

## Incidence of active tuberculosis in the native population of Canada

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We analysed the incidence rates of active tuberculosis reported between 1970 and 1981 in three groups of people born in Canada: Inuit, registered Indians and others (mainly of European origin). While the rates of tuberculosis were quite low in the last group, which constitutes about 82% of the population of Canada, they were 16 times higher among Indians and 24 times higher among Inuit. Some 20 to 30 years ago the Inuit had the highest recorded rate of tuberculosis in the world; with an intensive program the rate decreased sharply. Such a program has not been implemented among the Indian population, and the incidence rate has not decreased as rapidly. A major effort is required to satisfactorily control tuberculosis among Indians. In addition, we must not allow our efforts to slacken in the control of tuberculosis among the Inuit.

**Analyse de la fréquence de survenue de tuberculose évolutive, de 1970 à 1981, chez les Canadiens de naissance répartis en trois groupes: Inuit, Indiens inscrits et autres (surtout de descendance européenne). Ce dernier groupe, qui représente quelque 82% de la population canadienne, montre un taux très bas. Le taux est 16 fois plus fort chez les Indiens et 24 fois chez les Inuit. Chez ceux-ci, qui voilà 20 ou 30 ans**

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**avaient la plus grande fréquence de tuberculose au monde, une action intensive l'a fait régresser rapidement. Parmi les Indiens, chez qui on n'a pas institué une aussi vaste action, cette fréquence n'a pas baissé aussi vite. Il faut déployer là un effort important, sans relâcher ce qu'on fait déjà pour les Inuit.**

**A**s the incidence rates decline, tuberculosis is becoming less of a major public health problem in developed countries such as Canada. With specific chemotherapy tuberculosis can be arrested in almost all patients who comply with treatment.

Tuberculosis is unevenly distributed in the Canadian population, with the rates being much higher among aboriginal people and among immigrants from countries with a high prevalence of the disease.<sup>1</sup> We studied the incidence rates of tuberculosis in two aboriginal groups (Inuit and Indians) and compared them with those of others, mainly of European origin, who were born in Canada.

### Methods

With permission from the directors of tuberculosis control of all the provinces, Statistics Canada provided us with computer tapes containing information on all notifications of patients with active tuberculosis in the period 1970-81. Details of age, sex, reporting province and country of birth were included as well as the type of disease, bacteriologic status, occurrence of previous episodes of active tuberculosis and, if born in Canada, whether the patient was Indian or Inuit.

We calculated incidence rates for Inuit and nonaboriginal populations using figures from the

1971 and 1981 censuses of Canada.<sup>2,3</sup> As figures for registered Indians from the censuses differed from those from the Department of Indian and Northern Affairs, and as the department's figures were available in more detail, we used the department's figures for this group. Since figures for unregistered Indians were not readily available, we excluded this group from our study. We defined an incident case as any case of tuberculosis newly diagnosed active during the study period, including those never previously diagnosed and previously diagnosed cases that were again diagnosed active after a period of inactivity (reactivated cases). Cases that were continuously active were not included.

For the purposes of this report, native refers to all persons born in Canada, and aboriginal refers to those whose ancestors first populated this country (Inuit and Indians). Indian refers to registered North American Indians.

## Results

Fig. 1 shows the mean annual incidence rates of active tuberculosis in the three groups. The rates for Inuit and Indians were 24 times greater and 16 times greater respectively than those for other Canadians. Fig. 2 shows the trends in the incidence of tuberculosis over the study period. The rates

