

Moderne Bestrahlungsmodalitäten am Gastrointestinaltrakt

Felix Momm
Radio-Onkologie
Ortenau-Klinikum Offenburg-Kehl



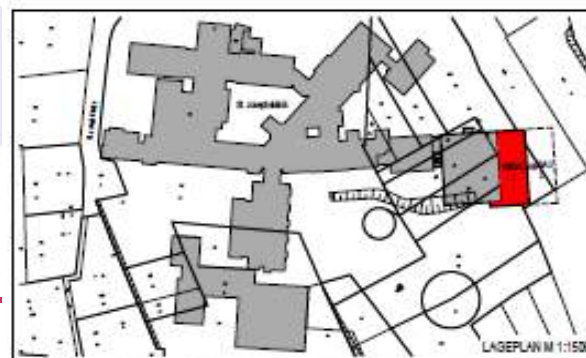
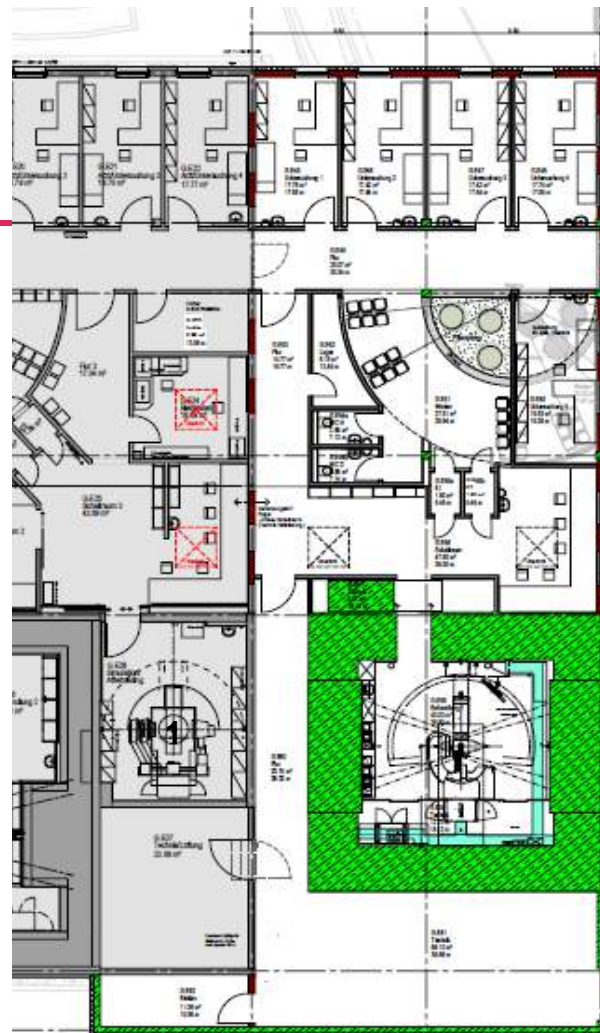
ORTENAU
KLINIKUM



