with parasitic (e.g., malaria and schistosomiasis) and bacterial (e.g., tuberculosis) infections; the latter is a concern in the United States, where pneumococcal and influenza vaccinations are recommended for HIV-infected persons. Field-based, prospective, and longitudinal studies are needed for a complete picture of the extent of interaction between vaccination and pathogen-induced immune activation, HIV replication, and associated rapid progression to AIDS.

The need for a global partnership to facilitate a more rapid identification of infectious agents in a manner that discriminates among closely related strains and species and uses genetic information to study evolution, emergence, and dispersal of infectious agents was emphasized. To address emerging infectious disease threats, CDC has a strategic plan that emphasizes surveillance and applied research for a strong public health-based defense against infectious disease. A goal of this plan is the integration of laboratory science and epidemiology to develop and use tools to detect and promptly identify emerging and reemerging pathogens and investigate factors that influence their emergence. To promote international collaborations and interaction between clinicians, epidemiologists, and laboratory scientists, CDC, ORSTOM, and CNRS will cosponsor the 2nd International Workshop on Molecular Epidemiology and Evolutionary Genetics of Pathogenic Microorganisms at ORSTOM, Montpellier, France from May 26 to 28, 1997.

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Simian Virus 40 (SV40), a Possible Human Polyomavirus (Workshop Held at NIH)

During the past 4 years, polymerase chain reaction (PCR) assays have detected DNA sequences related to SV40 (an oncogenic simian polyomavirus) in a variety of human tissues, especially choroid plexus tumors, ependymomas, mesotheliomas, and osteosarcomas (1-7). These findings were supported by the isolation of infectious SV40 from a choroid plexus tumor (8). Although another paper reported the failure to detect SV40 DNA in mesotheliomas (9), these studies have reawakened interest in inadvertent human exposure to SV40 in the late 1950s and early 1960s when polio and adenovirus vaccines prepared in rhesus monkey cells containing SV40 were used (10,11). In response to the implications of detecting SV40 DNA in human tumors, the Food and Drug Administration, National Institutes of Health, National Vaccine Program Office, and Centers for Disease Control and Prevention sponsored a workshop on SV40 on January 27-28, 1997 at the National Institutes of Health to examine the possibility that SV40 is an infectious agent in humans.

The workshop first reviewed the biology of SV40 and the human polyomaviruses JC and BK and the data associating SV40 DNA with human tumors. In addition to tumors, SV40 DNA sequences have been detected in human pituitary gland tissue, peripheral blood mononuclear cells, and seminal fluids from healthy persons (3,5,7). Two laboratories were unable to detect SV40 DNA by PCR assays in human tissue, including mesothelioma; researchers noted the ability of the PCR primers used in these assays to amplify DNA sequences from JC and BK viruses as well as from SV40 and discussed whether each set of primers in the PCR reaction requires specific conditions to amplify virus-specific DNA. Furthermore, preliminary data suggested that primers considered to be SV40-specific could, under certain conditions, amplify what appeared to be host DNA sequences. Two laboratories demonstrated that the sensitivity of different PCR primers to detect SV40 DNA was 1-10 to 10-1,000 SV40 genomes. These discussions emphasized the need for caution in interpreting PCR data and the need for standardized, quantitative PCR assay procedures.

National Institute for Biological Standards Control scientists described the use of PCR assays to search for SV40 DNA in current and early lots of polio vaccines and concluded that polio vaccines used in the United Kingdom in 1971 to 1996 did not contain SV40 DNA, while early vaccines prepared in rhesus monkey cells contained easily detectable amounts of SV40 DNA. To evaluate the relationship between exposure to SV40 in the early polio vaccines and the development of tumors (choroid plexus tumors, ependymomas, mesotheliomas, and osteosarcomas), scientists described epidemiologic surveys

that used tumor registries in two countries (two in the United States, one in Sweden). The surveys compared tumor incidence data in persons who could have been exposed to SV40 in polio vaccines with those who, because of their date of birth, could not have been exposed directly; no discernible relationship between exposure to SV40 and development of tumors was found. The surveys also found no association between exposure to SV40-contaminated polio vaccines and the incidence of tumors of the brain and ovaries. These results support the findings of most of the earlier epidemiologic studies (10,11) and help mitigate public health concerns about the use of SV40-contaminated polio vaccines.

