



Recent Developments in Computed Tomography

D. Braunstein, E. Dafni, S. Levene, G. Malamud, O. Shapiro, G. Shechter,
O. Zahavi

CT Division, Picker Medical Systems, Haifa, Israel
Email: gilad_shechter@elscintcorp.co.il

Computerized Tomography has become, during the past few years, one of the mostly used apparatus in X-ray diagnosis. Its clinical applications has penetrated to various fields, like operational guidance, cardiac imaging, computer aided surgery etc.

The first second-generation CT scanners consisted of a rotate-rotate system detectors array and an X-ray tube. These scanners were capable of acquiring individual single slices, the duration of each being several seconds. The slow scanning rate, and the then poor computers power, limited the application range of these scanners, to relatively stable organs, short body coverage at given resolutions. Further drawbacks of these machines were weak X-ray sources and low efficiency gas detectors.

In the late 80's the first helical scanners were introduced by Siemens. Based on a continuous patient couch movement during gantry rotation, much faster scans could be obtained, increasing significantly the volume coverage at a given time. In 1992 the first dual-slice scanners, equipped with high efficiency solid state detectors were introduced by Elscint. The acquisition of data simultaneously from two detector arrays doubled the efficiency of the scan. Faster computers and stronger X-ray sources further improved the performance, allowing for a new range of clinical applications. Yet, the need for even faster machines and bigger volume coverage led to further R&D efforts by the leading CT manufacturers. In order to accomplish the most demanding clinical needs, innovative 2 dimensional 4-rows solid-state detector arrays were developed, together with faster rotating machines and bigger X-ray tubes, all demanding extremely accurate and robust mechanical constructions. Parallel, multi-processor custom computers were made, in order to allow the on-line reconstruction of the growing amounts of raw data.

Four-slice helical scanners, rotating at 0.5 sec per cycle are being tested nowadays in several clinics all over the world.

This talk describes the main technological features and advances of this new brand of premium scanners. Results of clinical tests, demonstrating new diagnostics and application capabilities are shown. Future trends will be discussed.