Hot Spring Bath as the Reservoir of *Legionella* Bacterium

Key words: *Legionella pneumophila*, hot spring bath

*Legionella* are widely distributed in natural and man-made environments. In these environments, *legionella* can utilize metabolic products excreted by blue-green algae and other general bacteria, on the other hand they can multiply intracellularly within amoebae body. The major infection route of *legionella* is via 1–5 μm diameter aerosols which contain the *legionella* and reach human alveolar septa. These aerosols are produced from cooling tower, evaporative condenser, shower, nebulizer, humidifier, whirlpool spa, hot spring spa, bubbling hot water bath, etc.

In Japan, compared to Europe and USA, there have been many cases of legionellosis in relation to hot spring spa, and continuous circulating public and domestic hot water baths, not only by aerosolization but also by aspiration of water. There were a few cases of legionellosis in relation to hot springs in Europe and USA. But continuous water circulating public and domestic hot water bath system is specific in Japan. In Japan, hot spring bath water circulates and passes through a filter just as the water of a continuous water circulating how water bath. Amoebae can attach to these filters and multiply by ingestion of bacteria. On these filters, *legionella* may become parasitic with amoebae.

Confirmative microbiological tests for legionellosis are recognized by detection of bacterial cells by direct fluorescent antibody testing in respiratory tract secretions and DNA detection by PCR systems in respiratory tract specimens as well as the isolation of *legionella* bacteria by culture. But to investigate the infection route or distribution rate of *legionella*, isolation of bacteria from the environment is necessary.

Yabuuchi and colleagues reported isolation of *legionella* from a hot spring bath in Japan (1). Subsequently, they reported isolation of *legionella*, amoebae, mycobacteria and *Pseudomonas aeruginosa* from domestic continuous water circulating bath water and sauna bath water (2–4). The most frequently distributing serogroups of *L. pneumophila* in bath water were serogroup 4, 5 and 6 which differed from cooling tower water in which *L. pneumophila* serogroup 1 had been most frequently isolated. Most of hot spring-related cases of *legionella* pneumonia were genetically confirmed with consistency of PFGE pattern between patients’ strain and strains isolated from an epidemiologically-related source (5–7).

See also p 859.

It is the serious problem for public hygiene and human health that not only *legionella* but also mycobacteria and *Pseudomonas aeruginosa* are detectable in hot bath water. But the continuous water circulating system is very useful with respect to the economical and energy saving points of view. The Japanese Ministry of Health, Labour and Welfare requires that the man-made water from which aerosols may be aspirated directly by humans (bath water, shower water, etc), must be free from *legionella* by disinfection with chlorination or various other methods. Thus circulating-system baths will likely be removed from hospitals and aged person care centers. Further, the most effective methods to prevent legionellosis caused by each water system must be examined as soon as possible.

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Reference