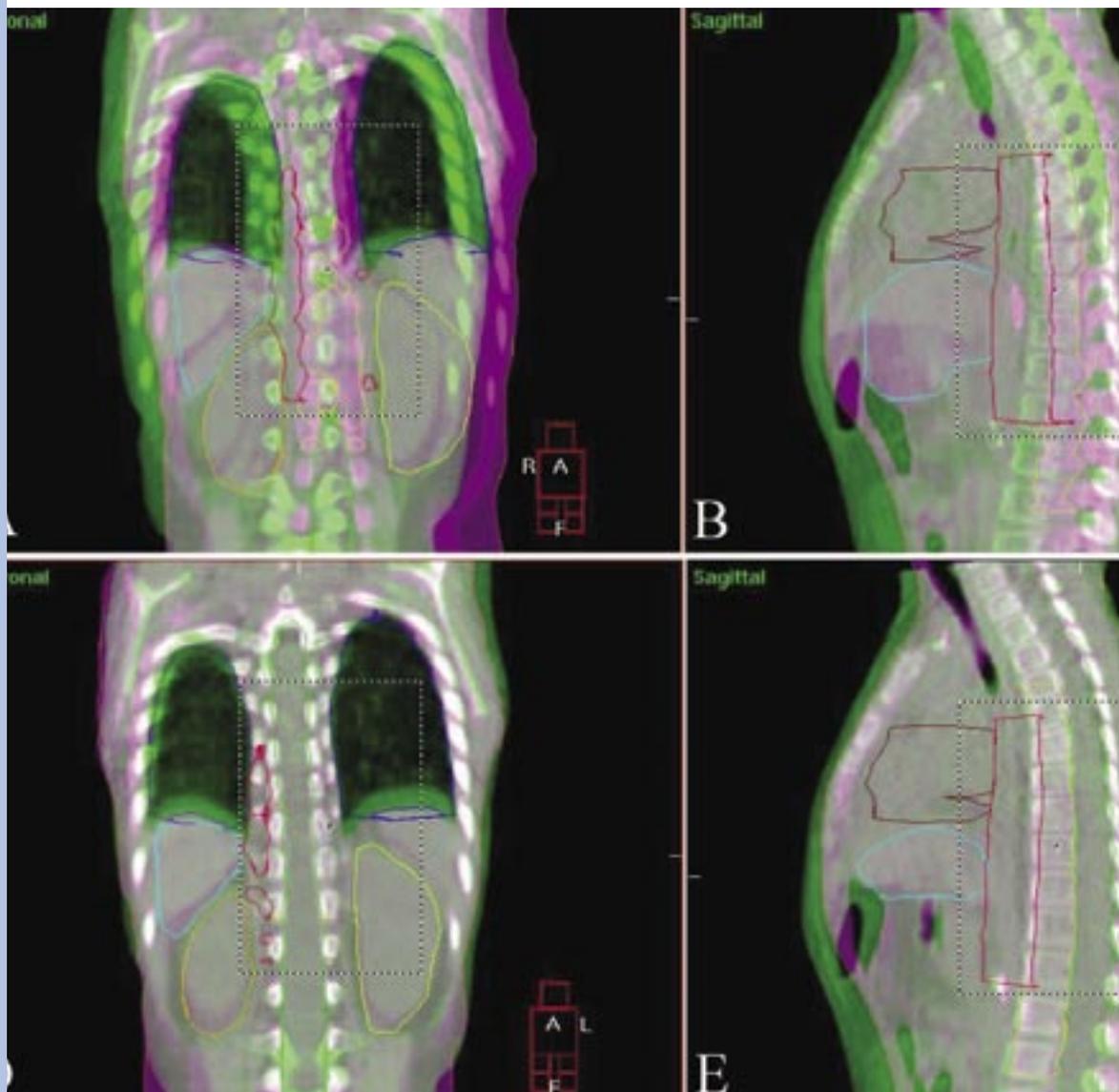


Case study



Re-treatment of a paravertebral tumor using Elekta Synergy®

Institution:	Universitätsklinikum Mannheim, Germany, Klinik für Strahlentherapie und Radioonkologie
Patient:	Male, 5 years
Diagnosis:	Alveolar rhabdomyosarcoma
Plan:	Nine-field IMRT
Image guidance:	VolumeView™ on-line correction
Positioning:	Vacuum mattress
Treatment:	Target – daily median of 2Gy (cumulative 40Gy) Spinal cord – daily median of 0.65Gy (cumulative 20Gy)