Lehrkrankenhaus der
Albert-Ludwigs-Universität Freiburg



ORTENAU
KLINIKUM



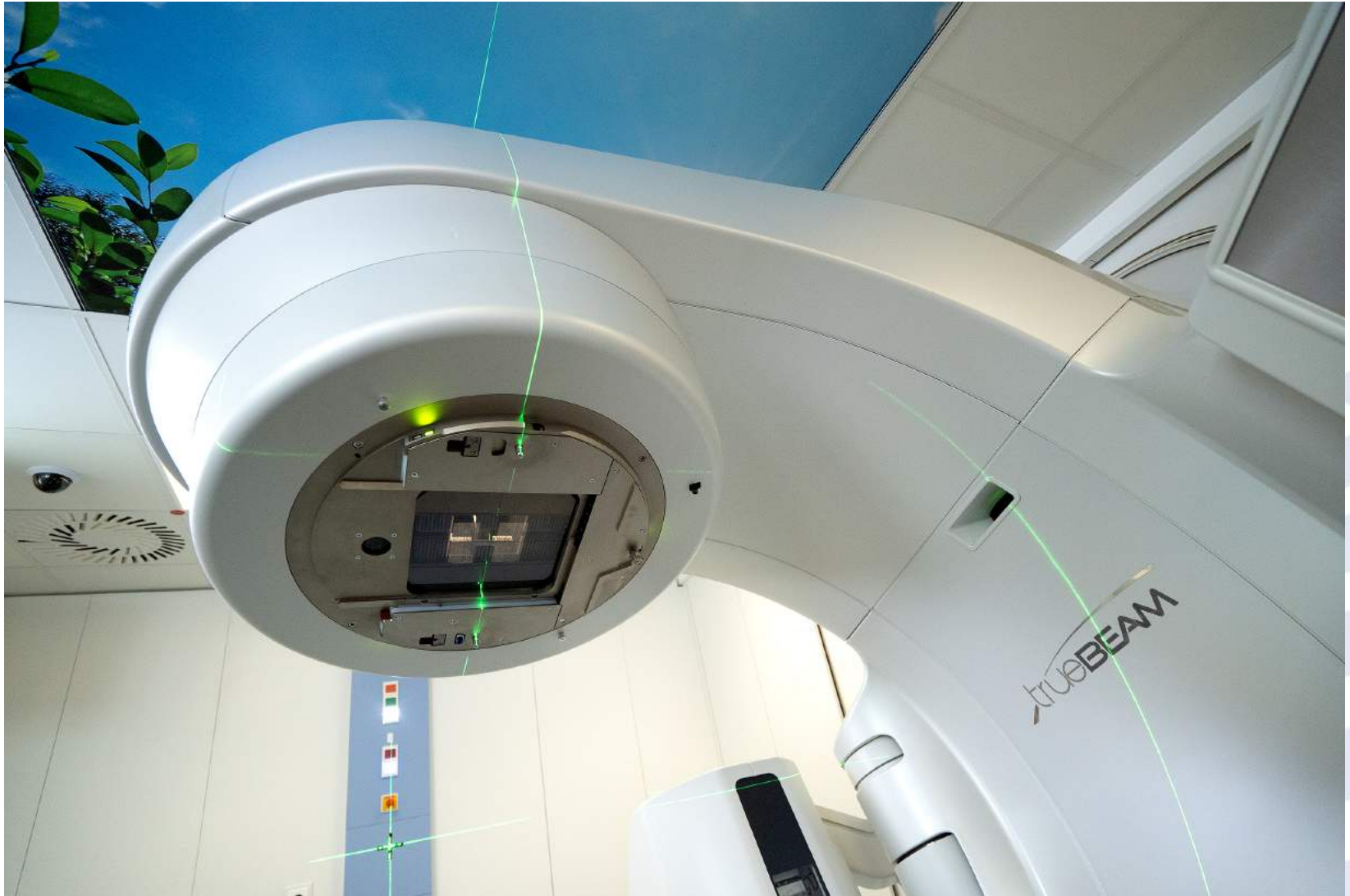














In Betrieb seit 12.06.12

IMRT

VMAT

IGRT

Gating

STX



In Betrieb seit 15.04.19

IMRT

VMAT

IGRT

Gating

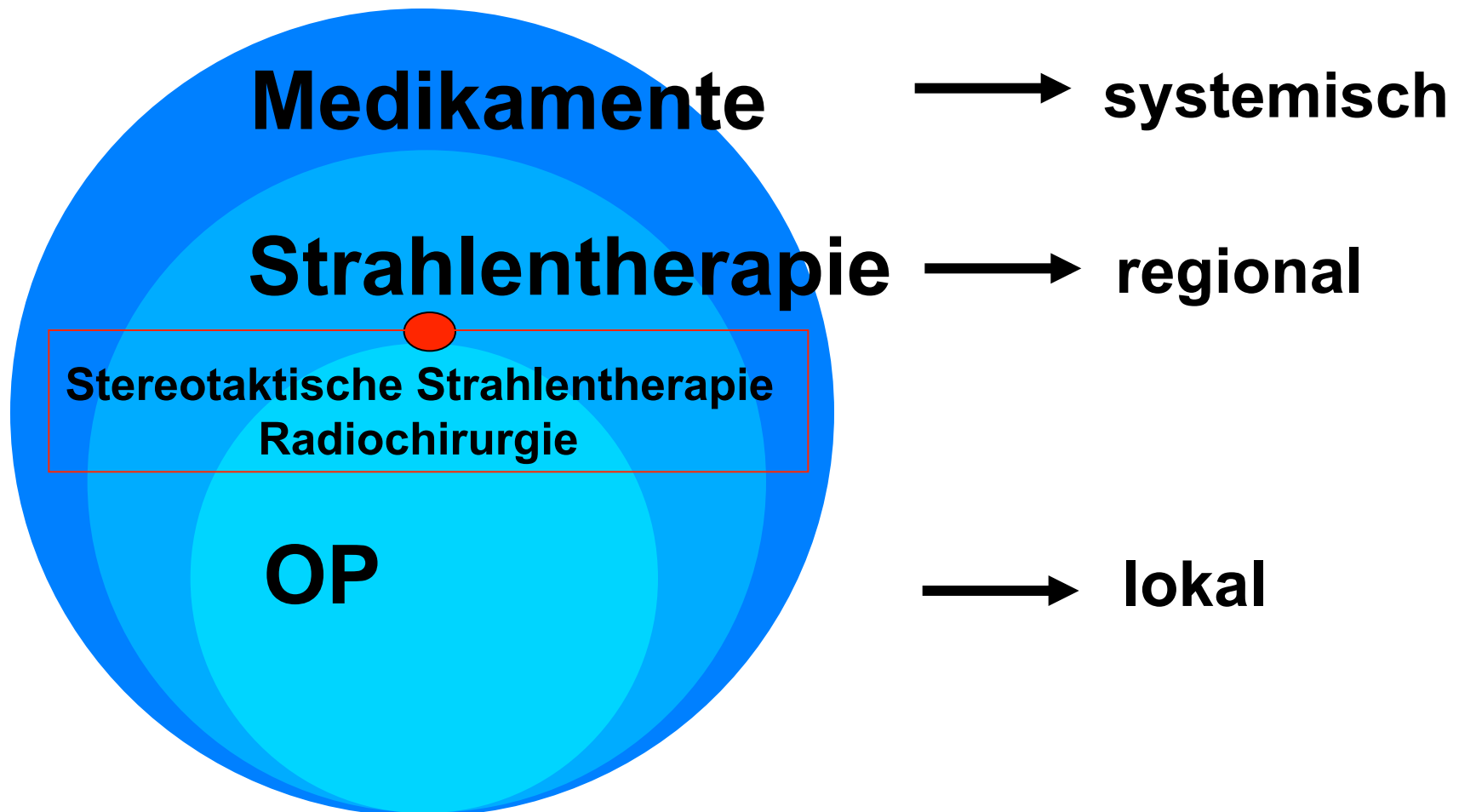
STX

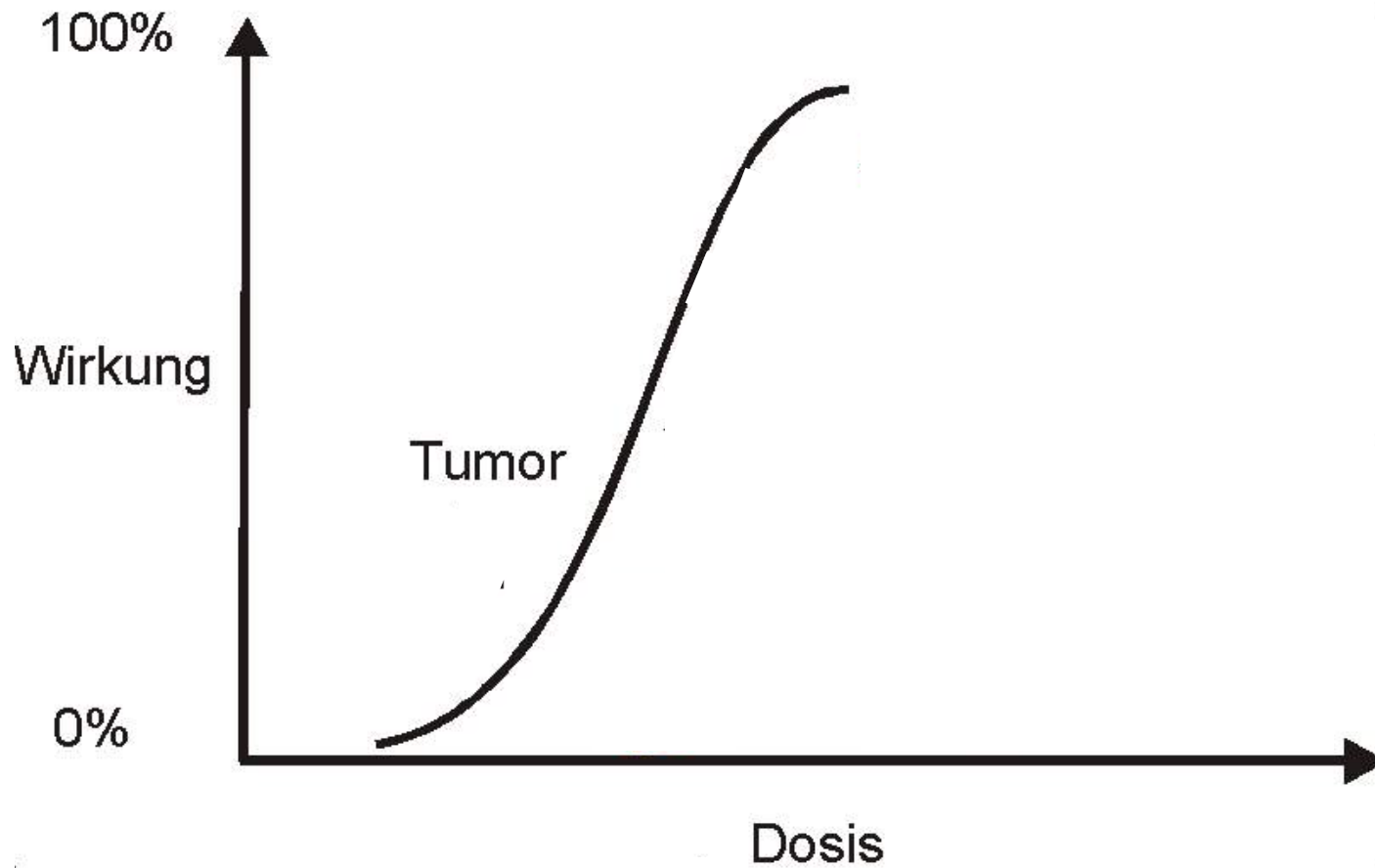


Vorteile:

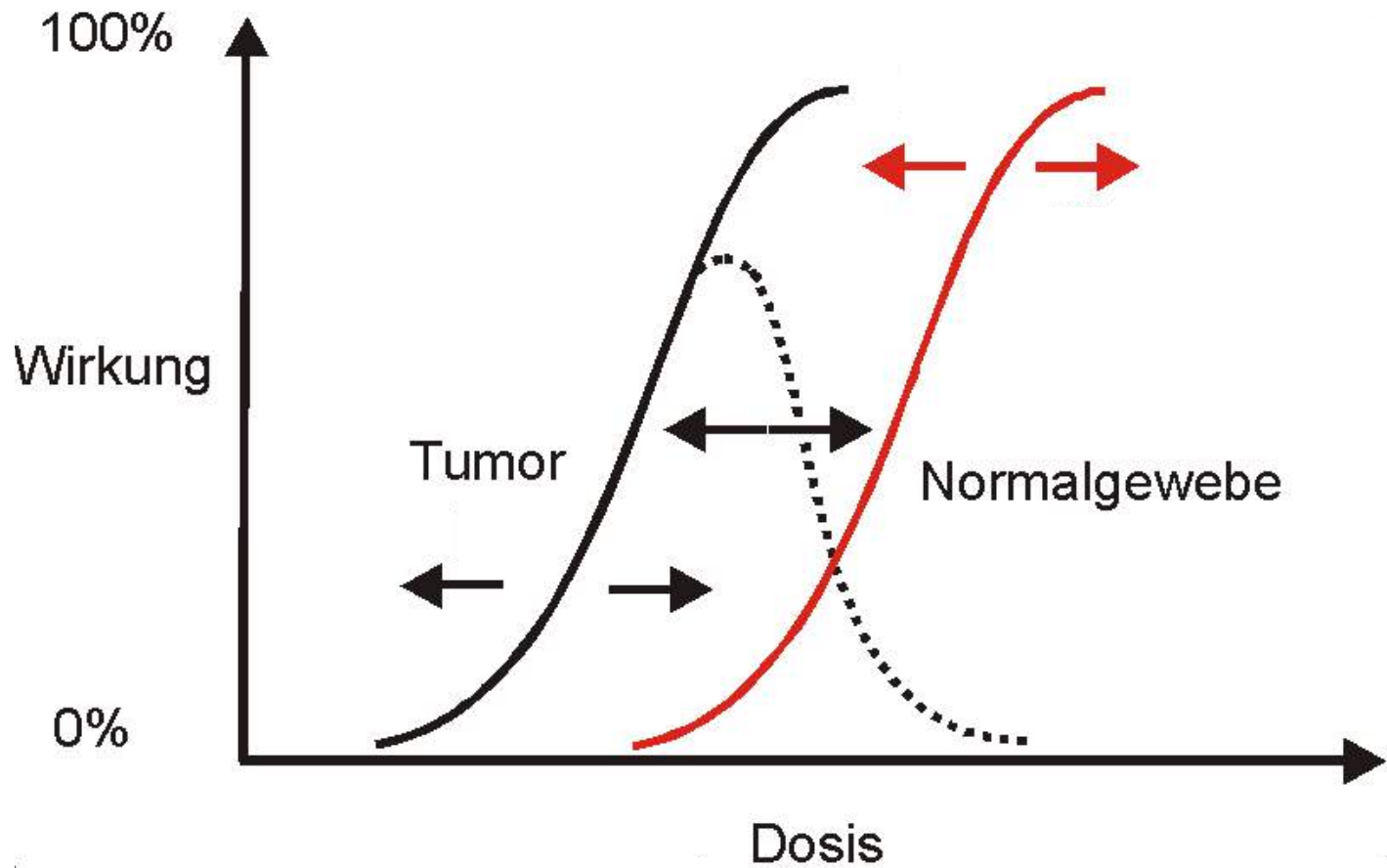
Größere Dosisleistung = Mehr Dosis pro Zeit (Flatness Filter Free)
Tischkorrekturen nicht nur linear, sondern auch in drei Drehachsen
Schnellere Beweglichkeit der Komponenten
Softwareverbesserungen in einigen Details



