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Laboratory Infections

IN THE search for agents of infectious disease there have been occasional instances of self-inoculation to prove an etiological relationship between a given microorganism and the disease with which it was believed to be associated. More frequently, however, laboratory workers have become infected unintentionally by the agents with which they were working as a result of some accident or without the exact circumstances being recognized. Certain infectious agents, such as those of undulant fever, tularemia, psittacosis, and Q fever, were prone to infect the persons working with them.

With new infectious agents being recognized, with more workers being exposed to the danger of laboratory infection, and with new techniques and procedures being constantly introduced, there has been an increasing interest in the protection of laboratory personnel. To obtain more information regarding the occurrence of laboratory infection, the National Institutes of Health sponsored a survey, conducted by means of a questionnaire mailed to nearly 5,000 U. S. laboratories. It revealed 1,342 instances of presumed laboratory-acquired infection, with 39 deaths (*Am. J. Pub. Health* [in press]), only one third of which had been recorded previously in the literature. More than 70 different agents were involved, representing bacteria, viruses, fungi, rickettsiae, and protozoa. The diseases most frequently encountered were brucellosis, tuberculosis, and hepatitis, which together accounted for about one third of all infections. Workers come in contact with the agents of these diseases through the handling of cultures, the examination of specimens, and the processing of blood and blood derivatives. The latter constitutes the principal source of hepatitis. There are other agents, however, with which relatively few persons have laboratory contact. Yet the number of infections caused by them has been large. For example, tularemia, psittacosis, typhus and Q fever, and the fungus infection coccidioidomycosis occur as institutional outbreaks or as scattered cases in laboratories where these diseases are studied intensively.

The greatest hope of preventing infection lies in the recognition of the sources of infection. Only 16 per cent of all the recorded infections could be traced to a definite incident that resulted in contamination. These are, of course, preventable in the sense that all accidents are preventable. It is the unrecognized sources of infection that constitute the greatest problem. In many instances circumstantial evidence points to aerogenic transmission. Coccidioidomycosis, for example, is naturally acquired by inhalation of the fungus spores present in dust. When cultures of the fungus are opened, the dry spores are easily detached and may be inhaled not only by the worker but also by other persons in the same room or building. It is more difficult to understand the formation of aerosols from suspensions of viruses and rickettsiae, but recent studies demonstrate that aerosols are commonly released when infectious materials are transferred from one container to another. To diminish the chances of aerogenic transmission certain safety measures, such as the use of protective hoods and pipetting devices, have been recommended. Further protection against some infections is available in the form of specific immunization.

Laboratory-acquired infections do not always follow the pathways of transmission established for the naturally occurring disease. Yellow fever has developed in the absence of the vector; the virus of lymphogranuloma venereum has infected persons working with it in the laboratory in the absence of venereal contact. These examples should be of interest to those concerned with protection against biological warfare because they suggest that even in the absence of some of the links in the usual chain of transmission a given agent might be a potential danger if properly dispersed in the environment. The occupational hazards are now being recognized not only among workers in infectious disease laboratories but in other fields related to medicine.

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