NEURODEVELOPMENTAL DISORDERS

INFANT BRAIN DEVELOPMENT IN FIRST 3 MONTHS

Investigators at University of California, San Diego, and centers in Hawaii and Trondheim, Norway, examined structural growth trajectories and rates of change in the whole brain and regions of interest in infants during the first 3 months after birth. Serial structural T1-weighted and/or T2-weighted MR images were obtained from 87 healthy term-born infants, aged 2 to 90 days. Whole-brain volume at birth was one-third of healthy elderly brain volume, with no gender differences. Growth rate was 1%/day, slowing to 0.4%/d by the end of the first 3 months. Overall growth in the first 90 days was 64%; male brain growth was faster than female. Longer gestation was associated with larger brain size. Expected brain size of an infant born one week earlier than average was 5% smaller than average. The cerebellum grew at the fastest rate, more than doubling in 90 days; and the hippocampus grew at the slowest rate, increasing by 47% in 90 days. The left lateral ventricle was larger than the right, and left-right asymmetry occurred in multiple regions of interest. MR imaging can be used to detect deviant maturational patterns indicative of neurodevelopmental disorders. (Holland D, Chang L, Ernst TM, et al. Structural growth trajectories and rates of change in the first 3 months of infant brain development. **JAMA Neurol** 2014 Oct 1;71(10):1266-74).

COMMENTARY. An MRI study to show a relationship between head circumference and brain growth in preterm infants found that brain volume is a determinant of head size at term. Microcephaly is associated with a reduction of brain tissue volumes, especially deep nuclear gray matter, showing a selective vulnerability of basal ganglia. Poor postnatal head growth in preterm infants becomes more evident by 2 years and is strongly associated with poor neurodevelopmental outcome and cerebral palsy [1].

An MRI study of the relationship between growth status and regional brain volume in premature babies at term-equivalent age showed a positive correlation between fractional anisotropy (FA) and head circumference and body weight. Body weight was the only significant predictor for FA ($P<0.05$) and white matter microstructure in brain areas related to attention, language, cognition, memory, and executive functioning [2].

References.
1. Cheong JL, et al. Pediatrics. 2008 Jun;121(6):e1534-40.
2. Tzarouchi LC, et al. Pediatr Radiol. 2014 Mar;44(3):297-304.

FETAL ALCOHOL SPECTRUM DISORDER PREVALENCE

The prevalence and characteristics of fetal alcohol spectrum disorders (FASD) among first grade children were determined in a representative Midwestern US city. No significant differences by race or ethnicity were found. The overall sample was white (76%), black (7.0%), Asian (4.3%), and Hispanic (8.2%). Most predictive maternal risk variables were late recognition of pregnancy, quantity of alcoholic drinks consumed 3 months before pregnancy, and quantity of drinking reported for the index child's father.

The prevalence of FAS in this community ranged from 6 to 9 per 1000 children; and total rate of FASD was 24 to 48 per 1000 children, or 3.6%. Children with a FAS diagnosis were shorter, lighter, and had smaller heads than all others; their BMI centile was lowest when compared to partial FAS cases, and alcohol-related neurodevelopmental disorder (ARND). A significantly higher frequency of smooth philtrum occurs in FAS cases compared to PFAS, ARND, and controls. A narrow vermilion border of the upper lip was significantly different in all FASD children compared to controls. All groups differed significantly by mean total dysmorphology score, and the total score significantly discriminates the FAS and PFAS groups from other groups. Minor dysmorphic features not specifically included in the diagnostic criteria include short inner canthal distance, inter-pupillary distance, clinodactyly and camptodactyly; all differ significantly by diagnosis. Children with FASD are more likely to have a hypoplastic midface, more clinodactyly and camptodactyly, and more frequent epicanthal folds. Performance centiles on all cognitive and behavioral tests were significantly lower for children with FASD compared to controls. The FASD group performed more poorly than controls on verbal IQ, working memory, general and conceptual ability and teacher rating of adaptive behavior. (May PA, Baete A, Russo J, et al. Prevalence and characteristics of fetal alcohol spectrum disorders. **Pediatrics** 2014 Nov;134(5):855-66).

COMMENTARY. The diagnostic criteria of FAS are growth deficiency, craniofacial abnormalities (smooth philtrum, thin upper lip), CNS developmental disorders (microcephaly, agenesis of the corpus callosum, cerebellar hypoplasia), small phalanges and nails, single palmar crease, epilepsy, cognitive and behavioral disorders [1].

References.

1. Duval-White CJ, et al. Am J Occup Ther. 2013 Sep-Oct;67(5):534-42.
2. Millichap JG. Neurological Syndromes. New York: Springer; 2013. p. 69.

HEADACHE DISORDERS

PRIMARY HEADACHE AND RHEUMATIC DISEASE

Investigators at Istanbul University and Mersin University School of Medicine, Turkey, assessed the occurrence, prevalence and clinical characteristics of primary headache in pediatric patients, aged <16 years, with chronic rheumatic diseases such as juvenile idiopathic arthritis (JIA) and familial Mediterranean fever (FMF). A 53-item headache questionnaire was completed by 601 patients (378 with FMF and 223 with JIA). Each group was divided into two subgroups according to headache occurrence or nonoccurrence: 29.5% with FMF had migraine, 37.6% probable migraine and 32.9% with tension type headache (TTH). In JIA group, 28.2% had migraine, 41.2% probable migraine, and 30.6% with TTH. Headaches were not aggravated by exacerbation periods of the systemic disease. Family history of hypertension and diabetes and of headache was reported higher in patients with headache, especially migraineurs. (Uluduz D, Tavsanli ME, Uygunoglu U, et al. Primary headaches in pediatric patients with chronic rheumatic disease. **Brain Dev** 2014 Nov;36(10):884-91).