Tumor Tracking System using Robotic Linear Accelerator

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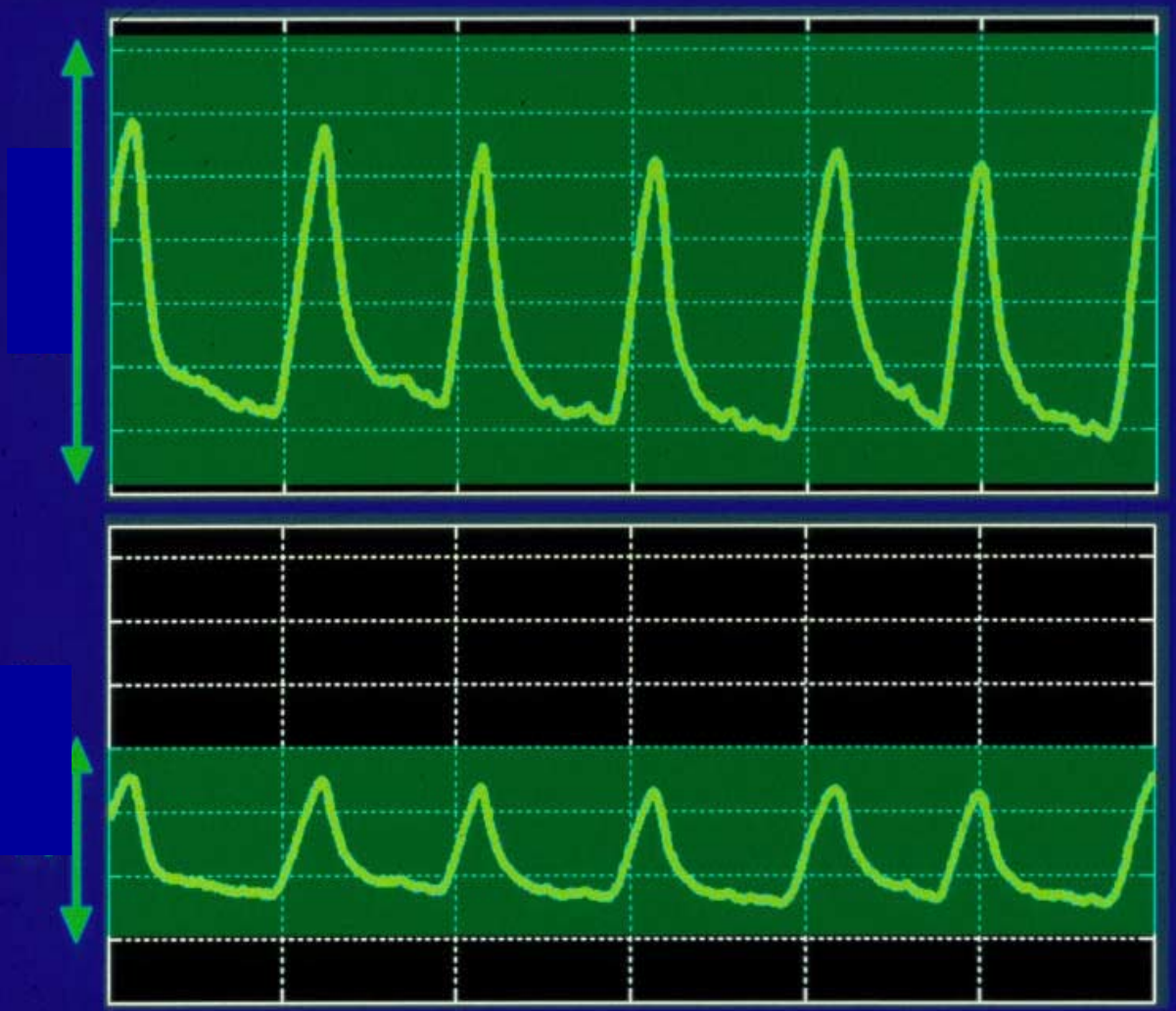
Body tumor