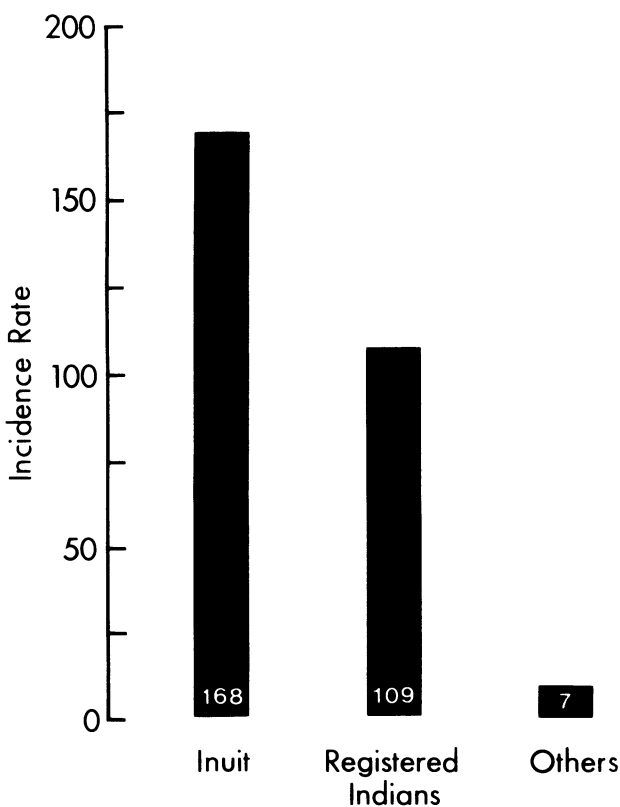


Fig. 1 — Mean annual incidence rates per 100 000 of active tuberculosis in Inuit, Indians and other Canadians, 1970-81, adjusted for age and sex.

declined annually by 16% among Inuit and by over 10% among nonaboriginal people, although the rate of decline among both groups diminished

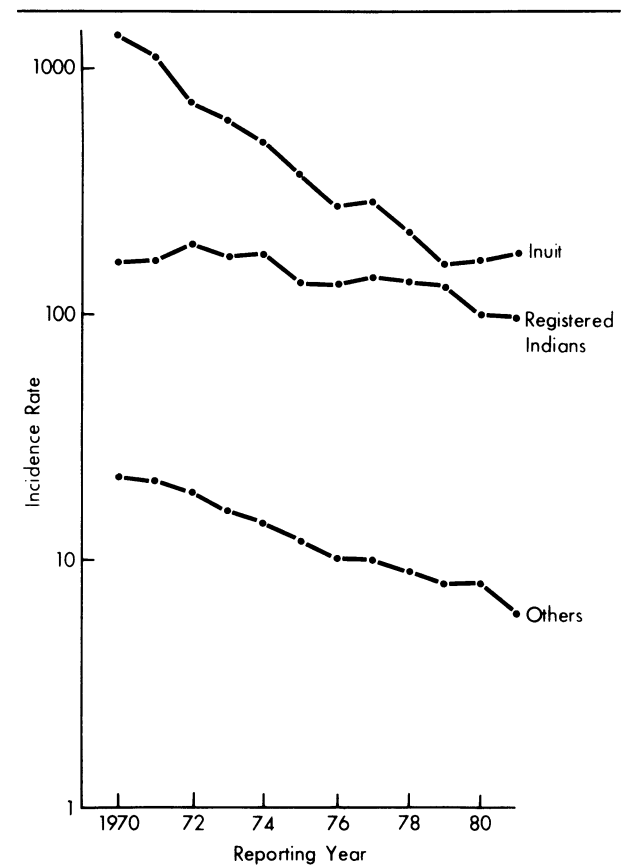


Fig. 2 — Trends in incidence rates per 100 000 of active tuberculosis in the three groups, adjusted for age and sex.

