
Epidemiological links among cases with the same genotypes
of *Mycobacterium tuberculosis* in aboriginal
villages of Hualian County

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Background

Tuberculosis has a very long latency period, and hence it is very difficult to trace the source or other cases according to epidemiological data such as contact mode when a tuberculosis case is found (1-2). However, we can group cases with the same genotype of *Mycobacterium tuberculosis* into one cluster, and establish

relationships of time, place and people in this cluster (3-5). According to data from Laboratory Center of the CDC, *Mycobacterium tuberculosis* collected from many tuberculosis cases in aboriginal villages of Hualian County belong to the same genotype (6). Therefore, professional personnel from the Field Epidemiology Training Program of CDC together with Health Bureau of Hualian County, regional nurses, heads of grassroots community organizations, and volunteers started an epidemiological investigation on December 16, 2004, trying to ascertain the epidemiological link among the 18 patients with the same genotype of *Mycobacterium tuberculosis*.

Demographic Data

There were 10 male (55.6%) and 8 female tuberculosis cases (44.4%). One of them (5.6%) was less than 20 years old, two (11.1%) were between 21 and 30, 8 (44.4%) were between 31 and 40, 4 (22.2%) were between 41 and 50, 3 (16.7%) were above 65. In 3 (16.7%) of them, the dates of onset were between 1996 and 2000, 1 (5.6%) was in 2002, 9 (50.0%) were in 2003, and 5 (27.8%) were in 2004. Four (22.2%) of the cases have passed away.

One (5.5%) of them lived in Cho-Shi, 3 (16.7%) in Wan-Rung, and 14 (77.8%) in Shiou-Lin. Among these 14 people, 5 (35.7%) lived in Fu-Shih, 5 (35.7%) lived in Chung-De, 2 (14.3%) in Jing-Mei, and 2 (14.3%) in Shiou-Lin.

Route of transmission

The dates of onset of these 18 cases were plotted in Fig. 1, which shows that the mode of transmission was human-to-human. The earliest onset date was June 15, 1996, and the latest was May 13, 2004. The time interval between illness onsets of the first case and the last case was 7 years 2 months, and the longest

interval between successive cases was 4 years, and the shortest was 2 months.

Epidemiological link

Besides case 9 who has passed away and case 10 who lived alone in Cho-Shi, all cases belonged to Tai-Ya tribe. Arranging these cases according to their dates of onset, case 1 and case 2 were brother and sister, and case 3 was the sister-in-law of case 4. The adopted daughter of case 5 was the cousin of case 18 and a close friend of case 11. The grandfather of case 11 was the cousin of the father-in-law of case 18. Case 2 and case 8 were sisters. Case 1, 15 and 16 were neighbors. Case 1 and 15 worked together before. Case 3 and 18 had been neighbors before. The mother of case 3 and case 18 were neighbors. Case 6 and 7 were friends living in the same village. Case 12 and 17 lived in the same village and had contact before. Although onset dates of cases in the cluster were separate widely, their epidemiological relationship might be distorted by recollection errors. Taken together, these cases still had some relationship. For example, 7 of them were relatives, and 9 were friends or neighbors (Fig. 2). Hence, in this kind of retrospective study, to establish a more certain epidemiological link, the cases should have their dates of onset within one year.

References

1. Heymann DL (editor). Control of Communicable Diseases. 18th Ed. Washington DC: American Public Health Association. 2004; 560-572.
2. Maguire H, Dale JW, McHugh TD, et al. Molecular epidemiology of tuberculosis in London 1995~7 showing low rate of active transmission. *Thorax* 2002; 57(7): 617-622.
3. Pena MJ, Caminero JA, Campos-Herrero MI, et al. Epidemiology of tuberculosis on Gran Canaria : a 4 year population study using traditional and molecular

- approaches. *Thorax* 2003; 58(7): 618-622.
4. Barnes PF; Yang Z; Preston-Martin S, et al. Patterns of tuberculosis transmission in Central Los Angeles. *JAMA* 1997; 278 (14): 1159-1163.
 5. Bishai WR, Graham NM, Harrington S, et al. Molecular and geographic patterns of tuberculosis transmission after 15 years of directly observed therapy. *JAMA* 1998; 280(19): 1679-1684.
 6. Hsu YH, Chen CW, Sun HS, et al. Association of NRAMP 1 gene polymorphism with susceptibility to tuberculosis in Taiwanese aboriginals. *J Formos Med Assoc* 2006; 105(5): 363-369.