Tumor with movement
such as lung or liver
Radiation Oncologist

Tumor without movement
such as thoracic or lumbar spine
Neurosurgeon

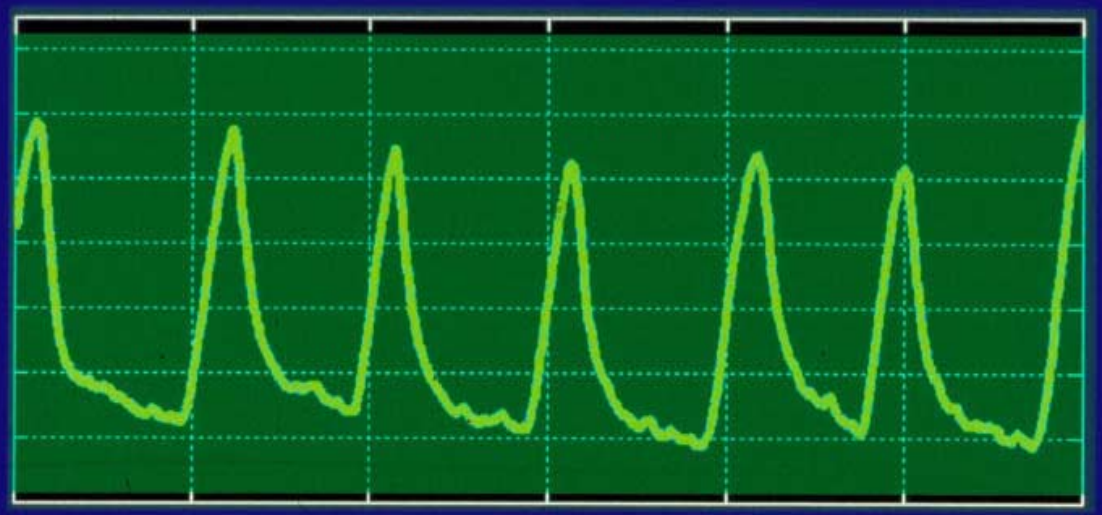
3-D Radiotherapy



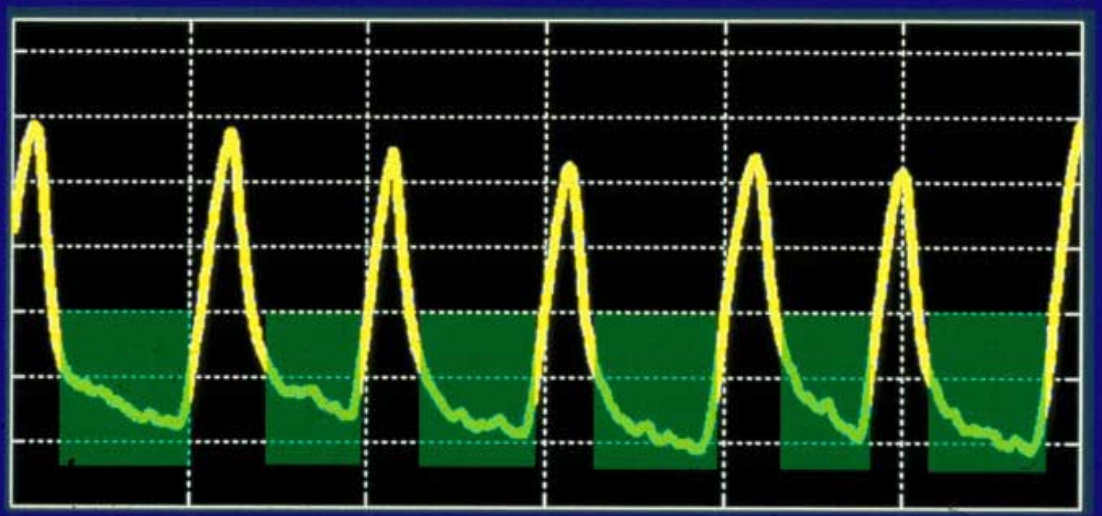
Conventional RT

