Evaluating the benefits of JMP® for SAS programmers

Xiaopeng Li, Celerion, Lincoln, NE

Chun Feng, Celerion, Lincoln, NE
Nancy Wang, Celerion, Lincoln, NE

ABSTRACT

JMP® is a user friendly software for creating figures in clinical research. For SAS programmers, JMP® also provides a convenient way to do quality control (QC) of listings, tables, and figures (TFLs). Additionally, using JMP® for QC is an alternative way to verify statistical analysis results, a quick way to verify SAS code for statistical analysis tables, and a way to do QC documentation. This paper provides details about what supports and benefits JMP® can provide for SAS programmers.

INTRODUCTION

JMP® software is known for generating figures quickly and helping programmers/nonprogrammers to understand the data better. JMP® is a user-friendly interface platform. It is a great assistant for scientists and engineers in terms of data visualization. Even without SAS® coding knowledge, a figure can be easily generated by pointing-and-clicking, pulling in variables of interests, and choosing available options to customize outputs. In clinical trial research, more and more people start using JMP®. It helps not only scientists understand data quickly, but also helps SAS programmers in many ways.

BENEFITS

QUICK REVIEW AND QC FOR FIGURES

In the early phases of clinical trial research, pharmacokinetics (PK) is one of the main focuses. Figures display data trends and PK analytical results graphically which provide initial impression on data distribution. Good figures provide good understanding of the data and help guide further analysis. To generate figures by using SAS® graphic procedures can be challenging. Especially, while dealing with multiple treatments or challenging data or highly specialized figures, it can be very time-consuming and error prone to program with SAS® codes. It is more efficient for SAS programmer to create a quick figure for review purpose by using JMP®.

SAS has several ways to import data sets, such as PROC IMPORT, INFILE and other methods. All of these methods need to specify the location of input files. Some methods need to define variable names, variable types, or formats. Some methods can only read in certain types of files. Reading data into JMP® is convenient comparing to SAS®. JMP® can read in all the file types that SAS® can. In addition, users do not need specify file types and define variable names or format. By dragging a file into JMP® home window, JMP® automatically reads and opens the file in a JMP® window (Figure 1). In Figure 1, JMP® provides a clear display of this data. The information of file name, file location, variable names, variable labels, the types of variables all shows in this window.
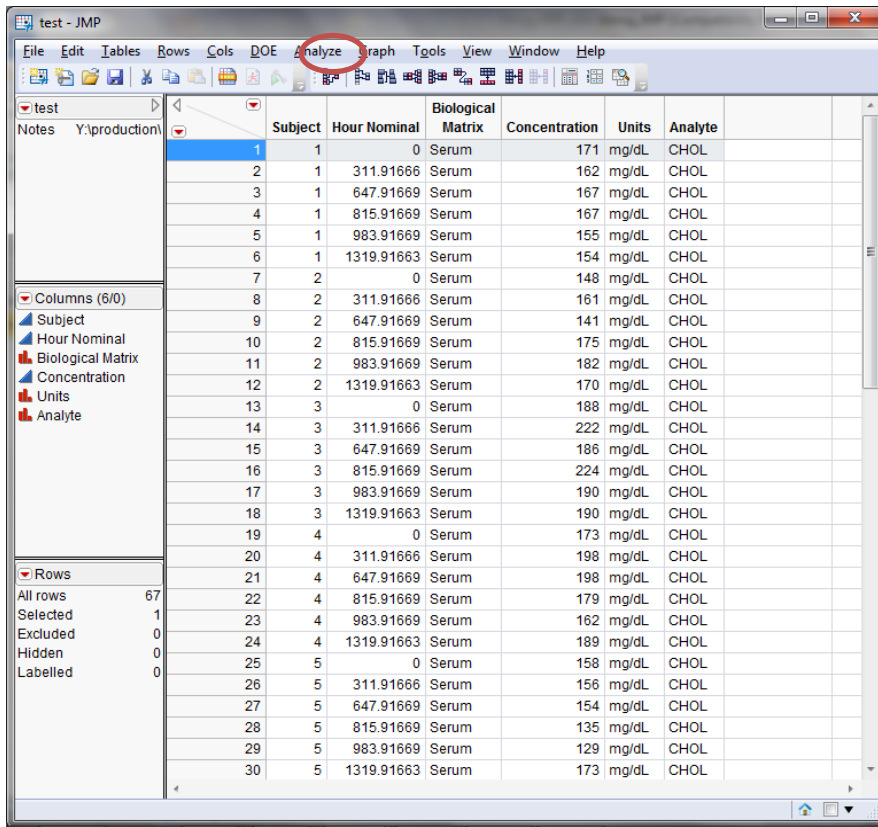
Figure 1. test data read in JMP®