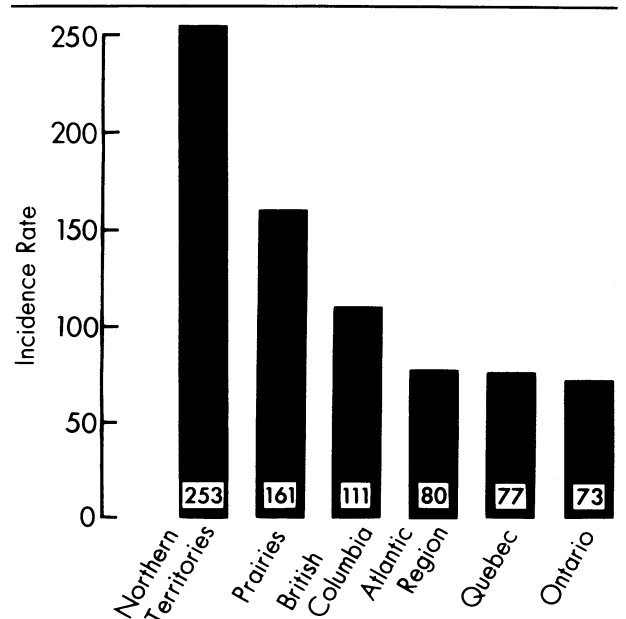


Fig. 3 — Mean annual incidence rates per 100 000 of active tuberculosis in Indians, according to geographic region, adjusted for age and sex.

somewhat during the second half of the period. The rate of decline was slower (just over 4%) among Indians.

The incidence of tuberculosis in Indians varied considerably in different regions in Canada (Fig. 3). Rates were highest in the north and lowest in the east. The population of Indians in 1981 was rather small in Atlantic Canada (11 600) and in the north (11 000) but larger in the other regions (British Columbia, 56 000; Prairies, 138 000; Ontario, 71 000; and Quebec, 32 000).

Most cases were reported to be culture-positive. A high proportion of pulmonary cases in the aboriginal groups had been bacteriologically confirmed. The proportions of cases in which results of bacteriologic examination were not reported were 5.0% among Indians, 8.2% among Inuit and 14.7% among others. The proportion of cases with negative results was highest among Inuit and lowest among Indians (Table I). The lowest proportion of cases with positive results for acid-fast bacilli on direct microscopy was among Inuit.

Table II shows the various types of tuberculosis in reported cases. The distribution of types varied somewhat among the three groups. Most striking was the preponderance of primary cases in Indians. Less striking but of interest was the higher incidence of tuberculosis lymphadenitis in Indians and of genitourinary and skeletal tuberculosis in nonaboriginal Canadians.

Reactivated cases of tuberculosis were most common among Inuit (23%); 16% of cases in Indians and 13% in other Canadians were reactivated.

## Discussion

It is encouraging to find that the incidence of tuberculosis in nonaboriginal Canadians is declining and is now, indeed, low. With this rate of decline, tuberculosis should be virtually eliminated as a significant disease in this population by the end of the century.

The story of tuberculosis control among the Inuit is one of success. Twenty to 30 years ago the small Inuit population in Canada had the highest recorded rates of tuberculosis in the world.<sup>4</sup> An intensive tuberculosis control program conducted

by the Northern Medical Service together with the cooperation of the Inuit has resulted in the fastest rate of decline ever recorded for this disease. The program consisted of case finding, with annual re-examination in most cases and a thorough treatment program that usually consisted of initial hospitalization followed by supervised chemotherapy. In addition, widespread programs of chemoprophylaxis and vaccination with bacille Calmette-Guérin were applied. While all these measures undoubtedly contributed to the decline, the removal of sources of infection by means of prompt diagnosis and thorough treatment was likely the most important.<sup>5</sup> It is admittedly somewhat worrisome that the rate of decline of tuberculosis in the Inuit appears to have levelled off during the last few years of the study period. This suggests that the impetus to fight tuberculosis in this population is waning.

In contrast with the Inuit, the situation among registered Indians is less satisfactory. Although the rates have declined somewhat, the decline has been much slower, perhaps no greater than can be expected from the natural decline of tuberculosis in this phase of the epidemic.<sup>6</sup> The effort and financial support in the fight against tuberculosis among Indians have been relatively smaller than in the

Table II — Type of active tuberculosis in the three groups

Type	No. (and %) of cases		
	Indians (n = 4 256)	Inuit (n = 627)	Others (n = 24 259)
Primary	844 (19.8)	49 (7.8)	1 268 (5.2)
Pulmonary	2 462 (57.8)	502 (80.1)	18 045 (74.4)
Pleural	209 (4.9)	4 (0.6)	1 063 (4.4)
Central nervous system	45 (1.0)	10 (1.6)	162 (0.7)
Lymph nodes	229 (5.4)	11 (1.8)	702 (2.9)
Genitourinary	172 (4.0)	30 (4.8)	1 623 (6.7)
Skeletal	76 (1.8)	10 (1.6)	608 (2.5)
Abdominal	31 (0.7)	1 (0.2)	157 (0.6)
Other	188 (4.4)	10 (1.6)	631 (2.6)

