NMT Bookshelf

A CLINICIAN'S GUIDE TO THE MODULATION TRANSFER FUNCTION. Martin L. Nusynowitz, Houston, Baylor College of Medicine Texas Medical Center, 1974, pp 27, $3.

The modulation transfer function (MTF) is currently accepted as the best method of describing the resolution of any linear imaging system. It is applicable to such diverse systems as collimators for scanners and scintillation cameras, films, radiographic screens, and optical lenses. However, most clinicians and technologists in nuclear medicine have a very poor understanding, if any, of the MTF, probably because of the complex mathematics usually, but not necessarily, associated with it. This book is designed to explain the MTF and how to measure it to nonmathematicians. This is an excellent goal, and to my knowledge there is little else currently available that really attempts it. Articles in the literature are written by and for physicists while most reference books include so cursory an explanation as to be of little value.

The author starts with discussion of the criteria necessary for a useful measure of resolution and then defines the MTF. The following section discusses many of the factors that affect a system's MTF. These include source-to-collimator distance, photon energy, and collimator design. This is straightforward and should be understandable to everyone.

The second half of the book is devoted to a more difficult topic: how to measure the MTF. The most practical way to do this is to derive it from a measurement of the line-spread function (LSF). This involves the Fourier transform of the LSF using integral calculus. The author attempts to explain this both pictorially and mathematically. The book concludes with a rather explicit set of instructions for measuring the MTF of a scintillation camera system and a comparison of the results with scan of a bar phantom.

The manuscript is well proofread, the illustrations are nicely done, and there are relatively few errors. The sinusoidal source to be imaged is a one-dimensional source instead of three dimensional as it is frequently referred to. No explanation is given as to how this one-dimensional source can be related to a real three-dimensional object to be scanned.

The descriptive title has set a challenging task for the author. My personal feeling is that he has succumbed too much to the physicists' treatment of these topics. More illustrations and nonmathematical explanations of the meaning of the MTF would have been very useful. No discussion is included on what to do with an MTF once you get it. Rather than a clinician's guide to the MTF, I think this would be more appropriate as an introductory reference for physicists or other mathematically trained instructors who want to learn about the MTF (yes, even some physicists don't understand the MTF) and teach classes of technologists or residents. A bibliography contains a list of MTF references as a starting point for further study.

JAMES EHRHARDT
University of Iowa
Iowa City, Iowa