In JMP®, many types of figures can be created. In Graph tab in Figure 1(red circle), JMP® provides chart, overlay plot, scatterplot in 3D, contour plot, bubble plot, parellel plot, cell plot, tree plot, scatter matrix, ternary plot, profiler, contour profiler, surface plot, mixture profiler, custom profiler and excel profile. JMP® also has graph builder assistant (Figure 2) which can build customized graphes.
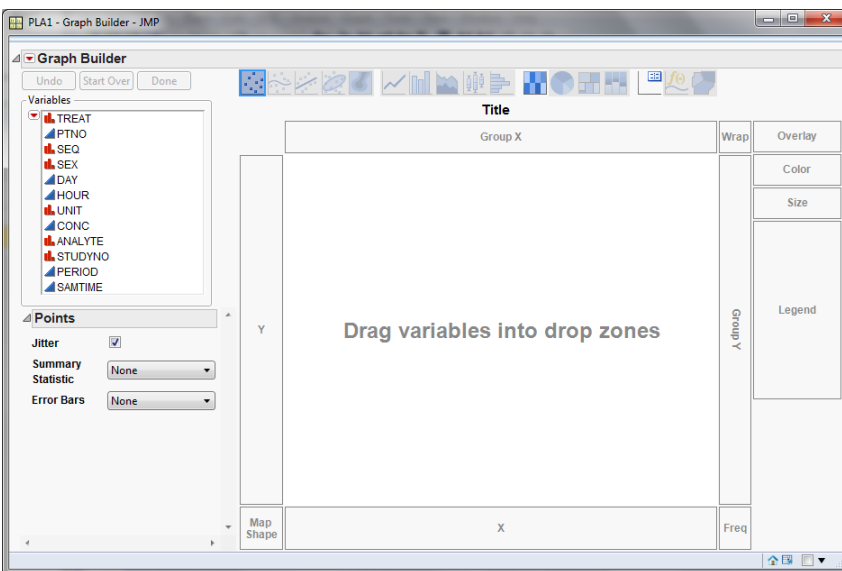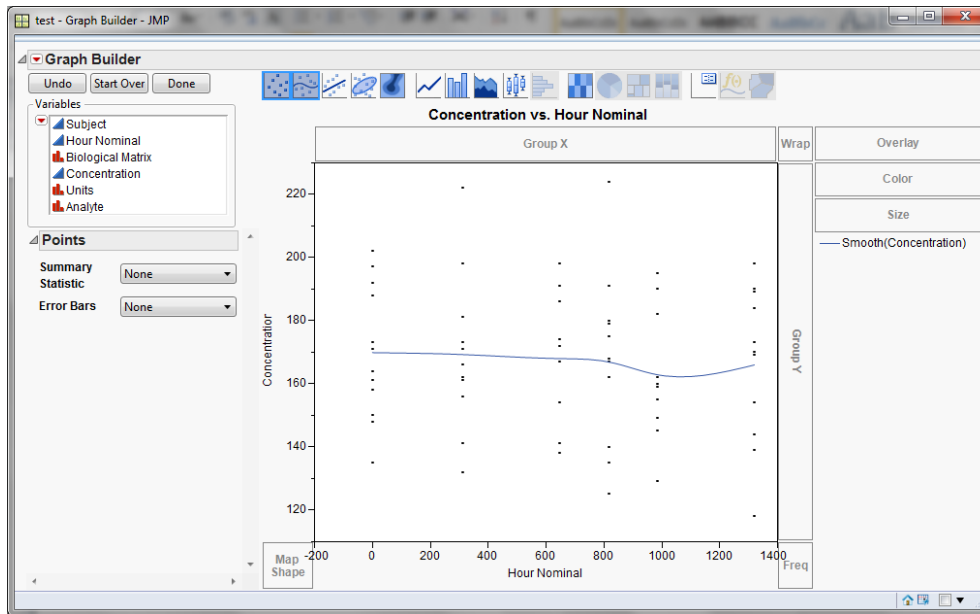

