

Recent advances in multi-modality instrumentation

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Dual modality devices such as PET/CT, SPECT/CT or PET/MR that combine both structural and functional information offer a more complete and accurate assessment of the status of disease. PET/CT instrumentation, for example, was first introduced into the clinic in 2001 and since then, progress in the technology has been rapid. Advances in each modality, CT and PET, have been consistently incorporated into the combined device ensuring state-of-the-art performance for PET/CT. Recent advances in CT include an increase in the number of detector rows or slices (from 1 to 128), a reduction in rotation times (to less than 0.4 s), and the emergence of the first CT scanner incorporating dual X-ray sources. Paralleling these advances, PET instrumentation has witnessed the introduction of new faster scintillators, higher resolution detectors, increased sensitivity through extended axial coverage, and the resurgence of time-of-flight information to improve image signal-to-noise. A major advance in image reconstruction techniques has been the introduction of statistically-based algorithms into clinical routine, with progressive refinement of the system model to more accurately represent the imaging process. Over the past eight years, the development, introduction and rapid adoption of PET/CT technology has significantly impacted the medical imaging field, with over 4000 PET/CT scanners now operational in medical institutions worldwide. This talk will highlight the most recent technical advances in multi-modality instrumentation and review the status of current PET/CT devices.