Table 1 Distribution of *Taq* 1 digest polymorphic bands in patients with multiple sclerosis and controls

Band size (kb)	n (%) showing polymorphic bands	
	Patients (n = 40)	Matched controls (n = 80)
4.9	11 (27.5)	23 (28.8)
4.4	39 (97.5)	78 (97.5)
3.25	38 (95)	76 (95)
2.4	14 (35)	32 (40)
1.9	5 (12.5)	7 (8.8)
1.65	15 (37.5)	27 (33.8)

background, analysis of the human MOG gene has defined its intron/exon structure and provided evidence that a 1.9 kb *Taq* 1 restriction fragment length polymorphism (RFLP) of the human MOG gene could be linked to multiple sclerosis in a significant fashion in a population of Australian patients with multiple sclerosis.³ We have examined this *Taq* 1 polymorphism in a population of patients with multiple sclerosis and controls from the Southampton area.

Venous blood samples were obtained from 40 patients with multiple sclerosis in the Southampton area and from 80 age and sex matched controls. The patients were 29 women and 11 men diagnosed as having clinically definite multiple sclerosis by the Poser criteria.⁴ The age range was 23–43 years with a mean of 33.9 years. DNA was extracted by standard procedures,⁵ digested with *Taq* 1, electrophoresed, and subjected to Southern blotting using the same human MOG cDNA as previously.³ Six polymorphic bands of 4.9, 4.4, 3.25, 2.4, 1.9, and 1.65 kb were found, plus three invariant bands of 1.75, 1.25, and 1.05 kb. This contrasts with the Australian study, in which *Taq* 1 digestion of human genomic DNA and hybridisation with the same MOG cDNA probe showed five polymorphic bands of 5.25, 4.65, 2.4, 1.9, and 1.05 kb and only one invariant band of 1.7 kb. In that study the 1.9 kb band was present in 12.2% of patients with multiple sclerosis and 3.7% of controls, a difference which was significant ($p < 0.05$). The table shows the distribution of the *Taq* 1 digest polymorphic bands between patients with multiple sclerosis and controls in the present study; none of these distribution differences were statistically significant. We assume that the 1.9 kb band found here is the same as in the previous study, in which case the incidence in the two sets of patients with multiple sclerosis is very similar—12.5% and 12.2%. However the incidence of this RFLP in the control group in the present study was much higher than in the previous study—8.8% *v* 3.7%—thus denying significance. We assume our finding of extra invariant bands in *Taq* 1 digests of the human MOG gene and largely different sized RFLPs are due to genetic differences in the two populations. This illustrates the difficulties of extrapolating between two geographically widely separated cohorts. It is also important to have comparable groups in terms of clinical types of multiple sclerosis, age and sex structures, and nature of the control populations used.

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Pneumocephalus as a complication of metastases and eroding infection in the sacral region

Pneumocephalus is a well known and rare disease that denotes a pathological presence of intracranial air. Below, we describe an extremely rare case of the development of pneumocephalus.

A 66 year old woman was admitted to our clinic with headache persisting for the previous two months. The headache had become particularly severe and had been accompanied by vomiting during the previous week. One year before being admitted to our clinic, the patient had undergone brain CT along with other tests and the results were normal. Medical records indicated that 10 years ago the patient had undergone surgical treatment of an adenocarcinoma of the rectum. Since then she had been under an oncologist's observation. Seven years after surgery, metastases developed in the L5

vertebral body and the sacrum. This was confirmed by radiography of the lumbosacral spine and the sacrum, by radioisotope bone scans, by sacrum CT, and by pathohistological analysis of the biopsy of the sacral region. Despite implemented radiation therapy the general condition of the patient deteriorated. She lost weight and finally became paralysed. Skin and subcutaneous tissue defects appeared in the sacral region and did not heal. Repeated cultures isolated *Enterococcus*, *Enterobacter* species, and *Hafnia alvei*. The patient refused the proposed necrotomy; instead she received antibiotic treatment. At admission the patient was extremely thin, subfebrile 37°C; cardiocirculatory and respiratory systems were stable. Findings of the anus praeter naturalis in the abdominal region were normal. In the sacral region a deep seated ulcerative lesion 12×9 cm in size was visible, covered by brown strata, which secreted purulent and bloody substance. A neurological examination indicated that the patient was conscious, that her speech was normal, and that there were no signs of meningeal irritation. Flaccid paraplegia was present together with sensory modalities impaired in the right L4 and S1 dermatome and the left L5, S1, S2, and S3 dermatome and she was incontinent for faeces and urine. Routine laboratory blood tests showed the following increases: erythrocyte sedimentation rate 56 mm/h, ALP 105 U/l, ALT 59 U/l, AST 28 U/l and reduced values of: HGB 113, HCT 0.345, MCHC 26.4 g/l. The findings from other laboratory tests were normal. The fundus oculi examination was normal. Findings from radiography of the paranasal sinuses and the skull were normal except for the presence of air in the third and in the lateral ventricles. The brain CT indicated that the size of the ventricular system was normal and the ventricular system was for the most part filled with very hypodense zones which, according to absorptivity, corresponded to the air. Some air was visible around the brainstem. Such a finding indicates a pneumocephalus (fig 1). The sacrum CT showed a large skin and subcutaneous defect. The sacrum was mostly destroyed and filled with

Figure 1 Brain CT showing intraventricular air.

