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AJNR

Celebrating 35 Years of the AJNR: September 1985 edition

AJNR Am J Neuroradiol 2020, 41 (9) 1757

doi: <https://doi.org/10.3174/ajnr.P0101>

<http://www.ajnr.org/content/41/9/1757>

This information is current as
of May 5, 2025.

Celebrating 35 Years of the AJNR

September 1985 edition

Gadolinium-DTPA in MR Imaging of Glioblastomas and Intracranial Metastases

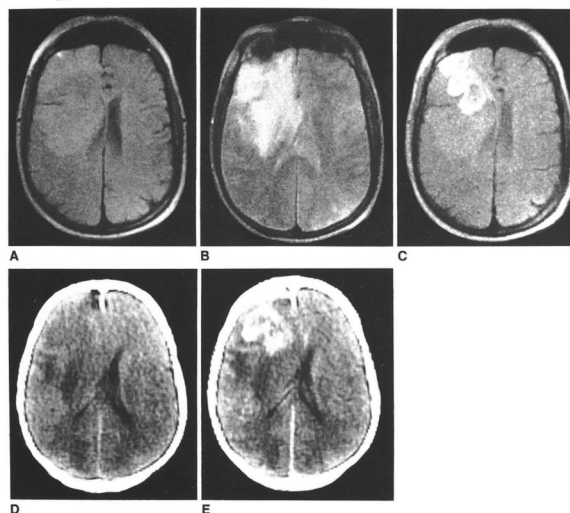
Claus Claussen¹
Michael Laniado¹
Wolfgang Schörner¹
Hans-Peter Niendorf²
Hanns-Joachim Weinmann³
Wiland Fiegler¹
Roland Felix¹

In 14 patients with the diagnosis of glioblastoma ($n = 7$) or intracranial metastases ($n = 7$), magnetic resonance (MR) imaging was performed using a variety of spin-echo (SE) pulse sequences before and after intravenous injection of 0.1 mmol gadolinium-DTPA (Gd-DTPA) per kilogram of body weight. In 10 patients, tumor tissue could not be adequately differentiated from peritumoral edema on unenhanced scans with any of the applied pulse sequences. In four cases of intracranial metastases, poor differentiation between tumor and peritumoral edema was possible in T2-weighted (SE 1800/70 and SE 1800/105) unenhanced scans. After administration of Gd-DTPA, tumor tissue showed marked contrast enhancement, and tumor delineation was consistently possible on SE 800/35 images. Tumor tissue could be differentiated from peritumoral edema on SE 800/70 scans. Gd-DTPA is likely to increase the potential of MR imaging and refine the evaluation of glioblastomas and intracerebral metastases.

The advent of magnetic resonance (MR) imaging has broadened the spectrum of diagnostic methods in radiology. Clinical experience with MR imaging of the brain is accumulating rapidly. It has already been shown that the diagnostic potential of MR for lesions of the central nervous system is comparable to that of computed tomography (CT) [1-5]. In some cases, MR even seems to be diagnostically superior to CT (e.g., in posterior fossa tumors and brainstem tumors) [6-9].

The use of iodinated contrast agents makes contrast-enhanced CT scans superior to unenhanced MR images, particularly in demonstrating the margin between tumor and peritumoral edema. Therefore, the development of specific contrast media for MR imaging was proposed [1-4, 7] and has become an attractive field of research.

Paramagnetic substances may be regarded as potent MR contrast agents if they enhance image contrast between magnetically similar but histologically dissimilar



MR Imaging of the Aging Brain: Patchy White-Matter Lesions and Dementia

Michael Brant-Zawadzki¹
George Fein^{2,3}
Craig Van Dyke^{2,3}
Ralph Kiernan²
Linda Davenport²
Jack de Groot⁴

