

# PREVALENCE OF RESPIRATORY DISEASE IN NEW MEXICO MINERS.

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To further describe the magnitude of respiratory diseases in older miners who have left the work force, we examined respiratory symptoms, spirometric abnormalities, and radiographic changes in a group of 992 self-selected active and retired miners who participated in a statewide screening program. An ATS respiratory symptoms questionnaire was supplemented with additional questions on mining. Obstruction was defined as FEV1% predicted < 80% and a FEV1/FVC < 70%. Radiographs were interpreted by ILO trained readers. All subjects were male. The mean age was 56.3 years (range 21-90); 60% were current or former smokers; 62% mined underground, 28% had mixed mining experience, 6% mined in open pits.

Age(yrs)	<45		45-65		>65		Total
Smoke	Yes	No	Yes	No	Yes	No	
N	183		575		234		992
Cough	17(%)	23(%)	31(%)	41(%)	53(%)	58(%)	37(%)
Phlegm	29	22	37	41	60	53	41
Wheeze	16	10	28	36	42	40	31
Dyspnea	17	7	19	26	24	28	21
Obstruction	6	6	19	12	41	25	19
Profusion ≥ 1/0	0	1	6	10	21	22	10
Active miner	68	69	43	29	1	5	35
Mining years	13	10	20	16	24	19	18

Respiratory symptoms and diseases are common in smoking and nonsmoking miners, and increase in frequency with age. For those 65 years of age and older, evidence of pneumoconiosis was seen in 21% of smokers and nonsmokers. The years of mining were not statistically different among subjects with radiographic evidence of pneumoconiosis compared to those without (22.2±12.6 vs 22.3±14.6, mean±SD). These results provide further evidence of an increase in respiratory problems as miners age.

# A PROSPECTIVE LONGITUDINAL CONTROLLED STUDY OF METHACHOLINE RESPONSIVENESS AND SPIROMETRIC LUNG FUNCTION IN CAREER SHIPYARD ARC WELDERS

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Inhalation of welding plume in full-time welders has been associated with chronic bronchitis and, in a few instances, with occupational asthma. To determine whether employment as a welder is associated with alteration in airway responsiveness, we performed a longitudinal study of spirometry and methacholine reactivity in 23 full-time shipyard arc welders and 33 non-exposed controls working in the same shipyard. All were self-selected volunteers who completed spirometry and methacholine challenge annually for 3 years. Subjects with pre-existing asthma were excluded from the study. Characteristics of the groups at entry into study:

	Age	% Male	% Smokers	% Pred FEV <sub>1</sub>	PD <sub>20</sub> FEV <sub>1</sub>
Welders	35	87	30	98	534
Controls	41	88	27	102	988

Welders had been employed a mean of 13 years, and performed primarily shielded metal arc welding a mean of 4 hours per day. For these subjects, who have completed three annual measurements in the study, the values at entry of mean group %predicted FEV<sub>1</sub>, %predicted MMEF, %predicted FVC, and PD<sub>20</sub>FEV<sub>1</sub> (methacholine challenge, cumulative breath units) were within the normal range, and did not differ significantly between groups. Lung function and methacholine reactivity did not change significantly over the two years of study. Although welders were, on average, more reactive to methacholine at entry than controls, this difference was not statistically significant and no significant chronic effect of welding exposure on lung function was seen over the two year period of observation. (Supported in part by NIEHS Clinical Investigator Award ES-00131 and the NHLBI Preventive Pulmonary Academic Award HL-02316.)

# THE EFFECTS OF A SINGLE SATURATION DIVE ON LUNG FUNCTION, DIFFUSING CAPACITY AND PULMONARY GAS EXCHANGE DURING EXERCISE. B. Lehnigk, R. Jörres, D.H. Elliott\*, I. Holthaus\*, H. Magnussen. Krankenhaus Grosshansdorf, D-2070 Grosshansdorf. \* GUSI, GKSS-Forschungszentrum GmbH, D-2054 Geesthacht, Germany.

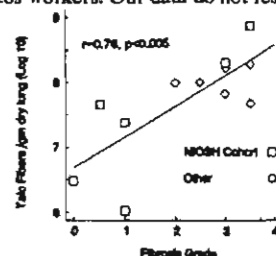
Recently for professional divers a decrease of pulmonary diffusing capacity and a reduction of exercise tolerance after saturation dives have been reported (JAP 1990, 68:1809; Undersea Biomed. Res. 1991, 2:103). In order to assess the individual response we investigated 8 professional divers (age 22-40 yrs) before and after an experimental saturation dive at 360 and 450 m (GUSI 21, GKSS). We measured lung function, diffusing capacity for carbon monoxide (TLCO, KCO,VA), and pulmonary compliance (Cstat) on two days before and on two consecutive days immediately after the dive. Pulmonary gas exchange during an incremental maximum exercise test was assessed via VE, VO<sub>2</sub>, PaO<sub>2</sub>, PaCO<sub>2</sub>, heart rate HR and anaerobic threshold AT.

