muscle autoantibodies whereas 37.5% of the ocular type, which is higher than the incidence in the report of Confalonieri et al. 1 All subjects in Cohen-Kaminsky's report had generalised myasthenia gravis of type IIA or IIb. 2 Chiu et al. 3 reported a difference in Chinese and Caucasian populations. The characteristic population pattern in our study may be common to east Asians and may partly cause a different correlation between sIL-2R and disease activity. 12 The study of this characteristic population may lead to the elucidation of the pathogenesis of low responder myasthenia gravis.

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MASATOSHI HAYASHI
KAIICHI KIDA
Department of Pediatrics, Ehime University School of Medicine, Ehime, Japan
JUNJI YOSHITAGA
Department of Neurology, Hiroshima City Hospital, Hiroshima, Japan

Correspondence to: Dr Masatoshi Hayashi, Department of Pediatrics, Ehime University School of Medicine, Shigenobu-cho, Onsen-gun, Ehime 791-02, Japan.


Decreased magnetisation transfer ratio due to demyelination: a case of central pontine myelinolysis

Conventional T2 weighted MRI has a high sensitivity for detecting multiple sclerosis lesions and is widely used for diagnosis and monitoring the efficacy of new treatments. An important limitation of T2 weighted images is their low pathological specificity: they do not identify the two pathological features that are hold to be the main pathological findings in multiple sclerosis—namely, demyelination and axonal loss. This lack of pathological specificity contributes to the weak relation between MRI abnormalities and disability in multiple sclerosis. Magnetisation transfer (MT) imaging indirectly visualises immobile water protons tightly bound to macromolecular structures that have very short T2 relaxation times and are invisible on conventional images. Measurement of MT ratio (MTR) in lesions provides information about structural integrity and by inference, myelin and axons. To explore the hypothesis that demyelination itself has an important effect on MTR, we performed MT imaging of a patient with central pontine myelinolysis—a condition in which demyelination is the predominant pathological feature.

A 50 year old woman presented with memory disturbance and poor balance. There was a long history of alcohol misuse leading to hospital admission with delirium tremens three months previously. There was no other history of note. Since then she had abstained from alcohol, after noticing residual poor balance and memory loss for recent events. Both problems worsened considerably in the weeks leading to her most recent admission. She also developed peripheral paraesthesiae, ankle swelling, and weight loss. Mental state examination showed a specific deficit in recent memory and formation of new memory, although registration was intact. On neurological examination she had a broad based ataxic gait and positive Romberg's test. Examination of the eyes showed bilateral gaze-evoked non-sustained horizontal nystagmus, but no other abnor-

malities. Ataxia was present in upper and lower limbs, more pronounced in the legs. Tone was increased in the lower limbs. There was no left ankle reflex and plantar responses were extensor. Vibration sense was absent in both legs and joint position sense was decreased in the toes. Light touch and pinprick sensation were reduced in the hands.

T2 weighted MRI demonstrated a single high signal symmetric lesion confined to the basis pontis which appeared hypointense on T1 weighted images (fig 1). There was no enhancement after intravenous injection of gadolinium-DTPA. Mild cerebral atrophy was also noted. Further imaging was carried out on a 1.5 Tesla GE Sigma MRI scanner with standard quadrature headcoil to obtain calculated MT images (fig 2). A dual spin echo sequence was used (TR 1730, TE 31/80, 28 contiguous 5 mm slices) both with and without presaturation pulse at centre of axis, the broad resonance of immobile macromolecular protons. Results were analysed on a Sun workstation using image display software (Dispimage, DL Plummer, Department of Medical Physics, University of London, UK). The MTR was greatly reduced in the centre of the pontine lesion with a value of 8-6%, compared with a normal appearance of 39-25% (obtained from the pons of five normal age matched female controls). Values for MTR in the surrounding rim of intact pontine tissue were normal. The greatest decrease in MTR was at the centre of the lesion, gradually increasing towards the outer edge.

