

LUNG FUNCTION AND BLOOD GAS ANALYSIS IN ELDERLY URANIUM MINERS WITH SILICOSIS COMPARED TO HEALTHY SUBJECTS

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Introduction: The accepted reference values for ventilatory lung function were obtained from subjects in a limited range of age. For elderly persons an extrapolation beyond the range of reference equations has to be performed. In decisions on remuneration for impaired lung function after industrial exposure, can this procedure be relied upon?

Material and methods: We examined lung function - spirometry, flow-volume-curves and whole body plethysmography – in 254 former uranium miners with silicosis, aged 72.1 ±4.7 yr, median 72 yr. Another 134 asymptomatic subjects (62 males, aged 25 to 59 yr (mean 30.8 ± 9.8 yr, median 34 yr), and 72 males aged 60 to 90 yr (mean 70.6 ±7.8 years, median 69 yr) were taken as healthy controls.

Results: Mean airway resistance (R_t) of the elder patients was 0.47 ±0.28 kPa/l/s and was significantly higher 0.18 ±0.06 ($P<0.00005$) compared to normal subjects. For specific resistance, we found a mean value of 2.05 ±1.56 kPa/s compared to 0.73 ±0.24 and 0.80 ±0.27 respectively in healthy controls. Tiffaneau-value was 59.9 ±13.48% compared to 76.9 ±6.6% and 83.4 ±5.1% in control subjects. Vital- and total lung capacity were slightly (13% and 10% respectively) but significantly smaller compared to the control groups ($P<0.0005$). The most relevant restrictions were seen in peak expiratory flow and with more than 50% reduction in maximal expiratory flow rates MEF75,50,25. Mean oxygen partial pressure of arterialized earlobe blood was 70.7 ±7.5 mmHg in patients, median 70.4 mmHg, and 78.4 ±3.4 mmHg in healthy subjects. The mean PaCO₂ (38.7 ±3.5 mmHg with a range of 48.9 mmHg to 27.8 mmHg) was not significantly altered in patients with silicosis. The changes in lung function and blood gas values of the elderly showed a similar age-dependency as observed for healthy adults of the age of 25 to 60.

Conclusions: Measured lung function values of healthy younger and elderly subjects showed a close correlation to the extrapolated reference values. Our results according to normal lung function justify an extrapolation of the reference equations beyond common range of age applying the same limitations as described for subjects in the middle age range. In patients with silicosis R_t , FEV1 and maximal expiratory flow rates (MEF75,50,25) were largely altered, whereas static lung volumes were only slightly altered.