Figure 2 CT of the sacrum. The arrow points to a small hypodense area representing air.

zones corresponding to soft mass density. Sporadically, inside the spinal canal some small hypodense zones were visible, the absorptivity of which corresponded to air (fig 2). Abdominal and pelvic CT scans were normal. Findings of lung and heart radiography and ECG were normal. The EEG indicated slow activity. Lumbar puncture was not carried out. Because of the condition of the patient neurosurgical intervention did not take place. The patient's condition gradually deteriorated and she died three days after admission to hospital. The basic pathophysiological mechanism of pneumocephalus is the development of a dural fistula which permits the flowing out of the CSF and the entry of air into the subarachnoid space, which, because it cannot flow back, successively accumulates intracranially. In head injuries, pneumocephalus is recorded in 0.5% to 1.0% of all cases.¹ It may also develop as a complication of neurosurgical treatment of chronic subdural haematoma or after posterior cranial fossa surgery.² It is described in the craniofacial approach to tumour removal from the base of the anterior cranial fossa as well as in nasal and otological surgery.³ Intracranial air appears as the consequence of eroding otological infections, of eroding tumours of the brain, nose, and nasopharynx in combination with radiotherapy.⁴ It is mostly described as a complication which follows insertion of a nasogastric tube and a case has been described also after insertion of a nasopharyngeal tube.⁵ Subarachnoid-pleural fistula and intracranial air may occur after severe chest trauma. Cases after thoracotomy and surgery of the tumour of the lung apex have also been described.⁶ Pneumocephalus may also develop when administering epidural anaesthesia and in continuous external lumbar subarachnoid drainage in the treatment of dural fistula.⁷ The first symptom of pneumocephalus is a headache which in anterior cranial fossa fractures or eroding processes may also be accompanied by rhinorrhea. Should the headache intensify and be coupled with other signs of increased intracranial pressure, an urgent brain CT is required to diagnose pneumocephalus. In

most cases it is a small quantity of air and the developed fistula may heal spontaneously. Should the fistula persist, urgent operative repair is needed to prevent brain herniation and death.

We consider the case described above to be exceptionally rare given the way pneumocephalus develops. In our opinion, the destruction of the sacrum, of skin, and of subcutaneous tissue of the sacral region, assigned to a malignant process which was hastened by eroding infection, caused a communication between the subarachnoid space and the surface of the skin. We think that the developed sacrodural fistula is the only possible explanation for the development of pneumocephalus.

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Paraneoplastic opsoclonus associated with papillary renal cell carcinoma

Opsoclonus is an ocular dyskinesia consisting of involuntary, repetitive, rapid conjugate ocular saccades that are irregular in amplitude and frequency and occur in all directions without an intersaccadic interval.¹ Opsoclonus appears more commonly in children,² and in half of such cases in association with neuroblastoma.¹ In adults, the most frequent causes are idiopathic (50%) and paraneoplastic (20%).¹ Among the second group, different types of tumours involving a wide variety of organs have been reported, although no case of renal tumour has been published.¹

A previously healthy 64 year old man complained of progressive vertigo and unsteady gait, together with mild headache, since a month before admission. At examination he showed severe opsoclonus (increased by saccadic movements and visual fixation), slight cephalic myoclonic movements, and he could not stand or walk because of truncal ataxia. The rest of the neurological evaluation was unremarkable.

Blood tests included white cell count, haemoglobin, erythrocyte sedimentation rate, glucose, urea, creatinine, bilirubin, immunoglobulins, and angiotensin converting enzyme. These were all normal. Serological tests for syphilis and HIV were negative, as was the screening for several tumour markers. Anti-Hu and anti-Ri serum antineuronal antibodies were not detected. On admission, CSF contained 19 mononuclear white blood cells (WBC)/mm³, 73 mg/dl protein, with normal glucose concentration and negative cytological examination. Two months later, a new CSF examination showed 40 mononuclear WBC/mm³, 47 mg/dl protein, and normal glucose concentration. Serological tests, as well as bacterial and fungal cultures, were negative in both CSF studies. Brain MRI and thoracoabdominal CT were normal.

Soon after the beginning of treatment with 60 mg/day oral prednisone the patient's neurological symptoms gradually improved. Seven weeks later, despite a slow decrease in the dose of prednisone, the patient became asymptomatic. Six months later, he complained of lumbar pain and radiography suggested the existence of lumbar osteoblastic lesions. Both ultrasound and CT studies disclosed a mass in the right kidney, without evidence of any bone metastasis. After a radical nephrectomy, the pathological study gave the diagnosis of a papillary type of renal cell carcinoma. At present, three years after the initial presentation, the patient remains asymptomatic and without any treatment.

Paraneoplastic opsoclonus usually antedates the detection of the underlying neoplasm by a period that may last up to one year.^{1,3} This sequence of events was also found in our patient, as the first abdominal CT examination did not detect the tumour. This could be explained by the fact that a substantial proportion of small renal masses can be missed by CT and ultrasound studies.⁴ Therefore, we consider that the development of opsoclonus in our patient was probably linked to his renal tumour. The pathogenesis of paraneoplastic opsoclonus is unknown, although there is increasing evidence that it may be immune mediated.¹ It has been proposed that antigenic substances may be shared between certain tumours and portions of the nervous system.⁵ This would elicit an efficient immune response against the