Statistical Science in Medical Research
Center for Medical Research and Development (CMERAD)

Activity Director: Esteban Walker, PhD
Dates: Sept. 3 – Dec. 17, 2009
Thursdays, 5:30 p.m. – 7:30 p.m.

Description/Purpose of Activity: Present and discuss core concepts of biostatistics and its methods. This is NOT an introductory course and is directed to motivated participants with some background in statistics and/or those who have been involved in research. The course will cover most of the statistical techniques used in the medical literature (from descriptive statistics to analysis of time-to-event data). The emphasis will be on applications and not the techniques themselves. The main purpose of the course is to make the participant a critical reader of the medical literature from the statistical point of view. Using real data sets, the software provided (JMP) will be used to illustrate the application of the methods and to discuss the interpretation of the results. The participant will be able to design simple databases, analyze data and interpret the results. **CME credit will be offered.**

Topics: The following general areas will be discussed:

- Descriptive statistics
- Inferential statistics
- Statistical data analysis methods
- JMP as a tool to analyze data
- Study design

Learning Objectives:

- Describe data effectively
- Discuss the types of statistical analysis methods and their application
- Internalize the concept of signal to noise ratio
- Identify sources of bias and variation in medical/biological studies.
- Translate medical/biological questions into statistical questions
- Understand the concepts of adjustment, confounding, and interaction
- Discuss the strengths and limitations of statistical modeling
- Improve their understanding of the medical literature by having a better grasp of data collection and analysis methods. Be able to point out strengths and weaknesses in the statistical methodology utilized
- Design and analyze simple studies to answer questions of interest
- Demonstrate proficiency in the use of the statistical software JMP
- Improve communication with biostatisticians

Format: Once per week 2-hour didactic sessions based on text material and use of software. Time permitting, there will be discussion of case studies based on ongoing CCF projects and interesting articles of the day, other readings on statistics per se, and general issues associated with students' ongoing projects. The use of the techniques discussed in class will be illustrated using JMP. It is highly advisable that the participants bring their laptop with the software loaded.

Software: Courses like this must revolve around software. It is better to work in one environment and build depth within it, rather than be shallow with several. We will use JMP (www.jmp.com/) and Excel. The two interface almost seamlessly. To download a free (renewable) one-year copy of JMP for CCF employees go to www.bio.ri.ccf.org/getJMP

Text: "An Introduction to Medical Statistics, 3th Edition" (2000), by Martin Bland. This book is an introduction to the statistical ideas and techniques used in medical research. The emphasis is in concepts and applications, not in mathematical derivations.

Other materials: British Medical Journal: Statistics Notes are an excellent complement for the course.

Data sets: PSA (Excel), SBP (repeated measures), SBP formula, More formulas, Survival data.