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3D Real-Time Tracking of Human Anatomy Using Combined kV and MV Imaging

In the presence of intra-fraction organ motion, target localization uncertainty can hamper the advantage of using highly conformal dose techniques such as intensity modulated radiation therapy (IMRT). To prevent adverse radiation exposure to healthy tissue, real-time knowledge of the tumor position is required during radiation beam delivery process. The integration of onboard kV diagnostic imaging with MV electronic portal imaging devices (EPID) on medical linear accelerators (LINAC) provides real-time 3D tumor position monitoring during treatment delivery. Stanford researchers have discovered a way to perform real-time 3D internal image feature tracking based on the combined use of kV and MV imaging. This technique requires minimal hardware modification and is potentially useful for image guided radiation therapy (IGRT) systems.

Applications

- Real-time guidance of radiotherapy equipment used for medical treatment

Advantages

- Inexpensive
- Lower radiation exposure to the patient
- Continuous monitoring of geometric target location to insure accurate dose delivery
- Less hardware modification and system downtime compared to other techniques

- Real-time image monitoring of the treatment beam can additionally allow for dose verification and collimator positioning accuracy

Patents

- Published Application: 20090208074
- Issued: 8,121,368 (USA)

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