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Subsecond multi-slice computed tomography: basics and applications

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Abstract

The recent advent of multislice-scanning is the first real quantum leap in computed tomography since the introduction of spiral CT in the early 90 s. We discuss basic theoretical considerations important for the design of multislice scanners. Then, specific issues, like the design of the detector and spiral interpolation schemes are addressed briefly for the SOMATOM PLUS 4 Volume Zoom. The theoretical concepts are validated with phantom measurements. We finally show the large potential of the new technology for clinical applications. The concurrent acquisition of multiple slices results in a dramatic reduction of scan time for a given scan technique. This allows scanning volumes previously inaccessible. Similarly, given volumes can be scanned at narrower collimation, i.e. higher axial resolution in a given time. From data acquired at narrow collimation, both high-resolution studies and standard images can be reconstructed in the so-called Combi-Mode. This on the one hand reduces dose exposure to the patient because

repeated scanning of a patient is no longer required. On the other hand, standard reconstructions benefit from narrow collimation as Partial Volume Artifacts are drastically suppressed. The rotational speed of 0.5 s of the SOMATOM PLUS 4 Volume Zoom furthermore opens up a whole range of new applications in cardiac CT. For the first time, virtually motion-free images can be acquired even for large volumes in a single breathhold by the combination of fast rotation and ECG triggering, respectively gating. We explain the underlying concepts and present initial results. The paper concludes with a brief discussion of the impact of the new technique on image display and postprocessing.



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Keywords

Multislice scanning; Computed tomography; Combi-mode; Partial volume artifacts; ECG triggering

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