Coal Mine Dust Lung Disease Among Miners Killed In The Upper Big Branch Disaster - A Systematic Review Of Lung Pathology

R. A. Cohen[1], F. Green[2], J. L. Abraham[3], A. Churg[4], E. L. Petsonk[5], S. K. MacNeill[1], S. Tramma[6], D. McAteer[7],

[1]Cook County Health and Hospitals System, Chicago, IL, [2]University of Calgary, Calgary, Canada, [3]SUNY Upstate Medical University, Syracuse, NY, [4]University of British Columbia, Vancouver, BC, Canada, [5]West Virginia University, Morgantown, WV, [6]National Institute for Occupational Safety and Health, Morgantown, WV, [7]McAteer and Associates, Shepherdstown, WV

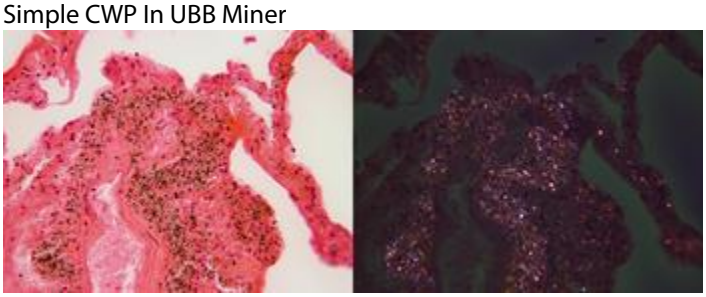
Corresponding author's email: bobcohen@uic.edu

Rationale: Recent reports have described advanced and fatal occupational lung disease in coal miners working under modern mining conditions.[1] On April 5, 2010, an explosion at the Upper Big Branch coal mine in southern West Virginia killed 29 employees. Among the 24 victims with sufficient lung tissue for evaluation at autopsy, the state medical examiner (ME) found coal workers' pneumoconiosis (CWP) in 17 (71%). To further evaluate the ME findings, three expert occupational pulmonary pathologists reviewed available lung tissue.

Methods: The NIOSH IRB approved this research. Consenting next-of-kin authorized the autopsy materials to be reviewed, and also completed a questionnaire on the miner's work, medical, and smoking histories. Pathology slides were coded and reviewed independently by the 3 pathologists. Specimens were graded as to quality, presence and profusion of coal macules, nodules, interstitial fibrosis, silicosis, mixed dust pneumoconiosis, and small airways disease, using a systematic and standardized method. Photomicrographs of all specimens were reviewed in conference to resolve any substantive differences in classification or scoring.

Results: To date, tissues have been reviewed for seven of the deceased male miners. Mean age was 43±10 years with mean mining tenures of 15±12 years. Six of the seven (86%) had at least minimal profusion of coal macules consistent with simple CWP, including two with fewer than five years of mining. (See figure 1.)

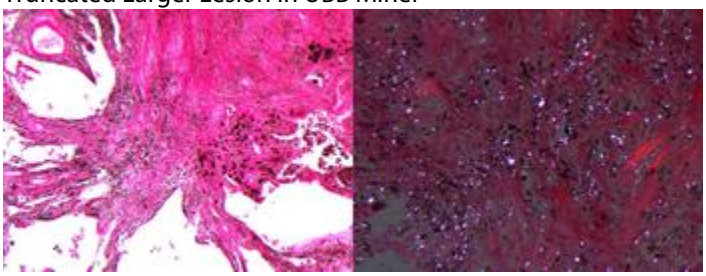
Simple CWP In UBB Miner



Dust macule containing innumerable birefringent particles in a miner with <5 years mining work

One miner had evidence of silicotic nodules and also a lesion that may have qualified as complicated pneumoconiosis or progressive massive fibrosis had it not been truncated in sampling. (See Figure 2.)

Truncated Larger Lesion In UBB Miner



Fibrosis and birefringent interstitial dust in miner with >25 years mining work.

One miner had diffuse dust-related interstitial fibrosis, a less common variant of coal mine dust lung disease.

Conclusions: A systematic pathologic review of lung tissue from seven relatively young active coal miners suggests a continuing high proportion had pneumoconiosis, compared to 58.8% previously reported from autopsies from 662 miners who began work after 1970.[2] The ongoing occurrence of advanced occupational lung disease justifies continuing and systematic analysis of pathologic material from coal miners, including the US National Coal Workers' Autopsy Study.

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[1] Wade AW, et al. Chest 2011;139;1458-1462

[2] Vallyathan et al., Arch Pathol Lab Med 2011;135(12):1550-6.

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