BrainLAB
radiotherapy solutions

exceeding limits with confidence

IGRT – Adaptive Gating

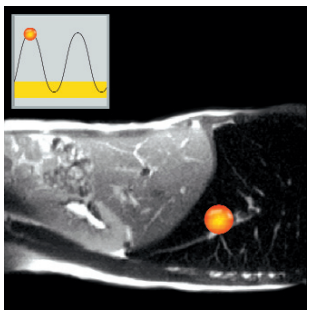
True dynamic image-guided delivery to moving targets

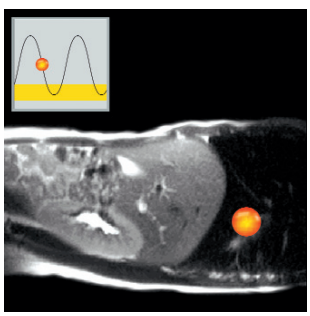
By precisely gating beams, ExacTrac® X-Ray 6D now has the clinically-proven ability to deliver highly accurate doses to tumors subject to movement. This is crucial for lung and liver indications where respiration-induced target movement before and during treatment often prevented highly focused doses and necessitated large margins to ensure sufficient tumor coverage.

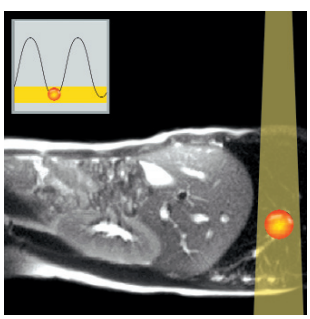
BrainLAB Adaptive Gating enables a significant reduction of safety margins, sparing much more normal tissue during treatment.

- 3-dimensional detection of tumor motion enables precise dose delivery to moving targets
- Published millimeter-precise tumor setup[1-2] for gating
- Infrared-triggered gating reduces patient radiation exposure compared to fluoroscopic approaches
- Robotic 6D setup of moving target for gating delivery, including translation and rotation
- Automatic beam triggering of most Linacs
- Gantry-independent x-ray verification possible at any time during delivery for highest clinical confidence
- Permits dose escalation protocols beyond standard approaches
- Therapist-controlled gating moderates physician involvement
- Fully automatic dose delivery improves treatment efficiency
- Clinically proven solution inspires confidence in gated treatments
- Patient-friendly approach leaves patient unconstrained
- Ideally suited for patients with limited respiratory function

Image courtesy of Dr. R. Wurm, MD, Charité, Berlin, Germany

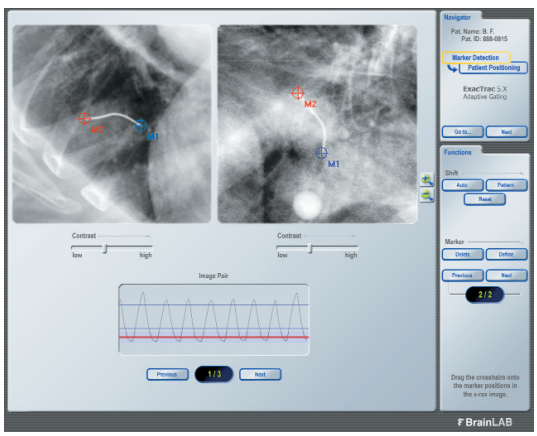




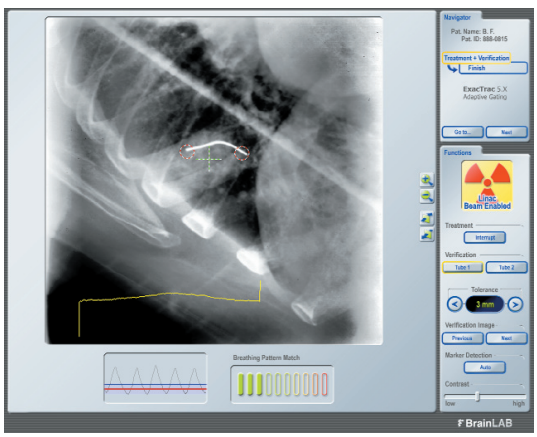


1) Verellen D, Soete G, et al.; Quality assurance of a system for improved target localization and patient set-up that combines real-time infrared tracking and stereoscopic X-ray imaging. Radiotherapy and Oncology 67 (2003) 129–141.
2) Yan H, et al.; A phantom study on the positioning accuracy of the Novalis system. Med. Phys. 30.12., Dec. 2003.

ExacTrac X-Ray 6D: The ideal platform for patient positioning and Adaptive Gating



Continuous tracking of the patient's breathing cycle coupled with stereoscopic imaging detects tumor movement in 3D



Gating interface allows x-ray images verification, even during treatment
Screenshots courtesy of AZ-VUB, Brussels, Belgium

CLINICAL BENEFIT

Daily imaging of the internal moving target is essential to guarantee consistent, precise, and safe gated treatment delivery. ExacTrac® excels at this, monitoring the patient continuously during treatment and enabling the linac beam only when the lesion moves within the user-defined "gating window". This allows confident implementation of advanced dose escalation protocols.

TECHNOLOGY

ExacTrac's unique combination of x-ray imaging and infrared tracking enables the correlation of internal 3-D tumor motion with the patient's breathing cycle. Sophisticated and easy to use software automates all treatment steps required for Adaptive Respiratory Gating*: x-ray imaging and verification, patient set-up and continuous tracking.

PROCEDURE

ExacTrac makes it possible to correlate automatic multiple x-ray acquisition with the patient's breathing cycle on the treatment couch. Stereoscopic x-ray image sets allow detection of the tumor's 3-dimensional movement via an implanted marker. The exact magnitude of tumor movement is calculated automatically, allowing precise synchronization of the gating window with the planned safety margin.

For precise gating, the patient is robotically aligned to the Linac isocenter. The integration of ExacTrac with the Linac enables the treatment beam only when the tumor position corresponds exactly with the path of the beam. The gated treatment is fully automated and provides the option of x-ray image verification independent of the gantry position, even during dose delivery.

CLINICAL RESEARCH PARTNERS

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