Figure 2. graph builder

For example, JMP® users can choose graph builder to create a mean figure based on the data in Figure 1. By dragging the concentration variable into y-axis and pulling nomial hour into x-axis, a figure with individual concentrations shown as dots and mean concentrations over hour shown as the blue line across the figure is generated (Figure 3).

Figure 3. individual and mean concentrations

To read in data and generate a similar draft figure above in SAS can take relatively longer time comparing to JMP®. JMP® saves time for SAS programmers to generate draft graphs used for scientists' decision making.

JMP® also provides an easy way for SAS programmers to QC the graphs created by SAS®. As examples shown below, by using graph builder assistant, a mean and an individual by treatment graph can be generated (Figure 4) to QC the graphs which are generated from SAS® (Figure 5).
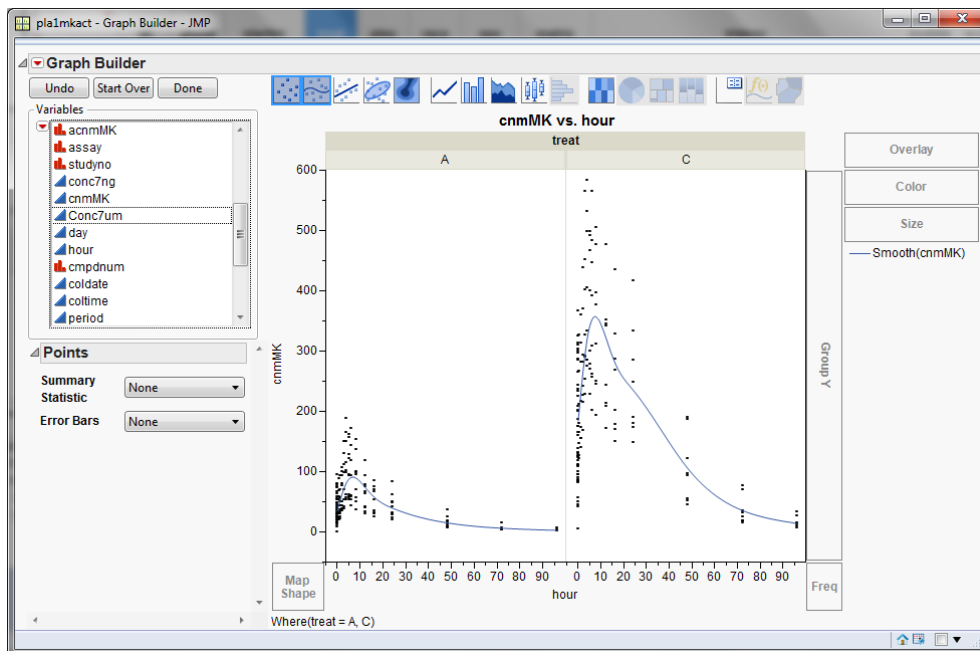
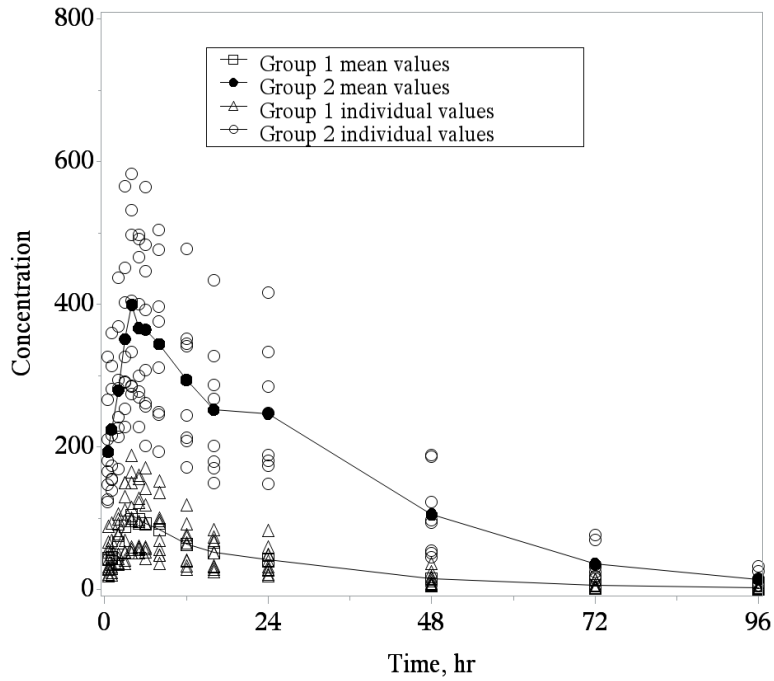**Figure 4. mean and individual graphs by treatment by JMP®**