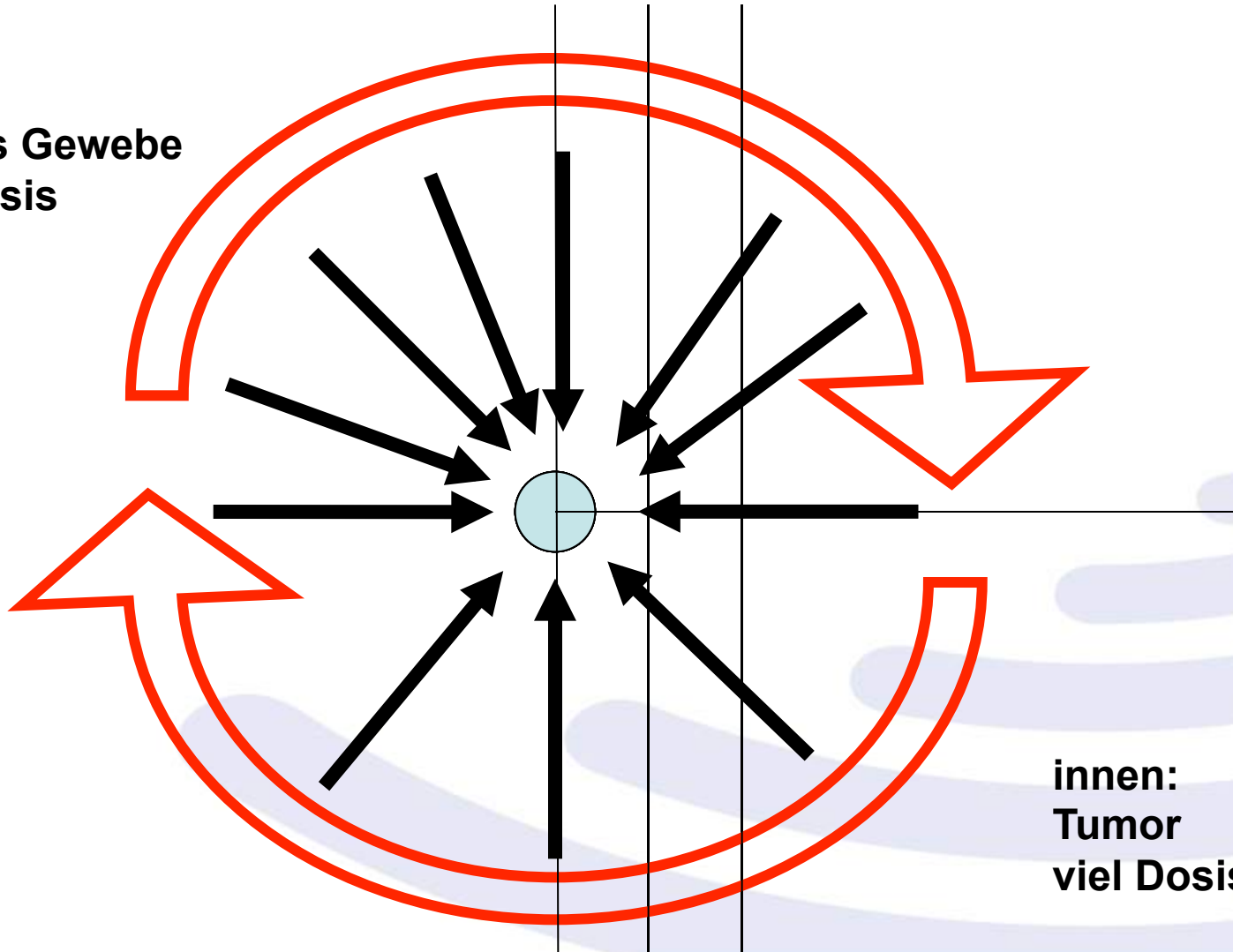




nach Holthusen 1936



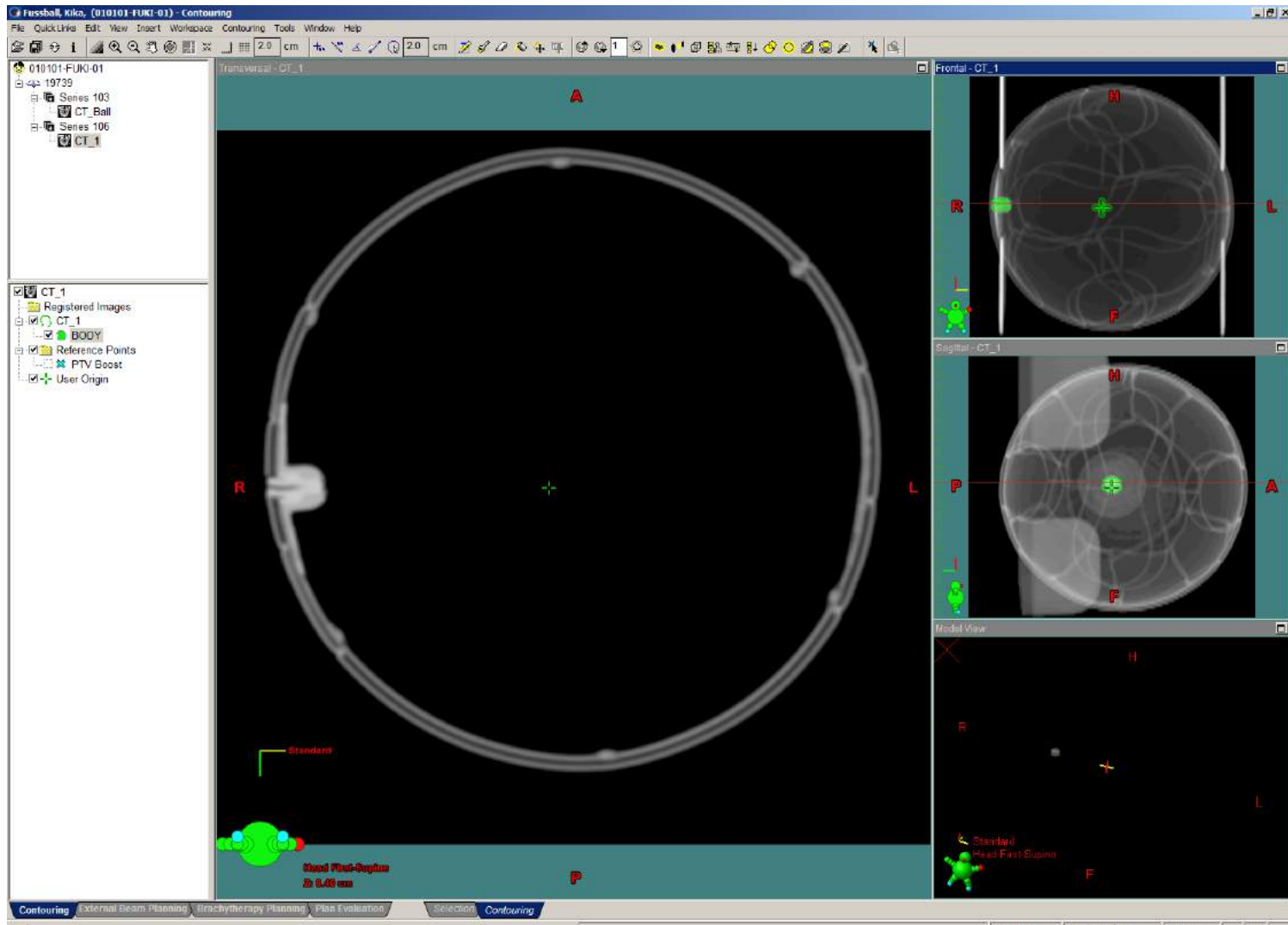
**außen:
gesundes Gewebe
wenig Dosis**

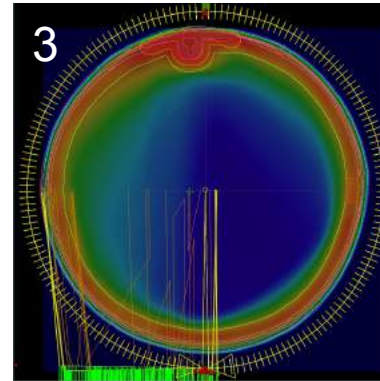
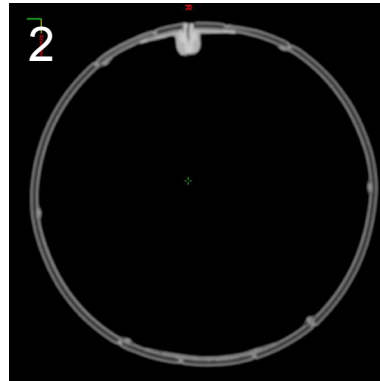


