The delayed appearance of a mercurial warning

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Commentary

Title: The delayed appearance of a mercurial warning

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ABSTRACT

The publication of a 1971 study from Japan on chronic methylmercury poisoning in adults provides an occasion to re-examine the history of Minamata disease and its social and political repercussions. Research findings were suppressed or held back due to controversies that were tearing the scientific community apart. Similar controversies occurred also outside of Japan. Only now are the long-term adverse effects of environmental methylmercury exposure becoming clear. The delayed release of the 1971 results therefore reminds us as epidemiologists of our obligation, even in the presence of scientific uncertainty, to call attention to preventable risks.

The tragic tale of Minamata disease is well known,[1, 2] but its epidemiology aspects keep unfolding. As early as 1953, the local inhabitants in this Japanese fishing village knew that their cats were dying from cramps that they dubbed ‘dancing disease’. Fish were found belly-up in Minamata Bay and in nearby waters. The company doctor at a local chemical factory was able to reproduce the dancing disease by feeding cats effluent water from the factory. However, this research was suppressed by the company, and the results only became public 40 years later.[3]

The first cases of Minamata disease were reported in 1956. The cause of this chronic neurological syndrome with tunnel vision, dysarthria, ataxia, and paresthesias was unknown at first. The link to seafood consumption was quickly revealed, and the prefectural authorities announced a warning against eating seafood from Minamata Bay. However, the national government soon after declared that the warning was illegal, since the contaminant was not identified. Expert committees investigated the possible causation, at first without reaching a conclusion. These discussions were derailed by requests to consider even far-fetched possibilities, such as the leakage of dumped explosives from the Second World War that was proposed by the Japan Chemical Industry Association.[4]

As sensitive chemical analyses were developed and experimental studies were completed, the evidence became overwhelming by 1960 that methylmercury was indeed the cause of Minamata disease. Several years later, the causal connection was finally recognized by the governmental authorities. Meanwhile, pollution of the bay continued, and the number of patients with obvious Minamata disease increased. Eventually, some forms of compensation were arranged, and the medical profession was then challenged to develop criteria for the Minamata disease diagnosis and eligibility of compensation. These criteria and the means of compensation were the object of much discussion and legal

proceedings. Still, as late as 1971, a representative from the polluting factory revived a previously refuted hypothesis that the disease was due to rotten fish (scombrotoxin) and not mercury contamination from the factory.[4] Only after a legal defeat did the company agree to pay compensation to the victims. In 1977, the Japan Environment Agency issued the formal rules on certification for formal recognition of Minamata disease patients. Although some legal issues are still lingering in court, the major case on compensation to Minamata disease patients was finally resolved only in 2004, almost 50 years after the disease had first appeared. During all of this time, the scientific community was torn apart by protracted controversies.

The delayed appearance of the 1971 study of widespread methylmercury toxicity in this issue of Epidemiology[5] should be seen in the light of the drawn-out debates on Minamata disease and the legal and political repercussions. The conclusions of this study would have spurred further and perhaps irreconcilable controversy. The social and political situation in Japan at the time was characterized by rapid industrial growth as a national priority to recover from the Second World War. Minamata disease patients were therefore an unwelcome reminder of the costs of unrestrained environmental pollution, and stigmatism was widely reported. But to explain away the delays in recognition of Minamata disease only as a local political phenomenon would overlook the common tendencies of epidemiologists and scientists in general to highlight the uncertainties in empirical studies.

Minamata disease began to raise attention worldwide, and expert meetings were convened by UN agencies. It was concluded that pregnant women “may be” at greater risk, but a proposed exposure limit for methylmercury at first aimed only at protecting adults against poisoning. As evidence accumulated from epidemiological studies in the Faroe

Islands and elsewhere on neurobehavioral deficits in children prenatally exposed to methylmercury from maternal seafood diets, US authorities called a meeting of international experts in 1998.[6] Their conclusions spelled out several uncertainties of the scientific evidence and some apparent disagreements between studies. However, a (U.S.) National Research Council committee[7] soon thereafter concluded that neurodevelopmental deficits are the most sensitive and well-documented effects and that these effects warranted a low exposure limit. This conclusion then became internationally recognized.[8] Now, chronic methylmercury toxicity in adults is also becoming more widely documented due to unfortunate experiences elsewhere.[9]

Seen in present-day perspective, the 1971 study has some limitations due to the cross-sectional design, the crude classification of neurological manifestations, and the possible misclassification due to the large number of examiners. However, it was the first and the largest population-based study conducted in Minamata and it benefited from a high participation rate in all of the three study areas. The study was clearly visionary and courageous for its time. Its message on non-specific, subclinical dysfunction as an outcome of low-level exposures to environmental toxicants remains important. From the above consideration of the political and scientific controversies on Minamata disease, it seems clear why the 1971 study was not released at the time. But could it have been published, e.g., in the US? We think not. The scientific community was not ready. Even the first papers on the Faroes studies on developmental toxicity were repeatedly rejected by major journals, before they eventually got published, and that was only in the 1990s.

As epidemiologists, we must therefore recognize an important warning reflected by this delayed paper on Minamata disease. For decades, scientific uncertainties on mercury led to exaggerated controversies that delayed preventive action.[10] However, when

uncertainties are interpreted as support of the null hypothesis, the costs to human health and society can be enormous.[11] We therefore have a responsibility to combine our epidemiology talents and insights with the courage to elicit preventive action against the harm caused by environmental chemicals. Emphasis on uncertainties amidst skepticism from colleagues, regulatory agencies or stakeholders, should not let us forget to call attention to preventable risks. Although seemingly fleeting or mercurial, this is the true warning from the 1971 paper.

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