Figure 5. mean and individual graphs by treatment from SAS

QUICK REVIEW AND QC FOR TABLES AND LISTINGS

Creating descriptive statistics for tables is an important task for SAS programmers. JMP® provides two methods to generate summary information. The first method is using the tabulate option of tables menu to generate summary information. In the tabulate window (Figure 6), summary statistics can be generated and used for QC. By pulling the interested variables into the table in tabulate window and selecting the descriptive statistics, the descriptive statistical summary is created (Figure 7).
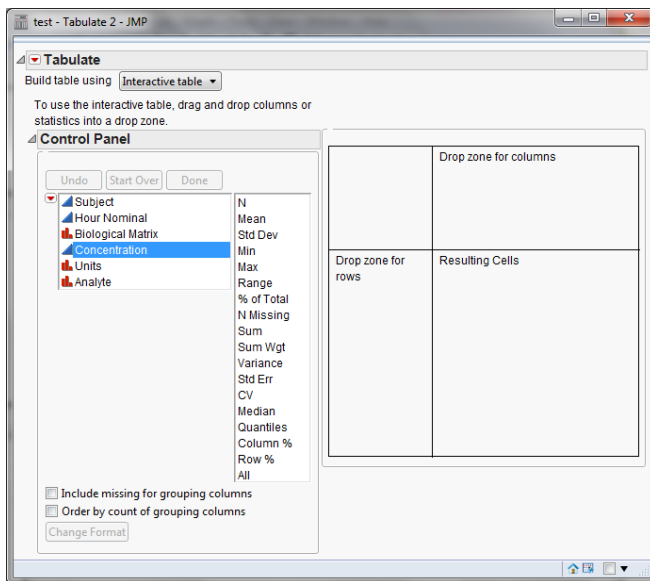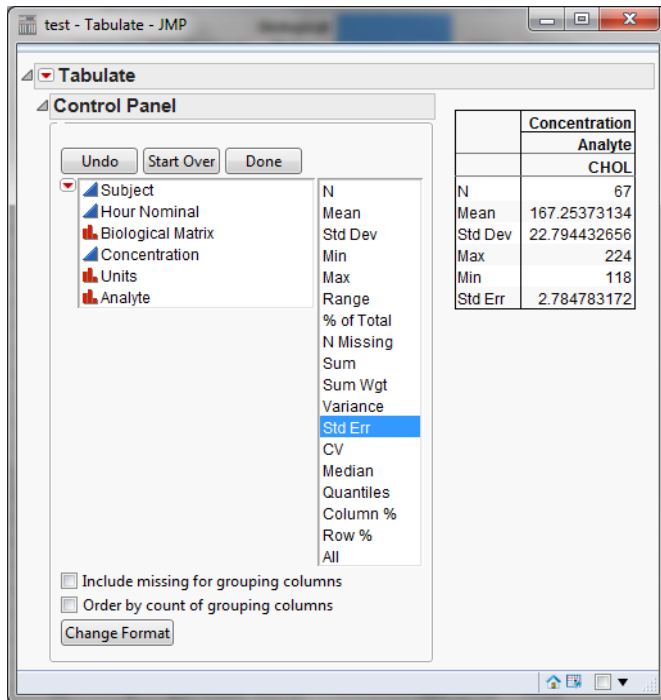

