



## Case study

# Elekta Unity makes SBRT possible for pediatric cardiac angiosarcoma patients

---

### Institution

Ankara Başkent University Hospital, Yukarı Bahçelievler, Mareşal Fevzi Çakmak Cd. 10. Sk. No:45, 06490 Bahçelievler Ankara

### Location

Turkey

### Medical staff

Meltem Şen, Gözde Uslu, Deniz Aydın, Mustafa Güleç (RTTs), Prof Güler Aydın, Esmâ Efe (Med Phys), Prof Cem Onal, Prof Cagdas Yavas, Gungor Arslan (Med Phys)



**BAŞKENT ÜNİVERSİTESİ**

**Case Study:** Elekta Unity makes SBRT possible for pediatric cardiac angiosarcoma patients

## Lead today and be future proof for tomorrow

### Heart tumors and radiation therapy

Primary cardiac tumors are a rare disease, reported in all age groups. <sup>1</sup>Radiation Therapy (RT) has historically mostly represented a palliative approach in patients who were not eligible for surgery. Cardiac angiosarcomas are extremely rare and difficult to treat. RT is given as part of treatment for inoperable patients with primary cardiac sarcomas or in cases where there is residual tumor. Radiotherapy treatment is often limited by the sensitivity of the heart and lung to radiation dose limitations.

### Why MRgRT?

The development of MR-guided Radiation Therapy (MRgRT) makes it possible to better visualize cardiac lesions and to apply higher doses per fraction in organs such as the heart. <sup>2</sup>As with all radiotherapy, it's vital to limit and control where possible the radiation therapy dose to healthy tissue—this is even more important in pediatric cases because of the long-term effects of any radiation therapy.

The Başkent team



## Case Study: Elekta Unity makes SBRT possible for pediatric cardiac angiosarcoma patients

### Patient details

A 16-year-old boy was diagnosed with cardiac angiosarcoma after complaining of fatigue, anorexia, and abdominal distention that did not respond to medication. Surgery to remove a 95mm× 65mm× 43 mm tumor (weighing 126 grams) was followed by chemotherapy.

Three months after undergoing surgery and chemotherapy, two lesions were detected with FDG-PET/CT on the right atrium wall, measuring 40 mm and 11 mm (image 3).

### Why Elekta Unity?

For the clinical team at Başkent, MRgRT was the best option, as the lesions were invisible on CT (image 2). Without access to Elekta Unity, the only alternative treatment option for this young patient would have included repeat cardiac surgery, conventional linac-based radiation

therapy, and additional systemic therapy with chemotherapy.

Elekta Unity enables unparalleled acquisition of diagnostic quality MR (1.5T) images before and in real-time during the treatment itself (image 3). MRgRT is an especially relevant case of cardiac when compared to cone-beam computed tomography (CBCT)-based RT. This better visibility of the tumor and surrounding anatomy, allowing for daily online adaptive strategies to improve target volume coverage while avoiding nearby critical structures.

The combination of imaging with online deformable plan adaptation and stereotactic treatment delivery capabilities meant the team could keep margins small and confidently delivering a higher dose safely —vitaly important for this pediatric patient.

