INCIDENCE AND ONSET OF PULMONARY TUBERCULOSIS IN OLD MEN

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Although there is evidence of a general decline of morbidity and mortality in pulmonary tuberculosis, old men in this country have not shared in this improvement (Stocks, 1952; Springett, 1952; McDonald and Springett, 1954; McFarlan, 1955). In fact, for them the figures have increased since 1938. Some aspects of the incidence of the disease in this group are considered, and a study is presented of a series of 35 men showing the mode of clinical onset after the age of 65.

Incidence

Published statistics of notifications of respiratory tuberculosis in England and Wales since 1938 (Ministry of Health, 1955) give the oldest age group as "45 and over." However, by courtesy of the Ministry of Health, figures were obtained for those of 65 and over. These showed that for men of this age notifications had more than doubled (from 808 to 1,660) in the 16 years from 1938 to 1954. It is well known that during this period the proportion of old people in the population has

increased. Since 1938, according to the Registrar-General's Annual Estimates for England and Wales, men over 65 have increased from about 1½ to 2 million, and women over 65 from about 2 to 3 million. Notifications were therefore calculated as rates per 100,000 in each age group year by year, and the results are shown

FIG. 1.—Respiratory tuberculosis in England and Wales: Notification rates per 100,000. Men and women over 65.

in Fig. 1. The graph shows that for men the rate has risen since the war from an average of about 50 to over 80. The curve for women is steady at about 17. By contrast, curves of notification rates for both sexes from 45 to 65 were about level; from 15 to 25 and from 25 to 45 they showed, after a wartime rise, a decline to about the pre-war level. Curves for children under 15 showed a post-war plateau. Men over 65 were the only group to show a steady post-war rise.

To what extent have these cases been discovered by mass radiography? The Ministry of Health kindly provided figures of cases of tuberculosis considered active (primary, post-primary unilateral and bilateral, and pleural effusions) in men and women over 60 from the beginning of 1943 to 1953, with totals of those in the same age period examined by this means (see Table). Unfortunately these figures are for an age group slightly different from the notifications. But if active mass radio-

TABLE I.—Cases of Active Tuberculosis in Those Over 60 Discovered Annually by Mass Miniature Radiography

Year	Men			Women		
	Total No. Examined Over 60	Active Pul. Tub.		Total No. Examined Over 60	Active Pul. Tub.	
		No.	%		No.	%
1945*	22,567	107	0.48	3,000	8	0.27
1946	16,498	94	0.57	3,612	14	0.39
1947	16,527	78	0.47	4,030	11	0.27
1948	23,260	100	0.43	6,220	14	0.22
1949	27,901	161	0.58	8,069	19	0.23
1950	37,735	212	0.56	14,598	42	0.29
1951	60,909	227	0.37	31,317	47	0.15
1952	71,856	330	0.46	41,755	69	0.17
1953	80,289	374	0.47	49,578	68	0.14
Totals	357,542	1,683	0.47	162,179	292	0.18

* Includes 2½ years from the start in October, 1943.

graphy discoveries are expressed as rates per 100,000 of the population of men and women over 60 they can be compared with the notification rates over 65 (assuming the prevalence of active disease does not change greatly between the two ages). In this way it can be shown that such cases constituted by 1953 about 15% of the notification rate for men and about 9% for women. In other words, mass radiography is responsible for about a third of the increase in notification rates in old men since 1943. However, it is impossible to say how many of these cases would otherwise have been revealed later by developing symptoms or by chance discovery. It is important to note that the percentage of those examined considered to have active disease has remained at an average of 0.47% for men, but for women it has declined by half from 0.27% to 0.14%.

Mortality

This has been comprehensively reviewed by Springett (1952). Stocks (1952) observed that the death rate from this disease in England and Wales in men over 65 rose considerably between 1938 and 1948, whereas in nearly all other age groups of both sexes there had been a fall. The Ministry of Health has also kindly supplied annual figures of deaths of persons over 65 from respiratory tuberculosis from 1938, which are here plotted as rates per 100,000 for comparison with notifications (Fig. 2). The rate for men rose from 58 in 1938 to a peak of 81 in 1951, since when, possibly due to chemotherapy, there has been a decline to 66, a figure still 14% higher than in 1938. By contrast, mortality rates for women of the same age have declined from 22 to 13, a decrease of 41%.

FIG. 2.—Respiratory tuberculosis in England and Wales: Mortality rates per 100,000 men and women over 65.