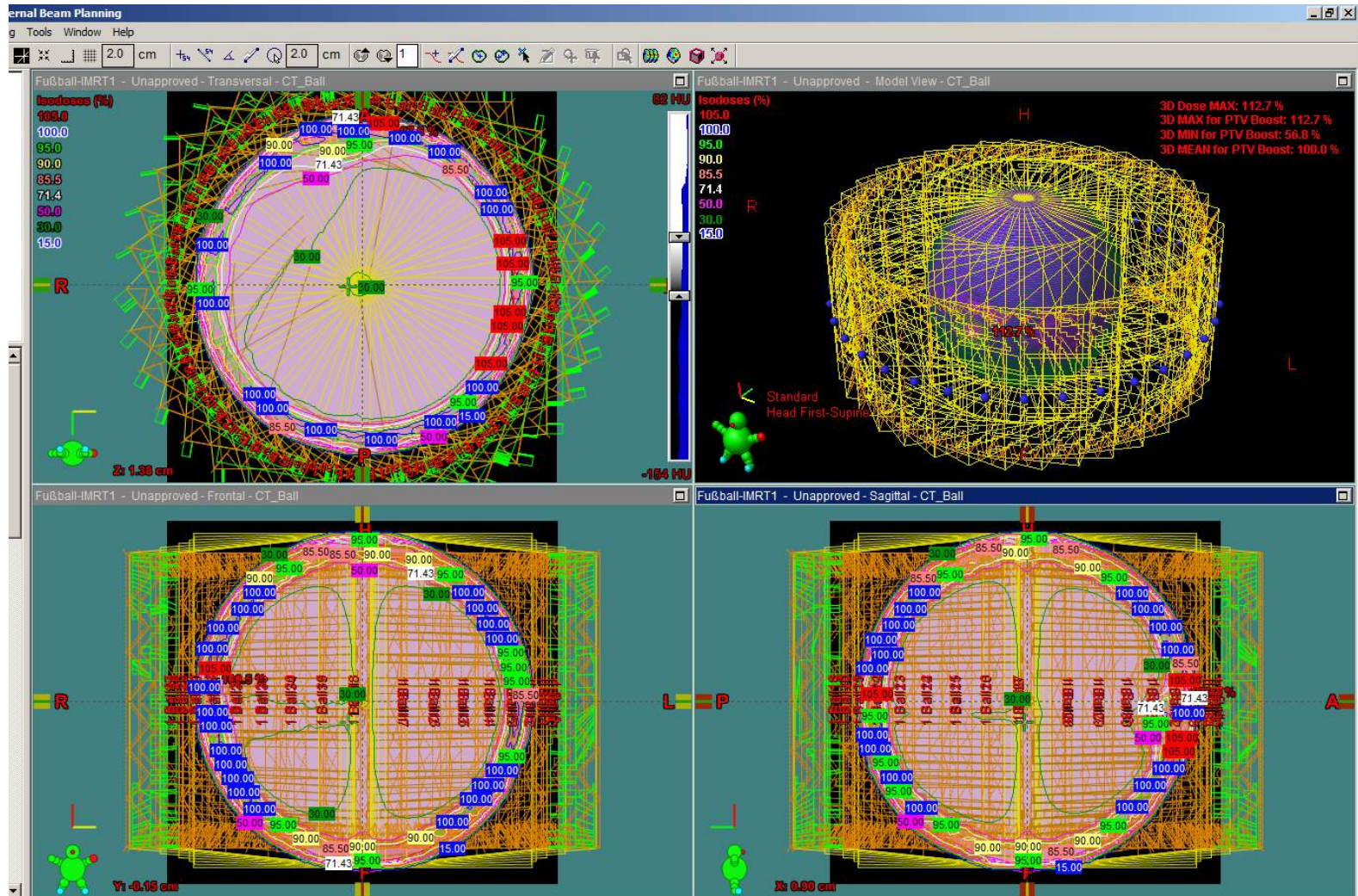
**innen:
Tumor
viel Dosis**











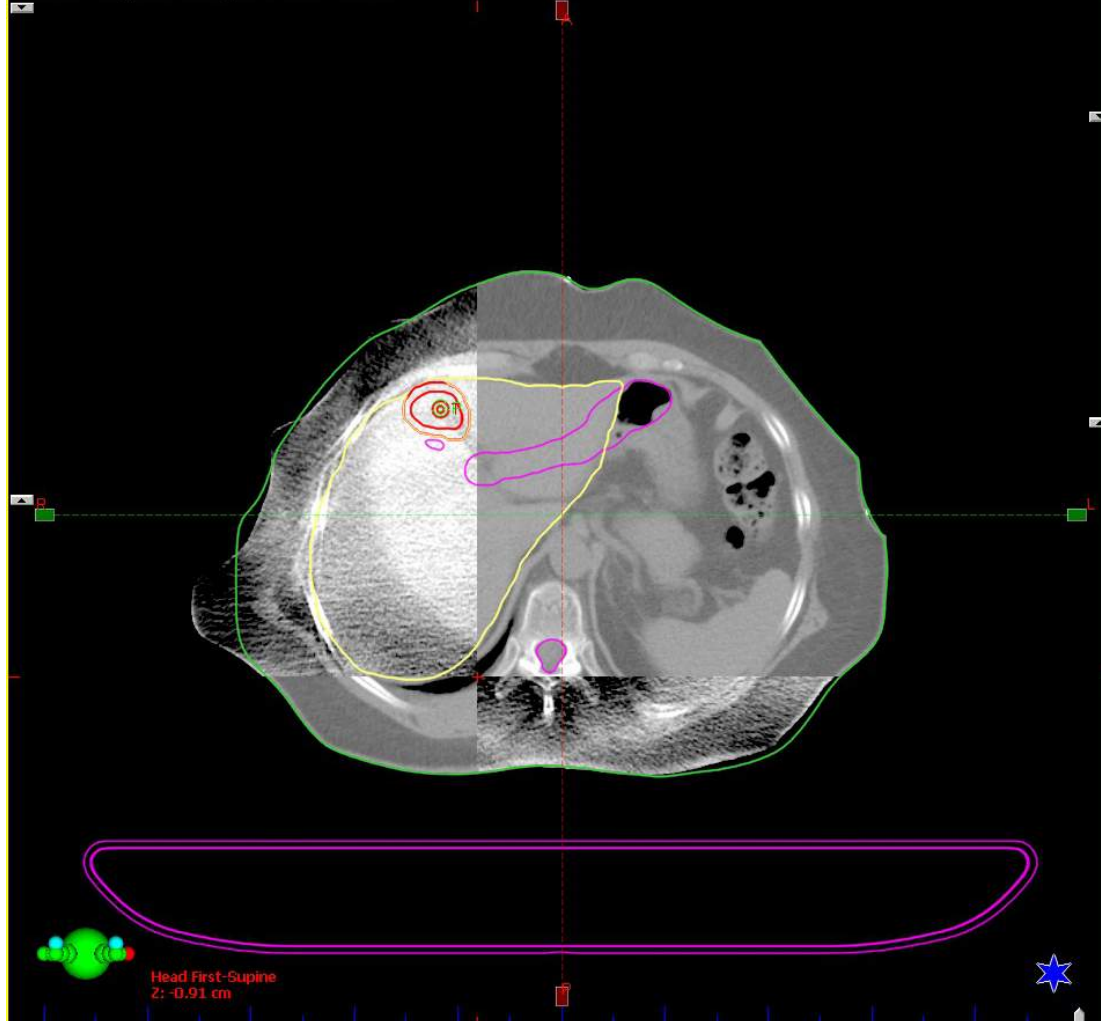


IGRT

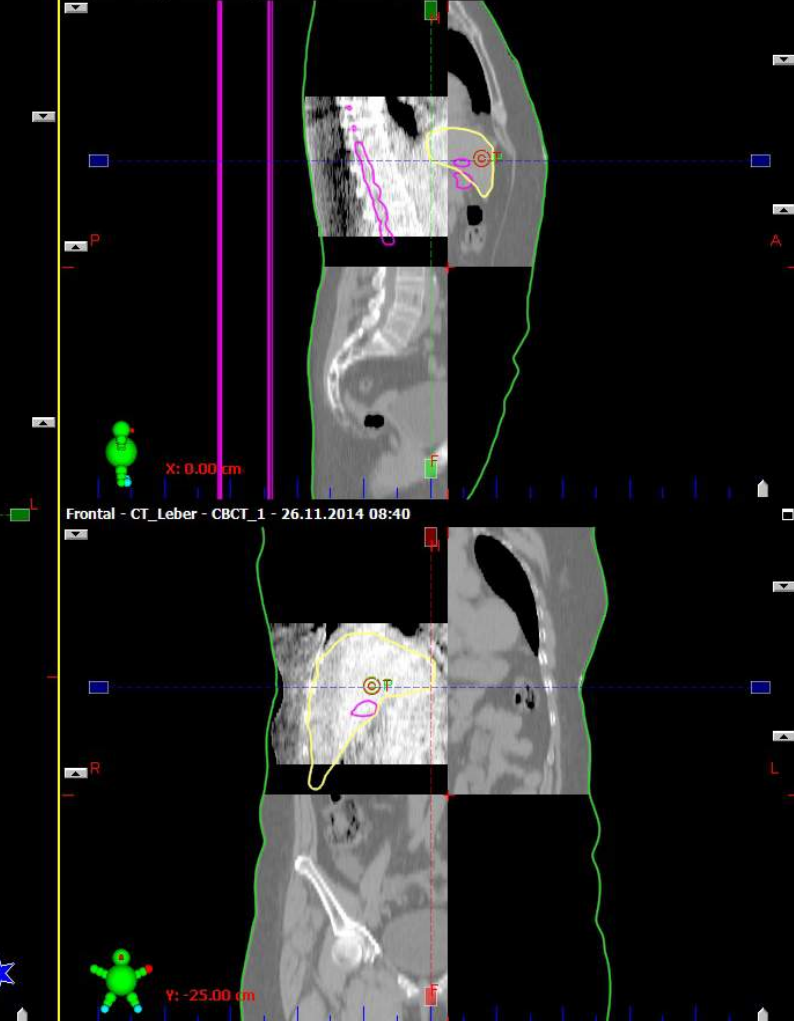
**Ohne präzise Bildgebung
ist eine präzise
Strahlentherapie
nutzlos!**