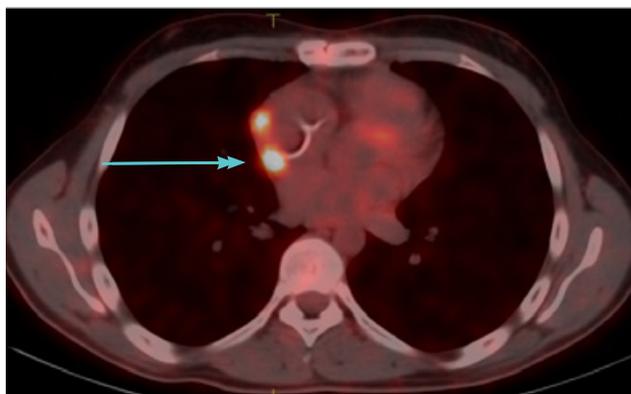


Image 1: Positron Emission Tomography (PET) scan



Image 2: Diagnostic CT

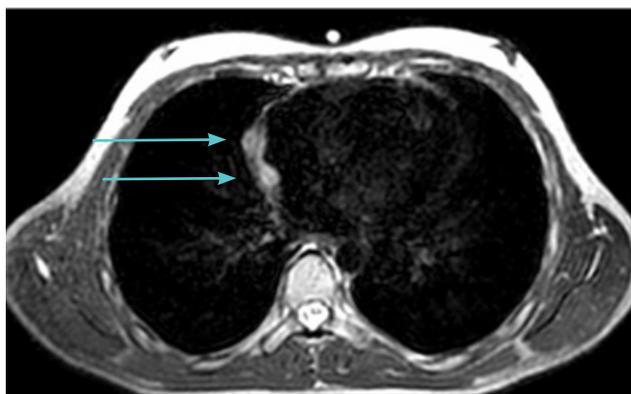


Image 3: Unity T2WMR sequence

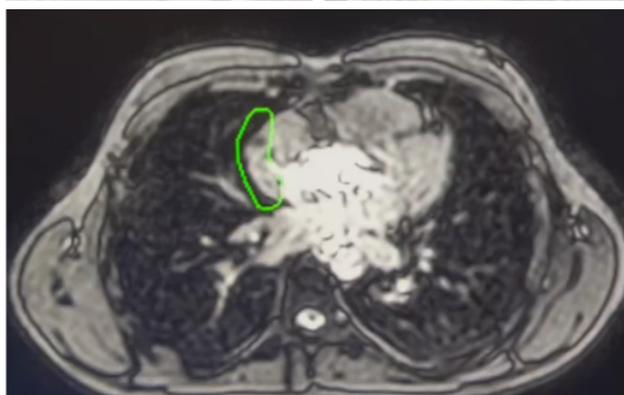
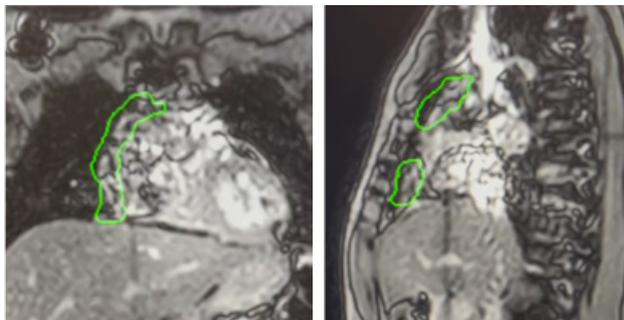
**Case Study:** Elekta Unity makes SBRT possible for pediatric cardiac angiosarcoma patients

## Treatment Details

### MR guided online Adaptive SBRT

MR guided online adaptive SBRT with Simultaneous Integrated Boost (SIB):

- 25 Gy tumor bed and 30 Gy recurrent nodules
- 3mm CTV-PTV margins
- 5 fractions / alternate days
- T2WMR sequence
- Online deformable plan adaptation for every treatment session
- Continuous motion monitoring of PTV during beam delivery provided visual confirmation of accurate beam delivery
- Treatment time patient In/Out 35min