Fig. 1 Distribution of dates of onset among cases with the same genotype of *Mycobacterium tuberculosis* in Aboriginal villages of Hualian County

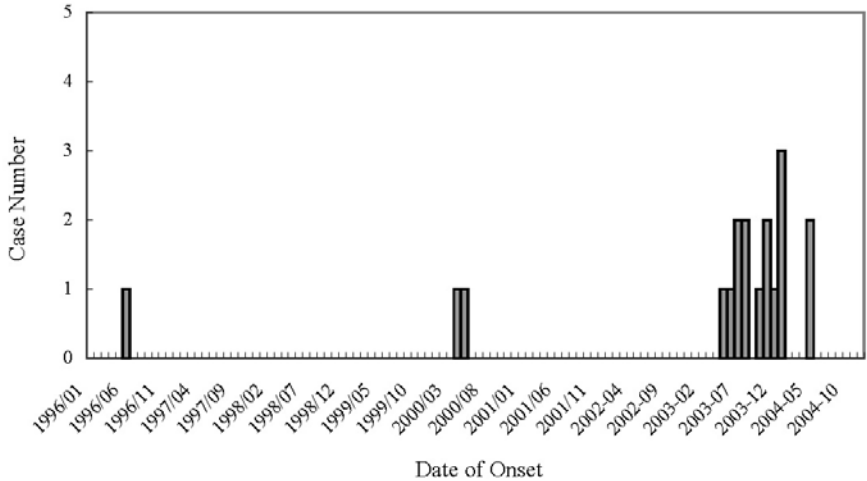
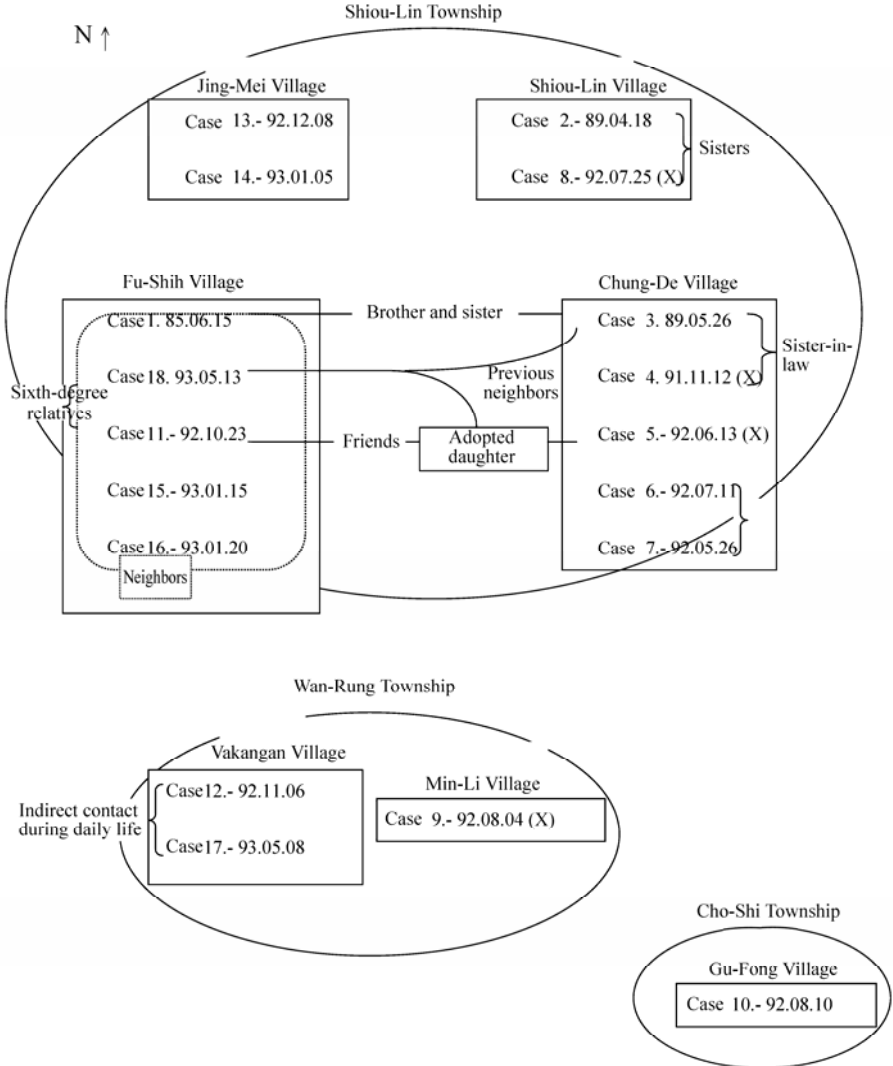


Fig. 2 Epidemiological link of the tuberculosis cluster patients in aboriginal villages in Hualian County



Note: Case numbers indicate the order of illness onset; (X) indicates deceased case