Lessons from Asbestos-related Cancers in Japan

Naomi Hisanaga[1],**Eiji Shibata**[2], **Kiyoshi Sakai**[3], **Michihiro Kamijima**[4],**Hitoshi Kubota**[5], **Ippei Mori**[5],

Aichi University of Education[1], Aichi Medical University School of Medicine[2],

Nagoya City Public Health Research Institute[3]. Nagoya University Graduate School of Medicine[4],

National Institute of Occupational Safety and Health[5], Japan

Introduction

Japan has imported a total of approximately ten million tons of asbestos in the past. As a result of massive use of asbestos, we are now encountering rapid increase of asbestos-related cancers. Moreover, additional asbestos exposure is on-going in demolition and rebuilding worksites. This report aims to introduce the asbestos story in Japan and to share the lessons we learned with other countries.

Asbestos load in environment and human lungs

We conducted an international cooperative study with Korean researchers to compare asbestos fiber concentrations in urban and rural air and autopsied lung tissues of deceased people not due to asbestos-related diseases between Japan and Korea[1,2)]. The fiber concentrations were determined by a transmission electron microscope equipped with an energy dispersive X-ray analyzer. The results disclosed obvious differences between the two countries. The geometric mean airborne (fiber/liter) and pulmonary (million fibers/g dry lung tissue) asbestos fiber concentrations in Japan were significantly higher than those in Korea in both urban and rural areas. The findings suggest the differences of asbestos load in the environments and human lungs. The health impacts of the differences are unknown yet.

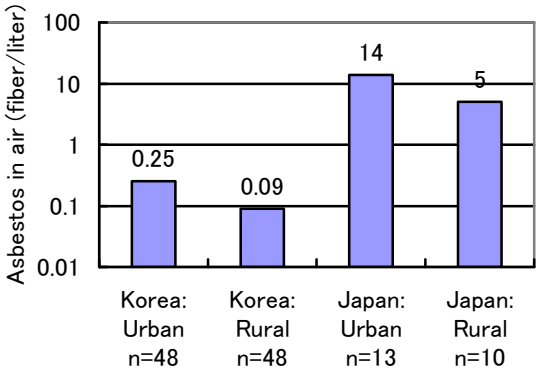

Fig.1. Geometric mean airborne asbestos fiber concentration in Japan and Korea (Figures in horizontal axis are numbers of determined points.)[1)] 【Method: Transmission electron microscopy】

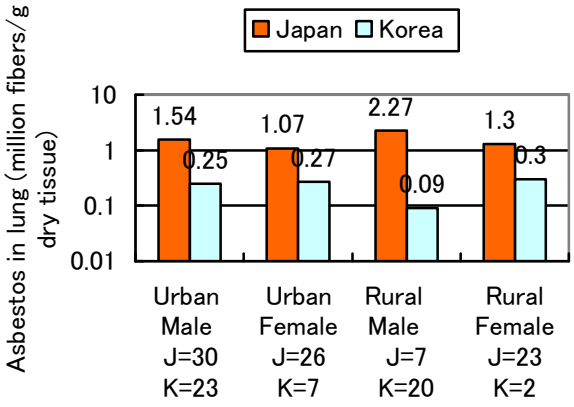

Fig.2. Geometric mean pulmonary asbestos fiber concentration in Japan and Korea (Figures in horizontal axis are numbers of subjects in Japan and Korea.)[2)] 【Method: The same with Fig.1】

Implementation of countermeasures

Figure 3 illustrates the development of countermeasures to protect workers' health from dust including asbestos taken by the Japanese government and changes in yearly asbestos import and the number of workers compensated as mesothelioma or lung cancer due to asbestos. The spread of asbestos use in industries was followed by various countermeasures. However, those countermeasures were insufficient to suppress the carcinogenicity of asbestos. Now the number of compensated workers is sharply increasing. In 2005, mass outbreak of mesothelioma among inhabitants near to an asbestos cement pipe manufacturer was brought to light. This incident triggered the social awareness on asbestos-related cancers and facilitated the application to workmen's compensation insurance system.