Parameter	Dimension	pre-dive	post-dive	differences in response	
VC	l	5.11 (0.47)	5.21 (0.50)	p<0.05	-
FEV <sub>1</sub>	l	4.02 (0.43)	4.09 (0.44)	-	-
TLCO	ml/min/Torr	34.0 (3.4)	33.3 (3.2)	-	p<0.01
KCO	ml/min/Torr/l	4.71 (0.52)	4.26 (0.57)	p<0.05	p<0.01
VA	l	7.26 (0.61)	7.88 (0.74)	p<0.01	-
Cstat	ml/cmH <sub>2</sub> O	332 (38)	310 (36)	p<0.05	-
VO <sub>2</sub> /kg	ml/min/kg	47.2 (2.9)	41.6 (4.6)	p<0.01	-
AT	l O <sub>2</sub> /min	3.10 (0.58)	2.79 (0.56)	p<0.01	-
VO <sub>2</sub> /HR	ml/beat	180 (11)	180 (10)	p<0.01	-
VE/VO <sub>2</sub>		26.3 (4.2)	31.9 (6.3)	p<0.01	-
PaO <sub>2</sub>	Torr	89.6 (8.5)	100.5 (9.8)	p<0.01	-
PaCO <sub>2</sub>	Torr	36.6 (3.6)	30.3 (4.1)	p<0.01	p<0.05

Two subjects showed a significant post-dive fall of TLCO and a more than average decrease in KCO. One of them had received oxygen during decompression, and the other one had preexisting signs of obstructive airway disease. In all subjects we observed a significantly lowered exercise tolerance after the dive accompanied by hyperventilation. These changes did partially reverse on the second post-dive day. We suggest that the changes in diffusing capacity may reflect the possible effects of oxygen toxicity and microembolism during decompression but are partially masked by an increase in VA. The increase may have been caused by the enhanced work of breathing during the dive. This factor and the counteracting effect of detraining during decompression may also explain the changes observed during exercise.

# TALCOSES AND ASBESTOSIS IN NEW YORK TALC MINERS: DOSE-RESPONSE ANALYSIS OF OCCUPATIONAL EXPOSURE, LUNG PATHOLOGY AND LUNG PARTICULATE BURDEN. J.L. Abraham, B.R. Burnett, A. Hunt, SUNY Health Science Center, Syracuse, NY 13210.

Pneumoconioses (talcoses, asbestosis, silicosis) and pleural plaques have long been associated with the large tremolitic talc deposit in upstate NY. We have recently studied autopsies (n=17) or biopsies (n=3) from men exposed from 0.4 to 39 yrs (from 1925-1990, most after 1950), including lung cancer (n=7) and mesothelioma cases (n=3). Fourteen were part of a NIOSH cohort [the source of cumulative exposure (EXP) data (in mppcf-yrs)], while 6 worked exclusively at mines not part of the cohort. Asbestosis (FIBR) was diagnosed and graded using standard criteria. Electron microprobe quantitative analysis (QA) of lung burden (LB) was done using *in situ* QA for non-fibrous (n=14) and digestion QA for fibrous (n=12) particles. Ranges (medians) include: age 39-76 (59); EXP 2.3-341 (48); LB 6.3x10<sup>6</sup>-1.8x10<sup>11</sup> (2.6x10<sup>8</sup>) total fibers/g dry lung. Correlations with p<0.05 were observed between, e.g., EXP and LB of non-fibrous talc, fibrous (asbestiform) talc, FIBR; FIBR and fibrous talc (Figure). Within this sample of cases, there was no demonstrable qualitative or quantitative difference in the LB or pathology between cases from the cohort and others. Asbestiform talc and tremolite fibers form a major portion (mean=43%) of the LB; cleavage fragments are also present. These data support a dose-response relationship between EXP and LB of asbestiform, non-asbestiform particles and fibrosis, and between LB and fibrosis. Relationships between measured EXP, LB and FIBR were similar to those observed in other asbestos workers. Our data do not resolve the question of increased risk of lung cancer related to these exposures. Most cohort cases had mining exposures in addition to those estimated by NIOSH. This complexity may in part explain some of the contradictory epidemiologic analyses reported by others. [We gratefully acknowledge NIOSH for the cohort exposure data and for partial support of the analyses.]



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ABSTRACTS

1992 International Conference

May 17-20, 1992 • Miami Beach, Florida

Contents .....	A3
Sunday, May 17 .....	A9
Monday, May 18 .....	A215
Tuesday, May 19 .....	A449
Wednesday, May 20 .....	A679
Index .....	A883

This special supplement of the *American Review of Respiratory Disease* contains abstracts of the scientific papers to be presented at the 1992 International Conference, which is sponsored by the American Lung Association and the American Thoracic Society. The abstracts appear in order of presentation, from Sunday, May 17 through Wednesday, May 20 and are identified by session code numbers. To assist in planning a personal schedule at the Conference, the time and place of each presentation is also provided.