Re-treatment of a paravertebral tumor using Elekta Synergy®

Radiation Oncologists: **Judit Boda-Heggemann MD. PhD, Angelika Rahn, MD., Frank Lohr, MD, Frederik Wenz MD.**

Medical Physicist: **Cornelia Walter, Frank Schneider**

Paediatrics: **Barbara Selle, MD,**

Anaesthetist: **Franz-J. Andres, MD**

Patient diagnosis and history

A five-year-old boy presented with a relapse of an alveolar rhabdomyosarcoma in the right paravertebral region of the diaphragm in June 2005. The tumor was first diagnosed in July 2004 (Stage IV) with abdominal and thoracic lesions and involvement of the right internal jugular vein. The patient was treated with radiation therapy and polychemotherapy in accordance with the high risk arm of the CWS 2002-P-Pilot study (vincristin, doxorubicin, ifosfamid, actinomycin D). The relapse was diagnosed by MRI and was in remission after treatment with topotecan/carboplatin and stem cell transplantation in September 2005.

Previous radiation therapy

The lower mediastinum, the upper abdominal para-aortic region and the right parasternal thoracic wall had been irradiated to 40Gy in December 2004 (dose limit due to extensive lung exposure). The neck region was irradiated to 39.2Gy in February 2005.

Treatment

A step-and-shoot IMRT-plan (figure 1) for the treatment of the paraspinal relapse in the dorsal diaphragm was created using NOMOS Corvus 5.0. The patient was positioned in a vacuum mattress and underwent daily deep sedation.

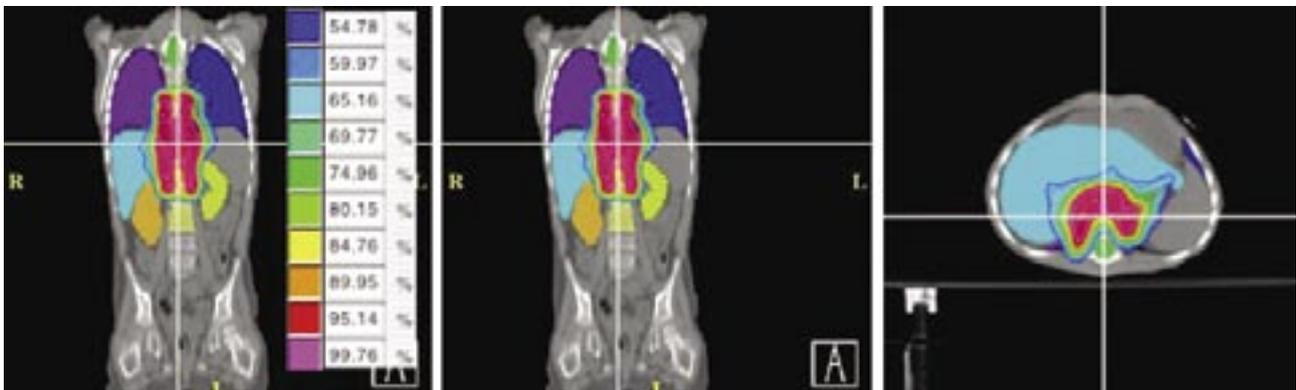


Figure 1: Shows the dose distribution for a nine-field IMRT plan with dose restricted to the spinal cord and kidney.

The tumor was irradiated via nine fields with a daily median dose of 2Gy (cumulative dose of 40Gy) to the target volume. Dose to the spinal cord was restricted to a median dose of 13Gy (daily median dose 0.65Gy; maximal cumulative dose 20Gy, daily maximum 1Gy) because of the previous exposure of the spinal cord to a maximum of 42Gy 12 months earlier.

Daily position controls and corrections were performed on-line using VolumeView™ imaging on Elekta Synergy®. The position before correction is shown in figure 2, A to C, and after correction in figure 2 D to F. Radiation therapy was well tolerated and completed as planned.

