AbstractID: 7234 Title: Digital Mammography, Computer-aided Diagnosis, Multiple-Reader Studies-- and the Holy Grail of Imaging Physics

The metaphor of the quest for the Holy Grail has been applied to the elusive problem in radiology of predicting the clinical ranking of imaging systems from the ranking obtained from physical laboratory measurements. Many investigators have demonstrated the ability to predict the ranking of imaging tasks with phantoms from higher-level laboratory measurements; however, extrapolation to complex clinical images is difficult. Moreover, the masking effect of reader variability can be very great, particularly in mammography. We show that the use of multiple-reader studies, computer-aided diagnosis, and new analytical techniques may be used to quantify and peel back the effects of reader masking--bringing us several steps closer to our elusive goal. Several well-known contemporary problems in the field of digital mammography and computer-aided diagnosis will be used to illustrate this approach.

Educational Objectives:

1. To understand the issues for assessment raised by the great variability of readers in mammography.
2. To understand the solutions offered by the multiple-reader, multiple-case (MRMC) receiver operating characteristic (ROC) paradigm.
3. To see the role played by physical measurements in assessment.
4. To explore the potential that computer-aided diagnosis may offer to bridge the distance between physical assessment and clinical assessment.