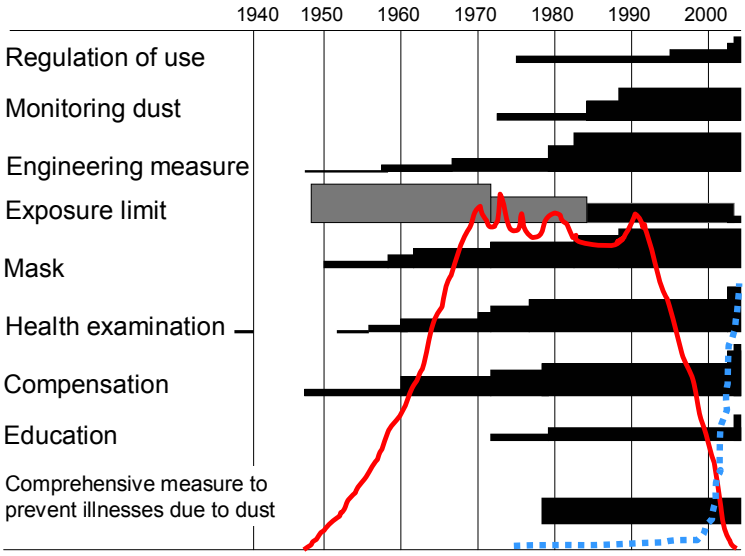

Figure 3. History of countermeasures against dust including asbestos taken by the Japanese government (Solid line: Trend in imported amount of asbestos. Dotted line: Trend in the number of workers compensated as asbestos-related cancers.)

Recently compensated workers as cancers due to asbestos

Total numbers of workers compensated as mesothelioma or lung cancer due to asbestos from 2005 to 2006 are shown by industry in Figure 4. Among 2078 mesothelioma cases, the number was largest in construction industry (872), and the next was shipbuilding (249). As for lung cancer case, of 1287, the number was also largest in construction (515), and the next was shipbuilding (195). Reflecting the wide use of asbestos, the cases distributed to various industries. Those cases would be the results of asbestos exposure mainly in 1970s or before.

Asbestos exposure in construction industry

We started to investigate asbestos exposure and its health effect in construction workers in the mid 1980s. Fig.5 demonstrates a worker cutting an asbestos-containing board by an electric circular saw without any countermeasure against dust. The airborne asbestos concentration in the worker's respiratory zone determined using a phase-contrast microscope was more than 100fibers/ml[4)]. We observed similar heavy exposure often during cutting boards using machine tools, such as a circular saw and a disk sander from the mid 1980s to the early 1990s. At that time, despite the widespread use of asbestos-containing construction materials and apparently high concentration asbestos exposure, countermeasures to protect workers were not taken appropriately. Those heavy exposures will result in the occurrence of mesothelioma and lung cancer in near future.

