Fazekas scale

The type, frequency, and extent of MR signal abnormalities in Alzheimer's disease and normal aging are a subject of controversy. With a 1.5-MR unit they studied 12 Alzheimer patients, four subjects suffering from multiinfarct dementia and nine age-matched controls. Punctate or early confluent high-signal abnormalities in the deep white matter, noted in 60% of both Alzheimer patients and controls, were unrelated to the presence of hypertension or other vascular risk factors. A significant number of Alzheimer patients exhibited a more extensive smooth “halo” of periventricular hyperintensity when compared with controls (p = .024). Widespread deep white-matter hyperintensity (two patients) and extensive, irregular periventricular hyperintensity (three patients) were seen in multiinfarct dementia. Areas of high signal intensity affecting hippocampal and sylvian cortex were also present in five Alzheimer and two multiinfarct dementia patients, but absent in controls. Discrete, small foci of deep white-matter hyperintensity are not characteristic of Alzheimer's disease nor do they appear to imply a vascular cause for the dementing illness. The frequently observed “halo” of periventricular hyperintensity in Alzheimer's disease may be of diagnostic importance. High-signal abnormalities in specific cortical regions are likely to reflect disease processes localized to those structures [1)]

The Fazekas scale is used to simply quantify the amount of white matter T2 hyperintense lesions usually attributed to chronic small vessel ischemia, although clearly not all such lesions are due to this.

This classification was proposed by Fazekas et al. in 1987

It remains the most widely used system for describing white matter disease severity in publications. It is not generally used in clinical practice, with terms such as 'mild', 'moderate' and 'severe' being favored.

Classification

The scale divides the white matter in periventricular and deep white matter, and each region is given a grade depending on the size and confluence of lesions

periventricular white matter (PVWM)

0 = absent

1 = “caps” or pencil-thin lining

2 = smooth “halo”

3 = irregular periventricular signal extending into the deep white matter

deep white matter (DWM)

0 = absent

1 = punctate foci

2 = beginning confluence

3 = large confluent areas

Importantly the etiology of PVWM and DWM changes differ. The latter is chronic small vessel ischemia in nature, whereas the former (periventricular) relates to a combination of demyelination, ependymitis granularis, and subependymal gliosis, as well as small vessel ischemia.

Additionally, it is important to note that it is the deep white matter component score which is useful in the assessment of patients with possible dementia (see neurodegenerative MRI brain (an approach)) and it is this component that is usually reported (e.g. “Fazekas grade 2”).

History and etymology The scale is named after Franz Fazekas (b. 1956), an Austrian neurologist and the author of the original article co-published in 1987 in the American Journal of Roentgenology and American Journal of Neuroradiology. At the time, he was training in research in radiology at the University of Pennsylvania [2)]

[1)] , [2)]

Fazekas F, Chawluk JB, Alavi A, Hurtig HI, Zimmerman RA. MR signal abnormalities at 1.5 T in Alzheimer's dementia and normal aging. AJR Am J Roentgenol. 1987 Aug;149(2):351-6. doi: 10.2214/ajr.149.2.351. PMID: 3496763.