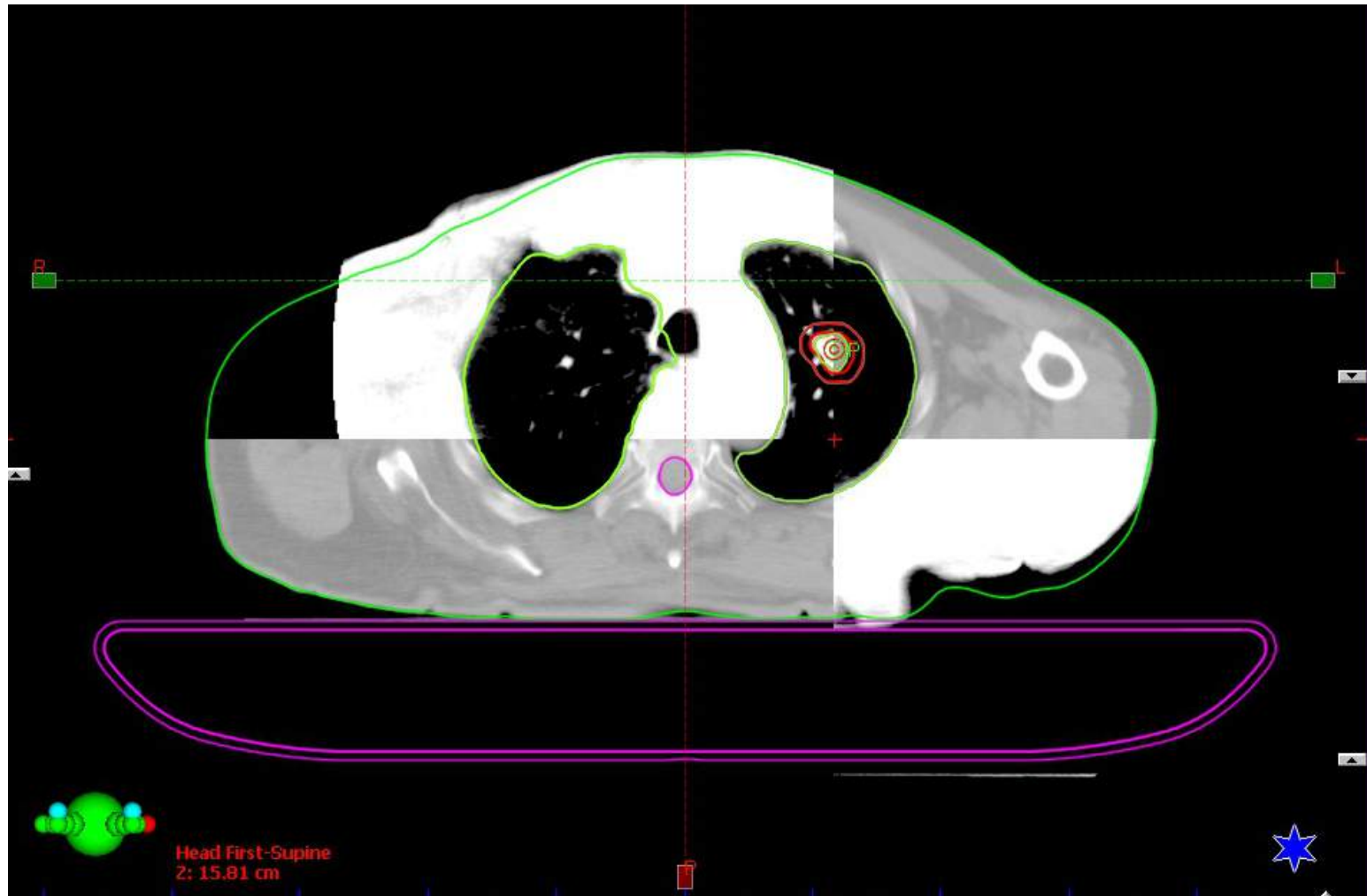


Transversal - CT_Leber - CBCT_1 - 26.11.2014 08:40



Sagittal - CT_Leber - CBCT_1 - 26.11.2014 08:40

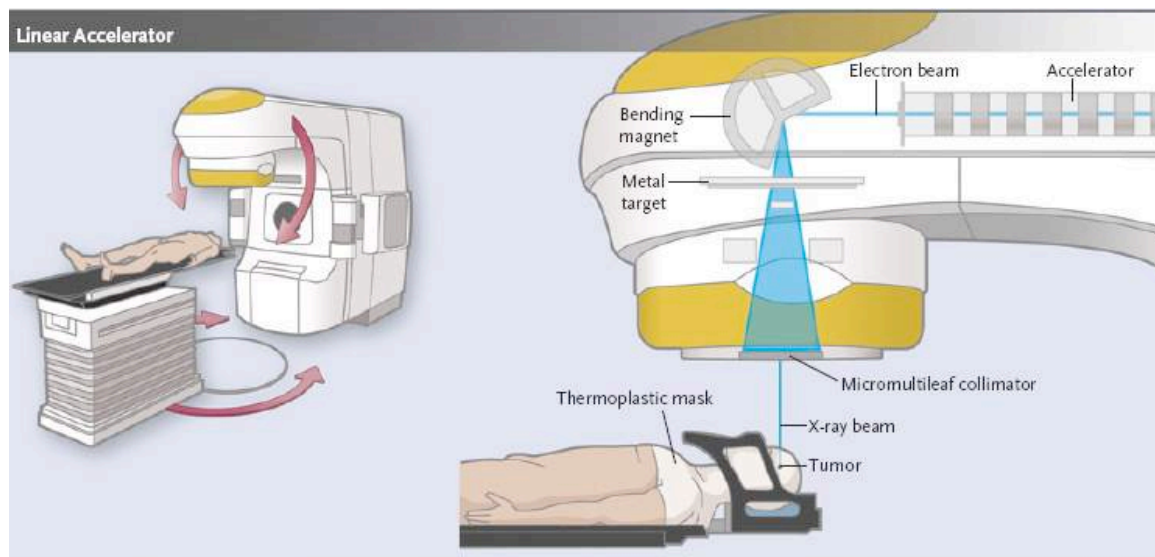




CLINICAL THERAPEUTICS

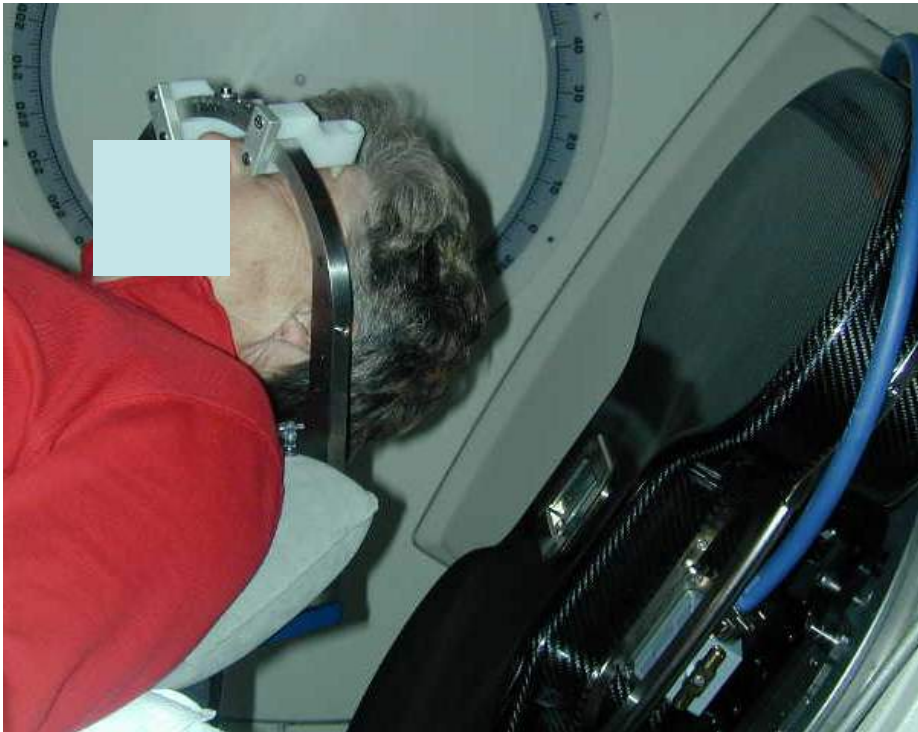
Stereotactic Radiosurgery for the
Management of Brain Metastases

John H. Suh, M.D.

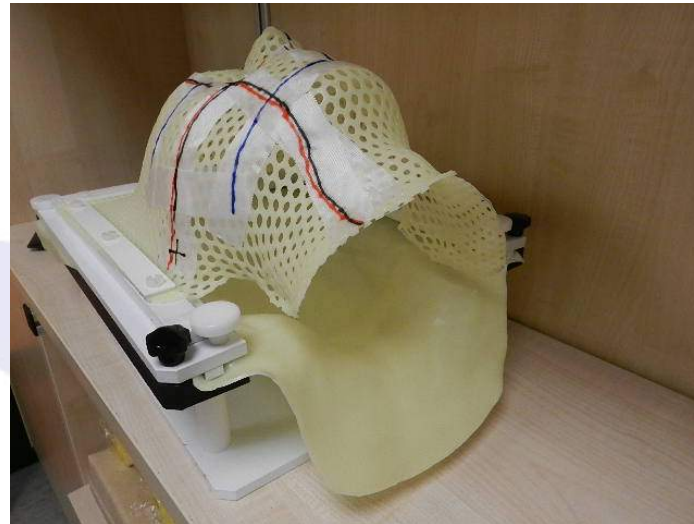
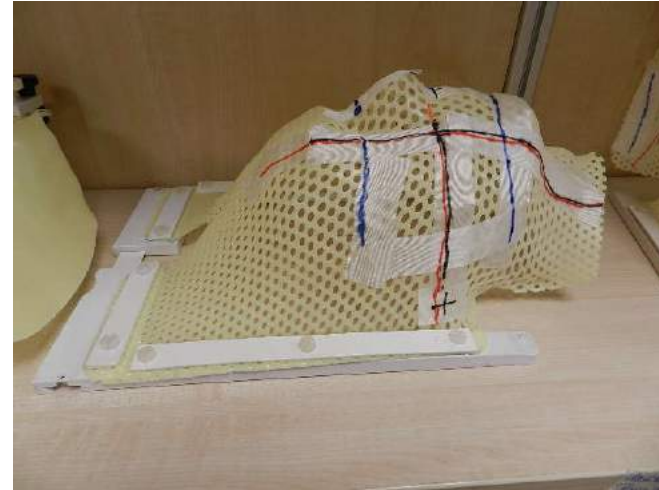


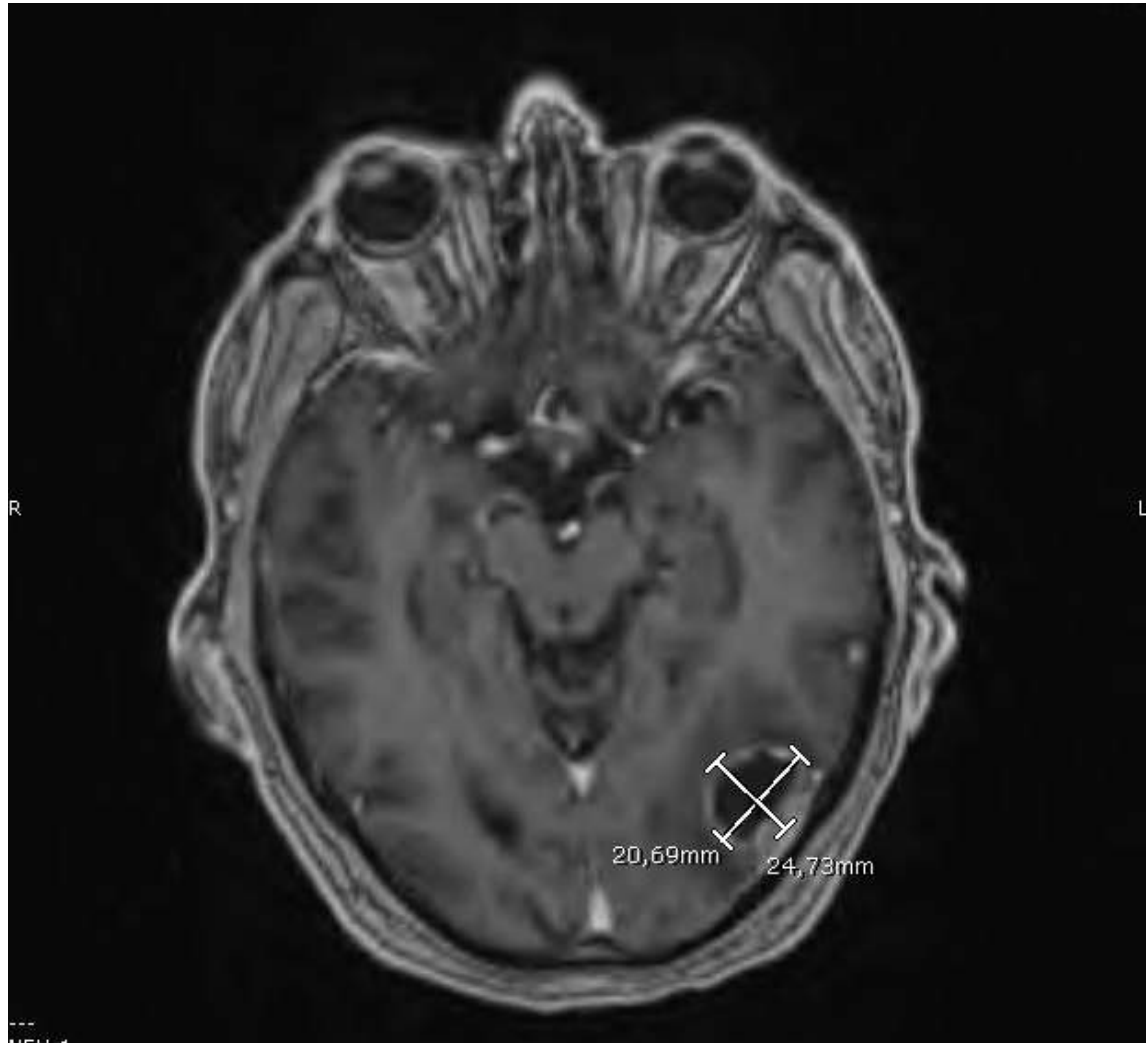
N Engl J Med 2010;362:1119-27.

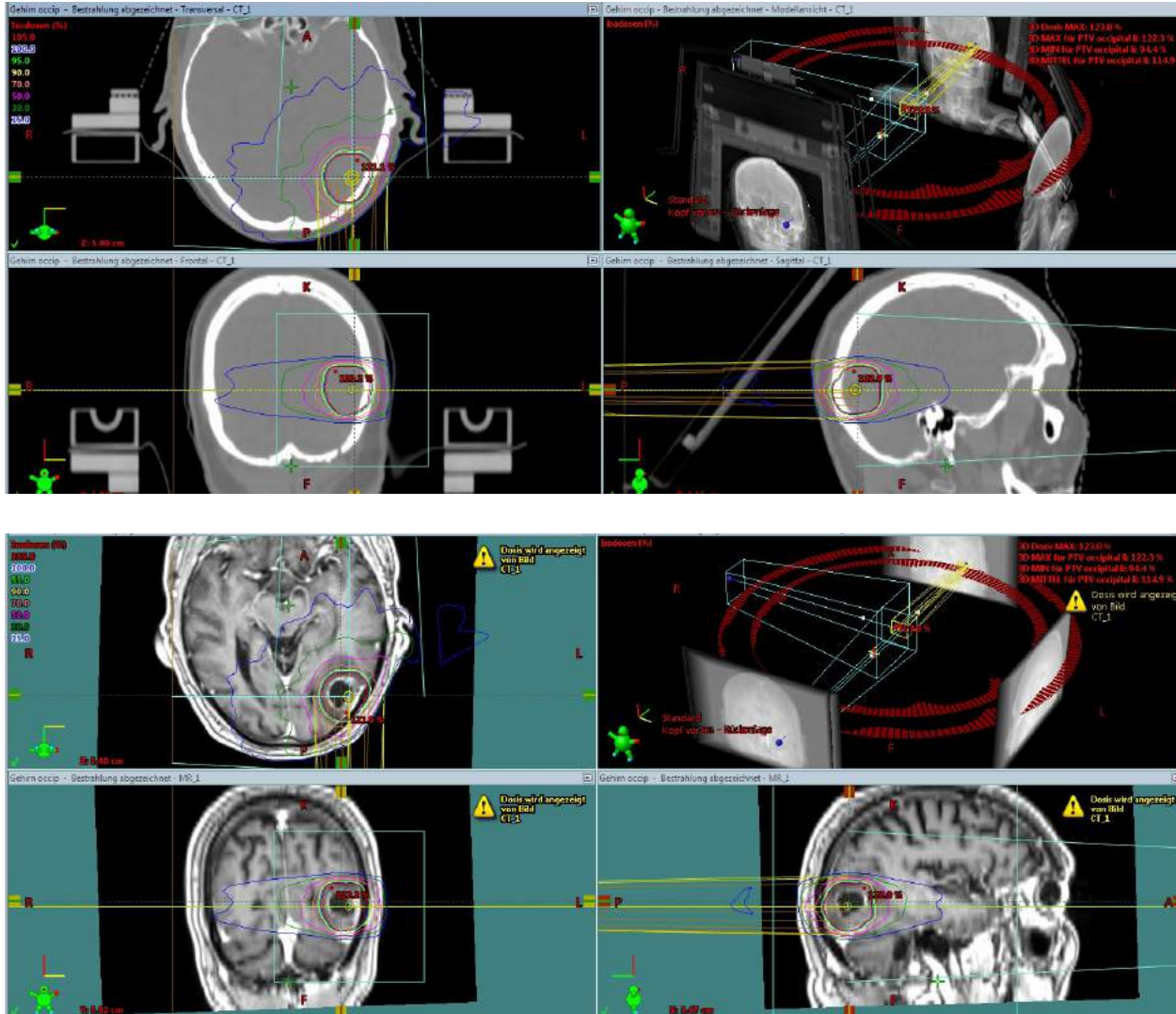
Copyright © 2010 Massachusetts Medical Society.

