The Sophistry of the Term "Legionnaires' Disease"

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In January 1977, the Center for Disease Control (CDC) of the federal government announced that its scientists had isolated a bacteria-like organism that appeared to cause the outbreak of Legionnaires' Disease. The published scientific evidence that formed the basis of this announcement was limited. In addition, a preliminary report has recently been transmitted by CDC (September 1977) to directors of state and territorial public health laboratories.

Within the past few months, the communications media have frequently reported the occurrence of sporadic cases of so-called "Legionnaires' Disease" attributed to the organism isolated by CDC. As a result of these reports, physicians and the public have been led into believing that the CDC organism has been shown to be primarily responsible for the outbreak of the illness among Pennsylvania Legionnaires and guests during their convention in Philadelphia in July 1976. The conclusion that the cause of Pennsylvania Legionnaires' Disease has been established and that the mystery has finally been solved is unwarranted. It bespeaks sophistry,—a type of reasoning that is superficially plausible but may be, in fact, delusive. Thus, in their communications, CDC neglected to present the alternative hypothesis that their microbe is a secondary invader that may proliferate in the lungs of patients who suffer from pneumonitis caused by a variety of toxic and infectious agents as well as from debilitating diseases.

It is our present view that the respiratory outbreak that occurred in Philadelphia in July 1976 was caused by a toxic agent and that many of the victims developed secondary pulmonary infections by microbes that probably include the one described by CDC. Briefly stated, the belief that Pennsylvania Legionnaires' Disease was caused by a chemical toxin is based upon the following observations:

1. The history, symptoms, physical findings, laboratory studies and course of the Philadelphia outbreak conformed closely to those produced by the inhalation of a toxic agent, such as nickel carbonyl. The fever that occurred in many of the victims was consistent with that observed in infections secondary to chemical pneumonitis.

2. The summarization report of the panel of 12 pathologists assembled by CDC to review the necropsy material from victims of the Philadelphia outbreak concluded that the lung lesions were probably produced by a toxic agent and that the possibility of an infectious origin was remote. The panel of
pathologists also noted that foci of secondary pneumonia were present in the lungs of a number of the cases. Furthermore, a comparison of histopathologic sections of lung tissue from Legionnaires' Disease with those of patients with fatal acute nickel carbonyl poisoning reveals the lesions to be essentially identical. The pathologic evidence supports the view that the primary cause of Pennsylvania Legionnaires' Disease was a toxic agent and that the organism isolated by CDC might be a secondary invader.

3. The outbreak was not contagious and the mode of transmission has not been established. It seems unlikely that an organism would be capable of infecting solely Pennsylvania Legionnaires and their guests among the many thousands of bicentennial visitors in Philadelphia, in addition to the normal population of the city, and to single out and produce in the Pennsylvania Legionnaires a respiratory disease which in itself was not contagious. On the other hand, exposure of the Pennsylvania Legionnaires at the Bellevue Stratford Hotel to an inhaled chemical toxin presents a more plausible hypothesis for the outbreak.

4. Since the symptoms and physical findings of the victims conformed to those of patients with acute nickel carbonyl poisoning, nickel analyses were undertaken on tissues obtained at necropsy from the victims. The nickel concentrations in the lungs of five of six subjects, reported by Sunderman, Jr. and Baselt, were several fold greater than the nickel concentration of normal lung tissue.

Later, Chen, Francisco and Miller confirmed the high concentrations of nickel in lung tissues of the victims of the Philadelphia outbreak. These independent investigators reported the average nickel concentration in lung tissues from the Legionnaire cases to be nine times that of the controls. Their high nickel values were considered to be "inconclusive," owing to possible contamination. Chen and coworkers made their analyses on nine cases of Legionnaires' Disease, on nine cases referred to as "controls" and on three cases of pneumonia. The tissues were obtained from CDC and were coded so that the analysts did not know in advance the origin of the tissues or the provisional diagnoses. It is noteworthy that eight of the nine lung tissues from the Legionnaire cases were the only ones that yielded the high nickel values. If the increased concentrations of nickel in the lungs of Legionnaire cases are attributed to contamination, then the cause must be determined for the non-contamination of tissues from the "controls" and pneumonia cases. The high concentrations of nickel obtained in the lung tissues from Legionnaire cases cannot be dismissed on the basis of preferential contamination.

The initial investigations of the Philadelphia outbreak by the public health authorities were concentrated primarily on efforts to establish a diagnosis of swine influenza. The failure of the authorities to emphasize chemical toxins as possible factors in the early stages represents a serious flaw in the scientific investigations. If samples of excreta and blood had been saved for analyses, a confirmed cause might have been ascertained. It is now doubtful that the primary cause of the Philadelphia outbreak will ever be established with certainty.
The available facts simply do not warrant acceptance of the conclusion that the CDC organism was the primary cause of the outbreak.

In the interest of scientific accuracy and to avoid sophistry, the microbe identified by CDC should be given a provisional generic name and the illness attributed to this organism should then be designated by citation. For example, if the organism were a rickettsia, the illness should be referred to as a rickettsiosis. It is a misnomer and a misrepresentation to use the term "Legionnaires' Disease" in reference to patients other than the victims of the 1976 Philadelphia outbreak.

References

3. Pathology of "Legionnaires' Disease". Memorandum from Director of Pathology Division and Staff Pathologist, Toxicology Branch, CDC to Director for Disease Control, Atlanta, GA, September 17, 1976.