whose color was green between 36.3–37.1°C (normal abd. skin temp.). Below this temp. the color was brown; above, green-blue (37.2–37.9°C) or blue (>37.9°C). The crystals were fixed to black saran plastic with an adhesive undersurface which permitted fixation to the skin. 365 observations (65 infants) were made of the color of the abdominal tape compared to rectal temperature.

	Tape color				
	Brown	Green		Blue-green	Blue
# of observations	10	295		47	13
False positive (5.4%)	4	0		11	5
False negative (1.9%)	0	7	1 < 36.2°C 6 > 37.5°C	0	0

Conclusions: Body temperature of term infants can be estimated accurately, quickly, simply and frequently by this method.

The effect of phenobarbital on asphyxia of the newborn monkey. DAVID E. FISHER, JOHN B. PATON, HENRY H. MANGURTEN, and RICHARD E. BEHRMAN. *Univ. of Ill. Coll. of Med., Chicago, Ill.*

Fourteen newborn monkeys (*M. speciosa,* 2–6 days old) were asphyxiated; 8 were pretreated with phenobarbital and 6 were untreated controls. The treated group received 10 mg/kg I.M. twice prior to the asphyxiation; only one of the infants was not clinically sedated. After 5 minutes of total asphyxia (blocked endotracheal tube) there was a significant mixed respiratory and metabolic acidosis associated with a profound decrease in cardiac output (C.O. ml/min/kg microsphere withdrawal method). Regional blood flow (% C.O.) to the brainstem, midbrain, cerebellum (total of these 3 areas identified as Brain in table) and the heart increased; the % C.O. distributed to the G.I. tract and kidneys decreased. These effects of asphyxia were not significantly modified by phenobarbital.

Acid-base parameters, O_2 consumption ($\dot{V}O_2$-Kipp diaferometer), blood pressure, cardiac output, and the regional distribution of the cardiac output were determined for phenobarbital treated and control groups prior to axphyxiation; no significant differences were observed.

Mean values	pH	C.O.	Brain	Heart	G.I.	Kidney
Before						
Control	7.396	152	4.2	4.4	7.6	11.9
Phenobarbital	7.420	214	5.2	5.9	6.5	12.4
After						
Control	6.950	22	9.5	18.0	2.8	5.0
Phenobarbital	6.870	32	13.2	17.2	2.1	3.0

Red cell volume in respiratory distress syndrome. R. USHER, S. SAIGAL, A. O'NEILL, L. CHUA, and Y. SURAINDER. *Royal Victoria Hosp., Jewish General Hosp., and McGill Univ., Montreal, Que., Canada*

The role of placental transfusion in the development of RDS is still in dispute. Red cell volume is closely related to placental transfusion in prematures with 32 ± 3 ml/kg being found after immediate and 48 ± 6 ml/kg after 5 min delayed cord clamping.

In order to determine whether the degree of placental transfusion was related to the incidence or severity of RDS, red cell volume was measured at age 4 hours in 262 premature infants by I^{125} albumin and venous hematocrit × 0.87 to obtain total body hematocrit.

Red cell volumes averaged 39.7 ml/kg in unaffected premature infants and 37.1 ml/kg in those with RDS (PO.O2). RDS survivors had a higher red cell volume (37.7 ml/kg) than fatal cases (33.8 ml/kg). The 87 infants with the smallest red cell volumes (mean 30.1 ml/kg) had a 10.3% risk of death from RDS; the 88 with intermediate red cell volume (38.0 ml/kg) had a 5.7% risk, and the 87 with the largest red cell volumes (47.9 ml/kg) had only a 2.3% risk of death from RDS, even though the birthweights and gestational ages of the three groups were identical. From this data, a placental transfusion seems to greatly reduce the risk of death from respiratory distress syndrome.

Diagnosis of the respiratory distress syndrome (RDS) by the absence of phosphatidyldimethylethanolamine (PDME) in tracheal effluents of low birth weight (LBW) infants. PAUL Y. K. WU, ROBERT C. BORER, JR., and HOUCHANG MODANLOU (Intr. by Louis Gluck). *Los Angeles County-Univ. of Southern Calif. Med. Ctr., Los Angeles, and Univ. of Calif., San Diego, La Jolla, Calif.*

PDME, an intermediate in the synthesis of surface-active lecithin from lungs, was isolated from lipid extracts of tracheal effluent ("mucus") obtained from hypopharynx, separated by thin-layer chromatography on precoated silica gel mylar strips and detected with bromothymol blue.

