AbstractID: 7812 Title: Clinical X-ray Computed Tomography in 2007: Status and Future

Clinical X-ray computed tomography has grown in importance for all of its applications, but most importantly for evaluation of the head, chest, abdomen, pelvis, and cardiovascular system. CT delivers an increasing fraction of the overall population radiation dose. Many limitations are present due to sensitivity to motion, metal artifacts, patient size, and limited functional information with a relatively high radiation dose. There are technical developments which promise to reduce these constraints, but at a significant cost. Most important are large area detectors with 64 to 256 rows of detectors, multiple energy channels, algorithmic improvements, and multimodality systems (especially PET/CT). CT is now the essential (and often the only) radiologic imaging procedure needed to manage many patients with acute or chronic diseases. Its speed and versatility, as well as reliability and simplicity of operation ensure that its role will continue for the foreseeable future. CT is used extensively for emergencies, cardiovascular, pulmonary, gastrointestinal, endocrine, neurological, orthopedic and other applications. Further technology development is aimed at common applications where reimbursement for CT scanning services is available or will likely become available. Multicenter clinical trials are underway that compare cardiac CT with other modalities, especially SPECT and cardiac catheterization. The most demanding CT applications are cardiovascular, where complex motion and small morphologic features coexist. Clinical cardiac CT consists of bolus intravenous contrast material injection with EKG gating and simultaneous x-ray scanning. Larger area detectors and higher frame acquisition rates partly address but don't solve all of the problems encountered due to respiratory, random body, and cardiac motion, in a spectrum of patients from infant to massively obese adult sizes (< 1 kg to 250 kg or more). The challenges and pitfalls in CT will be delineated and evaluated relative to current and future technology.