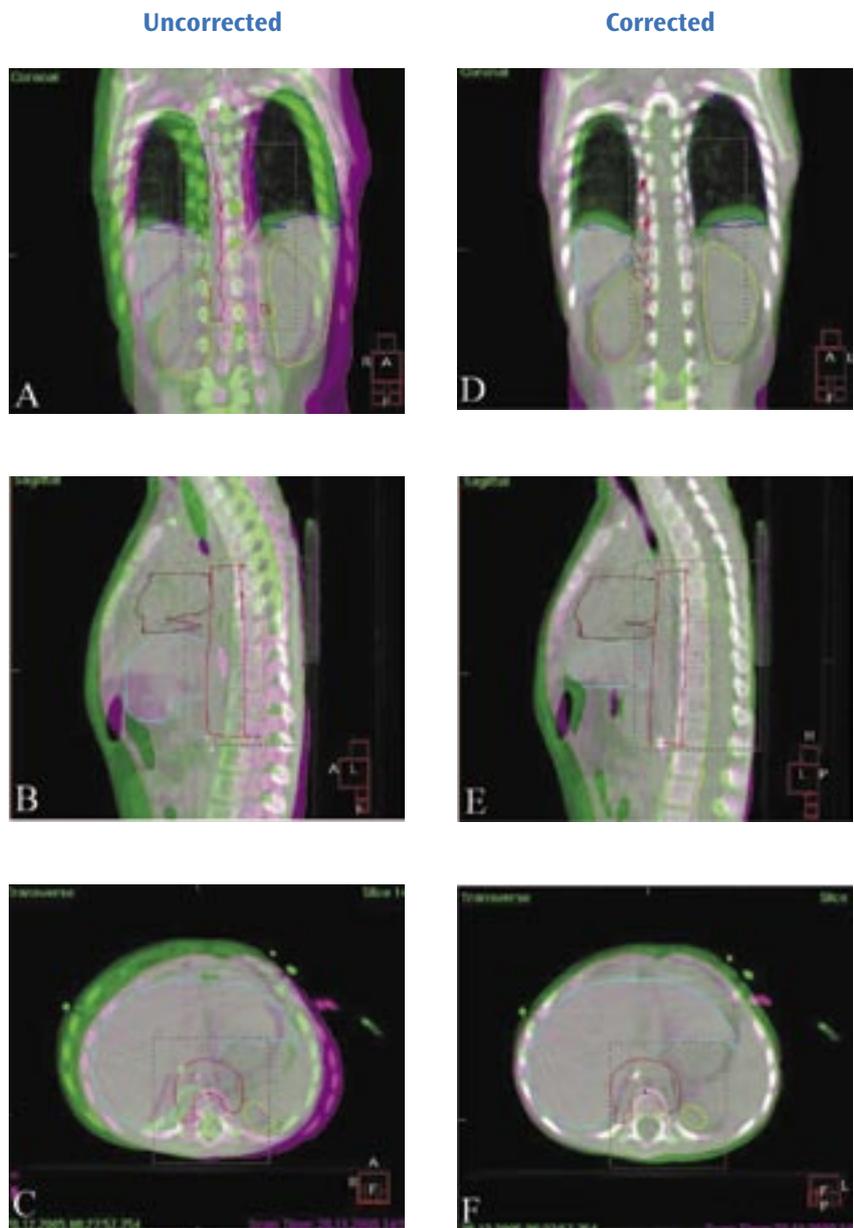


Figure 2: VolumeView™ images taken using Elekta Synergy®. Images A to C show position prior to registration and correction with structure overlay from the planning reference image. Images D to F show coronal, sagittal and axial positioning after correction drawn from the table correction vectors produced by the XVI software.

Treatment time = 35 minutes:

- 10 mins. anaesthesia and patient set-up
- 10 mins. positioning:
 - 3 mins. acquisition
 - 3 mins. registration¹
 - 4 mins. set-up correction²
- 15 mins. IMRT treatment.

¹ Manual or automatic bone matching and team decision making by reviewing full 3D volume

² Including anaesthetist patient checks

Outcome and follow-up

At the time of writing this case study, the tumor is locally controlled.

Discussion

IMRT (which alone can reduce toxicity to risk organs), combined with daily in-room position controlling and immediate repositioning with VolumeView™, allowed retreatment of the tumor relapse with high precision, resulting in a minimal dose exposure of the spinal cord and kidneys with minimal additional time requirement.

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