● 353 VALPROIC ACID (VPA): STEADY-STATE PHARMACOKINETICS IN PEDIATRIC PATIENTS WITH SEIZURES.

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In view of the paucity of steady-state VPA pharmacokinetic data in children, we present the results from a study of 30 patients on this drug (doses of 15-46 mg/kg/day):

Half-life	Elimination Rate	Clearance(Cl)		Vol. Distribution
$t_{½}$(hours)	Ke (hr.$^{-1}$)	ml/min/kg	ml/min/m^2	Vd(l/kg)
8.3 ± 2.6	0.09 ± 0.03	0.31±0.13	7.8±3.04	0.20 ± 0.06

Cl and Vd were higher in those receiving phenytoin and/or phenobarbital; the lowest Cl were found in 4 patients on methsuximide. Cl was inversely related to age and $t_{½}$ was age and sex dependent:

	Age (yrs.)			Sex		
	0.1 - 9	10 - 20	p	Male	Female	p
	n=19	n=11		n=16	n=14	
Cl(ml/min/kg)	.36±.14	.22±.08	<0.01	0.34±0.11	0.27±0.15	NS
$t_{½}$ (hrs.)	7.4 ±2.1	9.9 ±2.8	<0.02	7.5 ±2.0	9.4 ±2.8	<0.05

Peak and trough concentration ranges were 45 - 127 µg/ml and 13 - 101 µg/ml respectively; the variability in these concentrations emphasizes the need for specifying time of sampling in therapeutic monitoring. Our study also draws attention to (1)dependence of $t_{½}$ on age and sex and (2) effect of other anticonvulsants and age on Cl of VPA. These data are of therapeutic import.

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354 EFFECT OF INTRAUTERINE EXPOSURE TO NARCOTICS ON CORD BLOOD CONCENTRATIONS OF PROLACTIN(PRL), CORTISOL(C), AND THYROXINE (T_4) IN PRETERM INFANTS.

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PRL, C and T_4 enhance fetal lung maturation, and decreased cord blood levels of these hormones have been found in infants with RDS. Use of narcotics during pregnancy may both decrease the incidence of RDS and affect the metabolism of these hormones.

Cord blood concentrations were measured in 33 infants with a G.A. of 30 to 36 weeks. Ten were exposed to either heroin, methadone, or both and two of these developed RDS. Of the 23 non-narcotic exposed infants, 8 developed RDS and 15 did not.

The following results (median and range) were obtained:

	Prolactin (ng/ml)	T_4 (ug/dl)	Cortisol (ug/dl)
RDS	123.5(56.6-192.0)	8.2(5.9-16.8)	18.0(10.6-24.7)
No RDS	159.6(54.3-715.4)	9.9(5.6-16.2)	28.6(1.6-93.3)
Drug exposed	179.6(55.1-323.3)	9.5(5.1-21.3)	17.7(6.8-31.3)

The differences in PRL concentrations between the narcotic exposed and RDS groups were of borderline statistical significance (p=0.08), while levels of C were significantly higher in the no RDS than in the RDS or narcotic exposed groups (p<0.01). None of the other inter-group differences was statistically significant.

Intrauterine exposure to narcotics may play a modifying role in the synthesis of pulmonary surfactants.

● 355 RECOMMENDED AMIKACIN DOSES IN NEWBORNS OFTEN PRODUCE EXCESSIVE SERUM LEVELS.

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Emergence of a multiply drug resistant Enterobacter cloacae during a 7 week period in 1980 resulted in serious systemic disease in 4 infants and a high colonization rate in other infants in a newborn intensive care unit. Amikacin was employed as the aminoglycoside of choice in the initial treatment of suspected sepsis until the organism disappeared from the unit. Peak and trough serum amikacin levels were available in 18 infants. Recommended doses (7.5-10mg/kg loading; 15mg/kg bid IV) were given to 5 infants < 1000gm (range 590-980gm) and to 13 larger babies (range 1020-3300gm). Duration of therapy was similar in both groups prior to determination of antibiotic concentrations and averaged 3.2 ± 2.1 doses (x ± SD). Serum amikacin levels were measured using a Bacillus globii bioassay method with an accuracy of ± 1µg/ml. *Trough* levels 11.5 hours after a dose were 16.6 ± 11.9µg/ml in infants < 1000gm and 6.5 ± 4.3µg/ml in the larger infants (p < .02). *Peak* levels 1 hour post-infusion exceeded 40µg/ml in 3 of 5 < 1000gm babies and 4 of 12 > 1000gm infants (p = NS). These data show that surprisingly excessive blood levels of amikacin are likely in infants < 1000gm and may also occur in larger infants using currently recommended dosage schedules (J. Pediatr. 91:358, 1977). These unexpected findings emphasize the need to monitor drug levels and individualize therapy in very low birthweight infants.

