●1699 A TRANSMISSION ELECTRON MICROSCOPY STUDY OF HUMAN CEREBRAL CORTICAL AND GERMINAL MATRIX (GM) BLOOD VESSELS IN PREMATURE NEONATES. M. Halit Pinar, William H. Edwards, Jonathan Fratkin, Miguel Marin-Padilla (Spon. by Robert Klein). Dartmouth Medical School Depts. of Maternal and Child Health and Pathology, Hanover, New Hampshire.

Intracranial hemorrhage in premature human neonates is a major cause of mortality and morbidity. The hemorrhage usually originates in the GM over the caudate nucleus. Although structural susceptibility of the GM blood vessels to neonatal stress has been suggested as a cause for hemorrhage, histological confirmation is lacking. Because cortical hemorrhage in prematures is less frequent, we compared the ultrastructural morphology of blood vessels in the GM with those of the cerebral cortex. We studied prematures of 22-27 weeks gestation with and without GM and intraventricular hemorrhage. Autopsy materials were obtained less than 2 hours postmortem, fixed in glutaraldehyde and examined by transmission electron microscopy.

Our observations are that the cortical blood vessels uniformly have mature characteristics: continuous basal lamina, tight junctions, absence of fenestrations and complete pericytic encirclement. In the GM, however, there were 2 types of blood vessels. One type resembled the cortical vessels with all the characteristics of maturity. The second type had all the characteristics of immature blood vessels: presence of fenestrations and absence of a continuous basal lamina, tight junctions, and full encirclement by pericytes.

We postulate that the presence of structurally immature blood vessels in the GM makes this area more susceptible to hemorrhage.

†1700 METABOLIC EFFECTS OF GLUCOSE ADMINISTRATION IN THE ASPHYXIATED NEWBORN RAT. Paul F. Ploegman, Robert D. Jansen (Spon. by Richard L. Schreiner). Indiana University School of Medicine, Indiana University Hospitals, Department of Pediatrics, Indianapolis.

Brain injury resulting from birth asphyxia has been correlated with elevated CNS lactate levels. This study investigated the metabolic response of newborn rat pups to a glucose bolus given during normoxic recovery from asphyxia at birth. Three groups were studied: Group A-G, asphyxiated in 5% O_2 first 20 min of life, given glucose 1 g/kg at 20 min; Group A-S asphyxiated as group A-G but given saline at 20 min; Group C-G kept in room air from birth, given glucose at 20 min. Blood and brain tissue were obtained at birth, 20, 40, 60, 90, 120, 180, 240 and 300 min. Plasma glucose peaked in all groups at 40 min age (A-G, 230±16; A-S, 100±4; C-G, 156±12 mg/dl; $p<.001$ for intergroup comparisons); whereas blood lactate was maximum in each group at 20 min (A-G, 18.9±0.7; A-S, 17.4±1.5; C-G, 9.9±1.2 mM/l; p=NS A-G vs A-S, $p<.001$ A-G or A-S vs C-G). Blood lactate/pyruvate ratios also peaked at 20 min. Brain lactate and lactate/pyruvate ratios correlated directly with simultaneous blood values, with 20-min brain lactates being A-G 13.9±0.8, A-S 14.4±0.5 and C-G 7.1±0.9 mM/kg tissue; p=NS A-G vs A-S, $p<.001$ A-G or A-S vs C-G. Brain glucose reserves decreased with asphyxia and increased with glucose administration. Thus provision of glucose after an hypoxic insult increased available glucose but did not adversely affect tissue lactate or lactate/pyruvate ratios.

1701 DEVELOPMENT OF AN OLFACTORY TEST FOR CHILDREN. Robert A. Richman, Ernest M. Post, Herbert Wright, Lisa Kirsch, Geoffrey Morris, and Debra Ward. SUNY Upstate Medical Center, Department of Pediatrics and Olfactory Clinical Research Center, Syracuse.

To determine if olfaction could be reliably measured in young children, we tested 114 normal children, ages 4-10 years. We used 41 microfragrance ("scratch 'n' sniff") cards, and photographs to depict the test substances. The cards were randomized into 41 blocks of five. Each subject was scored on 5 trials of one block of five odorants, and identified each odorant by selecting one of the photographs. Children ages 4-5 identified 10, children ages 5-6 identified 13, and children ages 8-10 identified 22 of the odorants correctly more than 70% of the time. We then selected 5 of the more frequently recognized odorants and tested 175 additional children. The odorants were candy cane, fish, baby powder, bubble gum, and orange. We also administered the Peabody Picture Vocabulatory Test-Revised to determine the relationship, if any, between olfactory scores and general intellectual ability. Children between the ages of 3 6/12 and 4 years had only 68% correct. By age 5, the percent correct had reached a plateau of 93%. An adult with Kallmann syndrome (hypogonadotropic hypogonadism and anosmia) had only 24% correct. There was no relationship between the Peabody Test scores and percent correct on the olfactory test. In conclusion, we have developed an olfactory test for evaluating young children. The improvement in olfactory scores with age may be due to maturation of the olfactory process rather than intellectual development.