The pathological findings associated with central pontine myelinolysis are remarkably homogeneous: a single large symmetric lesion is found in the basis pontis. There is usually a rim of intact pontine tissue. Microscopically the main abnormality is destruction of myelin, with relative neuronal preservation. 1 Myelin destruction is typically associated with the centre of the lesion, becoming less pronounced towards the edge. 1 There are no inflammatory changes and oedema is absent. 1 In our patient we were confident that the lesion was due to the classical setting (alcoholism along with clinical features of Wernicke-Korsakoff syndrome) and the highly characteristic appearance of the MRI abnormality on the T2 and T1 weighted images. One notable feature was the lack of deficit related to the pontine lesion. Many patients with central pontine myelinolysis become profoundly disabled with bulbar palsy and tetraplegia during the acute phase of the illness. However, typical pathological changes of this condition have also been found at postmortem where there has been minimal neurological deficit referable to the pontine lesion. With the advent of MRI, patients like ours have been seen in whom the characteristic radiological abnormality has been identified in the presence of minimal clinical disability.

To identify specifically the structural specificity...
changes caused by axonal and myelin loss in demyelinating lesions, such as occur in multiple sclerosis, there is a need for an in vivo technique that measures macromolecular loss. MT imaging, which is based on the specific interaction between macromolecular and free water protons, has shown promise in this regard. Pronounced reductions in MTR have been found in lyssolecithin induced demyelination,

2, choline esterified with aminosugars, an ac- 

thetic encephalomyelitis lesions (in which there is demyelination), and progressive 

2 multifocal leucoencephalopathy (a condition in which demyelination predominates with a relative lack of inflammation or axonal loss). On the other hand, in acute experimental allergic encephalomyelitis in which there is inflammation and oedema without demyelination, only slight reductions in MTR are seen. 1 In optic neuritis, reduction of MTR within the optic nerve lesion correlates with the latency of the visual evoked potential, suggesting that a graded relation may exist between MTR reduction and the extent of demyelination. This pre- 

sent patient provides additional evidence in favour of myelin itself being a major contrib- 

utor to the MT effect.

A relationship between MTR is seen in multiple sclerosis lesions, and a correlation exists between lesion MTR and disability. 1 It is uncertain whether MTR measurement will be able to separate demyelination alone from demyelination which occurs as a con- 

sequence of axonal loss. The second may be more important for irreversibility disability in multiple sclerosis. Further experimental studies are needed to elucidate the quantita- 

tive MTR changes that occur in these two processes. Nevertheless, MTR measurement seems a robust, quantitative, and clinically relevant indicator of myelin integrity and may have an important role in monitoring the natural history of multiple sclerosis and its modification by treatment.

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NC SILVER GJ BARKER DG MACMANUS DH MILLER NMR Research Unit, Department of Clinical Neurology, Institute of Neurology, Queen Square, London WC1N 3BG, UK JW THORPE RS HOWARD St Thomas Hospital, Guy’s and St Thomas’ Hospital Trust, Lambeth Palace Road, London SE1 7EH, UK

Correspondence to: Dr DH Miller.


2 Esser K, Brochet B, Vital A, et al. Lyssolecithin-induced demyelination in pri- 


4 Thorpe JW, Barker GJ, Jones SJ, et al. Magnetisation transfer ratio and transverse magnetisation decay in optic neuritis: corre- 


Raised plasma polyamine concentrations in patients with severe head injury

Polyamines have been shown to be raised in response to neurotraumatic trauma in experi- 

mental models. 1, 2 There are no reports that a similar process occurs in humans, prompt- 

ing us to investigate whether plasma polyamines are raised in patients with head injury. Previous experience shows that plasma polyamines occur in the cerebral cortex after neurotraumatic trauma, and, if reflected by increased plasma concentrations occurring as a result of disruption to the blood brain barrier, this may be a useful diagnostic and prognostic tool.

Seventeen patients with head injury were studied. The patients varied in the circum- 

stance of injury, the time the sample was taken after the initial injury, and the CT findings, which showed extradural and sub- 

dural haematomas and cerebral contusions. One patient sustained an associated cardiac injury. Recovery of polyamines from sub- 

 locominal lesions; the other patients had no obvious organ damage apart from brain injury.

Blood samples were also taken from eight patients who had intracranial pathology 

related to trauma (five with subarachnoid haemorrhage and three with malignant pri-

mary brain tumours). Control samples were taken from seven patients who underwent 

comparative neurosurgery (forehead artery bypass grafts (non-head injury traumatic controls) and seven normal 

subjects.

Further study will elucidate the quantitative MTR changes that occur in these two processes. Nevertheless, MTR measurement seems a robust, quantitative, and clinically relevant indicator of myelin integrity and may have an important role in monitoring the natural history of multiple sclerosis and its modification by treatment.

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Plasma polyamines were extracted, fractionated, and quantified by HPLC. Values are mean (SEM). Significant differences are v control group.