Figure 6. tabulate window

Figure 7. tabulate window result

The second method is using the summary option of tables tab. Summary information can also be created in the summary window (Figure 8). By single-click the interested variable from select columns, choosing the statistical summaries from statistics and choosing grouping variables, a summary data will be created (Figure 9). JMP® provides two alternate methods to QC descriptive statistical summary for tables.
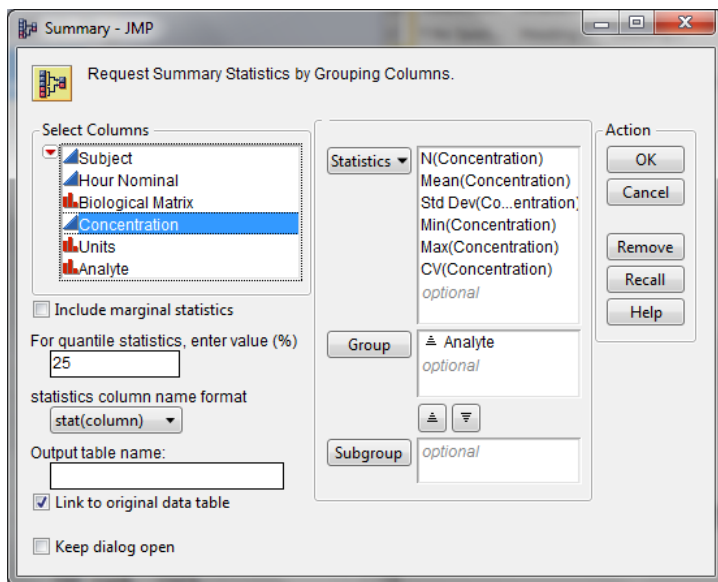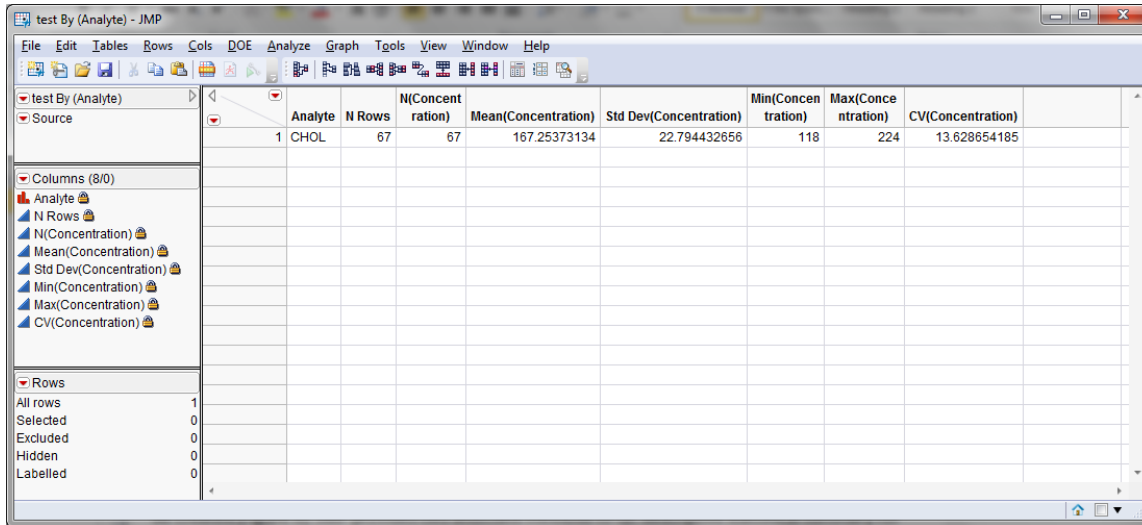