1702 NEONATAL CONVULSIONS: TYPE AND OUTCOME. Robertson, C.M.T., Glenrose School Hospital and Department of Pediatrics, University of Alberta, Edmonton, Canada.

Two hundred and thirty-six neonates with convulsions (90.8% of survivors) from a regional perinatal program had detailed neurodevelopmental follow-up as part of a cohort of 934 neonatal graduates assessed at 3.5 years of age. All children with known syndromes or malformations of the central nervous system were not included. Fifty-five percent were term neonates.

The types of clinical neonatal convulsions included: generalized tonic with or without generalized clonic (n=129)(36.4% handicapped), multifocal clonic (n=82)(35.4% handicapped), subtle or primitive (n=81)(33.3% handicapped), symmetrical myoclonic (n=6)(66.7% handicapped), and unspecified (n=12)(50.0% handicapped).

	# of Types of Convulsions					
	0	1	2	3	x^2	p
n	698	169	60	7		
% handicapped	9.2	26.6	46.7	57.1	93.0	<0.0001
% >6 months delay - FM	9.9	22.5	45.0	57.1	74.7	<0.0001
- GM	11.5	26.0	51.7	57.1	83.9	<0.0001
% >-1 SD IQ (Stan.Bin.)	16.8	33.7	40.0	71.4	46.4	<0.0001

[FM=Fine Motor; GM=Gross Motor; Stan.Bin.=Stanford-Binet]

'Handicapped' was also related to the number of types of anticonvulsants required to control the convulsions (chi square = 104.7, p= <0.0001), but was not related to the age of onset of convulsions.

Whereas previous studies have related seizure type and outcome, this study suggests a strong relationship between the number of different types of clinical neonatal convulsions per child and outcome.

†1703 PLASMA MONOAMINE METABOLITES FOLLOWING DEBRISOQUIN IN ADD. Bennett A. Shaywitz, Sally E. Shaywitz, George M. Anderson, Mark A. Riddle, James F. Leckman, Myra O. Smith, and Donald J. Cohen. Yale Sch. Med. Depts. Ped. & Child Stdy. Ctr.

We report an important new strategy in the investigation of the biology of ADD, the debrisoquin loading test. Debrisoquin, a unique monoamine oxidase inhibitor reduces the peripheral contribution to plasma catecholamine metabolites (HVA and MHPG, the principal metabolites of dopamine and norepinephrine, respectively), effectively minimizing the "noise" in the system, allowing central monoaminergic mechanisms to be more accurately examined. We studied the relationship between behaviors representing the cardinal symptoms of ADD and plasma monoamine metabolites in 5 boys with ADD (ages 7-14 years) before and after debrisoquin. Behavior was assessed by the Yale Children's Inventory (YCI) and a variety of cognitive and attentional tasks. Significant correlations were observed between plasma HVA and measures of impulsivity (YCI Impulsivity scale and Matching Familiar Figures Test), and plasma MHPG and measures of activity (YCI Activity scale) and attention (YCI Attention scale, Paired Associate Learning Test. Our findings suggest that dopaminergic systems influence those mechanisms responsible for impulsivity while noradrenergic systems relate to attention regulation and activity modulation.

●1704 FLUNARIZINE REDUCES BRAIN CATECHOLAMINE RELEASE AND MORPHOLOGIC DAMAGE CAUSED BY PERINATAL HYPOXIA-ISCHEMIA. F. Silverstein, K. Buchanan, & M. Johnston. U. of Michigan, Sect. of Peadiatric Neurology Ann Arbor.

Unilateral carotid artery ligation(UCL), followed by timed exposure to an 8% oxygen environment, in 7 day old rat pups is a useful preparation for study of the pathogenesis of hypoxic-ischemic brain injury. In this model, 1.5 hours of hypoxia-ischemia stimulates striatal dopamine turnover [homovanillic acid(HVA)/ dopamine(D) ratio] acutely and leads to tissue damage in the hemisphere ipsilateral to UCL(Ann Neurol 15:342, Neurosci Lettrs 49: 271). Pre-treatment with flunarizine, an organic calcium antagonist selectively concentrated in brain, markedly attenuated the acute striatal D release in a dose dependent fashion-optimally at 30 mg/kg. In normal pups HVA/D = .09 ± .01(n=20), & in saline pretreated hypoxic ligates HVA/D = 2.15 ± .5 on the side of UCL(n=15). However, in 14 littermate ligates given 30 mg/kg flunarizine intraperitoneally (i.p.), HVA/D = .37 ± .17 ($p<.025$, t-test). The same dosages, administered orally or i.p., limited the extent of morphologic damage; in animals sacrificed 2 weeks after injury, mean ipsilateral hemisphere weight reduction was 5.6 ± 2% in 12 pups given 30 mg/kg of flunarizine and 19 ± 4% in 13 litter-mate controls ($p<.01$, t-test).

These results demonstrate flunarizine's neuroprotective efficacy and confirm that in this model striatal dopamine turnover is a useful biochemical indicator of the threshold of hypoxia-ischemia needed to produce neuronal injury.