1843 WEIGHT TRAINING REDUCES RESIDUAL VOLUME AND INCREASES BODY WEIGHT, MUSCLE SIZE AND STRENGTH IN CYSTIC FIBROSIS. Gordon D. Strauss, Alan B. Osher, Chun-I Wang, Thomas G. Keens, Eric Goodrich, Fran M. Gold, Wendy Colman, Michael W. Stabile. UCLA School of Medicine, Neuropsychiatric Institute, Department of Psychiatry, Los Angeles, and USC School of Medicine, Children's Hospital of Los Angeles, Department of Pediatrics, Los Angeles.

Nine patients with cystic fibrosis (CF), age 24.7 +/- 7.2 (mean +/-S.D.) years, with FEF 25-75% 0.90 +/- 0.45 l/s (22% predicted) and residual volume (RV) 3.03 +/- 1.06 l (278% predicted) participated in a six month trial of variable weight training (VWT) designed to strengthen the accessory muscles of respiration. Weight, pulmonary function tests (PFT), muscle size and strength, self concept and social function were measured at baseline, after a 3-month control period and after VWT. Compared to control period, differences after VWT were significant (p .01, two tailed t test) for weight gain (mean 2.9 kg), reduced RV (mean 1.77 l) increased chest diameter A-P and transverse (mean 6.15 and 6.89 cm respectively) increased upper arm circumference (mean 1.80 cm), and percent of all muscle groups at normal or better strength (mean increase 100%). No other changes in PFT, self concept or social function reached significance. VWT appears to reduce hyperinflation by strengthening and enlarging the accessory respiratory muscles.

1844 EFFECT OF PGE_2 ON CONTROL OF BREATHING IN THE NEONATAL PIGLET. Cleide Suguihara, Eduardo Bancalari, Dorothy Hehre, Monica Caveny, Ronald Goldberg, Tilo Gerhardt. University of Miami, Jackson Memorial Hospital, Miami.

Prostaglandins (PG) and cyclo-oxygenase inhibitors influence fetal and neonatal respiration but the exact mechanism of this action is unknown. We evaluated the effects of PGE_2 on control of breathing in 7 neonatal pigs ($\bar{X} \pm$ SD; age 3.7±1.3 days; wt. 1.39±0.3 kg) sedated with PO Chloral Hydrate. Minute ventilation (VE) and airway occlusion pressure (Pocc) were measured in room air (RA), 5% CO_2 and 10% O_2 before and after 15-20 min. of PGE_2 infusion (1 µg/kg/min.) Results were ($\bar{X} \pm$ SD):

	VE	Δ VE/ Δ PaCO2		Pocc (cmH20)		
	RA	5% CO_2	10% O_2	RA	5% CO_2	10% O_2
Basal	508	111	581	15.2	25.4	17.3
	±115	±41	±100	±1.8	±5.6	±4.3
PGE_2	394	34	516	13.7	18.0	14.8
	±79	±16	±139	±4.1	±6.7	±3.2
P	<.05	<.001	NS	NS	<.05	NS

PGE_2 produced a depression of minute ventilation and ventilatory response to CO_2 but did not alter the ventilatory response to 10 min. of hypoxia. Two animals developed apnea immediately after decreasing the FiO_2 during PG infusion. Airway occlusion pressure with 5% CO_2 was also lower during PG infusion than basal. Lung compliance and resistance did not change with PG. These results indicate that PGE_2 reduces ventilation by central respiratory depression. While in some animals PGE_2 may alter the immediate response to hypoxemia resulting in apnea, it does not change the ventilatory response to steady state hypoxemia.

1845 ADDUCTOR POLLICIS MUSCLE FUNCTION TESTS IN CYSTIC FIBROSIS. A. Szeinberg, L. Levy, I.M. Fraser, C. Mindorff and H. Levison. Department of pulmonary medicine, The Hospital for Sick Children, Toronto, Canada

Malnourished individuals have been reported to have characteristic electrically stimulated adductor pollicis muscle (APM) function tests: reduced maximal relaxation rate (MMR) and increased force at 10Hz in relation to 100Hz stimulation (F10/100) (Am J Clin Nutr 1982;36:602). We reexamined this observation and assessed the capacity of these tests to detect acute weight changes, performing 44 APM function tests in 30 cystic fibrosis (CF) patients, aged 17 to 34 years. Patients whose body weight/height ratio (W/H), the ratio of actual to ideal body weight (Lancet 1975;2:219), was 90% or below were defined as malnourished. MMR & F10/100 in the well-nourished subgroup were comparable to values previously reported in normal healthy individuals. In the malnourished subgroup (W/H 83±2% SEM) F10/100 was significantly increased ($P < 0.05$), whereas, MMR did not differ between both subgroups. 14 patients were reexamined after a 3 month interval, four of which had changes in body weight of 2kg or more, however these were not associated with concomitant alterations in APM function.

In conclusion, our data confirms the observation that F10/100 is increased in malnourished individuals. However, neither F10/100 nor MMR are useful tests to follow the nutritional status of patients with CF.

●1846 CHILDREN'S RESPIRATORY STUDY (CRS) OF TUCSON: A PROSPECTIVE STUDY OF ACUTE AND CHRONIC LUNG DISEASE. L.M. Taussig, A.L. Wright, C.G. Ray, H.R. Harrison, and G.H.M.A. Pediatricians, Department of Pediatrics and Division of Respiratory Sciences, Arizona Health Sciences Center, Tucson, AZ.