Comparison of the Sexes

All figures agree in showing in the period under review a striking worsening for men over 65 compared with women. The ratio of male to female notification rates rose from 2.8 to 1 in 1938 to 4.8 to 1 in 1954. (This trend was also noticed in the 45–65 group, where the ratio rose from 3.2 to 1 in 1938 to 4.2 to 1 in 1954). The ratio of male to female

percentage positive in mass radiography figures (over 60) rose from 1.8 to 1 in 1945 to 3.4 to 1 in 1953. For mortality rates the ratio rose from 2.6 to 1 in 1938 to 5.1 to 1 in 1954.

Discussion of Statistics

The notification rates for old men are smaller than those for younger adults, so the problem of their increase should not be magnified out of proportion. But is the rise due to improved case finding or to increased prevalence of the disease among old men? Apart from mass x-ray examination, case-finding methods have not changed during this period. Although they have been intensified since the war they have not been directed preferentially to this section of the community. Moreover, in spite of these efforts, rates in other groups have declined. A greater attention to the welfare of old people has not brought to light more cases among old women. Katz (1953), in a review of tuberculosis morbidity in New York State over a similar period, 1935-50, found that increased case finding had masked a decline in morbidity figures. He regarded the fall in percentage of positive findings in mass surveys as better evidence of decreasing incidence. This fall has been observed in British mass radiography figures for most age groups, but not for men over 60. For them there is indicated a fairly constant case prevalence of 470 per 100,000. Though this figure is doubtless somewhat raised because of some selection of cases for mass radiography, the true level of incidence among old men is probably far higher than notification rates in the 80s would suggest. In these conditions rising notifications could, for a time, be due to improved case finding alone, but there is no room for complacency until decreasing incidence is shown by mass surveys.

With regard to mortality, Springett (1952) showed that with a general reduction in rates for pulmonary tuberculosis in this country there had been a shift in the peak mortality for men from middle life to about the age of 60. Nevertheless, the mortality experienced by men of this age group was no greater than that which they suffered at earlier ages. He pointed out that the shapes of mortality curves at different ages can be explained by the greater chronicity of the disease in the male sex. He considered that, as notification and attack rates are relatively lower in old age, tuberculosis deaths in later life are usually, though not always, the result of disease acquired many years earlier.

One must conclude that there is among old men (to borrow Springett's metaphor) a considerable reservoir of cases, and the evidence of mass surveys shows that so far our case-finding methods have not succeeded in lowering the water level. No satisfactory explanation has yet been advanced for the difference in behaviour of the disease in the two sexes or for the persisting tendency to reactivation in elderly males. There is here a field for epidemiological inquiry on the lines suggested by Morris (1955).

Clinical Onset

The present series of 35 men have all been under my daily care during the last four years in the male tuberculosis ward of Dorking General Hospital, which provides for advanced cases and for patients in the older age groups in the Surrey area needing hospital treatment. From these were selected those whose significant symptoms began after the age of 65—that is, those who were fit and well during their ordinary working lives. The series therefore excludes both the chronic survivor from known active disease of earlier life and the type of case where an old man's productive cough is for years attributed to "bronchitis" until its true nature is revealed after a grandchild has contracted tuberculous meningitis. The ages given are those at which active disease was discovered; they range from 65 to 83, with an average of 72.8. All cases were proved active by the association of radiological evidence with positive sputum, laryngeal swab, or gastric lavage.

The cases can be divided according to mode of onset into two main groups, those presenting with mainly chest symptoms and those with no prominent chest symptoms.

Cases with Mainly Chest Symptoms: 19 Cases (54%)

(a) The onset was gradual in eight cases. Cases 1 and 2 are typical examples.

Case 1.—A builder aged 76 (retired at 71) had had cough, sputum, dyspnoea, and malaise, with some weight loss and lassitude for three months. X-ray examination showed consolidation in the right lower zone and some infiltration in the left middle zone.

Case 2.—A painter aged 69 had had cough, sputum, slight dyspnoea, loss of weight, and night sweats for seven months, all dating from the "smog" of the preceding winter. X-ray films showed infiltration in the right upper and middle zone and the left upper zone.

(b) Acute chest illness with persisting symptoms occurred in three cases, including Cases 9 and 11.

Case 9.—A caretaker aged 68 had "pneumonia" one year before, leading to persistent productive cough, with lassitude and weight loss of 21 lb. (9.5 kg.). X-ray examination showed the trachea and mediastinum to the right, and collapsed and fibrotic right upper lobe with scattered disease in both lungs.

Case 11.—A gardener, formerly a butler, aged 73 was admitted to hospital with "pneumonia" and sputum found positive. Radiological evidence of consolidation in the right lower lobe persisted for two months and only resolved after streptomycin and isoniazid. A chest film taken one year before, as a contact of his wife, was negative.