Radiotherapy with Body Frame

4-D Radiotherapy

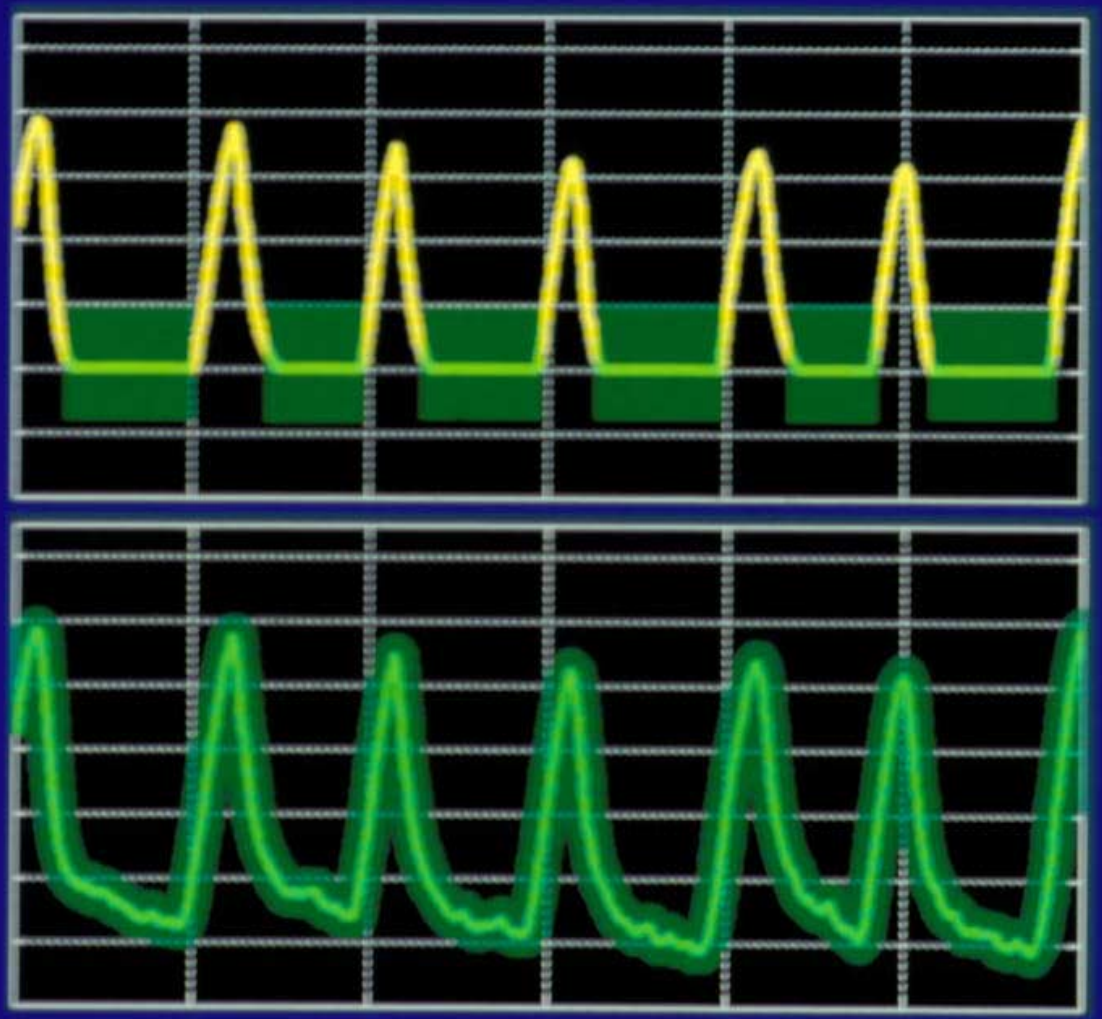


Conventional RT



Gating

4-D Radiotherapy



Gating +
Breath Control

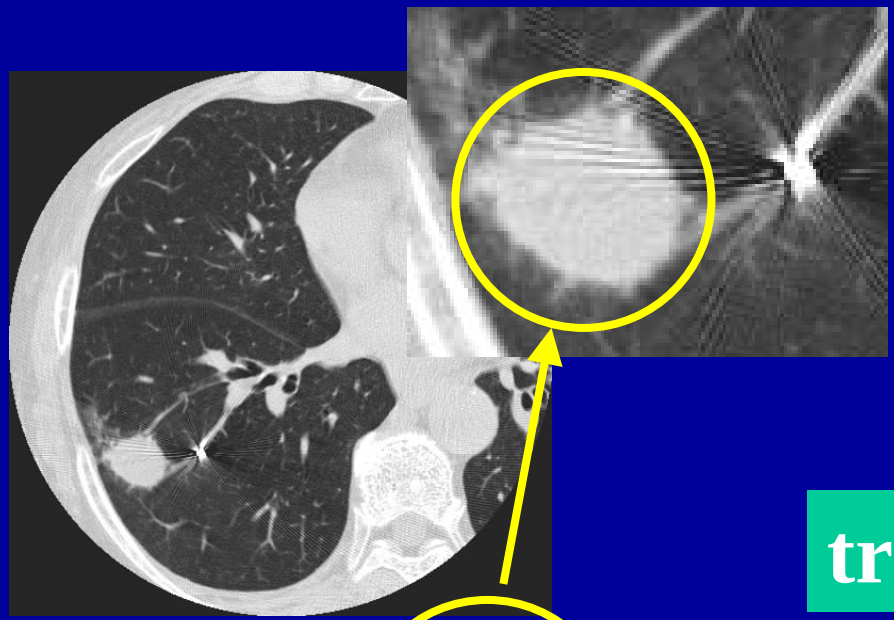
Tracking

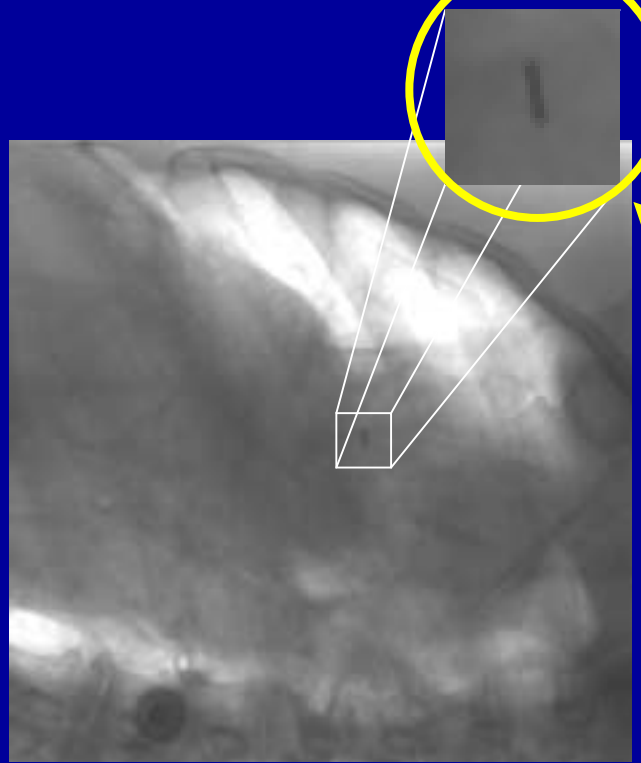
Materials and Methods

From Nov. 2001 through Oct. 2002, 15 patients were treated with SRT using a robot.

The dose escalation study was carried out. Total doses of 30, 39 and 45Gy were applied for 5 patients in each dose levels. All patients were treated with 3 fractions over 3 days.

