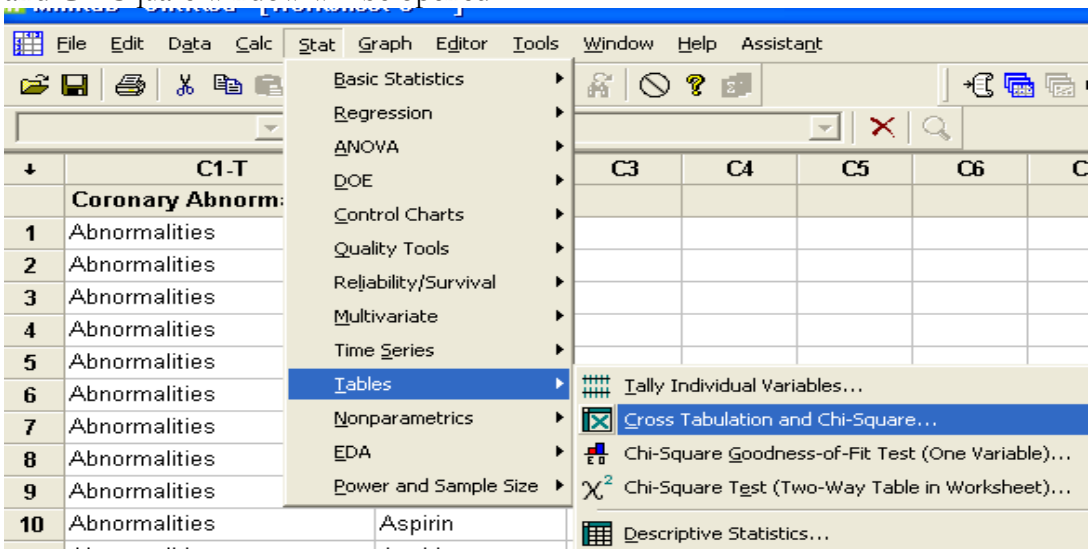
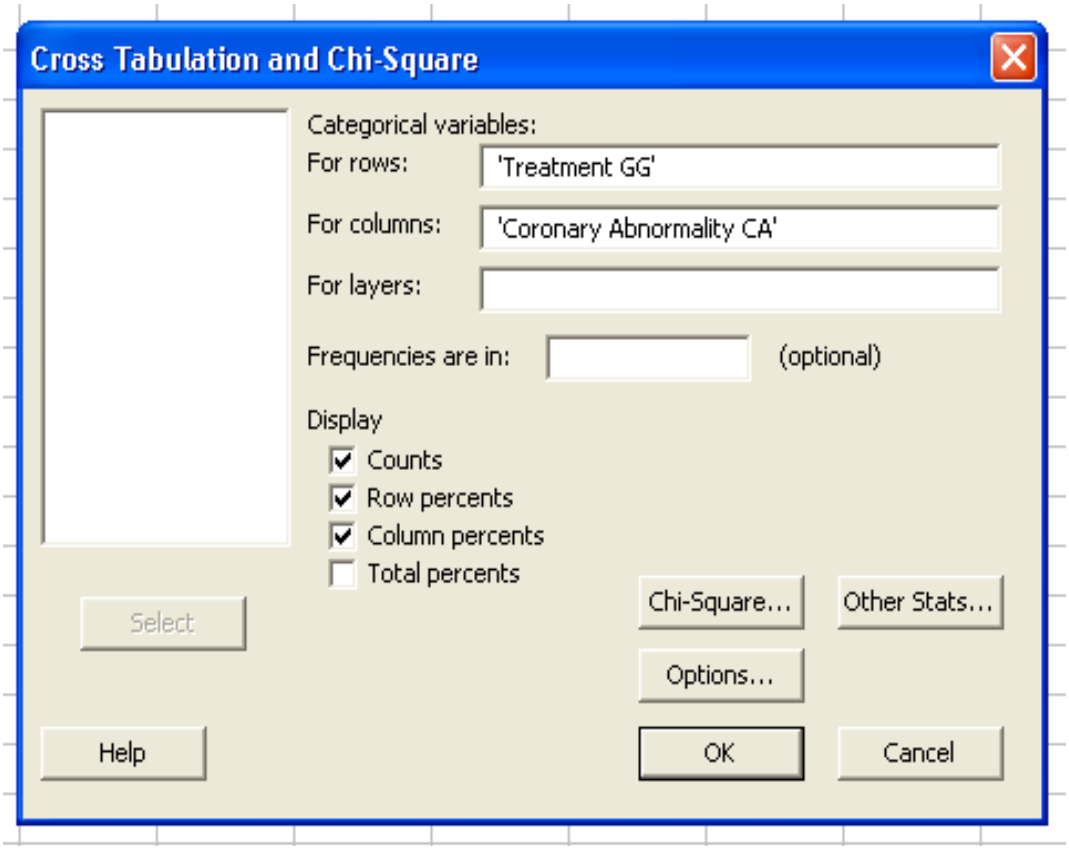
Crosstab on Minitab (Categorical Data Analysis III)