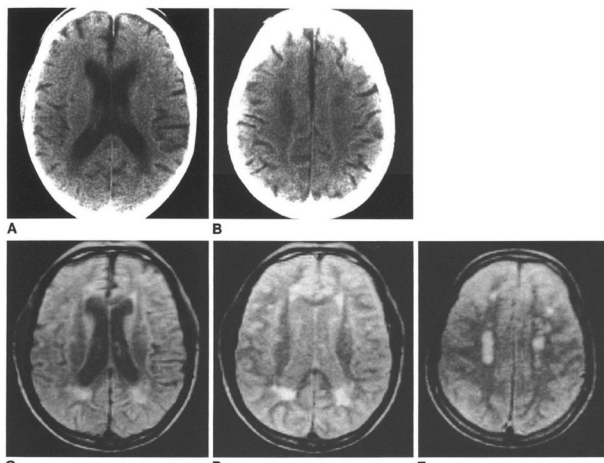
Magnetic resonance (MR) imaging studies of the brain in five elderly non-Alzheimer dementia were compared with those in two groups of control subjects. Group 1 included five subjects aged 59-66; group 2 included five subjects aged 74-81. In all of the demented patients and in three of the control group, MR showed diffuse, patchy white-matter lesions. These lesions were used to grade the severity of the changes. The results suggest a high correlation between the severity of the white-matter lesions and the degree of dementia in elderly patients with non-Alzheimer dementia.

The unprecedented sensitivity of magnetic resonance (MR) imaging of the central nervous system [1-5] has yielded results when applied to the aging brain. For instance, 20%-30% of the age of 65 demonstrate patchy, deep white-matter foci of increased signal intensity when examined by MR [6]. Because these foci appear to be pathologic, they present a diagnostic dilemma for the MR study, they present a diagnostic dilemma for the MR study, they present a diagnostic dilemma for the MR study.

There is a known association of subcortical arteriosclerotic changes as well as multiple foci of infarction with aging and dementia [7, 9]. Foci of abnormal signal intensity in the elderly discussed above have been seen in known cerebral infarction on MR [14]. The high incidence of white-matter lesions (PWMLs) in the aging brain may be due to ischemia or to other factors. It is possible that they represent edema and secondary to ischemia.

It is currently estimated that of the more than 24 million elderly who have severe dementia and 10% have mild to moderate dementia, the number of elderly with dementia will increase in the next 20 years as the median age of our population increases. Dementia can be defined as a disorder of the brain in which there is a decline in memory, reasoning, and construction. It must be differentiated from the cognitive changes of normal aging. Diagnostic criteria for dementia have generated controversy regarding their ability to detect changes due to normal senescence [18-21]. Likewise, the correlation between those changes observed with CT (e.g., enlarged ventricles) and detectable loss of cognitive function has been unconvincing [22-27].

It is currently believed that 50% of senile dementias are of Alzheimer type



Received September 26, 1984; revision February 11, 1985.
Presented at the annual meeting of the Society of Neuroradiology, St. Louis, MO, November 1984.
This work was supported by the Deutsche Forschungsgemeinschaft (DFG) under the Special Collaborative Program SFB 142.
¹Department of Radiology, Free University of Berlin, 1000 Berlin 18, West Germany.
²Department of Radiology, University of California, San Francisco, San Francisco, CA 94143.
³Department of Psychiatry, University of California, San Francisco, CA 94143.
⁴Department of Radiology, University of California, San Francisco, CA 94143.
AJNR 6:688-694, September 1985; 0195-6108/85/0605-0688\$03.00/0
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Received January 8, 1985; accepted after revision April 11, 1985.
Presented at the annual meeting of the American Society of Neuroradiology, New Orleans, February 1985.
This work was supported in part by National Institute of Aging grants BNS0 307-RN-5755 and R01 AG03334.
¹Department of Radiology, C209, University of California, San Francisco, San Francisco, CA 94143.
²Department of Psychiatry, Veterans Administration Medical Center, San Francisco, CA 94121.
³Department of Anatomy, University of California, San Francisco, CA 94143.
AJNR 6:675-682, September/October 1985; 0195-6108/85/0605-0675\$03.00/0
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