Methods





tracking

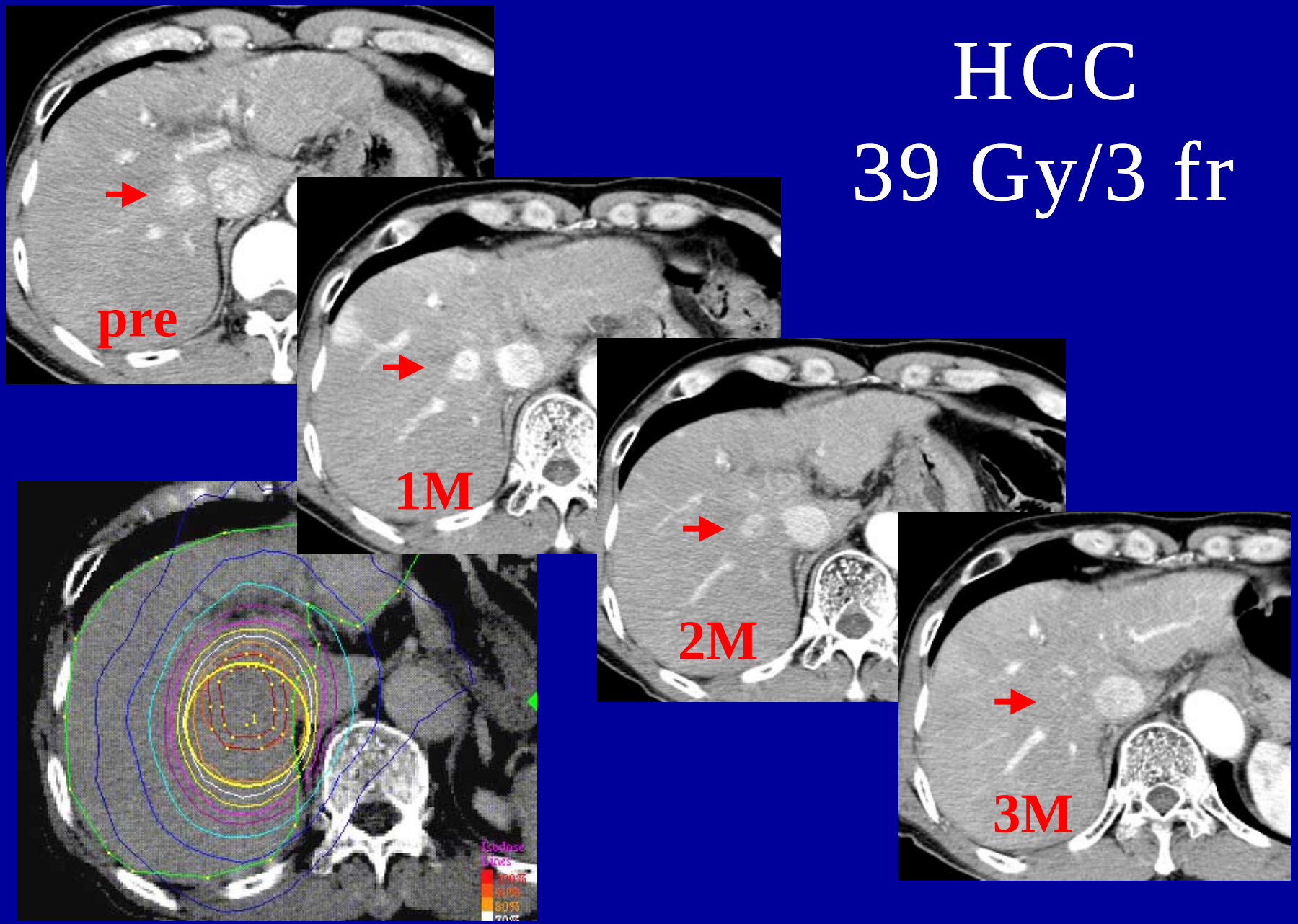
tumor

↓ : CT

gold marker

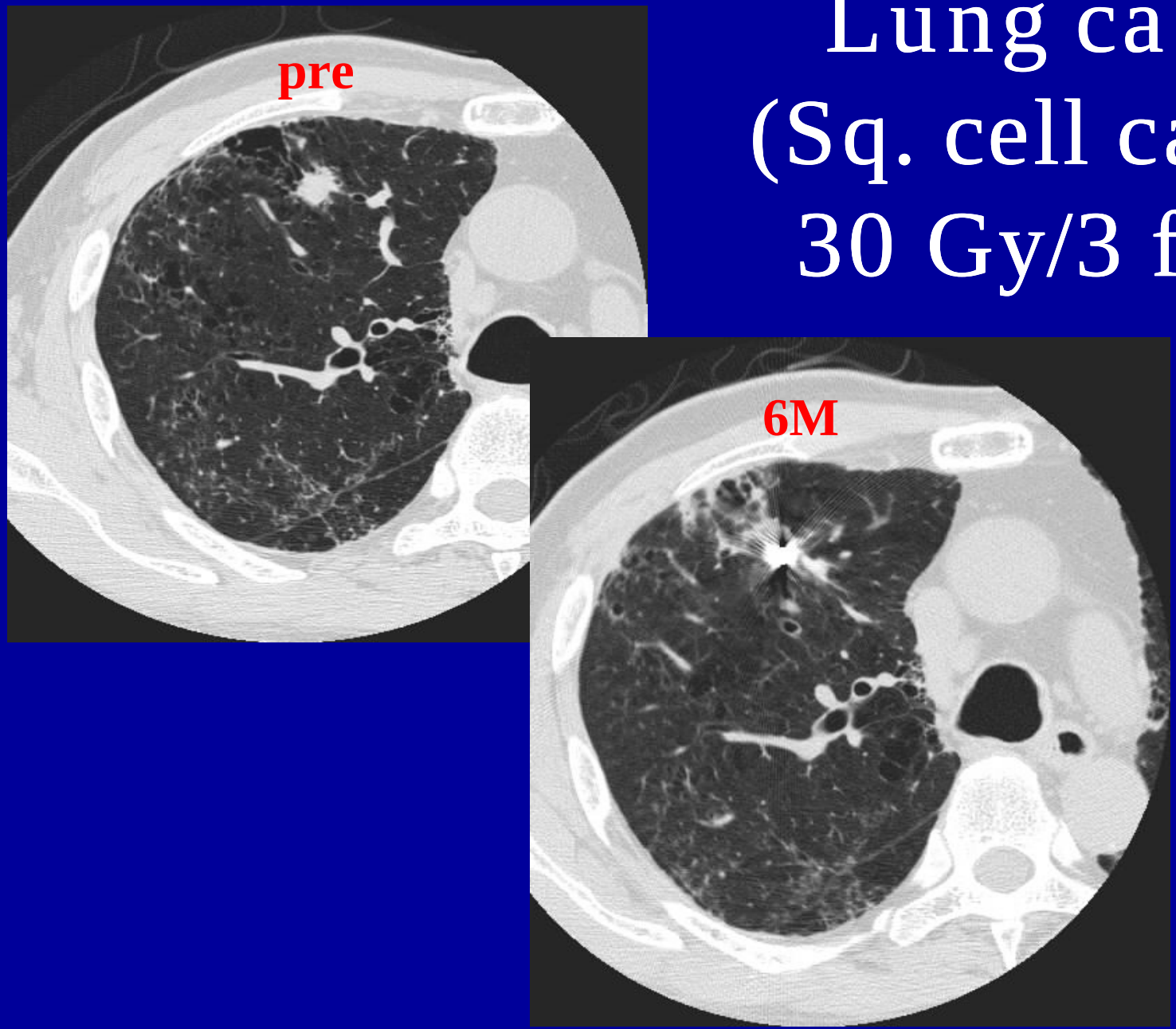
↓ : X ray

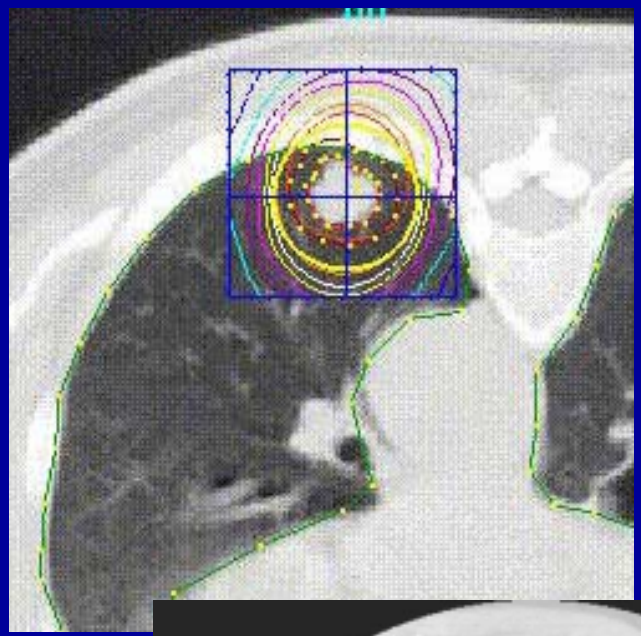
LED monitoring



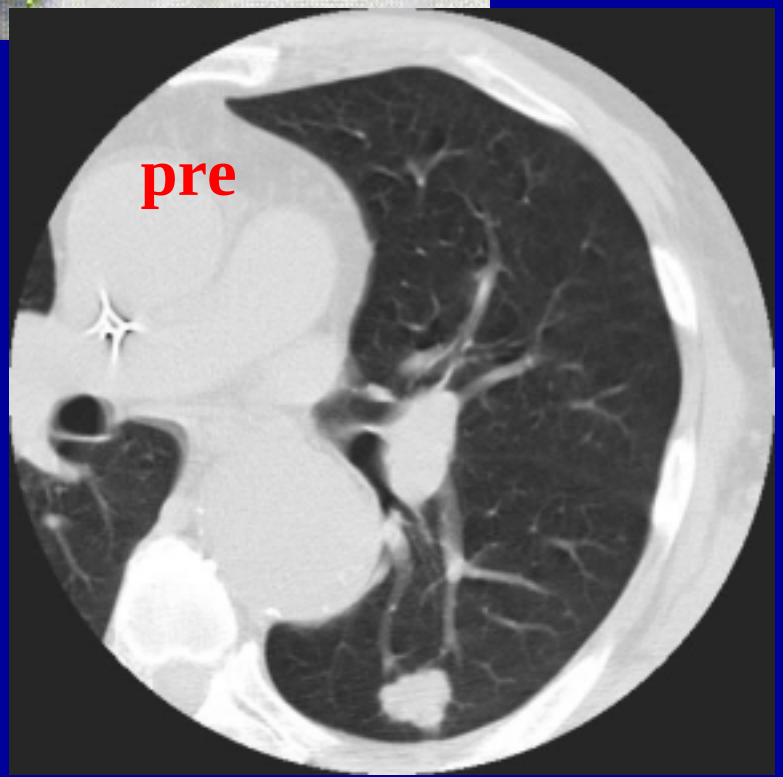