356 PERSISTANT INDUCTION OF A CYTOCHROME P450 DEPENDENT MICROSOMAL ENZYME, ESTROGEN - 2-HYDROXYLASE, IN BRAIN AND LIVER, BY PRENATALLY ADMINISTERED PHENOBARBITAL.

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A major pathway of estrogen metabolism is 2-hydroxylation, catalyzed by a cytochrome P450 dependent microsomal enzyme. In the periphery the resultant metabolic product catechol-estrogen (CE), is rapidly inactivated. In brain however the locally produced CE has several specific effects, having its own specific receptors, competing for dopamine receptors in the pituitary and inhibiting both synthesis and metabolism of catecholamine neurotransmitters. In the immature male rat and in the female, but not in the mature male, the liver but not the brain enzyme is inducible by phenobarbital.

We injected pregnant female rats with phenobarbital on days 18 and 19 of gestation. We then measured estrogen 2-hydroxylase activity in the brain and liver of offspring on 1 through 21 days. Liver enzyme showed a diphasic response to this prenatal treatment with a 80% decrease in enzyme specific activity on days 1 & 2, and a 100% increase in enzyme activity persisting from days 5 through 21. Brain enzyme levels were significantly increased (↑50%) by this treatment from day 7 through day 21. This prolonged induction of a liver microsomal enzyme differs from that seen in young animals where enzyme activity returns to normal by one week after treatment. This is one of the first reports of a successful induction of brain microsomal cytochrome P450 enzyme.

357 DISPOSITION OF ^{14}C-PHENYTOIN IN THE PREGNANT AND NON-PREGNANT BABOON.

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The maternal and fetal disposition of ^{14}C-phenytoin (DPH) was evaluated in the pregnant (125-160 days) and non-pregnant baboon. Five pregnant and four non-pregnant female baboons (12-17 kg) were pre-anesthesized with ketamine (7 mg/kg) and maintained under halothane during the first 5 hrs of study. ^{14}C-DPH was administered intravenously as a 5 mg/kg bolus dose and blood, urine and amniotic fluid samples were collected for 48 hours. Results from pharmacokinetic analysis were (mean and SEM).

	Half Life (hr)	Dist. Volume (l/kg)	Cl. (ml/hr/kg)
Pregnant	22 (1.02)	1.79 (0.10)	57.2 (2.4)
Non-Pregnant	14.9 (.66)	.99 (.05)	46.3 (3.1)

During the first 5 hrs a significant decrease was observed in the urine output from pregnant animals of the DPH diol and conjugated metabolites (HPPH). In amnionic fluid DPH and HPPH concentrations reached 50% of maternal serum concentration within 24 hrs following DPH administration. At 48 hrs the amnionic/serum ratio for HPPH rose to 0.85 while the DPH ratio remained at 0.50. No other DPH metabolites were observed in the amnionic fluid. It is concluded that during pregnancy DPH conjugation and diol formation are reduced while dist. vol. is increased. The decrease in DPH half-life during pregnancy appears to reflect the increase in dist. vol. rather than changes in clearance (metabolism).

358 EFFECT OF GENTAMICIN ON NEUROMUSCULAR FUNCTION (NMF) OF A HYPERMAGNESEMIC NEONATE.

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Treatment of maternal pre-eclampsia with $MgSO_4$ is reported to produce flaccidity, lethargy and hyporeflexia in their infants. Aminoglycosides can also affect NMF. Both agents interfere with release of acetylcholine, producing a defect in neuromuscular transmission. A term infant was born to a pre-eclamptic mother treated with 28 gm $MgSO_4$. The baby had cord blood Mg^{++} of 3.9 mg/dl and demonstrated neuromuscular compromise as measured by ulnar nerve stimulation studies and neurologic examination. Improvement occurred as serum Mg^{++} level approached normal (1.5 ± 0.2 mg/dl). At 48 hrs. of age, septicemia was suspected and antibiotics (ampicillin 50 mg/kg IV q 12 hrs. and gentamicin 2.5 mg/kg IV q 12 hrs.) begun. Two hours after receiving the second dose of gentamicin, the infant had respiratory, followed by cardiac arrest. Resuscitation was successful and 24 hrs. later NMF was studied before and after a gentamicin dose. Increasing fatigability of NMF occurred at 1 and 2 hrs. after gentamicin. This case suggests that depressed NMF in a hypermagnesemic infant may be further compromised by aminoglycoside therapy.