

Editorial

Beginnings of bronchitis

To develop appropriate strategies for prevention, the epidemiologist attempts to describe the natural history and development of diseases. In this task he faces formidable obstacles, of which perhaps the most important is time. Clearly, to observe the development of a disease one must observe individuals before they develop it and during all stages of the disease process. A further obstacle is the fact that very few individuals in a defined population develop a given condition and these have to be identified. Thus in a study of cigarette smoking and the development of lung cancer Doll and Hill¹ had to follow tens of thousands of doctors to identify several hundred cases of the disease. Bronchitis is perhaps a little easier to study than most diseases, since the symptoms are relatively common: about a fifth of men aged 45 years or more who smoke complain of a persistent cough and sputum production. Nevertheless, while this problem may be easier to investigate than the development of cancer, for example, not much progress has been made. But the hope is that studying the development of bronchitis may enable us to identify stages when the disease might be more amenable to treatment than when the patient is finally seen in the doctor's surgery, an outpatient clinic, or a hospital ward.

Bronchitis has been recognised for at least 173 years, since it was originally described by Badham in 1808. But although we know a lot about how to prevent the disease—by, for example, persuading people to stop smoking and reducing air pollution—much still remains to be discovered. An area that was long neglected and has recently become a major focus of attention is the study of the beginnings of bronchitis in childhood. Two recent articles in this journal^{2,3} illustrate the present interest of epidemiologists in this age group. As Stuart-Harris⁴ has reminded us, retrospective inquiry into patients' histories is notoriously fallacious. None the less, Reid and Fairbairn⁵ showed that adult bronchitis appeared to be related to bronchitis during childhood and McDonald *et al*⁶ found that 44% of recruits invalided out of the Royal Air Force with less than six months' service because of acute respiratory disease had a history of pneumonia or bronchitis before they entered the Air Force. In this study, however, no controls were used and at that time the authors did not attach much importance to the finding. In another study Rosenbaum⁷ found

that National Service men who had spent their childhood in industrial towns suffered from more—and more severe—respiratory illness than did those from country areas, irrespective of where they were stationed when in the services. Furthermore, British immigrants in the United States have a greater risk of developing respiratory symptoms than native-born men with similar smoking habits.⁸ The effect of the childhood environment on susceptibility to respiratory illness appears also to apply to lung cancer: British immigrants in New Zealand,⁹ South Africa, and Australia¹⁰ have higher lung cancer mortality rates than the native-born men with similar levels of smoking. Thus the various migrant studies suggest that the "British factor" has a lasting effect.

Although there has been a considerable fall in deaths from respiratory disease in childhood, the factors that have been incriminated in adults—social class and living in a poor or polluted environment—have been shown to play a part also in the occurrence of respiratory disease in children. To extend these investigations into the origins of bronchitis, and to provide more detailed information about stages at which intervention might be possible, three strategies are feasible. One approach is to undertake a retrospective investigation, either a case-control study or a prevalence study asking about events in the past. The second strategy is to do a prospective longitudinal study starting at birth and following the population over a period of time. The third is to do a prospective longitudinal study in stages.

The first type of investigation is essentially dependent on the individual's ability to recall past events. There are difficulties with this approach since people who have suffered severe illnesses or other misfortunes are more likely perhaps to remember them than are those who have suffered only minor ones. This criticism has often been applied to investigations such as those of Stewart and her colleagues¹¹ on the relationship between exposure to x-rays during pregnancy and the development of leukaemia. Despite these drawbacks, several such studies have pointed to feasible hypotheses for intervention in both respiratory and other diseases and the findings have eventually been confirmed by prospective studies. The theoretical arguments against retrospective studies are therefore perhaps somewhat unrealistic.

The long-term longitudinal prospective study, in which a cohort of individuals is followed over time, is perhaps the most difficult type of investigation. If a group of children is to be followed from birth to 50 years, say, clearly the investigator should start when he is 20 if he is to have any hope of obtaining results himself. Given sufficient dedication, however, such studies can be carried on from one group of investigators to another. Perhaps the best known of these in the United Kingdom is the study undertaken by Douglas and his group on individuals born in March 1946, who are still being followed by Colley and his colleagues.^{12 13} This study illustrates the many problems of following up a group of individuals over a very long period.