HCC
39 Gy/3 fr

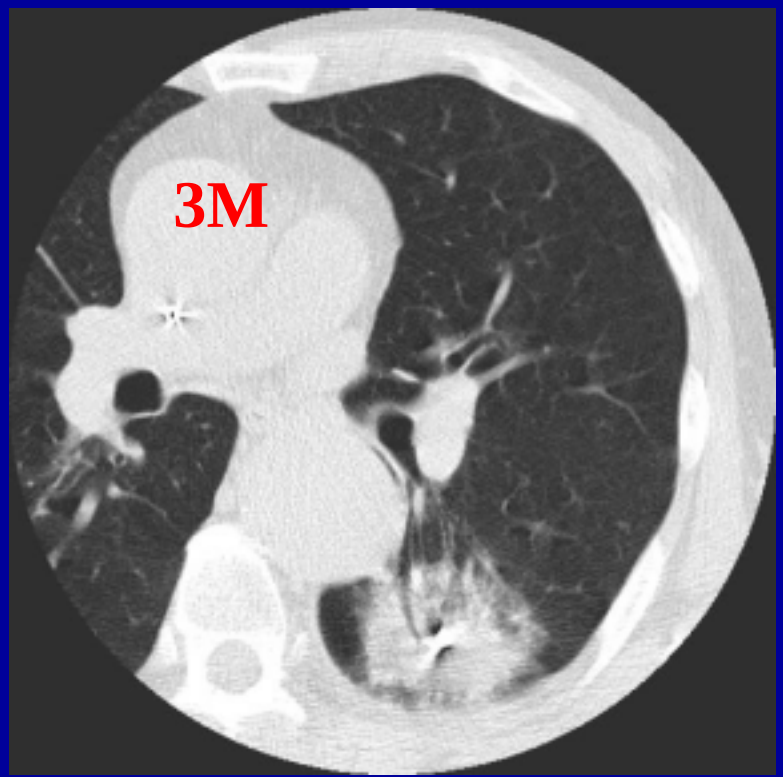
Lung ca. (Sq. cell ca.) 30 Gy/3 fr





Lung ca.
(Sq. cell ca.)
39 Gy/3 fr





Lung tumor		PR	6/9
		NE	3/9
	Radiation pneumonitis		8/9
Liver tumor	HCC	CR	2/2
	PVTT	recovered	2/3
	NHL	PR	1/1
	Liver dysfunction		0/6

HCC : Hepatocellular carcinoma
PVTT: Portal vein tumor thrombosis of HCC
NHL : Non-Hodgkin's lymphoma

Stereotactic radiotherapy using a robot is safe and effective.

