

Impact of Pathology in Study of viral infections

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Abstract

Health care professionals and scientists working in pathology are experts in illness and disease. They utilise their expertise to support every aspect of healthcare, from guiding Health care professionals to treat common diseases, to using cutting-edge genetic technologies to diagnose patients with life-threatening conditions. Pathologists play a major role in research, advancing medicine, and innovating new treatments to fight against viruses, infections, and diseases like cancer.

Emerging and reemerging infectious diseases and therefore the threat of bioterrorism signalize to the growing importance of the power of the anatomic pathologist to acknowledge infectious diseases. Most of the developed world and much of the developing world have been spared from devastating diseases, such as smallpox, diphtheria, and paralytic poliomyelitis, through vaccination and worldwide eradication efforts. Nevertheless, new pathogens continuously emerge, old adversaries, reappear when suitable conditions such as war or famine exist, and microbes continue to develop resistance, even to the new broad-spectrum antimicrobial agents. Furthermore, global environmental changes, such as human encroachment into previously wild ecosystems, deforestation, damming of river systems, expansion of irrigation systems, and possibly changes induced by global warming, are likely to alter the current patterns of infectious diseases, particularly vector-associated or parasitic diseases. Closer to home, and of more immediate concern, is the diagnosis and treatment of opportunistic infections that affect the ever-growing population of patients with iatrogenic, inherited, or acquired immunodeficiencies. In this article, we review methods used in the pathologic diagnosis of infections, emphasizing the critical role of the anatomic pathologist in the diagnosis of both routine and emerging infectious diseases.

Viruses cause a good range of human diseases, starting from acute self-resolving conditions to acute fatal diseases. Effects that arise long after the first infection also can increase the propensity for chronic conditions or cause the event of cancer. Recent advancements within the fields of virology and pathology are helping in improving our understanding of viral pathogenesis, in providing improved vaccination strategy data and in developing newer, more effective treatments for patients all over the world. The reports assembled here specialize in the interface between virology and pathology and encompass aspects of both the clinical pathology of viral disease and therefore the underlying disease mechanisms. Articles on emerging diseases caused by Ebola virus, Marburg virus, coronaviruses like SARS and MERS, Nipah virus and noroviruses

are followed by reviews of enteroviruses, HIV infection, measles, mumps, human respiratory syncytial virus, influenza, cytomegalovirus, and varicella-zoster virus.

The diagnosis of complex diseases, infectious or otherwise, requires the collaborative efforts of clinicians, radiologists, and pathologists. The differential diagnosis generated at the bedside through patient history and physical examination is narrowed through consultation and thoughtfully ordered radiographic and laboratory studies. The anatomic pathologist, by providing the morphologic interpretation of biopsies and cytologic preparations, is an important member of the diagnostic team. Histopathologic and cytopathologic studies often allow for the definitive establishment or exclusion of a wide variety of diseases. In some instances, a microorganism that fails to grow in culture could also be detected by means of histopathologic examination of tissue samples or cytopathologic examination of specimens of body fluids or aspirates. Conversely, cultures may yield the causative microorganisms from tissues that demonstrate an inflammatory response strongly indicative of infection, but in which microorganisms are not identified in histologic sections.

Pathogenesis is that the process by which viral infection results in disease. Pathogenic mechanisms include entry of the virus at a body site, replication at that body site, then spread to and multiplication within sites (target organs) where disease or shedding of virus or infection to the body occurs. Most viral infections are subclinical, suggesting that body defenses i.e immune system works against viruses arrest most infections before disease symptoms become manifest. Knowledge of subclinical infections comes from serologic studies showing that sizeable portions of the population have specific antibodies to viruses albeit the individuals haven't any history of the disease. Nevertheless, in this new era, pathology will continue to be a vital component of identifying the true relationships between viruses and human disease, and we hope that this Annual Review Issue will serve as a blueprint for future studies in the diagnosis, treatment, and prevention of virus-related conditions through an improved understanding of the processes involved.

Long term study of pathology in several viral infections allows dividing them into 4 groups. 1. Acute and chronic infections with highly specific histopathological changes due to viral inclusions and/or very typical cell transformations. 2. Acute or chronic infections with typical cell's changes and tissue reactions, but additional verification is needed (in our experience HIV, HBV, HCV, enteroviruses, parvovirus, JCV, HPV, etc) 3. Chronic

infections causing inflammation but without (or at least not yet known) typical morphological changes (in our experience EBV, HHV6, 7, 8). 4. Viral latency or incorporation in the host genome without any changes at light microscopy (CMV, EBV, etc). In many cases, while investigating surgical material pathologists may contribute to the identification of etiology of the disease (in our experience hepatitis, encephalitis, lymphadenopathy, and placentitis of unclear etiology). During the study of liver biopsies in viral hepatitis and placenta certain prognostic and predictive criteria have been elaborated. Pathological studies need to determine immediate death causes; we had the chance to research them in HIV infection, hepatitis B and C, influenza. Histopathological studies contribute to complex studies of the pathogenesis of viral infection, especially their quite different clinical course. Another highly important but very rarely discussed issue is the peculiarities of viral lesions in different organs and tissues; we have data related to the brain and placenta. A very important issue of quite different mixed infections can't be successfully studied without taking into consideration the results of the special morphological investigation. Most interesting data can be obtained if we are able to analyze structural changes in a different material providing correlations with clinical, virological, molecular biological, genetic, epidemiological data. In many cases, we can go forward only using modern technologies such as IHC, hybridization, and PCR in situ, electron microscopy.