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The Fusion of Molecular Imaging into Clinical Medicine: A role for AAPM?

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The accelerating introduction of molecular imaging into medicine holds promise for cures of numerous intractable diseases. *In vivo* measurements of pathologic details at the molecular level are on the horizon but substantial work on improved precision and accuracy are necessary before methods can be clinically useful. Accurate knowledge of spatial and temporal dimensions of molecular measures is necessary before such measures can be validated as biomarkers of clinically significant endpoints. These are functions that AAPM members have performed over and over again in medicine over the five decade history of the association. The extension into molecular imaging, however, requires even broader participation in multi-disciplinary teams extending beyond traditional departmental boundaries of radiology and radiation oncology. This presentation reviews developments in molecular imaging and the growing need to fuse molecular events to the spatial framework of well known anatomical imaging methods. The process of translation requires participation in preclinical studies using animal models to validate methods in experimentally controllable environments. The AAPM can play an important role in this process at numerous levels. Members can participate in the design and testing of new instrumentation for both preclinical/animal and human uses. Members can also use well documented society methods for developing nationally acceptable imaging standards and procedures for assuring the quality of data. This is especially important when data is intended for the use of regulatory agencies such as the FDA to prove the safety and efficacy of new methods of medical care.

Educational Objectives:
1. Understanding the meaning of “molecular imaging”.
2. Understanding the process for fusing molecular imaging into clinical medicine.
3. Understand the potential role for medical physics in applying molecular imaging.