Whether SV40 is a human infectious agent that might play a role in human neoplastic disease was also discussed. If SV40 DNA sequences are present in choroid plexus tumors in children born many years after vaccines were SV40 free (8), the possibility that SV40 is present in the population must be considered. Researchers reviewed data on SV40 antibodies in sera taken before 1954 (12) and in sera from persons in remote regions (13,14) not exposed to SV40-contaminated polio vaccines; the data suggest that SV40 might have been present in humans before the polio vaccines were introduced in 1954 (11). Because of cross-reactivity between BK, JC, and SV40 antibodies (15) and the lack of standardized serologic assays to identify SV40 specificity of antibodies present in single samples of human serum, it is difficult to determine whether SV40 was present in humans before the population was exposed to SV40 in the early polio and adenovirus vaccines. Thus, determining whether SV40 is an infectious agent in humans and whether humans were exposed before the polio vaccine was introduced requires further study.

Two preliminary studies showed that SV40 T proteins are expressed in some cells in mesotheliomas and these proteins can bind to both the p53 and Rb cell-cycle control proteins. The SV40 T protein-p53 and SV40 T protein-RB protein interactions are thought to contribute to neoplastic transformation; however, the role of these interactions in SV40-induced neoplastic transformation is unresolved. Further attempts to assess the link between SV40 DNA sequences and neoplastic processes in humans will require more conclusive data about whether SV40 DNA sequences are present in tumors, whether this viral DNA is integrated or extrachromosomal, and whether it is expressed. Two new experimental approaches were suggested to assess the ability of SV40 to contribute to neoplastic development in humans: prospective studies on the presence of SV40 in mothers and other family members of children with choroid plexus tumors and studies comparing the function of what may be an SV40-associated defect in the p53-independent cell-cycle control gene SEN6 in SV40-transformed human cell with cells from tumors containing SV40 DNA sequences.

The sponsors of the workshop were reassured by the independent epidemiologic surveys in the United States and Sweden that the incidence of neoplastic diseases in persons exposed to SV40 in viral vaccines has not increased. However, the sponsors should take the following steps to resolve questions raised by human exposure to SV40 in viral vaccines prepared in rhesus monkey cells in the 1950s and 1960s: 1) Form working groups to a) analyze the sensitivity and specificity of PCR reactions for detecting SV40 DNA in human tissues and develop standardized conditions to ensure confidence in the data generated by such reactions; b) develop methods for assessing the specificity of human polyomavirus neutralizing antibodies in plaque neutralization assays and consider other assays that can measure antibodies to virus-specific epitopes on the virions of polyomavirus; and c) develop ways to search for SV40 in the environment. 2) Encourage additional attempts to isolate SV40 from human tissues and increase the number of completely sequenced SV40 chromosomes obtained from SV40 field isolates. 3) Develop standardized reagents and make them available to laboratories who wish to assess the sensitivity and reliability of their PCR assay for detecting SV40 DNA. 4) Identify reagents such as archived tumor specimens, serum specimens and databases useful for epidemiologic evaluations, and any other specimens critical for evaluating when SV40 or SV40-like viruses entered the population.

For information about transcripts and audio and video recordings of the workshop, contact the Food and Drug Administration Freedom of Information Staff HFI-35, Rm. 12A-16, 5600 Fishers Lane, Rockville, MD 20857; phone: 310-443-1813. The proceedings of the workshop will be published in Developments in Biological Standardization.

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Conference on Foodborne Pathogens: Implications and Control

More than 400 food protection and public health professionals from 18 countries, including microbiologists, epidemiologists, physicians, and health policy makers in industry, academia, and government, attended the Conference on Foodborne Pathogens: Implications and Control. The conference participants examined the response of the food industry and its related public health/food safety regulatory agencies to the emergence of new microbiologic threats and to the reemergence of known pathogens in previously unimplicated foods. The 3-day conference was held in Alexandria, Virginia, USA, March 24-26, 1997. It was organized by the International Life Sciences Institute North American (ILSI N.A.), the Centers for Disease Control and Prevention, the U.S. Department of Agriculture, and the U.S. Food and Drug Administration, in cooperation with the Food and Agriculture Organization and the Pan American Health Organization.

The specific goals of the conference were to identify factors that foster the emergence/reemergence and dissemination of foodborne microbial hazards, explore scientific and food safety strategies to identify and address these hazards, determine future research needs, and review the lessons learned and knowledge gained concerning the emergence and dissemination of food-related microbial threats to health.

The rapid emergence and dissemination of microbial foodborne pathogens and human diseases is affected by factors related to the pathogens themselves, their hosts, and the food production and consumption environment. The conference explored the role of the rapid mutation of foodborne pathogens such as *Escherichia* and *Salmonella*; the increasing numbers of susceptible persons; the effect of current livestock production practices, produce handling and food processing practices, and aquaculture; and changes in consumer lifestyles and food preferences.

Identifying and anticipating new foodborne microbial hazards require concerted efforts. The changing epidemiology of foodborne disease calls for improved surveillance including rapid subtyping methods, cluster identification, and collaborative epidemiologic investigation (including case-control studies). Also examined was the