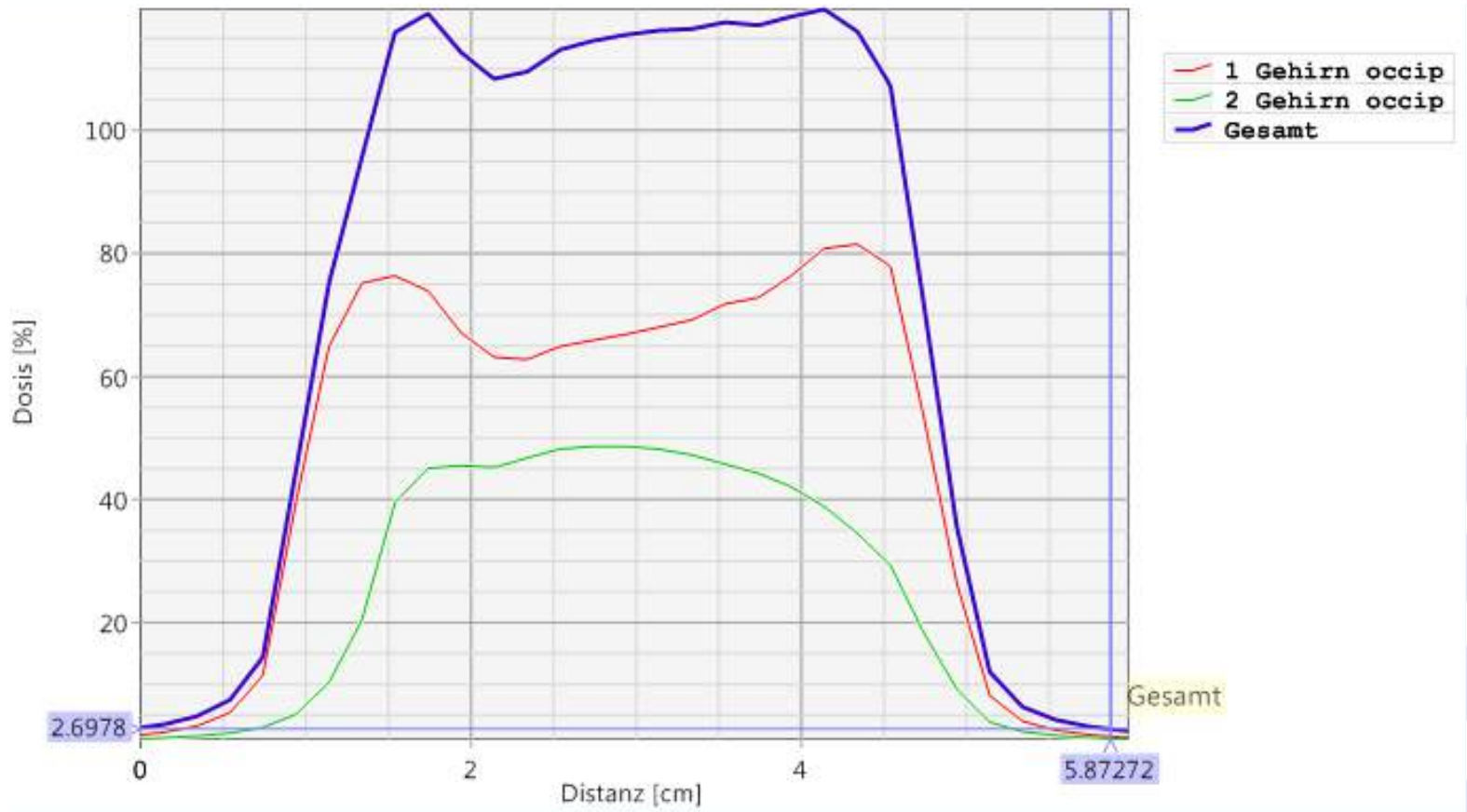


Stereotaktische Strahlentherapie Radiochirurgie

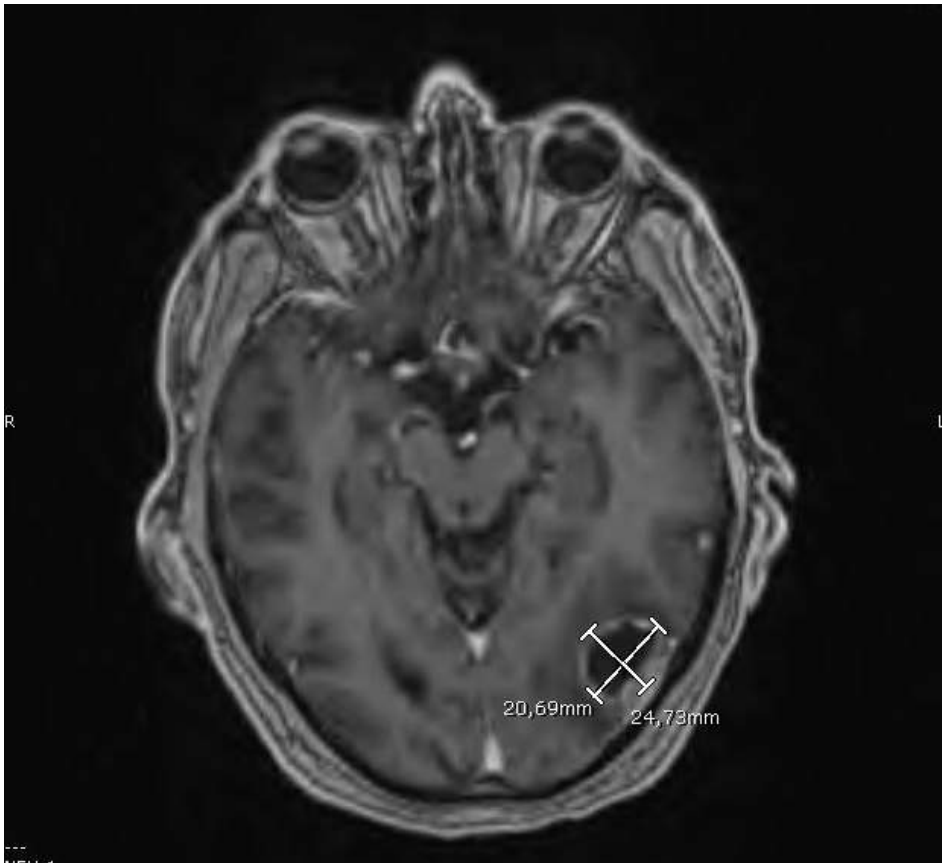




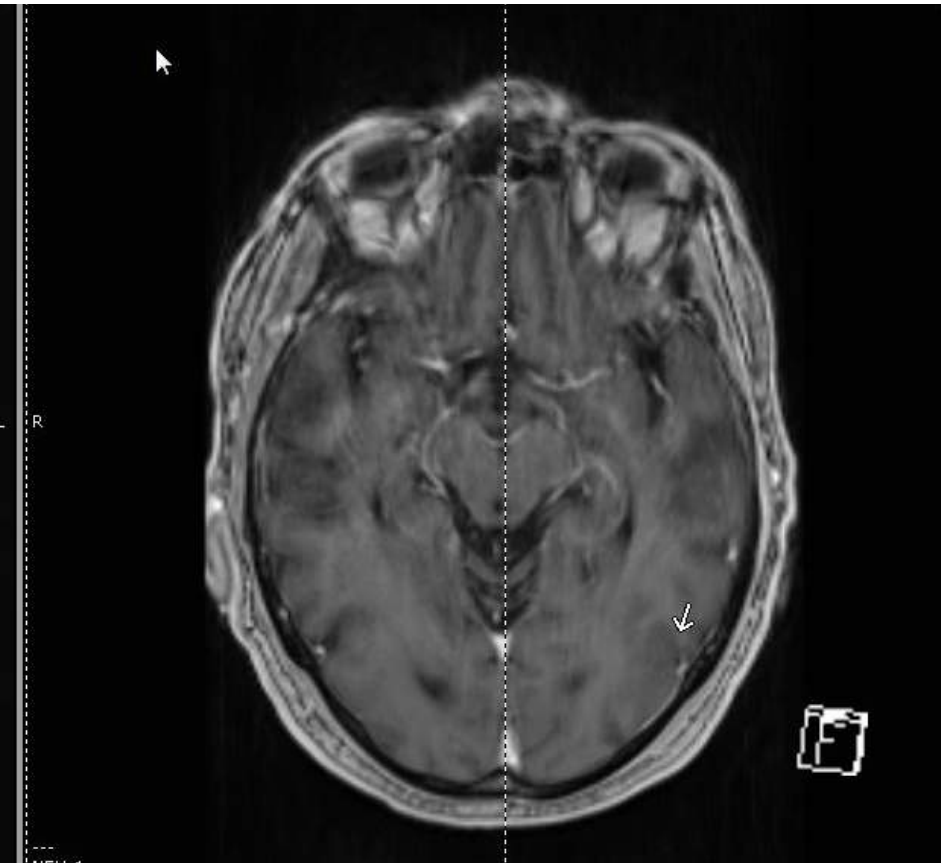




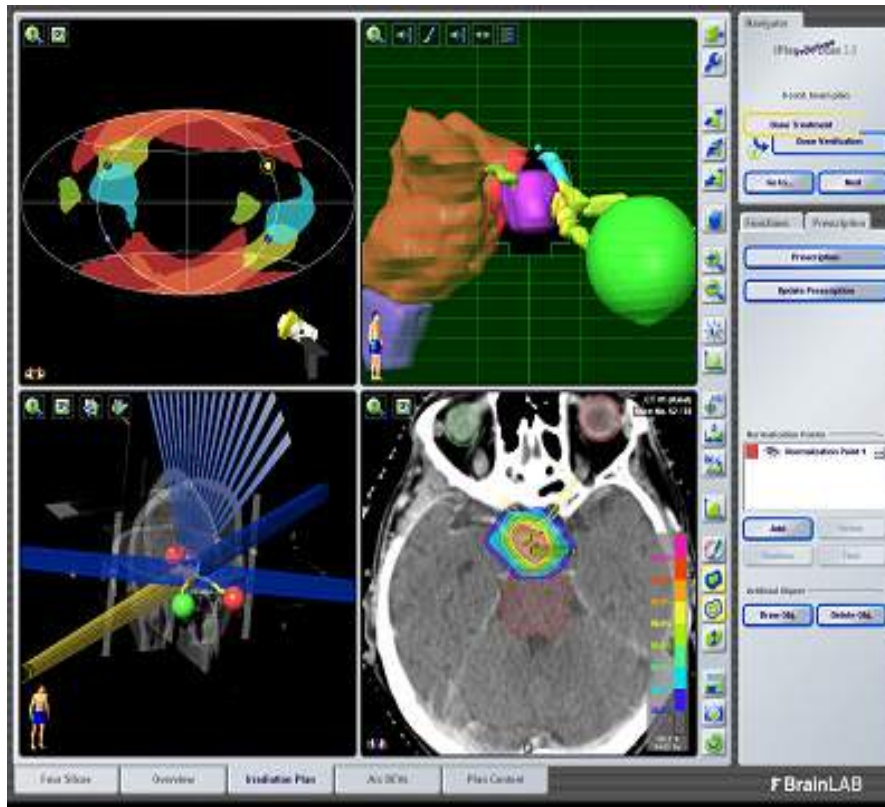
Tumor



vor STX-RT



2 Monate nach STX-RT

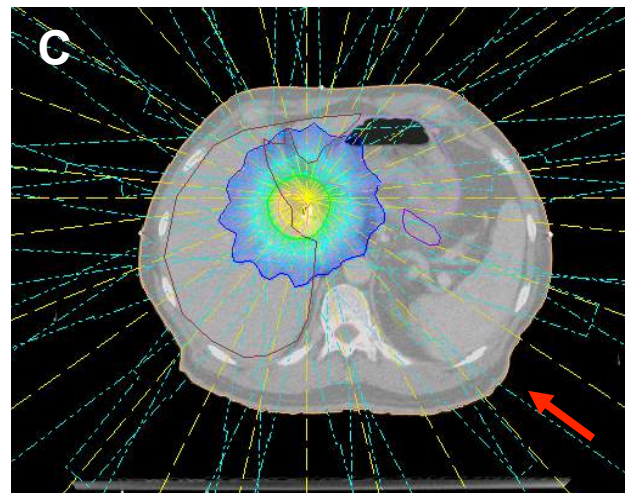
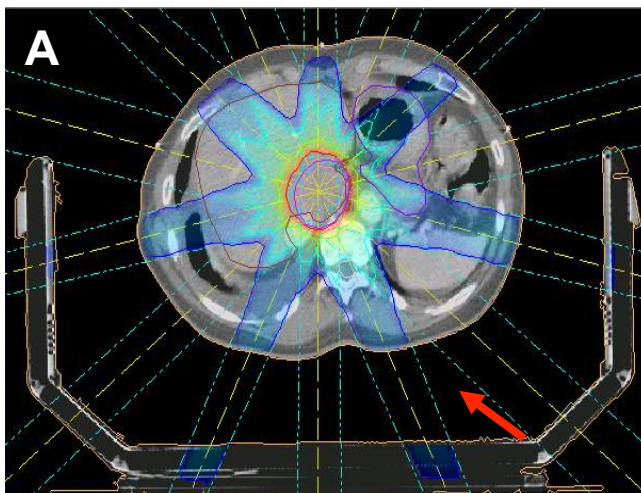


Bestrahlungsplanung:

- Hohe Dosis im Herd
- Steiler Dosisabfall

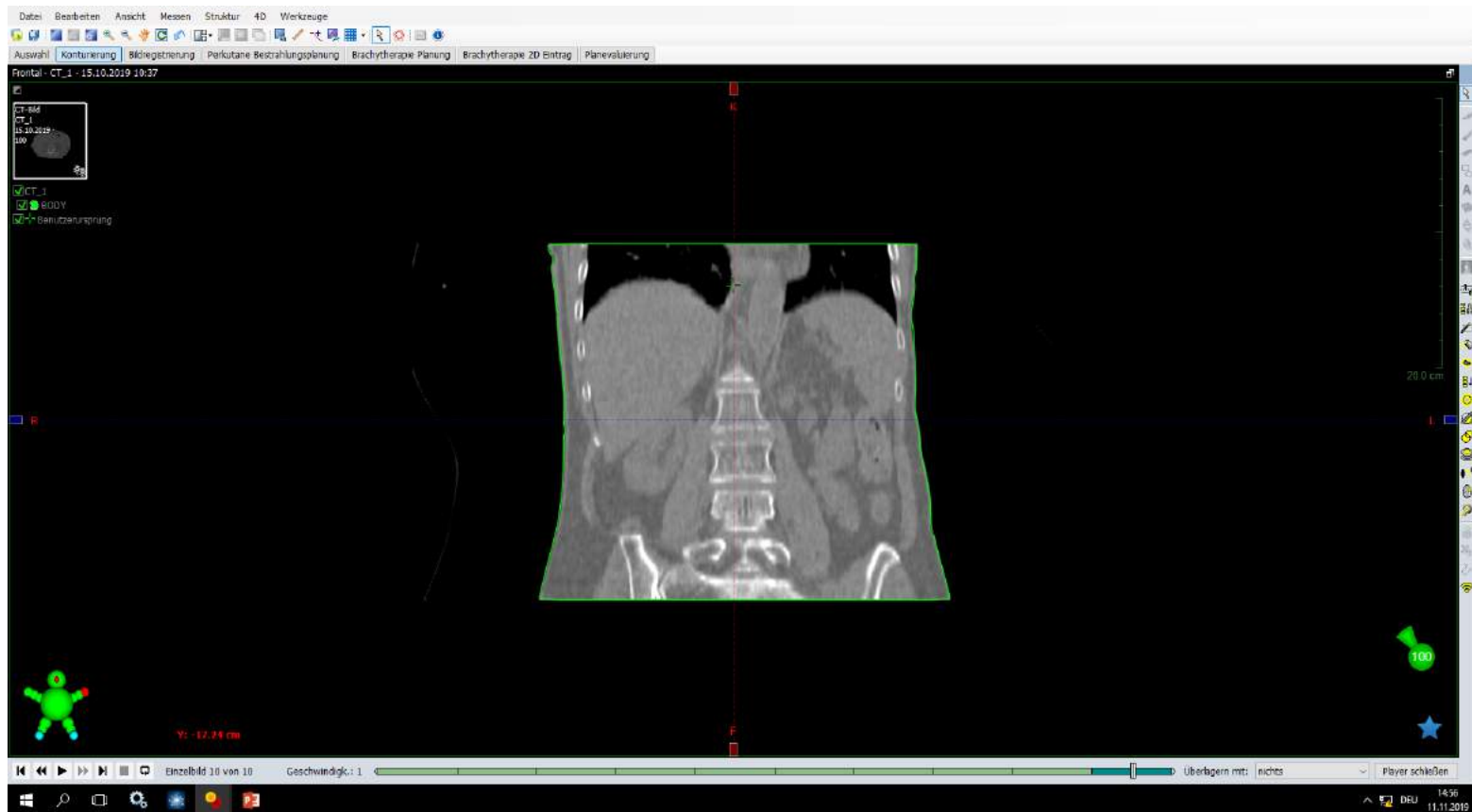
Umsetzung auf den Körperstamm:

- Lunge
- Leber
- Nebenniere
- Leberpforte/Pankreas