PDME, arterial blood pH and rectal temperatures were recorded serially (½, 1, 2, 3, 4 hours of life) in 28 randomly selected LBW infants. Of 126 tests performed, the results at 3 hours correlated with diagnosis of RDS. PDME was absent in 14/16 infants with RDS, and PDME was present in 11/12 infants without RDS. There was a significant ($p < 0.01$) association between arterial blood pH and PDME:

pH 7.20 ± 0.10 S.D.	PDME absent
pH 7.27 ± 0.12 S.D.	PDME present

Little correlation was found between temperature and PDME. The results indicate that serial determinations of PDME may provide a rapid definitive early chemical diagnosis of RDS.

Early treatment of neonatal acidosis in low birth weight infants in relation to respiratory distress syndrome. C. J. HOBEL, M. A. HYVARINEN, A. ERENBERG, G. C. EMMANOUILIDES, and W. OH. *UCLA Sch. of Med., Harbor Gen. Hosp., Torrance, Calif.*

The effects of early vs late correction of acidosis on the clinical course of the respiratory distress syndrome (RDS) was evaluated in 82 pre-term infants weighing less than 2,250 grams. Criterion for inclusion into the study was a pH of less than 7.25 either from fetal scalp, cord or umbilical arterial blood samples within 20 min of age. The infants were randomly grouped into: A, birth weight <1500 gm, early treatment (intravascular $NaHCO_3$ infusion within 30 min of age); B, <1500 gm, late Rx (2–3 hrs of age); C, 1501–2250 gms, early Rx, and D, 1501–2250 gm, late Rx. Infants were otherwise similarly managed. At designated intervals predetermined clinical parameters were used to make the diagnosis and to grade the severity of RDS. No significant differences were observed in arterial blood pH and PO_2 values between groups during the first 30 min of life prior to Rx. In the early Rx groups, the arterial blood pH was significantly higher during the first 12

hrs. Base deficits were significantly smaller for the first 3 hrs in the Group A and for the first 24 hrs for group C. The PaO_2 and $PaCO_2$ values were not significantly different between early and late Rx groups. The incidence of RDS between groups was similar. The degree of severity of RDS was significantly greater in the late treatment groups from 12–96 hrs of age. A higher mortality rate was observed in infants weighing between 1001–2250 gms with late Rx. This study suggests that early correction of neonatal acidemia favorably influences the course of RDS, and that it may reduce the mortality of infants between 1001 and 2250 gms.

DEVELOPMENTAL BIOLOGY

Cartilage ultrastructure in the chondrodystrophies. D. L. RIMOIN, R. SILBERBERG, R. L. KAUFMAN, and R. ROSENTHAL (Intr. by J. W. St. Geme). *Harbor Gen. Hosp., UCLA Sch. Med., Torrance, Calif., and Washington Univ. Sch. Med., St. Louis, Mo.*

The chondrodystrophies are a heterogeneous group of disorders which have been classified on the basis of clinical, radiographic and genetic criteria. Histopathological studies of costochondral junction and iliac crest biopsies have allowed for the further classification of these disorders on the basis of the type of derangement in endochondral ossification. Electron microscopic studies of resting cartilage from these biopsy specimens demonstrate that the chondrodystrophies may be further characterized on the basis of ultrastructural abnormalities in the chondrocytes or intercellular matrix.

For example in achondroplasia, a disease associated with normal endochondral ossification, no ultrastructural abnormalities are present in either the chondrocyte or the matrix. In the mucopolysaccharidoses, the matrix is ultrastructurally normal, but the chondrocytes are filled with large cytoplasmic vacuoles of possible lysosomal origin. These vacuoles are uniform in appearance in the Hurler syndrome whereas in the Sanfilippo syndrome, two distinct populations of vacuoles can be identified. These ultrastructural observations provide a further clue as to the specific pathogentic mechanisms operative in the bone dysplasias.

