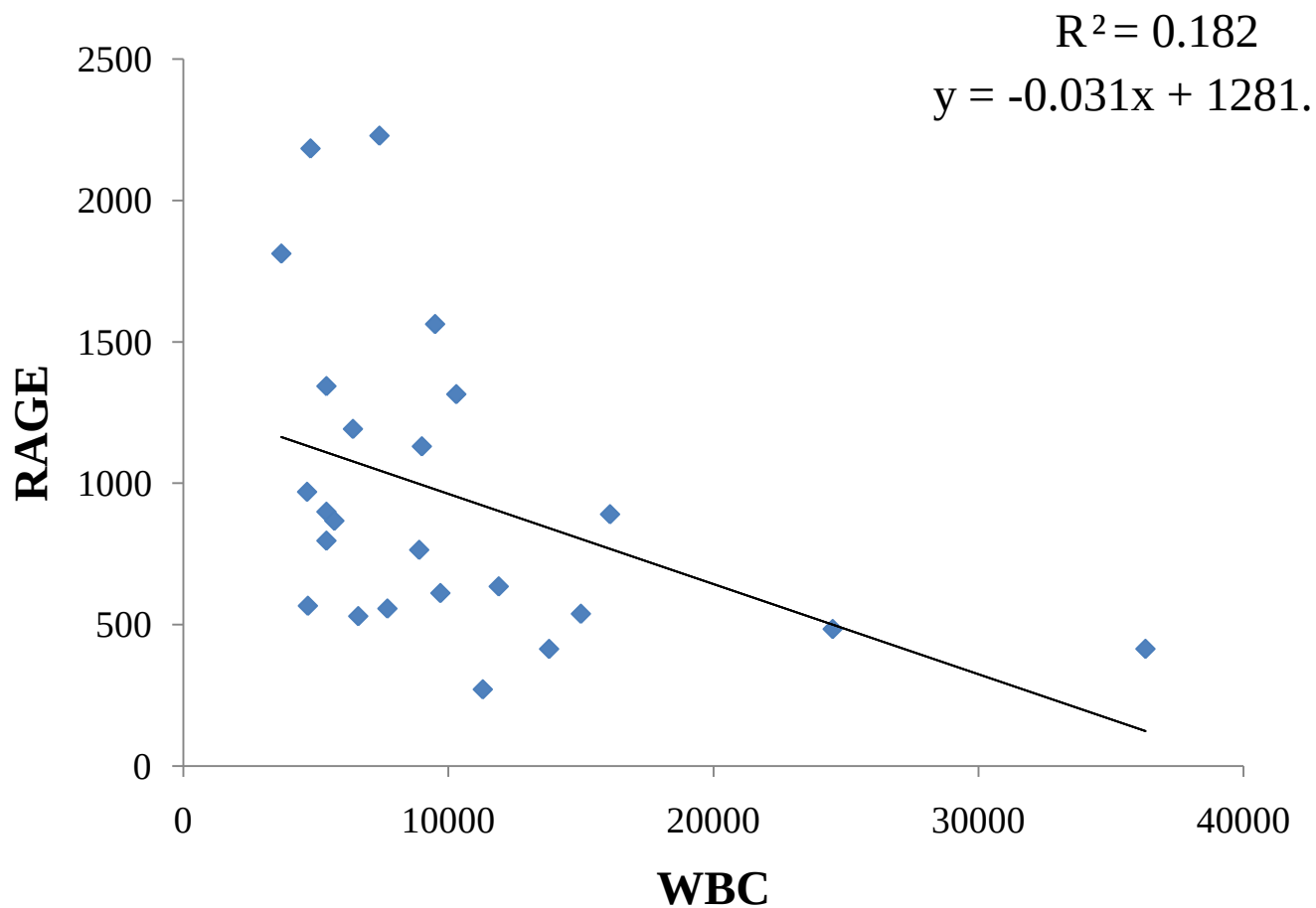
a. McNemar Test

b. Binomial distribution used.