(c) Acute presenting symptom drew attention to other chest symptoms of longer duration in eight cases—for example, haemoptysis in 4; pleuritic pain in 2 (in one of which a right pleural effusion was found in association with infiltration and positive sputum); and dysphagia in 1 case. Dysphagia also occurred in two other cases included under other headings. In the eighth case a man aged 79 collapsed in the street from exhaustion. He later gave a three-year history of cough, with dyspnoea, malaise, and lassitude for about a year, and hoarseness and dysphagia for several months.

Cases with No Prominent Chest Symptoms: 16 Cases (46%)

This interesting and varied group merits closer study because such cases are the ones most likely to be missed.

(a) With general symptoms, 2 cases, of which the following case is an example.

Case 20.—A man aged 75, still running his own village general store, had had lassitude for a year, with anorexia and weight loss of 1 stone (6.4 kg.). His doctor, suspecting gastric carcinoma, asked for a barium-meal examination, and on screening infiltration was noted, with atelectasis of the right upper lobe, and also infiltration in the left middle zone. The patient then admitted to a slight cough which did not worry him.

(b) Discovery during intercurrent illness, 10 cases.—Discovery and investigation of diabetes led in two cases to the finding of latent active pulmonary tuberculosis. One (Case 22) showed a curious sequence.

Case 22.—A policeman aged 72, who retired at 65, stubbed his toe; the injury did not heal and led to an abscess and persistent sinus for which he was sent to another hospital for a local operation. There glycosuria was found and he admitted being unwell for some years, with lassitude and weight loss, thirst, polyuria, and latterly diarrhoea. There were no chest symptoms but gastric lavage was positive for tubercle bacilli, and chest x-ray examination showed infiltration in the left middle and lower zones and the right middle zone—all brought to light by a stubbed toe!

Case 24.—A Chelsea pensioner aged 70 was admitted to hospital with an ischio-rectal abscess. X-ray examination showed disease in both upper zones, but chest symptoms only developed subsequently.

Case 25.—A waiter aged 67 had had a gastrectomy two and a half years before. A portable post-operative film then showed some right basal atelectasis and a minimal scar at the left apex. During the next few years the apical lesion extended and he developed dyspnoea, slight cough, lassitude, and loss of 1 stone (6.4 kg.) in weight. Attention has recently been drawn to this sequence by Anderson *et al.* (1955).

In Cases 26 and 27 anaemia seemed to be a predisposing factor.

Case 26.—A Covent Garden porter aged 78 was admitted elsewhere with frequent nose-bleeding. Melaena was also found, and when his haemoglobin fell to 45% he was given a transfusion. Chest signs subsequently developed with positive sputum, and x-ray examination showed fibrotic infiltration with a cavity in the right upper lobe and infiltration in the left lower zone.

Case 27.—A stores clerk aged 74 was treated in the E.N.T. department of a teaching hospital with nicotinic acid for Ménière's vertigo. Two years later, at a routine follow-up, he was found to have angular stomatitis, atrophic pharyngitis, microcytic anaemia, and koilonychia, and Patterson-Kelly (or Plummer-Vinson) syndrome was diagnosed—a rarity in a man of his age. A routine chest film then showed some apical fibrosis only, and anaemia responded to intensive iron treatment. However, 18 months later he was admitted to his local hospital with dysphagia of six months' duration (due to atrophic pharyngitis), weight loss of 3 stone (19 kg.), lassitude, anorexia, and epigastric pain. Microcytic anaemia had recurred (Hb, 52%; red cells, 4,240,000; C.I., 0.6) and sputum was positive. X-ray examination showed disease involving the right apex and the whole of the left lung. In addition to anaemia the deficiency syndrome undoubtedly played a big predisposing part both directly and indirectly by causing dysphagia. He responded well to chemotherapy, iron, and vitamins.

Two cases (including No. 29) were discovered after prostatectomy operations.

Case 29.—A linotype operator aged 70, who retired at 63, was admitted to a teaching hospital with urinary symptoms. After some 10 days prostatectomy was performed. On investigation of pyrexia during convalescence positive sputum was found and x-ray examination showed very extensive disease, undetected for over three weeks, illustrating how latent advanced disease can be in old age. He admitted lassitude and weight loss for six months, but regarded this and a slight cough as normal for his age, in which opinion he had been encouraged by his own doctor, who had examined him thoroughly a month or two before his admission for prostatectomy.

Another post-operative discovery was that made in Case 30.

