

Cancer and Immunodeficiency Imaging in a Multidisciplinary World

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ABSTRACT. Cancer and immunodeficiency disorders, particularly AIDS, are among the two most significant public health problems confronting medicine. Although they present in different patient populations and dominate different geographical regions, they are similar regarding lethality and are not wholly unrelated on the cellular and molecular levels. In the absence of definitive therapy for either, one goal is to convert what was an inexorable course into a chronic, manageable illness. In the case of cancer, the development of minimally toxic, cytostatic agents promises to control the disease to a point at which surgical cure may be possible. Sensitive, functional and molecular imaging techniques will be required to assess fully the effects of such therapies as well as to gain a better understanding of the molecular basis for these diseases in the most relevant milieu, i.e., *in vivo*. Developments over the last decade in efficient, high-throughput techniques for studying gene expression and generating new chemical entities for treating and potentially diagnosing disease, integrated with advances in genetic models of human disorders and miniaturization of imaging devices to study those models have enabled molecular imaging to emerge as a discipline to study cancer and other diseases in new ways. This presentation will provide an overview of molecular imaging, with a focus on radionuclide-based techniques such as positron emission tomography (PET) and single photon emission computed tomography (SPECT), in small animals and human subjects. Items including probe design, molecular-genetic and cellular imaging will be discussed. Imaging cancer and AIDS will be the clinical themes behind the discussion.