Excel繪圖-散佈圖

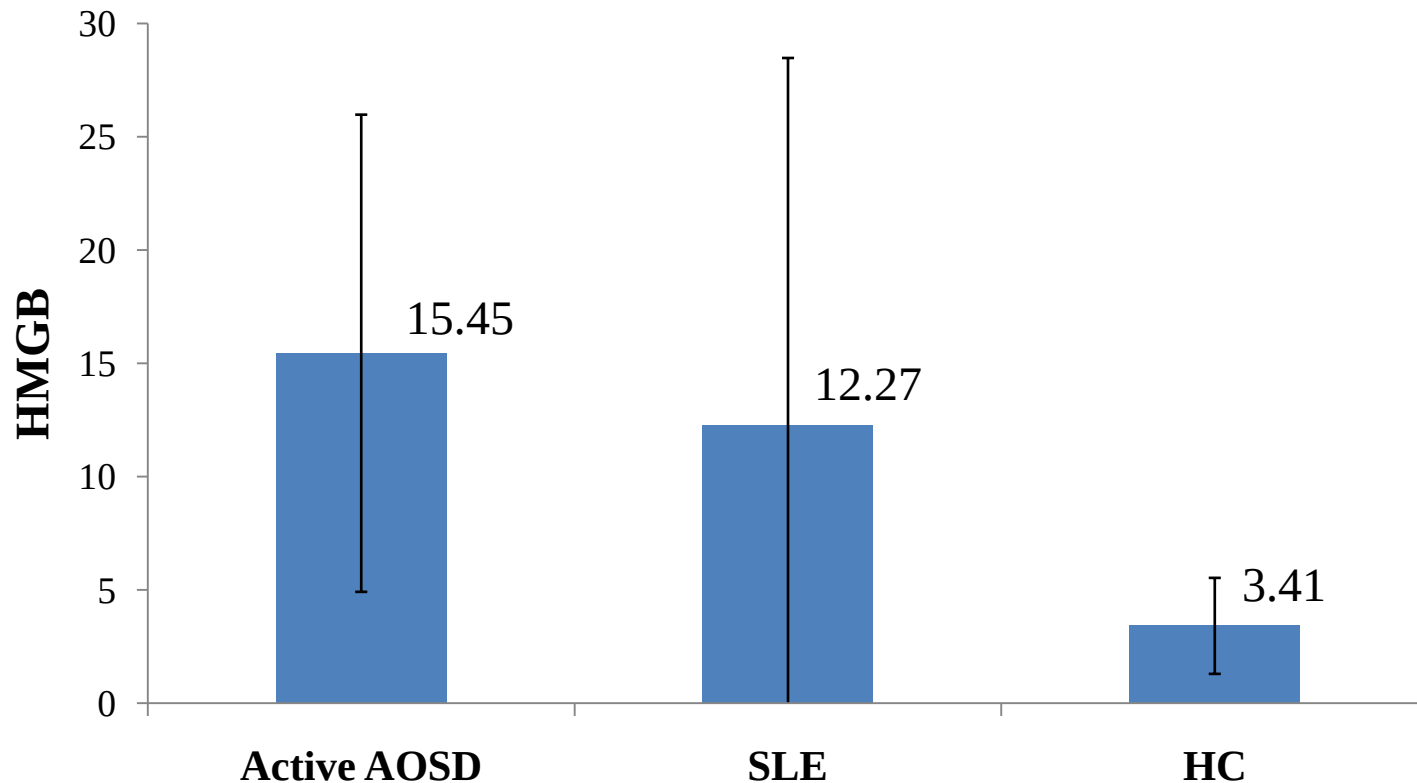


wbc	RAGE
7700	556.274
5400	796.313
4800	2183.388
6400	1191.452
3700	1811.692
16100	889.823
10300	1314.404
5400	1342.889
9500	1562.442
6600	529.316
5400	898.556
4700	565.974
8900	763.787
9700	611.09
7400	2228.683
9000	1129.887
24500	483.825
11900	634.544
13800	413.492
36300	413.759
5700	866.692
15000	537.8
4670	969.07
11300	270.47