Case 30.—A carpenter aged 81 (retired, ? age) was admitted to another hospital for suspected carcinoma of the colon. The pathologist's report on the lesion found at operation was "chronic tuberculous granulation tissue," after which a chest film was found to show patchy disease in the right upper zone. Sputum was positive on culture. His wife had died seven years before of pulmonary tuberculosis.

Case 31.—A handyman at a public house aged 73 was admitted with a history of swelling of the legs for two to three weeks, prior to which he had remained at work. X-ray films showed infiltration in the left upper zone and sputum was positive. The oedema responded to bed rest only.

(c) Cases with no symptoms, discovered by routine radiography. Four cases; among these, Case 32 was included.

Case 32.—A glass-blower aged 73 (latterly on pump maintenance), who retired at 66, felt quite well but attended when the mass radiography unit came to his area. A small cavitating lesion was found in the right upper lobe, but no treatment was advised at his chest clinic. A year later lassitude, dyspnoea, haemoptysis, positive sputum, and considerable radiological extension of disease necessitated admission and chemotherapy.

Another case (No. 33), first deemed inactive and retained in an institution, later produced a positive sputum after an ordinary cold, and had to be transferred.

Extent of Disease on Discovery

In only four cases was the disease confined to a single radiological zone. In one case it extended to five zones. The great majority (30 cases) were moderately extensive, with two or three zones involved and in a few cases four zones. Accurate assessment was not possible, but it was evident that disease on discovery in this age group was much more extensive than that commonly found at younger ages. Seven cases showed apparent cavitation, but routine tomography was not done in view of the age of the patients.

Social Factors

Retirement.—Twenty-one out of the 35 men (60%) had retired. The remaining 14 worked until the onset of symp-

toms compelled them to stop. The average retiring age for the whole series was 69.3 years.

Evidence of Economic Hardship, Privation, or Neglect.—These factors were considered in collaboration with the almoner and were thought to be important in about one-third of the cases. The man who collapsed in the street had retired from work as a garage hand at 75. A year later his wife died, after which he was living alone, cooking for himself, and, as he put it, he "went all to pieces." Symptoms dated from his wife's death and progressed until his collapse three years later.

Smoking Habits.—These were recorded in only 29 cases, of whom all were smokers. About half were light smokers (under 10 cigarettes a day), the remainder being medium or heavy.

The symptoms in one case were precipitated by the "smog."

Discussion

Though in a few cases previous chest films passed as normal were available, it was considered probable in most that the discovered lesion was due to reactivation of a silent focus and was not strictly "new." The point is of interest, but few of those now old are likely to be without a minimal tuberculous scar somewhere. Either way a problem remains; why should a lesion causing no symptoms during working life eventually become active, or, alternatively, why should an old man who has successfully resisted infection for so many years thereafter succumb? In only about half the cases were there one or more of the well-known social or medical predisposing factors. It should not therefore be assumed that the characteristically insidious onset is unlikely with comfortable home conditions and in the absence of intercurrent disease.

The series presents most of the well-known modes of onset described in standard textbooks—for example, Ellman (1952). Many had physical signs only of bronchitis, sometimes modified by emphysema. Instead of having their chest symptoms attributed to smoking or bronchitis all old men with persistent cough should be regularly radiographed and any chest infection followed to radiological resolution. Even apparently inactive lesions should be watched with suspicion. Regular sputum examination should not be neglected in such cases. Lassitude contrasts less with the slower tempo of old age than with the vigorous activity of youth, so its significance is more likely to be missed. Weight loss is often considered a normal accompaniment of age, as one patient (Case 29) said, "Of course old men *do* get thin." It may be either a symptom or a predisposing cause of reactivation, and is always worth investigation. Regular weighing of the old is an obvious moral. Fever and sweating are often inconspicuous in the old.

It is worth stressing that nearly half the patients had no chest symptoms of note. The effects of intercurrent disease in causing reactivation are well illustrated. Anaemia, whether nutritional or due to chronic blood loss, is especially apt to be missed in old age. Haemoglobin estimations are preferable to clinical guesswork in providing earlier evidence. Finally, within the last four years there were four cases (two in teaching hospitals) that had latent chest lesions brought to light only by reactivation after "cold" major surgery—which emphasizes the need for routine pre-operative chest radiography.

Summary

Since 1938 notification rates per 100,000 in England and Wales of respiratory tuberculosis in men over 65 have risen from about 50 to over 80, though for women of the same age they have remained around 17.

About a third of this rise is explained by mass radiography discoveries where the percentage of active tuberculosis cases found in those over 60 remained at an average of 0.47% for men, but declined from 0.27% to 0.14% for women.

