

differences in neurocognitive outcome measures for verbal and visual memory, visual motor speed, reaction time, and total symptom scores among the 3 groups. The PTM group had significantly lower verbal memory and visual memory scores post-injury than those in HA and non-HA groups. Differences in these scores were not found between HA and non-HA groups. Similar differences in the 3 groups were observed for visual motor speed scores. The PTM group also had significantly lower reaction time scores than the HA and non-HA groups, and the HA group scores were significantly lower than the non-HA group. The PTM group reported the largest mean increase in post-concussion symptom scores compared with baseline reports. (Mihalik JP, Stump JE, Collins MW et al. Posttraumatic migraine characteristics in athletes following sports-related concussion. **J Neurosurg** May 2005;102:850-855). (Reprints: Mark R Lovell PhD, University of Pittsburgh Medical Center Sports Medicine Concussion Program, 3200 South Water St, Pittsburgh, PA 15203).

COMMENT. High school and college athletes suffering a sports-related concussion accompanied by posttraumatic migraine (PTM) should be followed for symptoms of head injury and also neurocognitive impairments. Baseline and post-injury testing protocols should be available for students at risk for concussion. Neurocognitive test results are essential to determine recovery and fitness to resume sports in athletes suffering from PTM or other post-concussion syndromes.

INFECTION-RELATED CNS DISEASES

HUMAN HERPESVIRUSES-6 AND -7 ENCEPHALOPATHY IN UK

In a three year prospective study in Britain and Ireland, blood samples of 205 children (2-35 months of age) hospitalized with fever and convulsions and/or suspected encephalitis were tested for primary HHV-6 and -7 infections and reported from Royal Free and University College Medical School, London, UK. Of 156 children aged 2-23 months with primary infection coinciding with the acute illness, 26 (17%) tested positive for HHV (11 children with HHV-6; 13 HHV-7; and 2 with both viruses). All were febrile, 25 had convulsions (status epilepticus in 18), half had a rash, and 11 required ventilation. CSF from 21 patients was negative for HHV DNA, and only 2 had >5 white cells. Primary infection was defined by a) seronegative or low antibody titer in the acute sample containing viral DNA; and b) seroconversion to low avidity IgG antibody and rising titer >4 fold to the virus between acute and early convalescent sera, or low or high avidity IgG antibody between acute and late convalescent sera and viral DNA in the acute sample. The number of cases of HHV was much higher than that expected by chance ($p<0.001$), and HHV-6 and -7 were equally important causes of encephalopathy or convulsions, especially status epilepticus. Children at 1 year receiving MMR or other vaccine and developing fever and convulsion should be tested for HHV infection to avoid misdiagnosis of vaccine reaction. (Ward KN, Andrews NJ, Verity CM et al. Human herpesviruses-6 and -7 each cause significant neurological morbidity in Britain and Ireland. **Arch Dis Child** June 2005;90:619-623). (Respond: Dr KN Ward, Centre for Virology, Department of Infection, Royal Free and University College Medical School (UCL campus), Windeyer Institute, 46 Cleveland St, London W1T 4JF, UK).

COMMENT. This prospective study shows that primary infection with HHV-6 or -7 is responsible for encephalopathy and/or severe convulsions with fever in 17% of children <2 years of age (median age 1 year) who require hospitalization. Primary HHV infection is not associated with the rash of exanthem subitum in one half the cases. CSF does not show evidence of direct viral involvement of the CNS, and the severe convulsions with fever could be classified as “complex febrile seizures.” In the US, infection with HHV-6 accounts for one-third of all first-time febrile seizures in children <2 years old (Hall, Epstein, et al. **N Engl J Med** 1994;331:432-438; **Ped Neur Briefs** 2004;18:59). An elevated cytokine response independent of the severity of infection may be a factor in the mechanism of febrile seizures (Kawada et al, 2003; Millichap JG, Millichap JJ. **J Infect Dis** 2003;189:564).

Cytokines and febrile seizures. The height of the fever (not rate of rise) is the important determinant of a threshold to febrile seizures (Millichap, JG. **Pediatrics** 1959;23:76-85). Other FS causative factors related to infection include 1) an abnormal immune state and allergic response to infection; 2) genetic susceptibility; 3) a neurotropic toxin (eg. Shigella) or virus (eg. HHV-6 or -7, influenza A); 4) encephalopathy; and 5) an elevated cytokine response. Proinflammatory cytokines (interleukin-1B [IL-1B]) act as pyrogens, and fever induces IL-1B synthesis in brain microglia, leading to enhanced neuronal excitability and decreased seizure threshold. Dube C and colleagues (University of CA at Irvine) have shown that IL-1B receptor-deficient mice are resistant to experimental FS (**Ann Neurol** 2005;57:152-155). This resistance was independent of genetics and due to lack of IL-1B signaling; high IL-1B doses induced seizures only in IL-1B receptor-expressing mice. The authors conclude that endogenous IL-1B contributes to FS, and potentially contributes to hippocampal epilepsy. Further investigation of viral and cytokine-related factors in the cause of simple and complex febrile seizures is indicated.

DIFFERENTIATION OF ADEM AND MS AT PRESENTATION

The clinical features of published case series of acute disseminated encephalomyelitis (ADEM) and multiple sclerosis (MS) are reviewed at the Institute of Neurology, Queen Square, London. Differences in presentation of the two disorders may help in the early diagnosis, in the absence of a reliable diagnostic test for MS. Monophasic ADEM is more common in children <10 years old whereas MS usually presents at >10 years, and only 2.7-4.4% of cases of MS occur under 16 years of age. A precipitating infection is common in ADEM and unusual in MS. ADEM presents with signs of encephalopathy or encephalitis (headache, vomiting, drowsiness, meningism, and seizures in 13-35%), but these symptoms are uncommon in MS. Optic neuritis is bilateral in ADEM and unilateral in MS. CSF shows increased protein and lymphocytosis in ADEM, and oligoclonal bands in MS. Both ADEM and MS show disseminated inflammatory demyelinating lesions on brain MRI; these are cortical and in deep grey matter in ADEM and periventricular/callosal lesions in MS. Follow-up MRI shows no new lesions in ADEM, and relapse with additional lesions after 6 months in MS. (Dale RC, Branson JA. Acute disseminated encephalomyelitis or multiple sclerosis: can the initial presentation help in establishing a correct diagnosis? **Arch Dis Child** June 2005;90:636-639). (Respond: Dr RC Dale, Neuroimmunology Laboratory, 9th Floor, Institute of Neurology, Queen Square, London WC1N 3BG, UK).