A prospective longitudinal study performed in stages is an alternative strategy. This means studying one group from, say, birth to 5 years, another group from 5 to 15 years, a third from 15 to 35 years, a fourth from 35 to 44 years, and so on. In this way over five to 10 years some insight into the development of a disease over time can be gained. Such investigations do have serious theoretical drawbacks. The same population is not followed over the entire period of the investigation and therefore one is stretching logic somewhat by concluding that factors important for children studied in their first five years are also important in a different group of children followed, for example, from 5 to 14 years. Some safety measures, however, can be built in. The first five years of the cohort followed from 5 to 14 years can also be examined retrospectively. If this confirms that events found to be important in the first five years of life for one group have also been important for the 5-14-year-olds questioned about this period, then perhaps greater reliance may be placed on the findings.

A series of studies on children have been undertaken by various investigators in Britain, all of which have pointed to three major factors in the first years of life in the development of bronchitis. The first is a history of pneumonia and bronchitis in the early years. Children who suffer from these diseases in early childhood tend to have poorer ventilatory function in later years and more respiratory symptoms and disease.¹⁴⁻¹⁶ Independently of these factors, children exposed to high levels of environmental pollution tend also to have poorer levels of ventilatory function and to suffer from more respiratory symptoms and disease than those exposed to less air pollution;^{17 18} and children who smoke tend to have more respiratory symptoms than children who do not smoke.¹⁹

Respiratory illness in the first years of life is conditioned by several factors, of which the two most important appear to be exposure to cigarette smok-

ing by parents in the first year of life^{15 16} and respiratory infections from siblings. Boys and children from the lower social classes are known to have more illnesses than girls and those from higher social classes. These factors are important in the development of respiratory disease in early life and clearly offer hope for intervention.

The confirmation in a series of different studies that passive inhalation of cigarette smoke is associated with a greater risk of developing pneumonia and bronchitis could be and in many cases is being used as an effective way of stopping parents from smoking. Few parents wish to harm their children and thus this is an extremely important and effective way of influencing people to change their smoking habits. Preventing respiratory infection in siblings as well as preventing and treating it in the children themselves is a different matter. Although many investigations have shown the relation of viruses and bacteria to acute respiratory infection in children, few if any adequate methods of treatment have been found. No effective vaccine has yet been produced that can reduce the frequency of respiratory infection in children on a large enough scale to justify its introduction, and the treatment of respiratory infection in children is also open to question. Antibiotic treatment, although indicated where infection is caused by sensitive bacteria, is not indicated in viral infections—and we do not have any effective antiviral agents. Many children, however, continue to be treated with antibiotics without adequate diagnosis. This is clearly an issue requiring further work.

The importance of exposure to indoor^{20 21} and outdoor pollution at present levels still remains in doubt. Studies by Melia^{22 23} have failed to show any effect of present levels of environmental air pollution in Britain. Melia and her colleagues did, however, show that children from homes with gas cookers have more respiratory illnesses than those from homes with electric cookers.²⁴⁻²⁷ But we still need to know whether this is due to gas cooking per se or social and environmental factors that are more important in the aetiology of respiratory disease.

Considerable evidence is now available to suggest that various measures could be taken in childhood to prevent the onset and continuation of bronchitis in later life. There are, however, still some gaps. There have been no adequate studies following children from childhood through adolescence to adulthood. The types of studies discussed above have not yet been extended to those over 15; and there is still in fact little evidence to indicate how we can prevent the onset and progression of respiratory disease in childhood. There are few good controlled trials comparing different methods of treating and managing respiratory disease in children. Acute respiratory

disease in childhood is certainly important to the development of disease in later life and in consequence I feel strongly that appropriate and more effective methods for treating these conditions in children should be developed and tested to see whether this reduces the chance of disease in later life. For example, we know little about the use and effectiveness of bronchodilators in treating respiratory disease in children.

There are also several completely unexplored aspects of the respiratory diseases. Epidemiological studies have shown that the factors associated with bronchitis are place of residence and social class of parents, and with pneumonia social class only. The clinician, however, does not always appreciate these epidemiological findings. They are based on the reports of parents about the illnesses of their child, but when doctors' records are examined there is rarely much correlation between what the parent has said and what the doctor has recorded. Epidemiologists also state that bronchitis is more likely to influence the future occurrence of symptoms and respiratory disease than is pneumonia and that attacks of bronchitis in children are followed by lower levels of ventilatory function than are attacks of pneumonia, and yet clinicians consider pneumonia to be a more serious illness in childhood. This is an unexplored topic that should be investigated more thoroughly; the diagnosis, prognosis, and treatment of acute respiratory disease in childhood are not as clearcut as many believe.

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