Excel繪圖-直條圖(加誤差線)

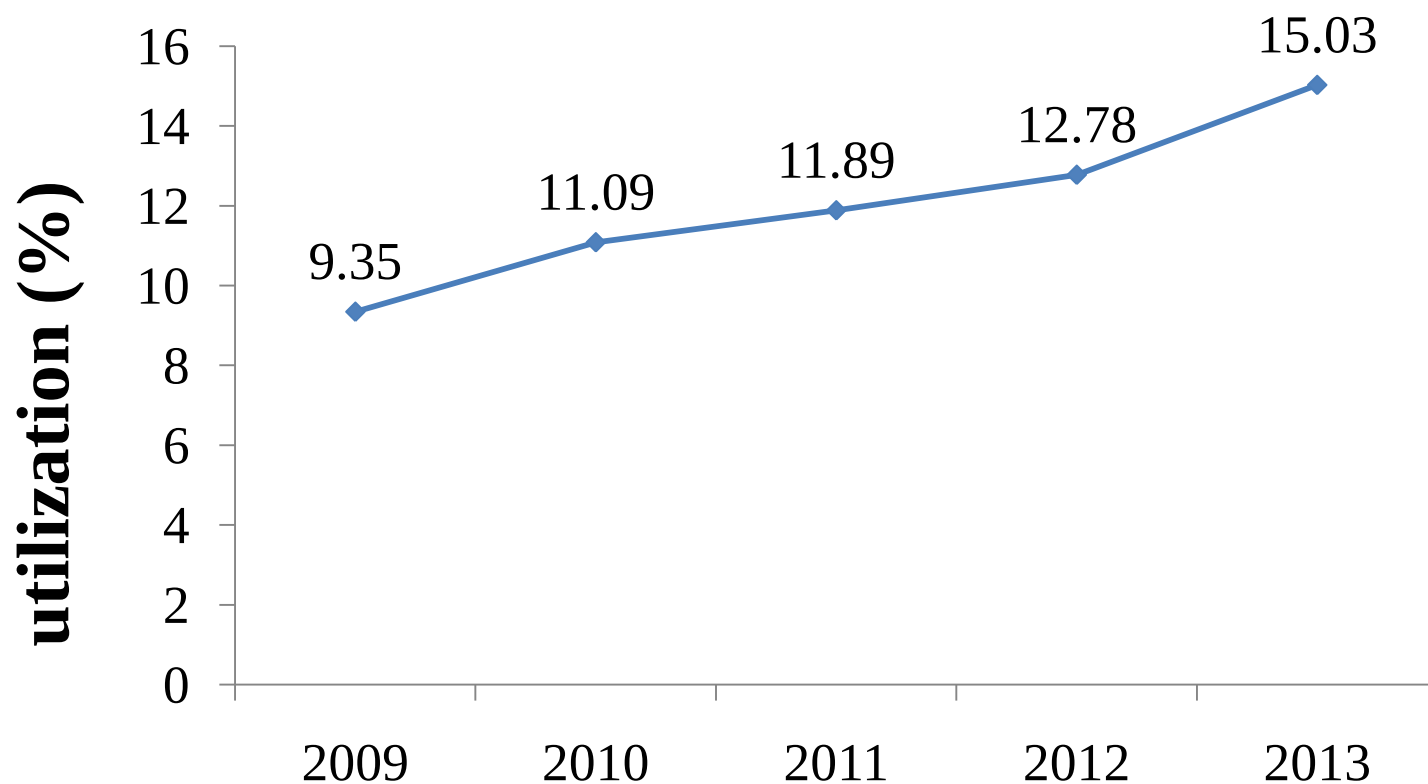
	HMGB		
	Active AOSD	SLE	HC
Mean	15.45	12.27	3.41
SD	10.53	16.21	2.12



Excel繪圖-折線圖



year	2009	2010	2011	2012	2013
utilization (%)	9.35	11.09	11.89	12.78	15.03





臺中榮民總醫院
Taichung Veterans General Hospital

Thank you

For your attention!!