DEVELOPMENTAL BIOLOGY

229 AMNIOTIC FLUID GAS TENSIONS. Soraya Abbasi, Vinod K. Bhutani, Nancy R. Roberts, Mitra M. Abbasi, Ronald J. Bolognese. (Spon: Lois Johnson). Univ. Penn. Sch. Med. Pennsylvania Hosp. Dept. Ob/Gyn & Pediatrics, Phila., PA.

Ninety-eight amniotic fluid (AF) samples, collected at amniocentesis over a gestational age (GA) range of 16-40 wks, were analyzed for CO_2 and O_2 gas tensions. Of these, 21 samples were obtained at Cesarean section and matched with both umbilical vein (UV) and arterial (UA) gas tensions. The cord and expelled placental vessels were catheterized for blood gas tensions. All samples were collected under anaerobic conditions and gas tensions measured by an IL 1301/1303 analyzer. AF gas tension values were analyzed as a function of gestational age and grouped: I = 16-20 wks GA, II: 21-30 wks, and III = 31-40 wks GA. Mean ± SEM values were: Gr. I, 17.5 ± 1 wk GA (n = 38); pH, 7.11 ± 0.01; PO_2, 59.1 ± 1.9 mmHg and PCO_2 42.3 ± 2.6 mmHg. Gr. II, 26.0 ± 1.0 wks GA (n = 7): pH = 7.16 ± 0.01; PO_2 = 64.3 ± 3.1 mmHg; PCO_2 = 44.3 ± 1.1 mmHg. Gr. III, 36.0 ± 1.0 wks (n = 53): pH 7.11 ± 0.01, PO_2 = 58.1 ± 3.8 mmHg, PCO_2 = 47.5 ± 1.2 mmHg. At delivery, the mean ± SEM values of AF and blood gas tensions were correlated as below:

	AF	UV	UA
pH	7.11 ± 0.01	7.28 ± 0.01	7.28 ± 0.01
PO_2 (mmHg)	51.7 ± 3.5	25.3 ± 1.6	18.4 ± 1.7
PCO_2 (mmHg)	49.2 ± 0.9	48.7 ± 1.8	49.4 ± 2.1

These data suggest that there is an equilibrium of gases, especially PCO_2, between the fetus, chorioamnion and maternal circulation. AF gas tensions need to be evaluated as an alternative and, presently, a less invasive means of assessing fetal gas tensions and thus of fetal well being.

230 THE EFFECT OF CHRONIC PROPRANOLOL (P) ON THE GROWTH AND ENDOCRINE FUNCTION OF NEWBORN PUPPIES. Raymond D. Adelman and Jan Wright. University of California, Davis, Department of Pediatrics, Sacramento, CA.

The effect of P, commonly employed in the treatment of neonatal hypertension, on growth, development and endocrine function of developing infants has not been examined. Beagle littermates, age 1 week, were placed in one of three groups: P 3 mg/kg/BID, P 9 mg/kg/BID, or control (C). Measurements of blood pressure, weight, and length were done weekly or bi-weekly. At 3 and 6 months of age fasting puppies were given, on different days, 0.5 gm/kg of glucose IV and 0.1 U/kg insulin IV for determination of glucose and insulin tolerance respectively. Fasting T_3 and T_4 levels were determined. Animals were sacrificed at 6 months and wet organ weights obtained.

Blood pressure was significantly lower in P treated animals ($p < .001$). There were no significant differences between P and C animals in body or individual organ size. After IV insulin, P animals had greater falls in serum glucose ($p < .02$) compared to C animals at 3 months (42.5% vs 33.6%) and at 6 months (33.6% vs 26.4%). In P animals glucose disappearance rate was slower at 3 months (.009 vs .011, $p < .05$) and T_4 levels were lower at 6 months (2.85 mcg/dl vs 3.51 mcg/dl, $p < .05$).

In summary, chronic β blockade with P had no effect on body or organ growth of newborn puppies. However, significant abnormalities were observed in thyroid function and in glucose homeostasis, suggesting the need for additional studies on the safety of chronic β blockade in developing infants.

● 231 MEASUREMENT OF THERMOGENIN SYNTHESIS IN BROWN ADIPOSE TISSUE (BAT). John D. Arnold, Hasmukh V. Patel, Karl B. Freeman (spon. by J.C. Sinclair) McMaster University, Depts. of Biochemistry and Pediatrics, Hamilton, Ontario, Canada.

Thermogenin is a mitochondrial inner membrane protein which mediates non-shivering thermogenesis in BAT. It has a molecular mass of 32,000 Da and acts by uncoupling mitochondria to produce heat. We report a method of measuring its synthesis. Polysomes were isolated from BAT of developing rabbits and translated in a reticulocyte protein synthesizing system. Newly synthesized thermogenin was isolated with monospecific antibodies. This technique has been applied in developing rabbits to demonstrate a 5-fold increase in thermogenin synthesis before birth, and a gradual decrease after birth.

	Age (days)	Thermogenin (% of new protein)
Fetal	24	0.17
	26	0.40
	29	0.67
	31 (term)	0.88
Post-natal	1	0.69
	7	0.73
	14	0.49
	23	0.29

The technique provides a method to study other perinatal influences on thermogenin synthesis such as the effect of postnatal environmental temperature. In preliminary experiments thermogenin has been purified from human neonatal BAT.

232 THE EFFECT OF DOPAMINE ON RENAL FUNCTION IN NEWBORN PUPPIES. Farahnak K. Assadi, Samson Samuel, Linda Fornell, Eunice G. John, (Sponsored by Dharmapuri Vidyasagar). University of Illinois College of Medicine, Department of Pediatrics, Chicago, Illinois.