Berücksichtigung der Atembeweglichkeit: 4D-CT



Berücksichtigung der Atembeweglichkeit: 4D-CT

Leber STX - Bestrahlung abgezeichnet - Transversal - CT_AV_Abd_0kt19 (Durchschn.)

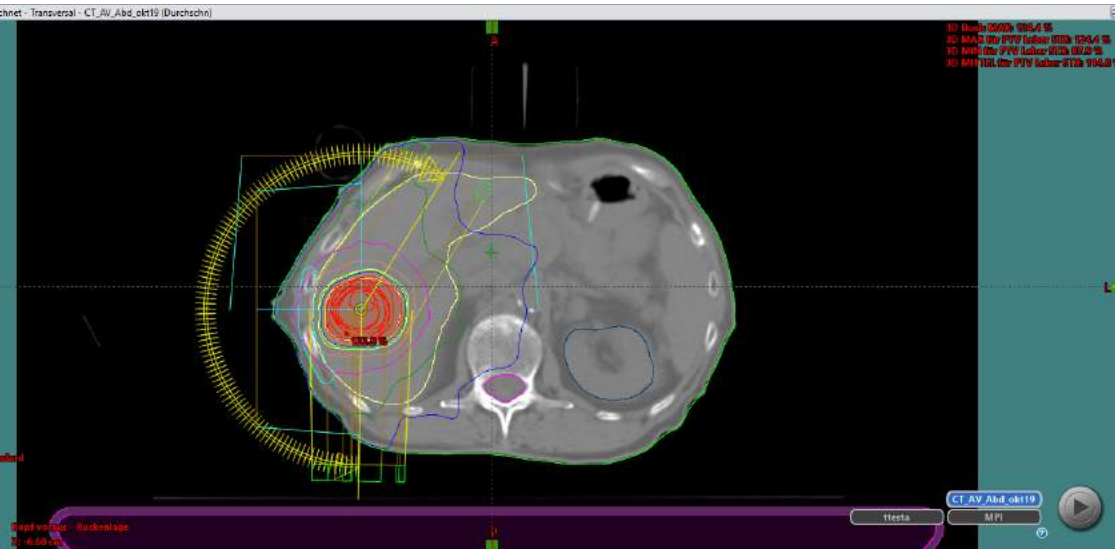
270253-ZIAL-01

Leber STX

CT_AV_Abd_0kt19

Registrierte Bilder

- CT_AV_Abd_0kt19
- BODY
- Bowel
- CouchInterior1
- CouchSurface1
- GTV10
- GTV20
- GTV30
- GTV40
- GTV50
- GTV60
- GTV70
- GTV80
- GTV90
- GTV100
- GTVEM
- HPTV-ITV
- HV conf ring
- ITV
- Leber
- Niere I
- Niere re
- PTV Leber STX



Bestrahlung [Gy]

