The Society for Computer Applications in Radiology

GENERALLY SPEAKING, Moore's Law states that computing power doubles every 6 months. Presently, this still seems to hold true, as evidenced by the phenomenal and continual increase in speed of computer chips and the resulting improvement in the capability of our computers. It appears, at times, that hardly a day goes by that someone does not advertise the release of a new even-higher-speed chip. Just a year or two ago, the concept of a chip of more than 500 MHz would have been difficult to imagine, and now it is a common product.

This of course is a double-edged sword. On one hand, for those of us in the market for home computers and related hardware, it is depressing to feel that every time we spend our hard-earned dollars, we are purchasing a piece of equipment that will be obsolete within 6 months. On the personal side, it is difficult to answer one's highly computerized offspring, who constantly demand greater and greater capabilities of their home computers, to deal with the increasingly more sophisticated and complex games that fall onto the display shelves of our local stores with the regularity and intensity of topical monsoons. The computer that we proudly brought home 6 months ago, with every conceivable bell and whistle, is suddenly relegated to the category of an obsolete piece of junk.

On the positive side, however, this same sequence of events is a fantastically exciting opportunity. When we consider, in particular, the almost meteoric advances of MRI and CT over the past 5 years, we realize that this is due almost entirely to the advances in computer hardware and software. If I recall correctly, the first CT scanner we installed in our trauma area, only several years ago, had the "staggeringly fast" capabilities of providing 8-mm slice-thickness scans at a 1-second scan time, and 1-second table repositioning, with reconstruction times approaching 2 seconds. Today we are installing a CT scanner that uses multislice technology, to acquire 8 slices each second, with a slice thickness of 3 mm or less, and with spiral technology that allows an entire chest to be scanned in less than 20 seconds. Realistically, although we still refer to this as *computed tomography*, the advancement of computer technology allows us to display these images in virtually any way imaginable, ie, using conventional axial slices, 2-dimensional MPR reformats, 3-dimensional representations, or a variety of virtual imaging capabilities, almost to be selected

at the whim of the operator. What we are doing, of course, can no longer be accurately described as "tomography." The computer capabilities of these scanners permits us to acquire a *volume* of information, rather than a stack of slices, and it would probably be more appropriate if we termed this technology *computerized volume imaging* (CVI) rather than CT. Indeed, if we insist on reviewing these images in the axial plane, we will be forced to study many hundreds of images for each examination, and the possible effect of this type of information barrage on our own diagnostic capabilities could be detrimental.

Another potential problem of these new technologies is the simply vast quantities of information that must be archived, and possibly transmitted for interpretation, either in a filmless environment or even on films. The concept of interpreting many hundreds of images, particularly on conventional film, is somewhat problematic. In the digital world, it seems unreasonable to expect the system to consistently archive and transmit hundreds, or even thousands of images, particularly when one expects that in the near future, a vast number of studies traditionally performed by conventional radiography may well be in the realm of CVI. This will substantially increase our archive and retrieval needs, if we insist on managing these images in the same way we have traditionally done for conventional CT. In practice, this will force us to rethink the way we interpret images. When CT first arrived on the scene, re-education was necessary to allow us to make diagnoses using cross-sectional images rather than the traditional methods. Now, it may be appropriate for us to rethink this philosophy, and possibly become more focused in our quest for information, to a specific body organ or system rather than the traditional global overview of everything visible on an axial image.

The future, as always, will be full of challenges of this nature. What is exciting, however, is that the computer has provided us with these challenges, and ultimately, with methods to substantially improve our diagnostic capabilities.

Jeremy W.R. Young, MD
Chairman, SCAR
Professor & Chairman
Department of Radiology
Medical University of South Carolina
171 Ashley Avenue
Charleston, SC 29425