Table I — Results of bacteriologic examination for *Mycobacterium tuberculosis* in cases of pulmonary tuberculosis in Indians, Inuit and other Canadians reported between 1970 and 1981\*

Result	No. (and %) of cases		
	Indians (n = 2 338)	Inuit (n = 461)	Others (n = 15 401)
Culture-positive	1 997 (85.4)	362 (78.5)	12 249 (79.5)
Smear-positive	1 398 (59.8)	198 (43.0)	9 593 (62.3)
Smear-negative	599 (25.6)	164 (35.6)	2 656 (17.2)
Culture-negative	341 (14.6)	99 (21.5)	3 152 (20.5)

\*Do not include cases in which results of bacteriologic examination were not reported (124 in Indians, 41 in Inuit and 2644 in others).

case of the Inuit. Moreover, Indian communities have been shown to resent and mistrust health care professionals from outside the communities and have stressed the need for increased Indian control of and participation in community health programs.<sup>7</sup>

Some of the differences between the three groups could be due to different diagnostic criteria. One indicator that this may be true would be whether the proportion of cases with bacteriologic confirmation differed substantially. If there was a tendency to overdiagnose active tuberculosis in one of the groups, one would expect a lower rate of bacteriologic confirmation. We found only small differences in this respect between the groups. Inuit had the highest proportion of pulmonary cases that were culture-negative (i.e., diagnosed on the basis of radiologic criteria alone). Moreover, they had the lowest proportion of smear-positive cases, in which there are large bacterial populations and which are often associated with radiologically advanced disease. These findings suggest early diagnosis (perhaps overdiagnosis in some cases) related to frequent screening.

In contrast, Indians had the lowest proportion of culture-negative cases of tuberculosis. The proportion of smear-positive cases was not different from that in the nonaboriginal group, among whom only a minimum of active case-finding programs are in operation. Because smear-positive cases are the chief source of spread of tuberculosis in the community, it might be expected that the rate of transmission in these communities will be high. Such a suggestion is supported by the high proportion of primary cases of tuberculosis among Indians. This high proportion could be explained by more intensive investigation of contacts or of other similar case-finding activities in the Indian population than in other groups. However, the fact that the incidence of primary tuberculosis in Inuit was lower only in the presence of intensive case-finding activities strongly suggests that these activities are not the only explanation for the higher incidence and that tuberculous infection is still common in this group.

The differences in incidence rates of tuberculosis among Indians in various regions of Canada are interesting. To some extent they may reflect socioeconomic factors. However, the differences are

certainly compatible with the hypothesis that natural resistance (herd immunity) is related to the time since the first mass exposure to tubercle bacilli. Indians in the eastern part of Canada came into contact with infected immigrants some 300 years ago. Immigrants did not bring their disease to the Indians in the Prairie provinces until the second half of the 19th century. Ferguson<sup>8</sup> reported that the annual rate of death from tuberculosis among Indians rose from 1% in 1881 to 9% in 1889. Indians in British Columbia had their first contact with immigrants somewhat earlier than those in the Prairies but later than those in eastern Canada, while in northern Canada this contact did not occur until the beginning of this century. Although the exclusion of unregistered Indians from the analysis may have influenced the results, there is no good evidence that this would have had a substantial effect.

Our findings show the need to continue the intensive antituberculosis campaign among the Inuit. Among Indians, a similar vigorous program must be maintained by our medical services and by Indians themselves. Moreover, the general physician must remember that tuberculosis is still common among aboriginal Canadians. It must be kept high on the list of possibilities in the differential diagnosis of illness in Indian or Inuit patients.

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## Poetry and tuberculosis

*I would like to remind those responsible for the treatment of tuberculosis that Keats wrote his best poems while dying of this disease. In my opinion he would never have done so under the influence of modern chemotherapy.*

— Arthur M. Walker (1896-1955)