Subcellular studies of the abdominal musculature in the prune belly syndrome. D. T. MININBERG, K. OKADA, R. PERSUTTI, and F. MONTOYA (Intr. by M. Lending). *New York Med. Coll., N. Y., N. Y.*

Light microscopy and electron microscopy were used to study the abdominal musculature in two infants with the prune belly syndrome. The electron micrographs demonstrated derangement in the coherence of the Z lines and myofibrils. This evidence supports the theory of developmental arrest at a 10 week level. We believe this to be the first time these electron microscopic studies have been made.

"Skin age" as a predictor of gestational age. A study of within-litter and between-litter variability in fetal rabbits. MARY E. AVERY, WILLIAM L. TAEUSCH, and N. S. WANG. *McGill Univ., Montreal, Que., Canada*

Recent studies in fetal rabbits led to the hypothesis that organ systems may mature at different rates among littermates, and raised the question of which organs were coupled in maturation, and presumably responsive to the same regulators. The number of epiphyseal centers and body weight were closely correlated and could vary 100% between littermates. Lung distensibility and stability (lung age) was predicted by gestational age better than by body weight. (Kotas, Avery, Pediat. 47: 1971). "Skin age" was assessed by histologic criteria in 70 rabbits from 14 litters delivered between 22 days gestation and term (30 days). Significant morphologic changes were evident from 24 to 30 days. "Skin age" was remarkably constant between littermates regardless of their weight, and in this sense it resembled lung age. In rabbits, at least, the skin is a predictor of maturity.

Evaluation of human gestational age by albumin, IgG globulin, and alpha-1-fetoprotein measurements. M. A. HYVARINEN, P. ZELTZER, E. R. STIEHM, and W. OH. *UCLA Sch. of Med., Harbor Gen Hosp., Torrance, Calif.*

Serum albumin (Alb) and IgG globulin levels in the developing fetus increase with maturity because of an increasing placental passage from the maternal circulation to the fetus. In contrast, levels of alpha-1-fetoprotein (AFP) decrease with maturity from a maximum serum level at 20 weeks of gestation (mean level > 140.0 mg%) to trace levels (mean 5 mg%) at 40 weeks gestation. These observations permit an estimation of gestational age by measuring levels of cord blood IgG, Alb, and AFP, and when paired maternal IgG and Alb levels are available, by calculating fetal/maternal IgG and Alb ratios. Cord sera (and the matched maternal sera) from 55 infants (23 preterm, 32 term) on whom gestational age had been estimated by maternal history and physical examination (Dubowitz criteria, J. Ped. 77:1, 1970) were studied. Gestational age was correlated ($p < .001$) directly with cord levels of IgG ($r = 0.81$) and Alb ($r = 0.76$) and inversely with AFP ($r = -0.79$). Birth weight was also correlated ($p < .001$) with cord IgG ($r = 0.79$), Alb ($r = 0.73$) and AFP ($r -0.76$). Using a fetal/maternal IgG and Alb ratio did not result in an improved correlation. Although AFP was detected in all cord sera, AFP was not detected in the maternal circulation, nor in 14 of 15 amniotic fluid samples. Cord IgG and albumin levels best reflect gestational duration while cord AFP levels reflect fetal maturity.

Early fetal expression of genes for lysosomal enzymes. C. RONALD SCOTT, SANDRA H. CLARK, and JOHN S. O'BRIEN. *Univ. of Wash., Seattle, and Univ. of Calif., San Diego, Calif.* (Intr. by R. J. Wedgwood.)

Deficiency of specific lysosomal enzymes have been increasingly implicated in childhood storage diseases and the activity of these enzymes in cultured amniotic fluid cells has been used as an indicator of fetal genotype. To establish the time of expression of the genes for lysosomal enzymes during early human development, the activity and electrophoretic mobility of selected lysosomal enzymes were determined in fetal liver between 40 and 156 days' gestation and compared to infant and adult values. Only fetal liver obtained from therapeutic abortions performed by hysterotomy and dated by crown-rump measurements was selected. β-Glucosidase, β-glucuronidase, N-acetyl-glucosaminidase, α-glucosidase and β-galactosidase were assayed using their respective p-nitrophenol substrates. Activity of each enzyme was present in the earliest specimens and the specific activity remained constant between the 5th and 22nd week of gestation and were similar to those measured in infant and adult livers. Starch-gel electrophoresis was performed on those two enzymes, β-galactosidase and N-acetyl-glucosaminidase, known to have more than a single molecular form; there was no difference in their electrophoretic patterns during development.

This study establishes that for the five lysosomal enzymes