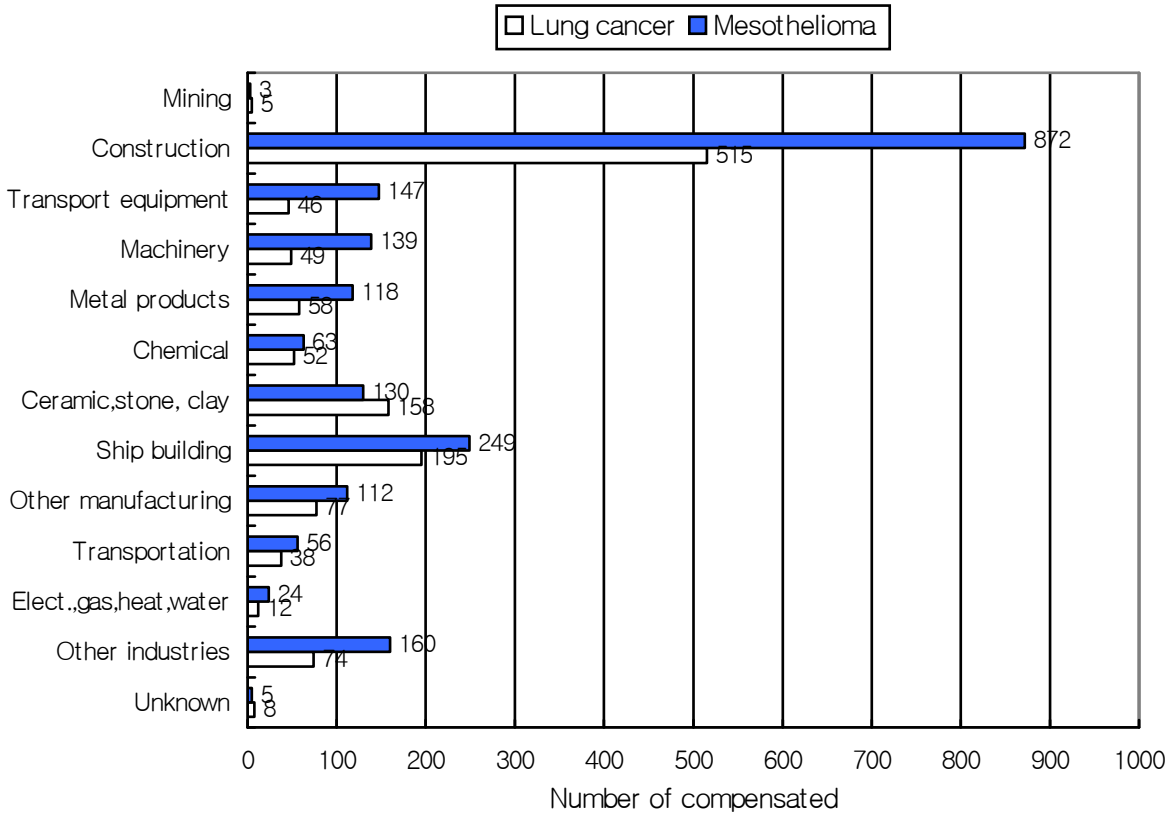

Fig.4. Workers compensated as mesothelioma and lung cancer due to asbestos from 2005 to 2006 by industry[3)]

Fig.5. A carpenter cutting a board containing asbestos by an electric circular saw without mask. The airborne asbestos concentration in his respiratory zone was 131fbers/ml. [4)] 【Method: Phase-contrast microscopy】

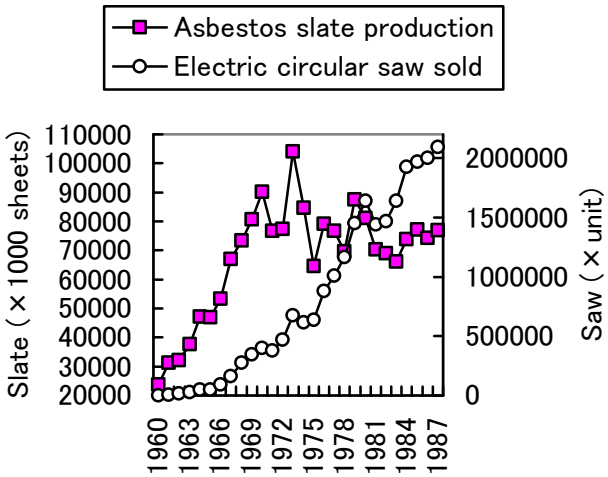

Fig.6. The relationship between asbestos slate production (×1,000 sheets) and sales figures of electric circular saws (×unit) from 1960 to 1987 in Japan.

In Japan, the production amount of asbestos slate boards began to increase rapidly in the 1960s, and it was followed by the spread of electric circular saws as a convenient cutting tool (Fig.6). Together with higher productivity, however, electric circular saws brought obviously larger amount of dust emission to construction sites. Although it was lost, this era was the essential chance to prevent asbestos-related diseases primarily.

