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Bronchitis in relation to work

by Anthony Seaton, MD, FRCP, FFOM¹

SEATON A. Bronchitis in relation to work. *Scand J Work Environ Health* 10 (1984) 471—472. The term bronchitis means different things to different people. Work-related bronchitis might include acute irritation or allergic syndromes or chronic cough and airway obstruction. The investigation of such episodes varies according to the suspected problem — acute symptoms are investigated in the individual and followed up if necessary epidemiologically, while chronic disease requires an epidemiologic approach. Examples of investigations on soldering, polyvinyl chloride manufacturing, and coal mining are quoted.

Key terms: airway obstruction, coal mining, emphysema, occupational asthma, polyvinyl chloride.

To the layman, the term bronchitis may imply acute episodes of cough and/or wheeze, more persistent and regular cough with sputum production, or progressive and ultimately incapacitating shortness of breath. The doctor generally uses the terms acute bronchitis to define brief, usually infective, episodes of airway disease and chronic bronchitis to indicate persistent cough and sputum production, as defined by the British Medical Research Council for epidemiologic purposes. Thus use of the term bronchitis, as in the title of this paper, may lead the unwary into a number of semantic traps. This problem of terminology is made even more confusing by the difficulty of finding a suitable term to describe chronic airway obstruction, which, because of its association with chronic cough and cigarette smoking, has also been included in the concept of chronic bronchitis.

Thus the occupational physician, on being asked to investigate a suspected problem of bronchitis in the workplace, may be confronted with either acute or chronic respiratory symptoms. Either allergic or irritative mechanisms may prove to be causing these symptoms, and they may or may not be associated with the workplace. How then should the problem be investigated?

The first step should be to discuss the suspected problem with members of the workforce. This procedure will often lead to a *clinical investigation* of one or several individuals, which, together with appropriate *occupational hygiene investigations*, may be all that is required.

A simple example might be the case of electronics workers complaining of cough and chest tightness related to work. Investigation of one or two affected

subjects by serial peak flow recordings made at work and while on sick leave or by challenge testing, together with an investigation of their work practices, may lead to the conclusion that colophony flux, used in soldering components on circuit boards, is the cause of the problem, and appropriate action may then be taken to prevent further ill health. This sort of clinical investigation, while not strictly research, is a necessary part of the skills of an occupational physician. It may allow the detection of new or previously unrecognized hazards (3). Epidemiologic techniques may then be used to measure the prevalence or incidence of the condition and to obtain information on the relationships between provocation of the condition and exposure to the noxious agent (1, 2) so as to give guidance on the prevention of further problems.

The investigation of such acute symptoms, usually due to bronchial irritation or hypersensitivity, is relatively simple compared to that of chronic cough or breathlessness. The main problem is assessment of the role of pollution in the workplace since the condition is a common one in the general population and is related overwhelmingly to cigarette smoking. For example, in a factory manufacturing polyvinyl chloride, the occupational physician wondered if the dust was playing any part in the production of respiratory symptoms in the workforce, many of whom were smokers. A cross-sectional study was planned to obtain information on respiratory symptoms, smoking habits, and lung function, while also making estimates based on current measurements of respirable dust levels of individuals' dust exposures. Care was taken to include a sample of exemployees in the study, in case they included a disproportionate number of ill men, contributing to the "well-worker effect." The results of this investigation showed no relationship between dust exposure indices and cough and sputum. But there was a positive relationship, most marked for current smokers, between breathlessness and dust exposure and, similarly, a negative rela-

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tionship between forced expiratory volume in 1s (FEV_{1.0}) and dust exposure (8). These relationships suggested the possibility of an interaction between cigarettes and polyvinyl chloride dust and caused the speculation that smokers may contaminate their cigarettes with polyvinyl chloride and thereby inhale pyrolysis products.

Such investigations of chronic airway disease may be taken a stage further to demonstrate the interrelationships of pathological lung changes, symptoms, dysfunction, and dust exposure. These investigations, being time-consuming, expensive, and complex, have rarely been carried out. But their value is being demonstrated in the British coal-mining industry, and the results are usable in hygiene standard setting (7). Following a series of studies in which the FEV_{1.0} of coal miners was shown to vary inversely with dust exposure (4, 5), it has recently proved possible to obtain sufficient lungs at necropsy (from men who had previously been studied epidemiologically and whose dust exposure had been measured prospectively) to investigate the relationships between coal dust exposure and pathological emphysema. Evidence has been produced that the *prevalence* of emphysema in lungs of coal miners is related to dust exposure, though the relationship is complex in that it is only evident for lungs in which there is also a fibrotic reaction to the dust. It is affected also by the composition of the dust inhaled (6). Further studies are now taking place to determine the excess of respiratory disease among coal miners in relation to dust exposure in order to provide additional guidance for dust control.

The investigation of bronchitis in the workplace thus presents occupational physicians and epidemiologists with many interesting challenges. In respect to this statement it is proper to recall that the main cause of lung disease in the western world is still cigarette smoking, and anything that can be done in the workplace to dissuade people from smoking would be an important contribution to the health of the workforce.

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