Mortality rates for respiratory tuberculosis for both sexes over 65 show a rise from 58 in 1938 to a peak of 81 in 1951 for men, but a steady decline from 22 to 13 for women.

All figures show a worsening for men over 65 compared with women in the last 17 years, so that by 1954 male notification and death rates were about five times the female rates.

Even if rising notification rates in old men are due to increased case-finding there is evidence that a large number of these cases exist to be found, and it is suggested that the problem of reactivation in old men merits further epidemiological study.

A series of 35 cases is presented of men fit up to age 65 who subsequently developed active disease, probably usually due to reactivation of old lesions. Cases are classified according to mode of onset, 46% showing no prominent chest symptoms, often in spite of extensive active disease.

Well-known social and medical predisposing factors were found in only about half the cases.

Some suggestions are made to promote earlier recognition of these cases in view of their obvious danger to the community.

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Discussing the extreme case of those with a total lack of capacity for guilt or moral sense, in the course of the second Freud centenary lecture on April 17, Dr. D. W. WINNICOTT said it was tempting to postulate a constitutional factor. But psycho-analysis pointed to another explanation—namely, that for these individuals the early environmental setting was not reliable enough for the development of the capacity for guilt sense to take place. It was in fact possible to watch the loss and the regain of the capacity for guilt sense in a child or adult with anti-social tendencies, and to assess the variations in environmental reliability which produced these effects. It was at this point of loss and regain of moral sense that one could study delinquency and recidivism. According to psycho-analytic theory, antisocial behaviour was never the same as the crime that belonged to the prototype of guilt feeling in the individual. In other words, the antisocial act was either done to make sense of inexplicable guilt, the prototype for which was under repression; or else it was done in an attempt to reach to guilt feeling that was repressed and could not be experienced. In the first category came all the relatively unimportant crimes of children and adults, such as bed-wetting, lying, and stealing; in the second the rarer and more ugly criminal acts.

ALLERGY TO MOULD SPORES IN BRITAIN

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Untoward reactions from mould spores were first recorded by Charles Blackley (1873). The suggestion that moulds might be among the causes of asthma was revived half a century later by van Leeuwen (1924), and in the same year Cadham (1924) described three cases of asthma resulting from sensitization to the spores not of a mould but of another fungus—namely, wheat rust (*Puccinia*)—present in the atmosphere of the Canadian wheat fields. Van Leeuwen's views gained ground widely during the next few years (van Leeuwen, 1927; Hansen, 1928; Jiménez-Díaz and Sanchez Cuenca, 1931; Ellis, 1933). Sensitivity to *Alternaria* was described by Hopkins *et al.* (1930), to *Aspergillus fumigatus* by Bernton (1930), and to *Cladosporium* by Cobe (1932). Apart from Cadham's observations, respiratory allergy to fungi was at this period generally thought to be related to indoor habitats such as haylofts, granaries, damp cellars, and the like, and therefore of little general significance.

The first to focus attention on moulds as allergens of importance to the ordinary asthmatic was Feinberg (1935), who found that out of a group of 243 patients with respiratory allergy, 68 (or 28%) gave positive reactions to one or more mould extracts. He next showed, in collaboration with Little (Feinberg and Little, 1936), that mould spores were abundant in the air of Chicago during summer and autumn only, and went on to correlate the seasonal frequency of one kind of mould spore (*Alternaria*) with symptoms experienced by patients who were skin-sensitive to extracts of the same kind of spores (Feinberg, 1937). Later he made similar observations regarding *Cladosporium* (also known as *Hormodendrum*) and certain other kinds of mould spores, and stated that at least 20% of his allergic patients (as determined by both skin testing and history) were allergic to some kind of mould or other (Feinberg, 1944).

To-day in the U.S.A. mould spores are widely accepted as common allergens (Sheldon *et al.*, 1953) and indications of their probable significance in Europe have come from Sweden (Nilsby, 1949), Denmark (Flensburg and Samsøe-Jensen, 1950), France (Vallery-Radot *et al.*, 1950), and Spain (Alemany Vall, 1955). It is the purpose of this article to consider the evidence for the occurrence of mould allergy in Great Britain.

Preliminary Considerations

In order that any kind of plant spore shall be held responsible for giving rise to allergic symptoms, it must first be shown to be antigenic. Secondly, any antigenic kind of spore, in order to affect a significant number of people, must occur in the air in large numbers and over a wide area. Thirdly, before any given patient's illness can be diagnosed as an allergic reaction to a particular kind of spore it must be shown that he experienced his symptoms at a time or