Figure 8. summary window

Figure 9. summary data created by summary window

VERIFY STATISTICAL ANALYSIS PROGRAMS

Statistical analysis results are one of the most important results for clinical research studies. Biostatisticians and SAS programmers can verify the statistical analysis results based on statistical outputs from SAS®. Though double programming is a preferred method to verify the accuracy of the statistical analysis, it is relatively time-consuming. JMP® can be used as a double programming QC on statistical analysis results and verifies SAS® statistical model codes. Fit model option in analyze (Figure 10) menu can be used to create alternate SAS® outputs and verify the SAS® statistical model codes. JMP® provides many options to support creating statistical analysis model. By selecting the dependent variable in Y column, specifying the analysis group in by column, defining independent variables and random variables in construct model effects column and choosing other options, JMP® will provide statistical analysis outputs (Figure 11). These statistical outputs provide SAS programmers and biostatisticians another resource to verify the statistical analysis results from SAS®.
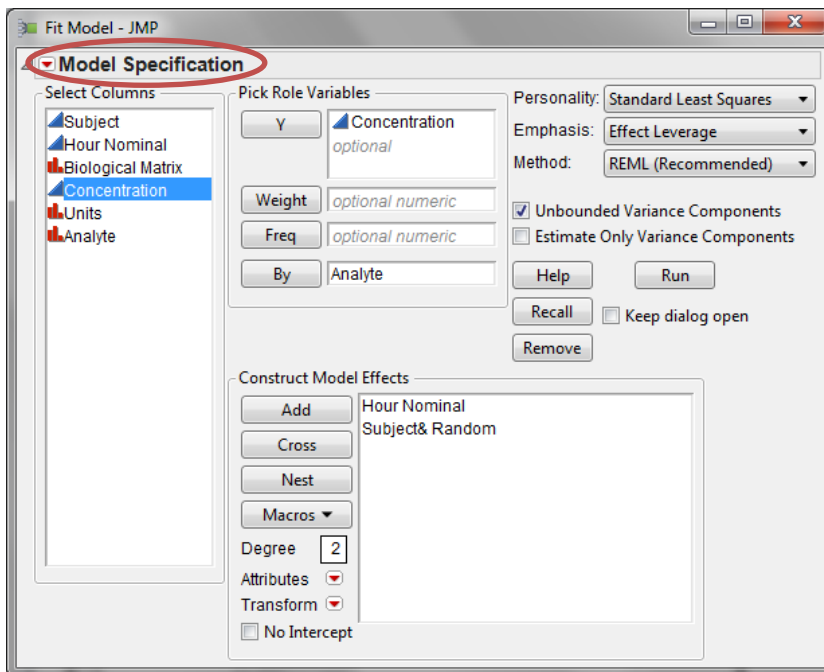

