

A medically oriented
"detective story."

TALC-COATED

R I C E

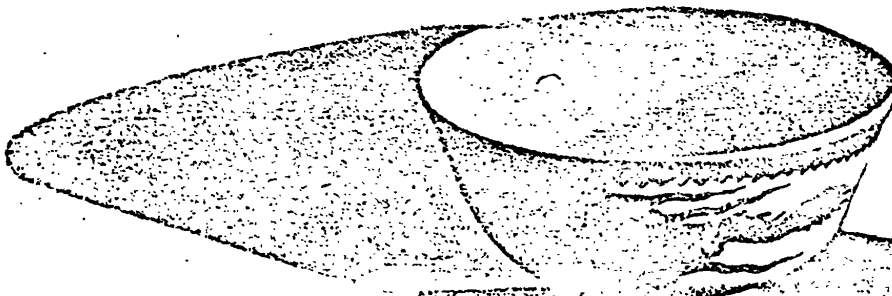
■ Last summer I walked through a ceramics plant to see how dusty it was because one of my patients had developed lung trouble after working there for several years. Within the plant itself the air seemed fairly clean. However, when I walked outside, I saw piled against a shed a number of open sacks of whitish powder which the manager told me was talc. It was to be added to the clay. A small breeze stirred the surface of the talc, picking up some dust and blowing it throughout the back yard. Some blew into my face and onto my clothes. I asked whether the workmen inhaled the talc, and the answer of the manager, who appeared an intelligent and careful man, suggested he believed that the talc constituted no hazard.

I worried about this since California talcs, as well as other talcs, are mixtures of minerals, of which a large percentage is asbestos. Asbestos causes lung can-

cer in workmen who inhale it, and, interestingly enough, these workmen also have an increased incidence of cancer of the gastrointestinal tract, particularly of the stomach.

Then, with this entire subject still fresh in my mind, I went shopping with my wife at a market near our beach home in Laguna. There is a Japanese population in Laguna, and this particular market carries food intended for the Japanese purchaser. I was startled to see a sack of rice intended for Japanese consumption bearing on it the label "coated with glucose and talc." Japanese people have a high incidence of stomach cancer. Talc coating on rice meant that the Japanese, at least in the Los Angeles area, were eating talc with their food. The obvious question was whether the two facts were related. Later, in Los Angeles I visited several markets, and in each I found that rice intended for Japanese

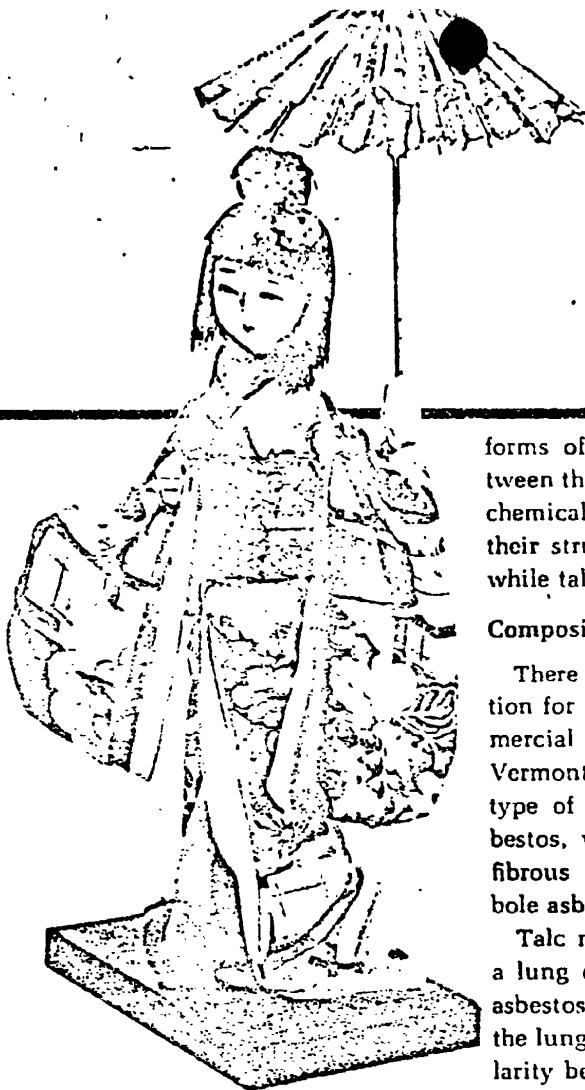
by R. R. MERLISS, M.D.



consumption bore the label "coated with glucose and talc." The next piece of information needed was how widely used talc-coated rice is in Japan itself. I found I could not buy Japanese imported rice in Los Angeles. The United States, at least in this area, does not import rice from Japan. However, I bought a sack of California-produced talc-coated rice, and visited several stores in the Japanese area of Los Angeles, asking in each case the Japanese owner whether this is the type of rice commonly used in Japan. In each case he told me that it was.

Beginning of a hypothesis

This, then, represented the genesis of a hypothesis: i.e., that the high incidence of cancer of the stomach in Japanese is due to their eating of asbestos-contaminated talc adhering to the rice. The further development of the hypothesis led me to spend a number of evenings away from home reading relevant studies. I learned that the age-adjusted rate of cancer of the stomach in Japanese men from 1962 to 1963 was the highest for all nations. It was 67.96 per 100 thousand men and was seven times the frequency of that in men in the United States. Investigation of the original report on the health problems of asbestos workers by Irving Selikoff of Mount Sinai Hospital showed that the workmen exposed to this mineral had a significant increase in gastrointestinal cancer, especially



stomach cancer. Presumably the increase came from the inhalation of fibers of asbestos, which then settled in the pharynx or the nasopharynx (that part of the respiratory tract shared with the mouth), and were swallowed, becoming trapped in the glands of the stomach, causing development of cancer there.