What is the future of the robotic radio-therapy system?

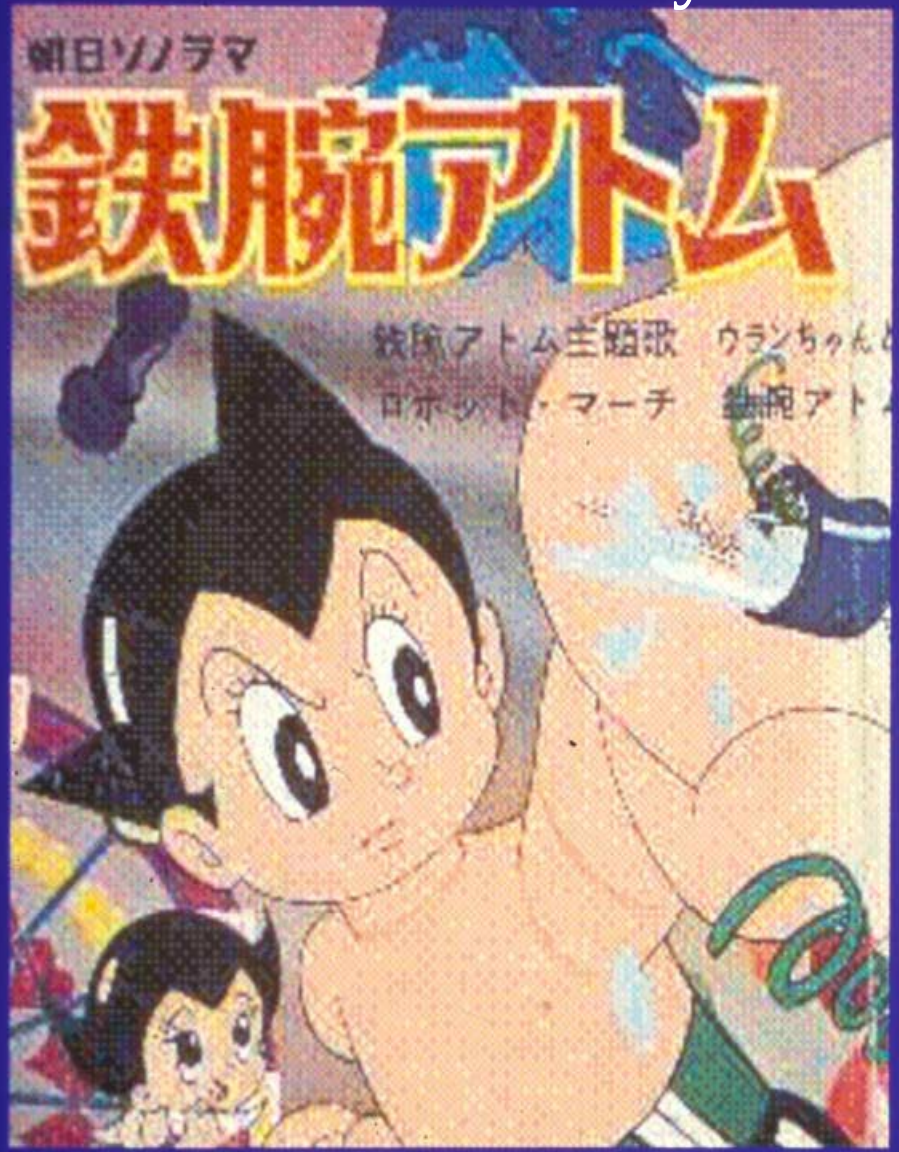
Robotic Stereotactic Radiotherapy

Target volume

Treatment planning
- Inverse planning

Tumor movement
- Tracking
- RTRT

The Astro-Boy



Self-controlled

The Iron-Man No. 28

Remotely controlled

To keep the emergency stop button

Thank you for your attention