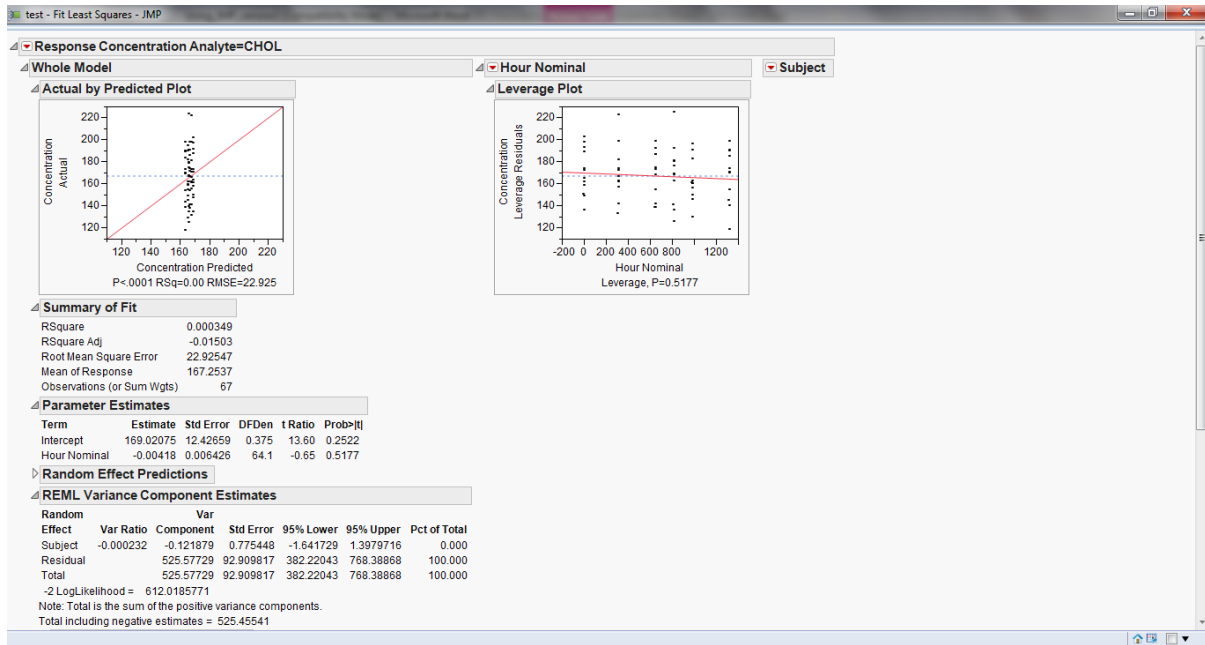**Figure 10. Fit Model window**

Figure 11. statistical output from JMP®

Fit model option can also be employed to QC the SAS statistical model codes. The SAS® codes can be created by selecting the red bottom of model specification (in Figure 10) and then choosing create SAS job (Figure 12).

Figure 12. SAS codes created by JMP®

QC DOCUMENTATION

Documentation is important in clinical research industry. When SAS programmers use JMP® as a QC tool, JMP® provides required documentation as well. In the tabulate window, created descriptive statistical summary table can be saved by using "Make Into Data Table" option and a new JMP® file will be created (Figure 13). Save the new JMP® file, then it can be considered as a QC document.
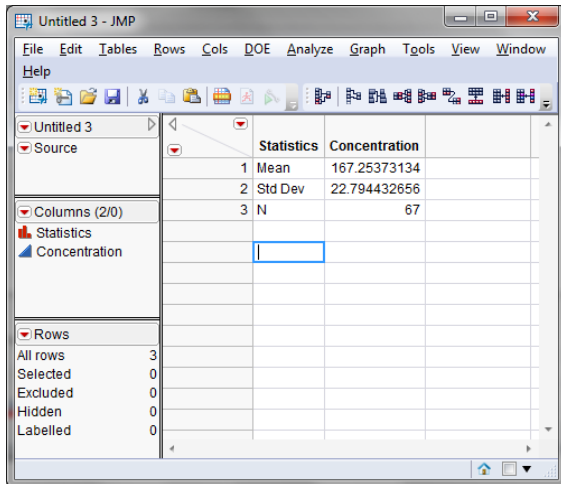
Figure 13. descriptive statistical summary table by JMP®

