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Dementia drugs give impetus to early and accurate diagnosis

By: Paula Gould

Dementia affects between 1% and 6% of people over the age of 65, and 10 to 20% of those over 80. So as more and more individuals survive into old age, the absolute number of dementia sufferers is likely to soar in the years ahead.

The pharmaceutical industry has been quick to spot this expanding market, and treatments promising to slow the effects of dementia are becoming available. But given the symptomatic similarity of many disorders affecting brain function, it is not easy to decide who should be receiving which drugs This is where radiologists will play an increasingly important role, according speakers scheduled to appear at this morning's special focus session.

"Before administering an expensive treatment, you want to identify those patients who will benefit, and those patients for whom the treatment simply won't work," said Dr. Hans Rolf Jäger, consultant neuroradiologist at the National Hospital for Neurology and Neurosurgery in London. "You certainly don't want to give a drug for Alzheimer's disease to a patient with another disorder."

Radiologists have always played an important role in differentiating betwee dementing disorders. This is not going to change. They are now being aske make that call as quickly as possible. The sooner patients are given neuroprotective treatments, the more effective those treatments can be.

"Before, when we didn't have any treatments that could potentially help the patients, it was just a case of making the correct diagnosis. But now, both clinically and in research, there is an increasing interest in an early diagnos said Prof. Elna-Marie Larsson, director of neuroradiology at Aalborg Hospita Aalborg, Denmark.

The majority of patients presenting with cognitive decline will undergo a he CT examination. This excludes treatable conditions, such as brain tumor or hydrocephalus, from the list of possible diagnoses. MRI can rule out structu lesions, though the relatively low number of systems has restricted its use i this area to date. But high-resolution MRI can also aid identification of the neurodegenerative pathology by revealing characteristic patterns of brain atrophy. Physicians seeking a more all-inclusive initial dementia assessmen may consequently start choosing MRI over CT.

A nuclear imaging examination may then add physiological information and further differentiate between dementias. SPECT remains a common choice, though it is not wholly satisfactory, given its relatively low resolution.

"What we would like to do is find something that could replace SPECT to loc at the cerebral blood flow, because this information is valuable," Larsson sa

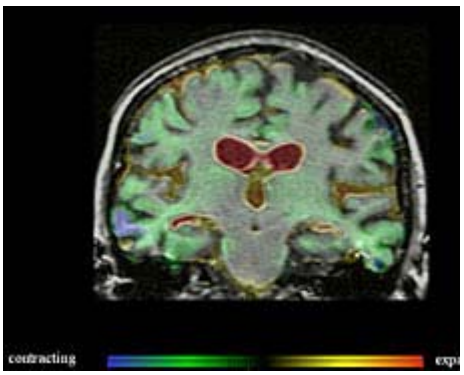
Possible options include PET and perfusion MRI. But few dementia patients receive one of these examinations unless they are enrolled in a research study. She predicts, however, that clinical perfusion studies will become mc widespread in future.

Jäger envisages greater use of quantitative parameters — in both structura and functional imaging — for dementia diagnoses in the coming years. Quantitative data can take the subjectivity out of diagnosis and treatment

monitoring, he said. Greater reliance on measurement as opposed to observation alone will also help radiologists identify subtle volume changes and altered physiological parameters. This should lead to earlier, more accurate diagnoses of neurodegenerative diseases.

"With dementia it is a race against time to make the right diagnosis, so tha the patient can receive drug therapy. This is why it is really important to detect subtle changes before they become obvious to the naked eye," he sa

Most modern MR units found in general radiology departments should be suitable for acquiring volumetric images. Jäger recommends that these images be postprocessed by practitioners with specialist knowledge. Researchers have already shown how the progression of Alzheimer's disease, frontotemporal dementia, and Huntington's disease can be tracked by monitoring the rate of brain atrophy. These analyses require precise registration of past and current 3D MRI brain examinations.

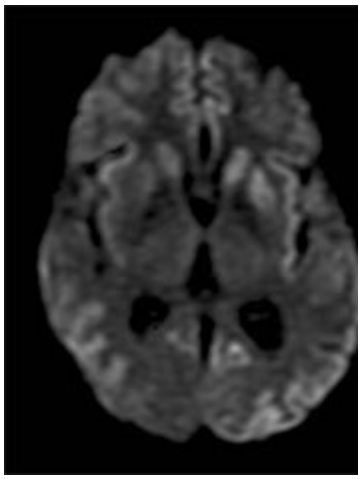


Coronal MRI with voxel-compressio mapping color overlays demonstrate volume changes over a 14-month per in a patient with Alzheimer's disease (Provided by R. Jäger and reprinted fr Lancet Neurology 2003;2;79-88)

Nonspecialist radiologists with access to a top-end MR machine should similarly be able to carry out basic diffusion imaging, though again postprocessing and quantitative analy should be left to experts, he said. More complex quantitative imaging methods, such as diffusion tensor imaging, magnetization transfer imaging, and perfusion MRI, are best carried out in neurological and neuroradiologica centers.

Changes to the apparent diffusion coefficient (ADC) in the hippocampi and parietal white matter can be used to evaluate disease progression in Alzheimer's patients. Hippocampal ADC may also indicate the likelihood of patients with mild cognitive impairment developing Alzheimer's disease. Diffusion-weighted imaging is also particularly sensitive to early changes in Creutzfeldt-Jakob disease (CJD).

Diffusion-weighted trace image of a patient with sporadic CJD shows hyperintense signal change in several cortical regions. This was not detectable on standard MRI. (Provided by R. Jäger)



"I have diagnosed CJD several times in my own clinical practice on diffusion-weighted images when it was not possible to diagnose the patient's cause of dementia on a normal MRI scan," Jäger said.

He is currently investigating whether quantitative imaging techniques can additionally be used to monitor the response of CJD patients to novel drug treatments.

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