In adults, moderate doses of dopamine (D) (5 to 15 μg/kg/min) increase renal blood flow; high doses (>20 μg/kg/min) decrease renal blood flow. Although many newborn infants with shock are treated with D, little is known about the effect of moderate dose of D in this age group. Thus we studied the renal effect of intravenous D before (C) during (E) and following (PE) the infusion of dopamine (10 μg/kg/min) in 1 wk old puppies (P). Renal blood flow (RBF), glomerular filtration rate (GFR), urine flow (V) fractional sodium excretion (FE_{Na}) free water clearance and distribution of renal blood flow (RBD) were obtained before and during infusion of dopamine. The results are: M±SE, *P<.05 by paired t test.

	RBF (ml/min/kg)	GFR(ml/min)	V ml/min	FE_{Na}	CH_2O
C	15.5 ± 2.2	4.0 ± 0.84	0.80 ± 0.26	2.9 ± 2.5	0.07 ± 0.01
E	*8.3 ± 0.9	*2.2 ± 0.52	*2.44 ± 0.58	*4.9 ± 2.4	*0.05 ± 0.01
PE	10.7 ± 1.07	3.4 ± 0.52	0.82 ± 0.25	4.8 ± 3.1	0.05 ± 0.01

Outer cortical to inner cortical blood flow ratio decreased significantly during D infusion (P<.05). These studies demonstrate that D in moderate doses decreases RBF, GFR, and CH_2O; increases FE_{Na}, and UV in puppies. These findings are similar to high output renal failure and should be interpreted with caution. Difference in renal response to moderate dose of D in adult and 1 week old may be a function of D receptors.

233 THE EFFECT OF ARGININE VASOPRESSIN (AVP) IN MODULATING CARDIOVASCULAR RESPONSE IN HYPOXEMIC (HPX) NEWBORN LAMBS. Nancy A. Ayres, Douglas N. Weismann, Oliva McWeeny, Jean E. Robillard, U Iowa, Peds, Iowa City, IA.

To evaluate the role of AVP in modulating the hemodynamic response to HPX, chronically catheterized newborn lambs (5-19 days) were studied using a selective antagonist, d$(CH_2)_5$Tyr(Me)AVP, to the vasopressor response of AVP. Experimental lambs received a 100 ug bolus infusion of AVP-inhibitor prior to the onset of HPX; control lambs received the vehicle only. Using microspheres, cardiac output (C.O.) and organ flow were measured in both groups.

	CONTROL (n=7)		AVP-INHIBITION (n=7)	
	Baseline	HPX	Baseline	HPX
PO_2 mmHg	85±3	36±1*	95±2	38±2*
MABP mmHg	76±2	73±3	80±47	76±3
Heart Rate beats/min	177±9	231±22*	216±17	249±20*
C.O. ml/min/kg	620±39	794±71*	774±170	971±352
Heart ml/min/gm	2.75±0.39	7.54±1.05*	3.26±0.93	6.35±1.5*
Brain ml/min/gm	1.09±0.10	1.55±0.16*	1.18±0.11	1.54±0.11*
Adrenal ml/min/gm	1.64±0.62	5.00±0.76*	3.41±0.62	4.85±0.46*
Kidney ml/min/gm	3.13±0.23	3.89±0.56	3.66±0.47	3.47±0.33

x ± SEM, * for p<0.05. HPX resulted in a similar increase in C.O. and organ flow to critical organs (heart, brain and adrenal) in both groups of animals. In addition, vasoactive substances (epinephrine, norepinephrine, and angiotensin II) were measured and increased similarly in both groups. Thus, AVP does not appear to play a critical role in the cardiovascular response to HPX in newborn lambs.

234 THE ROLE OF ARGININE VASOPRESSIN (AVP) IN MODULATING THE CARDIOVASCULAR RESPONSE IN HYPOXEMIC (HPX) FETAL LAMBS. Nancy A. Ayres, Oliva McWeeny, Jean E. Robillard, U Iowa, Peds, Iowa City, IA.

The role of AVP in modulating the cardiovascular response to HPX was studied in 2 groups of fetuses (111-135 days; term 145 days). The experimental (EXP) group was given the AVP inhibitor (AVP-I), d$(CH_2)_5$Tyr(Me)AVP (400 ugm bolus), 80 minutes prior to the onset of HPX. The control group (CON) received only vehicle. Using microspheres, cardiac output (C.O.) and blood flow distribution were measured in both groups before, during and 80 min after HPX. HPX significantly decreased fetal PO2 from 20±4.0 to 13±3.5 mmHg ($p<.001$) and produced significant increases in the proportion of C.O. distributed to heart, brain, and adrenals and a significant decrease to the carcass in both groups. A significant decrease to the gut was seen only in CON fetuses and C.O. decreased significantly only in EXP. The effect of AVP-I on fetal arterial blood pressure (ABP) during HPX was as follows:

% Change in Mean Arterial Blood Pressure during HPX as Compared with Baseline			
minutes of HPX	CONTROL (n=10)	EXP (n=12)	p value
1	+6.8±3.0	-8.4±2.2	.001
2	+2.5±1.7	-10.8±2.6	.001
3	+3.2±2.9	-11.3±2.5	.005
4	+2.7±1.5	-13.5±3.6	.005
5	+3.1±2.3	-8.6±3.5	.02
10	+9.0±3.0	-3.2±4.0	.05
20	+7.3±2.8	-6.7±3.1	.005
30	+4.1±2.6	-10.5±5.3	.05

Epinephrine, norepinephrine, and angiotensin II increased similarly in both HPX groups. Thus, AVP appears to play a significant role in modulating C.O. and ABP during HPX but does not affect redistribution of flow to heart, brain, adrenal and carcass. Moreover, the decrease in ABP following AVP-I (EXP) during HPX was not associated with a greater increase in vasoactive substances in CON fetuses.