Additionally, all results from JMP® can be saved as JMP® report file from the tool bar (the red circle in Figure 14). These two methods support QC documentation.
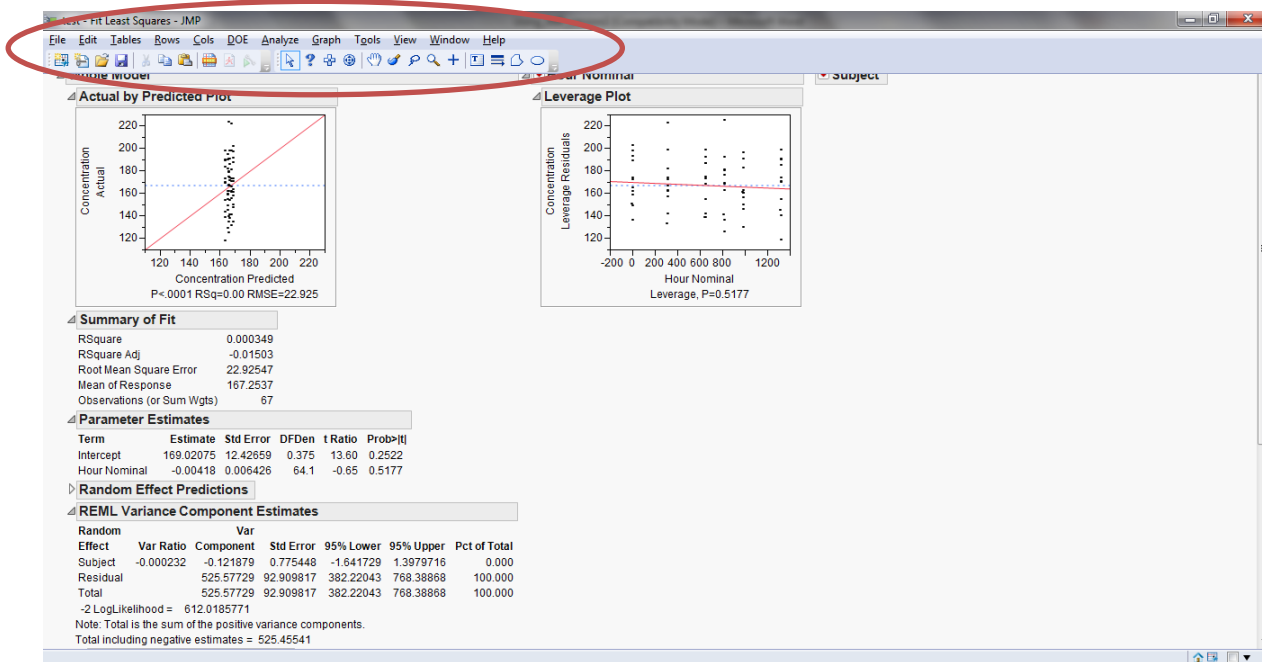

Figure 14. result of statistical analysis output

CONCLUSION

In summary, JMP® provides programmers an efficient and reliable QC method. First, JMP® provides a quick way to create figures based on different file types of data sets. It provides a virtual image to review and QC figures. Second, JMP® provides alternate ways to check summary statistical results in tables. Instead of double programming in SAS or checking numbers in EXCEL®, JMP® is a good supplement tool for programmers to perform QC functions. Third, based on the functions from JMP®, statistical analysis results can be generated efficiently. JMP® provides another way to generate statistical results in using different platform other than SAS®. Additionally, JMP® can save all the results mentioned above as QC documentation.

REFERENCES

JMP® website. Available at http://www.jmp.com/

Chun Feng, Xiaopeng Li, Nancy Wang and John Brejda, *JMP Start Biostatisticians' Quality Check on Analytical Results*, American Statistical Association Conference on Statistical Practice, 2014 Feb.

CONTACT INFORMATION

Your comments and questions are valued and appreciated. Contact the author at:

Xiaopeng Li
Celerion Inc.
621 Rose Street Lincoln, NE 68502
Work Phone: (402)437-6260
Email: xiaopeng.li@celerion.com