Rice meant for the American consumer is milled mechanically. On the other hand, California rice prepared for the Japanese consumer is treated with glucose, which forms a sticky film, to which the talc is applied. The talc is thought to preserve the flavor of the rice. About 2 per cent of all the talc produced in the State of California from 1959 to 1963 was used as a rice additive. I had a sample of the sack of rice I bought examined. Study of the ash demonstrated close to about four million asbestos-form fibers per gram.

I found that the mineral talc is defined in the geologic texts as a hydrous silicate of magnesium. So are some

forms of asbestos. The difference between these two minerals is not in their chemical composition but rather in their structure, asbestos being fibrous while talc is flaky or granular.

Composition of talc

There is no firm commercial definition for talc. The composition of commercial talc varies with the deposit. Vermont talcs are said to be a granular type of mineral relatively free of asbestos, while California talc contains fibrous silicates, classified as amphibole asbestos.

Talc miners and processors develop a lung disease called talcosis, just as asbestos miners develop asbestosis of the lungs. There is a good deal of similarity between talcosis and asbestosis. In one study¹ older talc workers showed more than four times the expected incidence of lung and pleural cancer. The presence of pleural cancer, or mesotheliomata, is especially revealing, since this particular type of tumor is very rare, and occurs primarily as a result of asbestos inhalation. Autopsies on six talc workers with talcosis showed the presence of the characteristic "asbestos body" in the lungs of every one.² This is a fiber of asbestos, coated with iron-containing protein material, which will give a positive stain for iron.

Up to 30 per cent of various talcs, depending on their points of origin, are classifiable as fibrous silicates, which are largely varieties of amphibole asbestos. *Chrysotile*, the classical form of asbestos, has a fiber more suitable for weaving and has been used for making asbestos curtains, blankets, and so forth. *Chrysotile* frequently occurs as a contaminant of talc.

However, amphibole asbestos fibers,

An internist, Dr. Merliss has been in private practice in the Los Angeles area. He is senior attending physician emeritus of the Los Angeles County General Hospital. In addition to the numerous articles he has had published in professional journals, he is also the successful author of two published novels.

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which are usually shorter than chrysotile fibers, are no safer. In one study I saw from Holland amphibole asbestos mineral predominated in asbestos bodies in the sputum of a group of men exposed to asbestos and having a high incidence of malignant tumors of the pleura (the membrane that lines the lungs and chest cavity). Moreover, miners of talc that contains more amphibole asbestos than chrysotile have a substantial increase in the incidence of cancer of the lung.

At this point the information I collected appeared to support the hypothesis that eating rice coated with asbestos-contaminated talc might contribute to cancer.

The next step in the investigation of the hypothesis was to examine the geographical occurrence. Studies within Japan showed that in prefectures in which rice is the major staple, stomach cancer is higher. It is lower where the population eats heavily of other staples such as soybeans or yams. The death rate from stomach tumors is greater in Japanese who eat rice with every meal than in Japanese who eat it not as frequently.

Finally, the stomach-cancer incidence of Japanese cannot be considered a hereditary or genetic disorder, since as Japanese migrate westward, the incidence of stomach cancer falls. Thus the incidence of stomach cancer among Japanese in Hawaii is greater than among their non-Japanese neighbors, but is roughly only a little over half as much as in Japan.

History of talc coating

The most difficult aspect of the development of this hypothesis was the determination of the nature of the rice currently being eaten in Japan, and the

history of talc coating of rice in Japan. While storekeepers have told me that to their memory, talc-coated rice was customarily eaten in Japan, information directly from official sources in Japan has been slow in coming. When it finally did come it was incomplete and only partially revealing. I have learned that talc-coated rice was the classical form of Japanese rice preparation in the past. However, officially, this has stopped in recent years. The Japanese Ministry of Agriculture and Forestry writes that with enforcement of food sanitation laws in 1947, the addition of talc to rice has stopped. This same Japanese official source indicates that there is no current contamination of rice by talc. I have had five specimens of Japanese rice, imported from Japan or purchased there by visitors, examined for asbestos. Four of these demonstrate no asbestos. However, one specimen of canned cooked rice, currently prepared and cooked in Japan and imported to America from Japan, contains a substantial amount of asbestos, even after the cooking and washing process. Consequently, it would seem that while the use of talc-coated rice in Japan has officially been abandoned, at least one sample of rice from Japan is still currently contaminated with talc.

At the moment, then, the hypothesis remains neither proven nor disproven. With all carcinogens, or co-carcinogens (other substances that work with carcinogens to cause cancer), the period between injury and the development of clinical cancer is always long. In the human being such a period between injury and development of cancer may run up to twenty to thirty years. This is what makes the identification of carcinogens difficult, and why

it took us so long to recognize that smoking causes cancer. The latent period between exposure and development of the cancer is particularly long with asbestos. In one study³ lung cancer appeared more than twenty years after the beginning of occupational exposure to asbestos inhalation. In another study⁴ the increase of lung cancer first appeared about twenty-five years after first exposure.

Consequently, I expect now, should the hypothesis be correct, that sometime in the future, after the expiration of the latent period necessary for carcinogenesis, cancer of the stomach in Japanese in Japan will begin to decrease. Exactly when this drop occurs will depend on the length of the latent period, and the time when widespread application of talc to rice in Japan stopped.

The value of this hypothesis, then, will be decided by the death rate from cancer of the stomach in Japan in the future. Consequently, the next ten years will tell whether this hypothesis is valid. If the death rate drops, it will be strongly supported. If not, one will then have to conclude that one more seemingly attractive hypothesis on the genesis of a form of cancer will have been disproved. □

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