Sudden-Death Syndrome

One-third of all infants who die within the first year of life and after the immediate neonatal period appear immediately before death to be in good health; they die suddenly, and the cause of death is unexplained. This problem has frustrated coroners and medical investigators for 300 years.

A conference that concerned itself with this problem was held at the University of Washington School of Medicine, Seattle, on 9 and 10 September. The participating pathologists agreed: (i) that specific findings are scarce; (ii) that considerable pulmonary edema, sometimes frankly hemorrhagic, is often present; (iii) that petechial hemorrhages involving pleural, epicardial, and occasionally endocardial surfaces are often seen; and (iv) that the thymus is not pathologically enlarged and on histologic examination appears normal. None of these findings were considered pathognomonic, but it was agreed that they are characteristic. In children who die before the age of 2 years, and most frequently in those who die when they are between 2 and 5 months old, these pathologic anatomic features, in conjunction with the absence of other demonstrable pathologic findings and the absence of any evidence of previous significant illness, appear to constitute a syndrome. The designation "sudden-death syndrome" seemed acceptable to all the conference participants.

The problem of the epidemiology was discussed. The evidence indicates the following points. (i) The syndrome appears in all socioeconomic groups, and the incidence is much the same in England and in several parts of the United States. (ii) The evidence relative to seasonal and sex incidence is not clear. (iii) Temporal correlation with the occurrence of infectious disease in the general population remains uncertain. (iv) Although multiple cases in a single family have been reported, no clear evidence as to whether these are fortuitous is available. Twin studies are in progress in England.

A major portion of the conference was concerned with the discussion of two problems, (i) the etiology, and (ii) the mechanism of death. Attempts at viral isolations have been made by several highly competent groups of investigators. However, not all of the most recent virological techniques have been applied. In a small number of instances viruses have been isolated from

tissues, including lung and brain, taken at autopsy. In a few instances the same virus has been recovered from other members of the immediate family. However, in the majority of cases examined no viruses were recovered from the autopsy tissues available. The possibility was raised that the sudden-death syndrome may represent a response to viral infection during the period of incubation. The response of mice infected with ectromelia was suggested as an example of occasional fatality during the usually silent incubation period. The data available at present neither support nor disprove a viral etiology for the syndrome.

The problem of immunological immaturity and the change from early neonatal resistance mechanisms to more mature responses was discussed. It was suggested that the second, third, and fourth month of life may be a transition period during which the infant is more vulnerable to infectious disease than he is shortly after birth. While gamma globulin levels in this group of infants appear to be within the normal range for this age, this finding cannot be taken as evidence against such a hypothesis.

There was considerable discussion of the possibility that hypersensitivity to proteins in cow's milk resulted, after inhalation of milk during sleep, in an atypical anaphylactic reaction. An experimental model in guinea pigs was presented in which the pathologic findings bore sufficient resemblance to those of the syndrome to merit serious consideration. Circulating antibodies to cow's milk proteins have been observed in a substantial proportion of infants who died with this syndrome, but nearly as high a proportion of living infants of the same age have also exhibited positive titers. Another finding consistent with this hypothesis was the frequent presence of cow's milk antigen in the lungs of children who died with the syndrome. All agreed that while the hypothesis was attractive, the evidence was highly circumstantial and currently incomplete. If one could prove that infants who never received cow's milk (entirely breast-fed) never exhibited the syndrome, the case for the hypothesis would be strong. Such information is exceedingly difficult to obtain.

Cardiopulmonary factors which might lead to sudden unexplained death were described by the pulmonary physiologists. It became evident that for the age group most affected, nothing is known about pulmonary physiology

and cardiopulmonary responses. Once again it was emphasized that the 2- to 5-month period may well be a transitional period between the neonatal and the more mature infant response, and that this possibility merits a great deal more study.

The conference brought together for the first time a variety of individuals interested directly or indirectly in the problem. The interchange revealed, as I have indicated, a number of gaps in basic information concerning infant development. One is startled to find that the number of infants who die of sudden-death syndrome is comparable in order of magnitude to the number of adults who die from carcinoma of the lung. Despite this fact, the epidemiological information is miniscule in comparison to that on carcinoma of the lung. The questions raised by the conference should provide a stimulus for more comprehensive and detailed studies of the areas indicated, including cooperative investigations on the epidemiology in this and other countries.

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Calorimetry

In order to report new developments in thermodynamics and thermochemistry, to develop cooperative schemes for improving the acquisition and dissemination of thermodynamic data, and to exchange views on techniques, the 18th Annual Calorimetry Conference was held 16–18 October in Bartlesville, Oklahoma, at the Bureau of Mines Petroleum Research Center. This conference was the first to be held at the home laboratory of its founder, the late H. M. Huffman.

The keynote address, "Some legacies of H. M. Huffman to calorimetry and thermodynamics," was delivered by John P. McCullough (Socony Mobil Oil Co.), a successor of Huffman as director of the laboratory. He described the (i) development of a model laboratory and (ii) the method of obtaining coherent and comprehensive thermodynamic data by a coordinated series of various kinds of experiments upon carefully selected classes of compounds. This approach, initiated by Huffman and continued by his successors, has resulted in such outstanding contribu-