Remaining asbestos exposure in demolition and rebuilding sites

In 2006, the use of asbestos was prohibited except specified limited uses in Japan. The most important remaining issue is asbestos exposure in demolition and rebuilding sites. Based on our research, we summarized the structure of occupational safety and health issues in demolition and rebuilding sites in Japan (Fig.7). Important points are (1) many types of jobs are involved in the sites, (2) self-employed workers are the major labor force, (3) workers can be exposed to not only asbestos but also other various hazardous factors, and (4) we cannot say the present safety and health measures are sufficient. To avoid reproduction of asbestos-related diseases and other illnesses and injuries, implementing a comprehensive measure to protect the workers' safety and health is indispensable.

We suppose that similar situations would be common in the world. International exchange of lessons and good practices gained in countries can facilitate resolution of the issues.

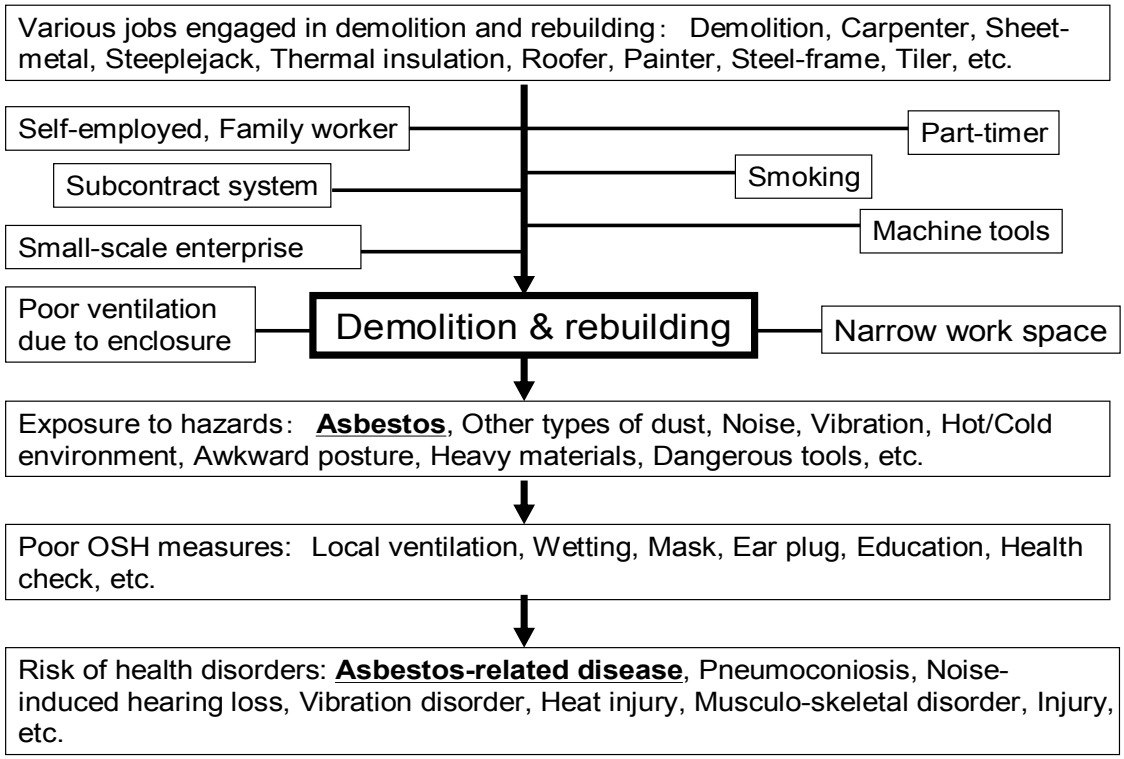

Fig.7. Structure of occupational safety and health issues in demolition and rebuilding sites

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