

Lung Pathology In Coal Workers With Rapidly Progressive Pneumoconiosis Emphasizes Importance Of Silica And Silicates In Addition To Carbon

A. Najmuddin¹, R. A. Cohen², E. L. Petsonk¹, B. Young³, S. MacNeill⁴, S. Tramma⁵, M. Regier⁶, J. L. Abraham⁷, A. Churg⁸, F. Green^{9, 10}

¹West Virginia University School of Medicine, Morgantown, WV, ²University of Illinois School of Public Health, Chicago, IL, ³Charleston Area Medical Center, Morgantown, WV, ⁴Stroger Hospital of Cook County, Chicago, IL, ⁵NIOSH, Morgantown, WV, ⁶West Virginia University School of Public Health, Morgantown, WV, ⁷SUNY Upstate Medical University, Syracuse, NY, ⁸University of British Columbia, Vancouver, BC, Canada, ⁹University of Calgary, Calgary, AB, Canada, ¹⁰

Corresponding author's email: bobcohen@uic.edu

Rationale:

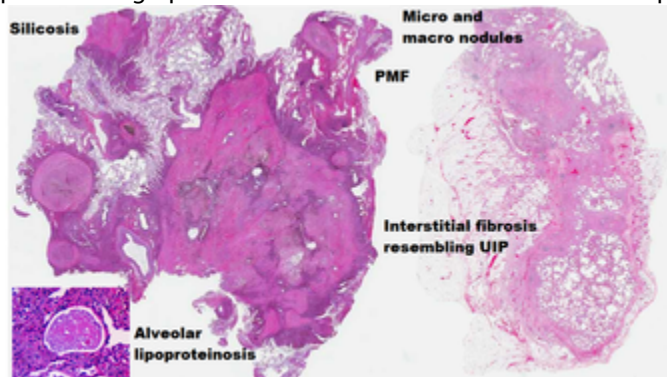
Rapidly progressive coal workers' pneumoconiosis (RPP) [Antao et al, OEM 2005;62:670-674] has recently been described in the United States, despite declining reported mine dust exposures. RPP appears more common among younger coal miners and in certain geographic regions, labeled "hot spots". Surveillance has shown increasing r-type pneumoconiotic opacities on miner chest radiographs in these regions, suggesting excessive exposure to silica and silicates. We sought to describe the pathology and investigate the patterns of inflammation, fibrosis, and deposited particles associated with this form of the disease, using existing coal miner lung specimens.

Methods :

Miners who had lung biopsies or autopsies were identified through the West Virginia Occupational Pneumoconiosis Board, the Black Lung Clinics Program, and miners' attorneys. After IRB approval and informed consent, participating miners or families completed a standardized questionnaire on demographics, smoking, and work. Slides were obtained, anonymized, and independently scored by three expert pathologists, using a standardized pathological scoring system, based on published criteria.

Results: Twenty-one of 27 miners or family members contacted for the study consented. Radiographs in all cases demonstrated RPP. Eighteen specimens, (7 surgical biopsies, 5 explants, 3 autopsies, 2 needle core biopsies, and 1 transbronchial biopsy), were received and reviewed by the three pathologists, forming the basis of this report. The miners had a mean age of 56 (range 44-76) at the time tissue was obtained and a mean mining tenure of 31 (range 20- 48) years. The pathology reviews documented a particularly aggressive form of pneumoconiosis with features of accelerated silicosis. A majority of cases demonstrated PMF. Classic lesions of simple CWP were present but not prominent. Atypical features such as diffuse dust-related fibrosis and alveolar lipoproteinosis were present. Polarized light microscopy revealed large amounts of birefringent mineral dust particles consistent with silica and silicates, with sparse carbonaceous coal dust. (See example in **Figure 1.**)

Figure 1: Brightfield microscopy showing classic as well as atypical features of one example of rapidly progressive pneumoconiosis. photomicrographs for ats abstract 110513 with annotation.png



Conclusions:

Lung pathology from a group of coal miners with rapidly progressive pneumoconiosis has demonstrated complicated pneumoconiosis, as well as accelerated silicosis, and diffuse dust-related fibrosis. These preliminary results are consistent with exposures to coal mine dusts containing high concentrations of respirable silica and silicates. Note: The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

This abstract is funded by: Stroger Hospital of Cook County Pulmonary Research Fund

Am J Respir Crit Care Med 189;2014:A5218

Internet address: www.atsjournals.org

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