

Grant: AFC618-04

Title: Coal Mining Risk of Arthritis, Including Auto-Immune Rheumatologic Disease

Organization: University of California, San Francisco

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Focus Area: Musculoskeletal Disorders

Project Summary: There is strong evidence that rates of arthritis are higher in states with large numbers of coal miners. West Virginia has the highest prevalence of arthritis among adult males (30%, age adjusted) and the narrowest gender gap (only 4% less than women) of any state in the U.S. Further, Tennessee and Kentucky have the third and fourth leading state rates for arthritis among adult males (26.3 and 26.2%, respectively), while Pennsylvania and Ohio both have state rates for adult males within the top 15 for arthritis in the U. S., despite a more diverse labor force than West Virginia. In comparison, the age- adjusted adult male arthritis prevalence rate in California, a state without many coal miners, is 15.7%.

The cause of this geographic clustering is unknown, either for osteoarthritis (the dominant form of the condition, associated with degeneration of the joints) or for inflammatory/autoimmune arthritis (a smaller subset of disease but which has been shown to be related, in part, to environmental exposures. Both of these types of arthritis are associated with substantial morbidity, including disability in work and non-work activities.

Occupational exposure to mineral dust, including from coal mining, has been shown in multiple independent studies to be strongly associated with markedly elevated risk of autoimmune disease with arthritis manifestations. Specific associated arthritis conditions associated with mineral dust include rheumatoid arthritis (RA), systemic lupus erythematosus (SLE), and systemic sclerosis (SSc). Despite suspicion of increased arthritis in coal mining populations, the coincident collocation of regions in which coal mining is concentrated and where there is a high prevalence of arthritis in males has never been investigated. The etiologic connection between these two phenomena is likely to be coal mining itself. This association, if established at the regional level, is important for the delivery of health care services and for public health policy, as well as being relevant to individual case attribution and compensation.

We will address the current knowledge gap concerning arthritis and coal mine employment by carrying out a population-based survey. We will target adult males aged 50 or over, living in counties in Kentucky, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia with elevated death rates from Coal Workers Pneumoconiosis (CWP). We will identify those at risk based on reported occupations linked to coal dust or silica exposure. We will identify survey respondents with arthritis (including auto- immune disease subtypes) based on self-reported diagnoses using methods validated by the National Center for Health Statistics.

Study Aims and associated **Hypotheses** for this exploratory research project are:

Aim 1: Delineate risk factors for arthritis in a population survey of adult males in geographic areas manifesting a high burden of CWP.

Research Hypothesis: Coal mining employment is associated with increased risk of arthritis, taking account other known risk factors for arthritis, for example age, ergonomic exposures beyond those from mining occupations, and cigarette smoking.

Aim 2: Delineate the risk factors for auto-immune rheumatologic disease in a population survey of adult males in geographic areas manifesting a high burden of CWP.

Research Hypothesis: Coal mining employment is associated with increased risk of auto-immune rheumatologic conditions, taking account of risk associated with non-coal mining occupational mineral dust exposures (such as those linked to construction or metal foundry work) and covariates including age and cigarette smoking. Further, the magnitude of this risk will be greater than for arthritis overall.