Some practical thoughts concerning imaging techniques for patients who have Alzheimer's disease are presented, followed by a somewhat negative, biased overview of the value of current imaging procedures for these diseases. Finally, a new technique that will inevitably be applied to these patients, nuclear magnetic resonance (NMR) imaging, is discussed.

Nuclear magnetic resonance has not been tested significantly in this patient population. To be frank, the practical value of the use of imaging techniques, that is, static imaging techniques, for elderly patients who are or are not demented remains to be proved. Imaging techniques have been used mainly for diagnosing problems other than such basic disease processes as Alzheimer's disease. We look for meningiomas, butterfly glioblastomas, subdural hematomas, and for hydrocephalus which is often the communicating type, either idiopathic or the result of subarachnoid hemorrhage. Unfortunately, that is basically the only practical value of today's imaging techniques for the demented patient. Although they are valuable, they are simply not very helpful for diagnosing the intrinsic process of Alzheimer's disease.

Multi-infarct dementia is another common clinical situation for which the computed tomography (CT) scan or a comparable type of imaging examination may be helpful. CT is one way to differentiate multi-infarct dementia from Alzheimer's disease. In conjunction with history and physical examination, a CT scan is about 90% accurate in diagnosing...
multi-infarct dementia. The problem is, of course, that many of these patients may have a combination of brain atrophy of aging and perhaps actual Alzheimer's disease added to previous vascular insults and strokes. CT yields an overview but it does not tell us anything about the patient's functional capacity, and that is an unfortunate aspect of this imaging technique. CT is a static image of the gross anatomy, and that is about all.

In general, in patients who may have Alzheimer's disease, we look for gross atrophy of the brain. We apply that term loosely in clinical neuroradiologic practice to a process that results in volume loss of the brain and a secondary increase in the volume of cerebrospinal fluid in the subarachnoid spaces and the ventricles. A typical CT scan of a patient who indeed has Alzheimer's disease will show prominent cerebral sulci and large lateral ventricles. Patients with dementia, regardless of etiology, have difficulty complying with the requirements for doing a satisfactory CT scan. The problem is more serious when NMR studies, that take even longer, are undertaken.

The problem is that all changes observed on the CT scan are not specific to Alzheimer's disease. Normal CT scans of different patients show quite a variety in ventricular size, all within normal limits depending on the patient's age. It is a statistical fact that ventricles and cerebral sulci normally grow larger as people age. In fact, the first thing we teach students and residents about CT scans is that if a CT scan of a patient older than 45 does not show some evidence of volume loss or atrophy, one should suspect that it is, in fact, an abnormal CT scan for a patient of that age. Such patients may have cerebral swelling or a subtle subdural hematoma. Volume loss is a normal phenomenon. Wide variations occur, and they are all within the limits of normal. Scans may show very large sulci, but the patient may have no neuropsychological evidence of dementia of any kind. But it is also found that patients who are finally given a clinical diagnosis of Alzheimer's disease may have a normal-looking scan for their age. Other patients may have a little more atrophy, but that is basically what we expect to see in most 65-75-year-old patients. In the individual patient, one simply cannot distinguish the normal aging process from atrophy of a pathologic nature, like Alzheimer's disease, on the basis of that patient's CT scan.

Some patients show changes in the deep white matter when the central part of the scan around the lateral ventricles appears black rather than gray. That is normal, and can loosely be termed leukoencephalopathy. This pattern is quite common in older patients, and is probably more common in patients with a variety of central nervous system (CNS) dysfunctions. These have never been categorized well, either in terms of the etiology of the CT appearance or its functional correlates. The NMR