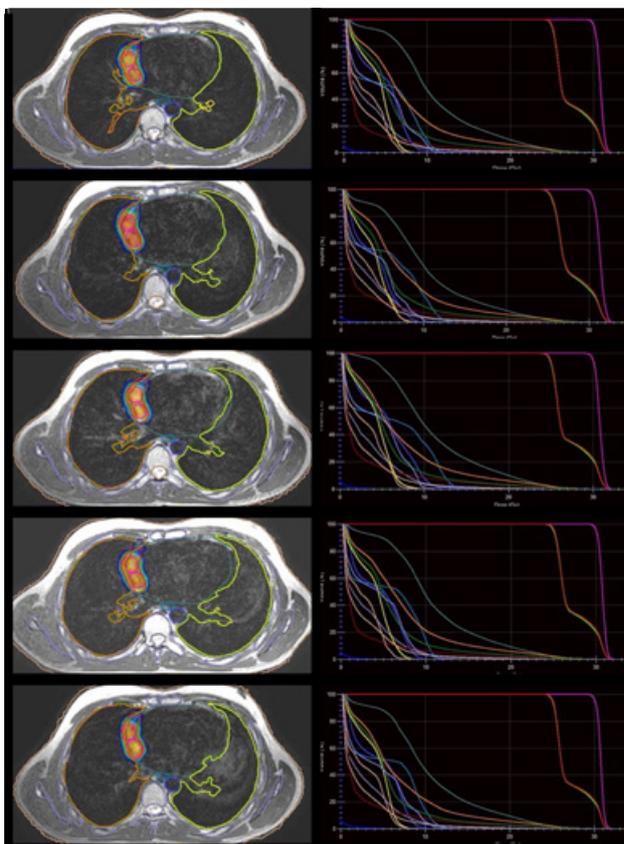
Live motion monitoring of PTV with exceptional quality cine imaging

## Results

The patient reported zero radiation toxicities.

## Future proof for tomorrow

Some preliminary retrospective studies for online adaptive MRgRT for primary cardiac tumors show promising indications of little toxicity and prospective multicentre trials are planned.



**Case Study:** Elekta Unity makes SBRT possible for pediatric cardiac angiosarcoma patients

**As a leader in precision radiation therapy, Elekta is committed to ensuring every patient has access to the best cancer care possible.**

We openly collaborate with customers to advance sustainable, outcome-driven and cost-efficient solutions to meet evolving patient needs, improve lives and bring hope to everyone dealing with cancer.

To us, it's personal, and our global team of 4,700 employees combine passion, science, and imagination to profoundly change cancer care.

**We don't just build technology, we build hope.**



# Hope for everyone dealing with cancer.

#### Elekta AB

Box 7593  
SE-103 93  
Stockholm, Sweden  
T +46 8 587 254 00  
F +46 8 587 255 00

#### Europe, Middle East, Africa

T +46 8 587 254 00  
F +46 8 587 255 00

#### North America

T +1 770 300 9725  
F +1 770 448 6338

#### Latin America, South America

T +55 11 5054 4550  
F +55 11 5054 4568

#### Asia Pacific

T +852 2891 2208  
F +852 2575 7133

#### Japan

T +81 3 6722 3800  
F +81 3 6436 4231

#### China

T +86 10 5669 2800  
F +86 10 5669 2900

 [elekta.com](https://www.elekta.com)

 [@elekta](https://twitter.com/elekta)

 [/elekta](https://www.facebook.com/elekta)

 [/company.elekta](https://www.linkedin.com/company/elekta)

Elekta Unity is CE marked and 510(k) cleared. Not commercially available in all markets.

© 2022 Elekta AB (publ.) All mentioned trademarks and registered trademarks are the property of the Elekta Group. All rights reserved. No part of this document may be reproduced in any form without written permission from the copyright holder.

#### References

[1] Gupta R, Meghrajani V, Desai R, Gupta N. Primary Malignant Cardiac Tumors: A Rare Disease With an Adventurous Journey. <https://doi.org/10.1161/JAHA.120.016032> Journal of the American Heart Association. 2020;9:e016032

[2] Corradini S, von Bestenbostel R, Romano A, Curta A, Di Gioia D, Placidi L, Niyazi M, Boldrini L. MR-guided stereotactic body radiation therapy for primary cardiac sarcomas. *Radiat Oncol.* 2021 Mar 26;16(1):60. doi: 10.1186/s13014-021-01791-9. PMID: 33771179; PMCID: PMC7995725.