AbstractID: 9797 Title: CAD: Where We Are and How We Got Here

Computer-aided diagnosis (CAD) has been defined as a diagnosis that is made by a radiologist or clinician when the output of a computerized image analysis method is incorporated into their decision-making process, so that a radiologist, it can be said, *makes* a computer-aided diagnosis. Many investigators, however, use the term computer-aided diagnosis in reference to the actual computer methods that facilitate such diagnostic assistance, so that an investigator, it can be said, *performs* computer-aided diagnosis research. Simply stated, these computer-aided diagnostic methods incorporate powerful techniques of physics, mathematics, statistics, and computer science for application to anatomical and physiological information contained within medical images. The computerized analysis of medical images provides different levels of information through enhanced image visualization techniques, quantitative measurements, and computerized detection and classification of lesions. Over the years, medical imaging technology has evolved and so, too, have the computer-aided diagnostic methods of the many dedicated research groups around the world. A brief history of CAD will be provided to demonstrate the manner in which advances in imaging technology have driven CAD research efforts and how successes in CAD research have driven the development of imaging technology. The current state-of-the-art will be presented for a range of applications, including breast imaging, thoracic imaging, CT colonography, and radiographic bone analysis. In this context, practical issues that must be addressed for successful research in CAD will be introduced, including truth and scoring metrics, assessment methodologies, automated classifier strategies, and the role of the radiologist. This presentation will provide the background for the specific issues being addressed by the other speakers in the "Practical Aspects of CAD Research" symposium and will anticipate the topics of the following day's "Unanswered Questions in CAD Research" symposium.

Educational Objectives:
1. To understand the breadth of clinical applications for CAD methods and their historical context.
2. To gain an overview of various approaches to the development of CAD methods.
3. To appreciate the practical issues that must be addressed for successful research in CAD.

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