The CRS, begun in 1980, is a longitudinal study assessing the role of infectious, physiologic, genetic, immunologic, allergic, environmental, and familial factors in producing acute and chronic lower respiratory tract illnesses (LRIs) in childhood. Healthy neonates were enrolled at birth together with their parents and siblings. Cord and 9-month bloods are evaluated for a variety of immunologic tests. During an LRI, specimens are obtained for viral, chlamydial, and mycoplasma cultures and serologies and immunologic tests. In the first few months of life, before LRIs, a subset of the enrolled population is studied with pulmonary function tests, including bronchoprovocation with cold air. Historical data are obtained using questionnaires. 1,182 infants have been enrolled in the study; this represents 79% of the families eligible for enrollment. The loss/drop rate is 3.3% per year. There have been 785 LRIs. Pulmonary function tests have been done on 180 infants. This longitudinal study: (1) offers a unique opportunity to evaluate a number of potential risk factors for acute and chronic lung disease in a large cohort of children followed from birth; and (2) avoids the pitfalls of cross-sectional analyses, biases of recall, and the absence of infectious, immunologic, and physiologic data, characteristics of most previous studies. (Supported by NHLBI-SCOR Grant HL-14136.)

●1847 CROMOLYN SODIUM DECREASES THE PULMONARY VASCULAR RESPONSE TO ALVEOLAR HYPOXIA IN LAMBS: Bonnie J. Taylor, James E. Fewell, Donald E. Hill, Univ of Ark for Medical Sciences, Department of Pediatrics, Little Rock, AR

Cromolyn sodium (CS), a mast cell stabilizing agent, attenuates the pulmonary vascular response to hypoxia (H) in adult sheep. However, its effect on the newborn's pulmonary vascular (PV) response to H, which is more pronounced than that of the adult, is not known. We therefore investigated the effect of CS on the PV response in 6 newborn lambs instrumented for measurements of systemic and pulmonary artery pressures (SAP, PAP), left atrial pressure (LAP), and pulmonary blood flow (Qp). The cardiopulmonary response to alveolar H (F_IO_2 0.10, F_ICO_2 0.05) was determined twice in each animal; once following placebo (normal saline) and once following intravenous infusion of CS (3mg/kg/min). The experiments were separated by 24 hours and the sequence of placebo (PL) and CS was alternated between animals. CS did not affect baseline cardiovascular variables but significantly decreased the H-induced PV response of increased PAP and pulmonary vascular resistance (PVR).

	PL-Control	PL-Hypoxia	CS-Control	CS-Hypoxia
PVR	.068 ± .03	.099 ±.04†	.071 ± .03	.068†
PAP	28 ± 9	39 ± 8†	30 ± 7	31 ± 10†
Qp	330 ± 48	373 ± 78	328 ± 64	369 ± 64

(† $p<0.05$ by paired t-test for differences between groups)
These results provide indirect evidence that mast cell degranulation mediates the PV response to hypoxia in newborns.

●1848 DO HYPOXIA AND HYPERCAPNIA CONTRIBUTE TO DIAPHRAGMATIC FATIGUE IN PRETERM INFANTS? William G. Teague, Ralph C. Targett, and Gregory P. Heldt (Sponsored by Richard D. Bland), Cardiovasc Res Inst and Dept of Pediatrics, Univ Calif, San Francisco, CA

Muscle fatigue shifts the power spectrum of the diaphragmatic electromyogram (DE) from high to low frequencies. Hypoxia and hypercapnia accompany respiratory failure in neonates, however their contribution to respiratory muscle fatigue is unknown. We tested the effects of alveolar hypoxia and hypercapnia on the DE frequency spectrum in 5 preterm infants studied at 39 ± 2 post-conceptional weeks of age while they breathed room air (control) and after 5 minutes of breathing 17% O_2 or 4% CO_2. We recorded DE from bipolar electrodes at the right costal margin mid-axillary line, abdominal movements with a circumferential strain gauge, skin-surface O_2 (PsO_2) and CO_2 ($PsCO_2$), and esophageal pressure (Pes) with a saline-filled tube. A fast Fourier transform calculated the centroid frequency (Fc) and summed amplitudes of power (SA) over 256 ms windows of DE selected at the peak of abdominal respiratory movements, free of QRS complexes. In each infant, diaphragmatic SA and Pes excursions increased during both hypoxia and hypercapnia. Fc fell with hypoxia but not with hypercapnia: ($\bar{X} \pm$ SE; *$p < 0.05$ compared to control, anova)

	Fc(Hz)	SA(mv)	PsO_2(torr)	$PsCO_2$(torr)	Pes(cmH_2O)
Control	47 ± 5	60 ± 17	72 ± 4	34 ± 4	-3 ± 1
17% O_2	39 ± 5*	115 ± 22*	39 ± 4*	32 ± 4	-5 ± 1*
4% CO_2	50 ± 10	101 ± 45*	95 ± 4*	38 ± 3	-5 ± 1*

In preterm infants, transient hypoxia but not hypercapnia causes power spectral changes consistent with diaphragmatic fatigue.