COMMENT. Lack of familiarity with guidelines for the management of concussion in sports-related head injuries was one explanation for the frequency of inappropriate discharge instructions. The Colorado Medical Society guidelines are summarized as follows:
• Grade 1. Confusion without amnesia or loss of consciousness. Return to sport permitted after 20 minutes, if no symptoms at rest or on exertion.
• Grade 2. Confusion with amnesia but no loss of consciousness. Observe 24 hours. Return permitted after 1 week without symptoms.
• Grade 3. Any loss of consciousness. Admit if neuro exam abnormal. Return permitted after 1 month, if asymptomatic for past 2 weeks.

Football accounted for 55%, baseball 12%, soccer 6%, and wrestling 3% of injuries in the above study. Documentation of discharge instructions is important for medico-legal reasons.

## PERPETRATORS OF ABUSIVE HEAD TRAUMA

The identity of abusers and their relationship to victims was studied by reviewing medical charts of 151 head injured children, aged 24 months or younger, seen at the Children's Hospital, Denver, CO from Jan 1982 - Jan 1994. All infants had documented intracranial bleeding and other injuries. Male infants were abused more frequently than female (60% v 40%); and 23% died. Male perpetrators outnumbered females 2.2:1. Fathers and boyfriends were the most common perpetrators: 37% and 20%, respectively. From 1989 to 1993, the percentage of infants abused by men nearly doubled. Female baby-sitters were a large, previously unrecognized group of perpetrators, accounting for 17%. Mothers were responsible for only 12%. (Starling SP et al. Abusive head trauma: The relationship of perpetrators to their victims. Pediatrics February 1995;95:259-262). (Reprints: Dr SP Starling, The Children's Hospital, B-138, 1056 East 19th Ave, Denver, CO 80218).

COMMENT. These findings should focus attention on baby-sitters as a previously unrecognized group of abusers. Despite an increase in support services and media publicity, non-accidental head injury ("shaken baby syndrome") remains the leading cause of death or long-term disability among child abuse cases. Subtle or mild trauma is particularly difficult to diagnose, often mistaken for viral illness, feeding problems, or infant colic. Shaking injuries are rare after the second year. The most common age for whiplash abuse is 5 months, when the head is large in relation to the body, and the neck muscles and head control are weak. (Brown JK, Minns RA, 1993). See Progress in Pediatric Neurology II, Chicago, PNB Publ, 1994. pp387-396, for an overview of head injury in children by Dr J Keith Brown, Edinburgh, and various recent articles and editorial commentaries.

# LEARNING AND BEHAVIOR DISORDERS

## MECHANISM OF SUGAR-INDUCED BEHAVIORAL EFFECTS

The adrenomedullary response to a standard oral glucose load (1.75 gm/kg; maximum, 120 gm) and susceptibility to neuroglycopenia (assessed by the hypoglycemic clamp and measurements of P300 auditory evoked potentials [AEP]) were studied in 25 healthy children (8 - 16 years of age) compared to 23 young adults at the Children's Clinical Research Center, Yale University School

of Medicine, New Haven, CT. Baseline and oral glucose-stimulated plasma glucose and insulin levels were similar in children and adult groups. A late fall in plasma glucose level at 3 - 5 hours after glucose ingestion stimulated a rise in plasma epinephrine, twice as high in children compared to adults. Hypoglycemic symptoms (shaky, sweaty, weak, or tachycardia) increased in children but not in adults, in association with the late fall in plasma glucose. P300 amplitude, a measure of cognitive function, was significantly reduced when glucose concentration was lowered to 75 mg/dl in children, but was preserved until the level fell to 54 mg/dl in adults. Children are more vulnerable to effects of hypoglycemia on cognitive function than are adults. (Jones TW et al. Enhanced adrenomedullary response and increased susceptibility to neuroglycopenia: Mechanisms underlying the adverse effects of sugar ingestion in healthy children. J Pediatr February 1995;126:171-7). (Reprints: William V Tamborlane MD, Department of Pediatrics, Yale University School of Medicine, 333 Cedar St, New Haven, CT 06510).

COMMENT. This study shows that consumption of glucose by healthy children may be followed by a fall in plasma glucose sufficient to induce hormonal changes and adverse behavioral and cognitive effects. The authors stress that their data do not prove a causative role for dietary sugar in children with hyperactivity. However, a balanced diet of protein, fat, and complex carbohydrate, to limit postprandial falls in glucose levels, should avoid symptoms associated with the enhanced adrenomedullary responsiveness demonstrated in healthy children.

Mild hypoglycemia (60 mg/dl) caused a significant decline in performance on a battery of cognitive tests in a study of adolescents with insulin-dependent diabetes mellitus at the University of Pittsburgh School of Medicine. Neither hyperglycemia, nor the rapid drop from acute hyperglycemia to euglycemia, affected symptoms, cognitive function, or counterregulatory hormone secretion. (Gschwend S et al. Effects of acute hyperglycemia on mental efficiency and counterregulatory hormones in adolescents with insulin-dependent diabetes mellitus. J Pediatr Feb 1995;126:178-84).

## COGNITIVE EFFECTS OF CRANIAL IRRADIATION

The effects of cranial irradiation on neuropsychological test performance, 9 months after diagnosis of acute lymphoblastic leukemia (ALL), were evaluated in 74 children aged 3 to 6 years included in the Children's Cancer Group cooperative treatment trials. Children who received cranial irradiation (18 Gy divided in 10 fractions) plus intrathecal methotrexate had significantly lower scores on the McCarthy Motor Scale and the Token Test of receptive language and auditory comprehension, when compared to children receiving intrathecal methotrexate alone. Performance of tests of general cognition, visual motor integration, and receptive language requiring verbal recognition and visual recognition (Peabody Picture Vocabulary Test-R) showed no differences among the treatment groups. (MacLean WE Jr et al, for the Children's Cancer Group. Neuropsychological effects of cranial irradiation in young children with acute lymphoblastic leukemia 9 months after diagnosis. Arch Neurol February 1995;52:156-160). (Reprints: Dr D Hammond, Children's Cancer Group, PO Box 60012, Arcadia, CA 91066).

COMMENT. In the past nine months issues of PNB have included two previous reports of the adverse effects of cranial irradiation in