Test of Homogeneity and Fisher's exact test

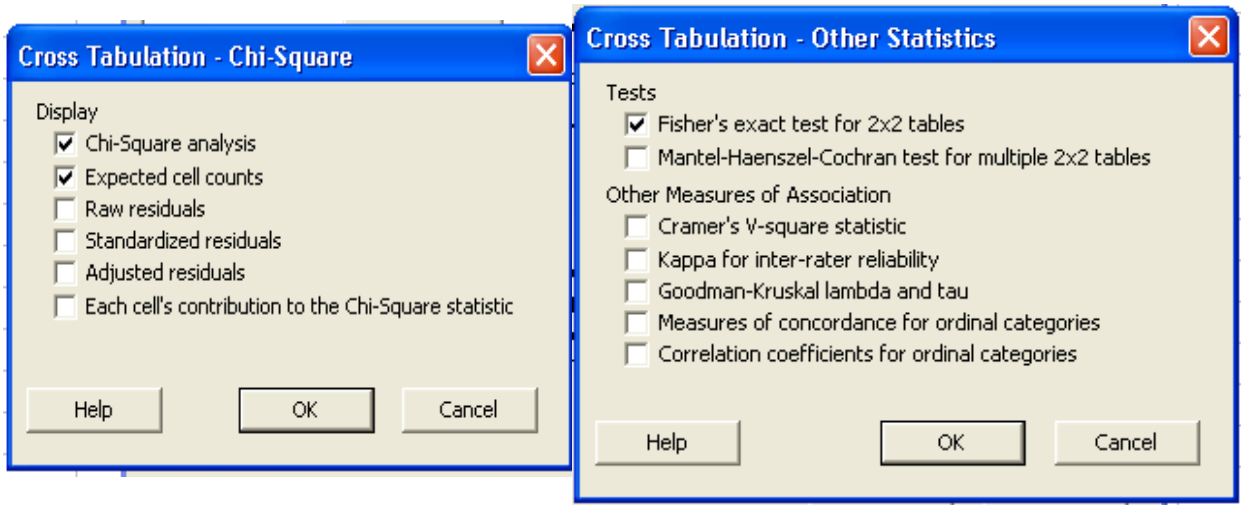
Problem: The treatment of children with Kawasaki syndrome (Continued)

By clicking on the **Stat** and **Tables** and **Cross Tabulation and Chi-Square**, the Cross Tabulation and Chi-Square window will be opened.





Assign CA as column and GG as row and make sure "Row percents" and "Column percents" are checked off under "Display", then open "Chi-Square" and "Other Stats"



Make sure "Chi-Square analysis" and "Expected cell counts" are check off in the "Chi-Square" window and "Fisher's exact test for 2x2 tables" is checked off in the "Other Statistics" window. Click "Ok" to continue and "Ok" to run the tests. We can get the following output.

Tabulated statistics: Treatment GG, Coronary Abnormality CA

Rows: Treatment GG Columns: Coronary Abnormality CA

	Abnormalities	No Abnormalities	All
Aspirin	21	63	84
	25.00	75.00	100.00
	80.77	44.68	50.30
	13.08	70.92	84.00
Gamma Globulin	5	78	83
	6.02	93.98	100.00
	19.23	55.32	49.70
	12.92	70.08	83.00
All	26	141	167
	15.57	84.43	100.00
	100.00	100.00	100.00
	26.00	141.00	167.00

Cell Contents: Count
% of Row
% of Column
Expected count

Pearson Chi-Square = 11.436, DF = 1, P-Value = 0.001
Likelihood Ratio Chi-Square = 12.180, DF = 1, P-Value = 0.000

Fisher's exact test: P-Value = 0.0010477

The Chi-square test of Homogeneity can be done by using Pearson Chi-square.

Step 1. H_0: $p_0=p_1$, H_a: $p_0 \neq p_1$ (or H_0: $RR=1$, H_a: $RR \neq 1$)
Step 2. $\chi^2= 11.436$
Step 3. The test statistics, 11.436 is larger than the critical $\chi^2_{1,0.05}=3.84$. Thus reject H_0.
Step 4: Reject H_0 since p-value = .001 is less than $\alpha=0.05$.

Note: To the test be valid each cell has at least 5 expected frequency. Combining the two groups, we see that 26 of the 167 patients developed coronary abnormalities. The estimated risk of coronary abnormalities is 26/167 = .1157. Assuming that the null hypothesis is true, the risk is the same in both treatment groups, and we would expect that 11.57% of the patients develop coronary abnormalities. Among 83 patients in the Gamma globulin, we expect that (.1157)×(83)=9.6031 patient would develop coronary abnormalities.
Note also that this is same as Chi-square independent test for 2 × 2 table.

Fisher's exact test is useful when one or more of the four expected cell frequencies in 2 × 2 table is less than 5. In this example, 6% of the patients treated with Gamma globulin developed coronary abnormalities whereas 25% of patients treated with Aspirin developed abnormalities. The estimated RR is .24. The null hypothesis is H_0: $RR=1$, and H_a: $RR \neq 1$. We use the two-sided Fisher's Exact test to test the hypothesis. Assuming $\alpha=0.05$, we reject H_0 since p-value is .001 is less than 0.05. (There is significant evidence that treatment with Gamma globulin developed less coronary abnormalities.)