- 100.0
- 100.0
- 65.0
- 90.0
- 70.0
- 85.0
- 100.0
- 150.0

CT_AV_Abd_0kt19

Heute MPI

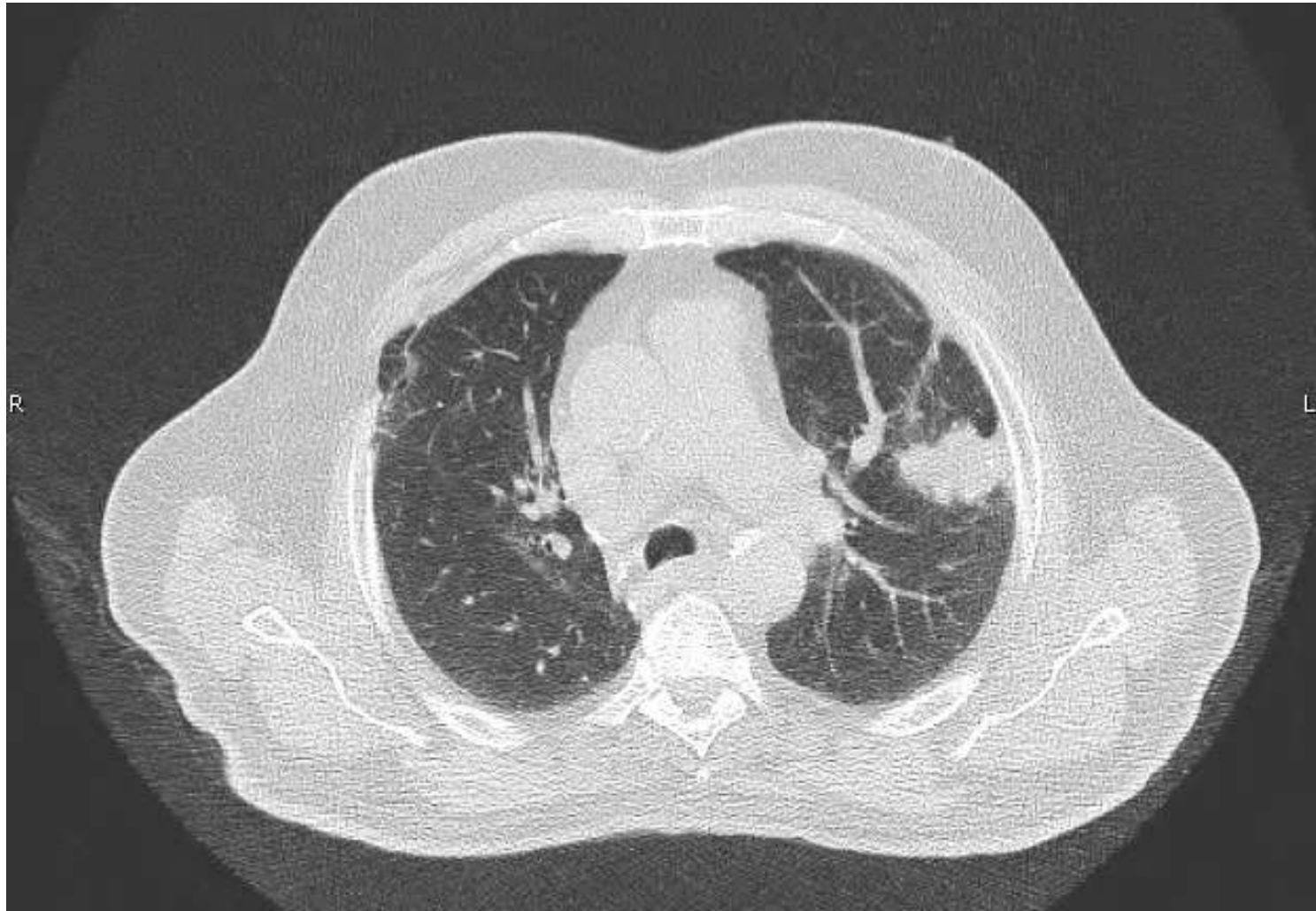
Felder

Gruppe	Feld-ID	Technik	Coval/Energie	M.L.C.	Feldgewichtung	Skalieren	Gantry Rtn [Grad]	Couch Rtn [Grad]	Couch Rtn [Grad]	Koll.	Feld X [cm]	Y [cm]	Z [cm]	Feld Y [cm]	T1 [cm]	T2 [cm]	x [cm]	y [cm]	z [cm]	SSD [cm], source-to-skin	MTU [ML]	Ref. D [Gy]
1	Set Leber STX 0	STATIC	TrueBeam1 - GK		0.000	Voran REC	0.0	0.0	0.0	Keine	18.3	+7.8	+10.5	14.8	+7.5	+7.3	-7.70	3.40	-6.90	91.8		
1	1 Leber STX	ARC+	TrueBeam1 - 10X-FFF	VMAT	0.937	Voran REC	181.0 UZ 32.0	33.0	0.0	Keine	6.0	+3.0	+3.0	3.3	+3.0	+2.5	-7.70	3.40	-6.90	92.3	936.0	
1	2 Leber STX	ARC+	TrueBeam1 - 10X-FFF	VMAT	0.916	Voran REC	32.0 GLUZ 181.0	5.0	0.0	Keine	6.1	+3.1	+3.0	5.8	+3.0	+2.5	-7.70	3.40	-6.90	88.1	915.6	
1	3 Leber STX	ARC+	TrueBeam1 - 10X-FFF	VMAT	0.707	Voran REC	181.0 UZ 32.0	85.0	0.0	Keine	5.3	+2.8	+2.5	6.1	+3.0	+3.0	-7.70	3.40	-6.90	92.3	706.6	
1	Set Leber 270	STATIC	TrueBeam1 - GK		0.000	Voran REC	270.0	0.0	0.0	Keine	14.9	+7.4	+7.5	14.8	+7.5	+7.3	-7.70	3.40	-6.90	94.8		

Bereit

Benutzer: Prof. Dr. Felixmann, Momm Gruppe: Oncologik Ort: Main UF: NLM DE

14:09 11.11.2019



485377

C1

PTV li Oberlappen : R0

- STX_OLlappen_0
- STX_liOlappn
- STX_OLlappen00

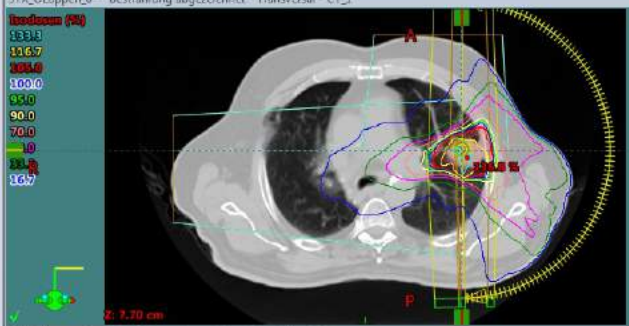
STX_OLlappen_0

CT_1

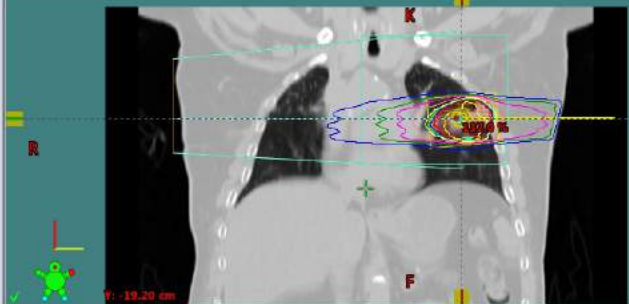
Registrierte Bilder

- CT_4D_1
- CBCT_1
- CBCT_1
- CBCT_2
- CBCT_2
- CBCT_2
- CBCT_3
- CBCT_3
- CBCT_3
- CBCT_4
- CBCT_4
- CBCT_4
- CBCT_5
- CBCT_5
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- CBCT_8

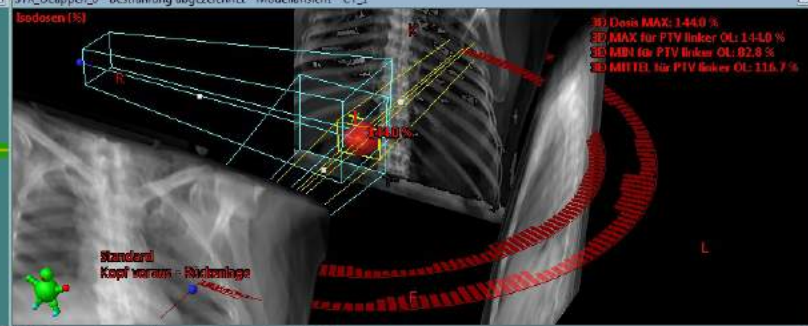
STX_OLlappen_0 - Bestrahlung abgezeichnet - Transversal - CT_1



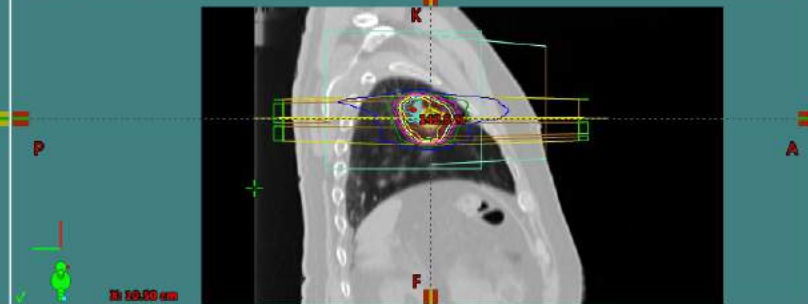
STX_OLlappen_0 - Bestrahlung abgezeichnet - Frontal - CT_1



STX_OLlappen_0 - Bestrahlung abgezeichnet - Modellsicht - CT_1

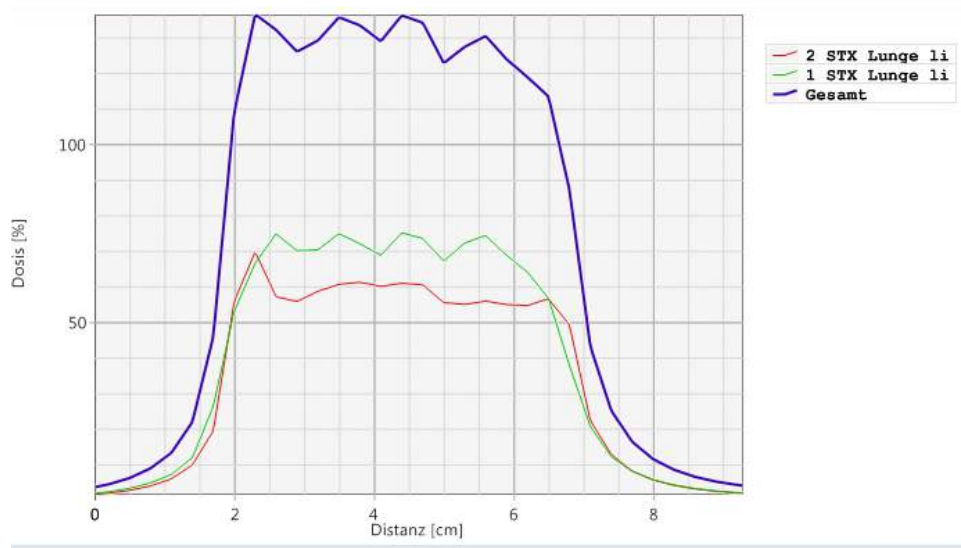
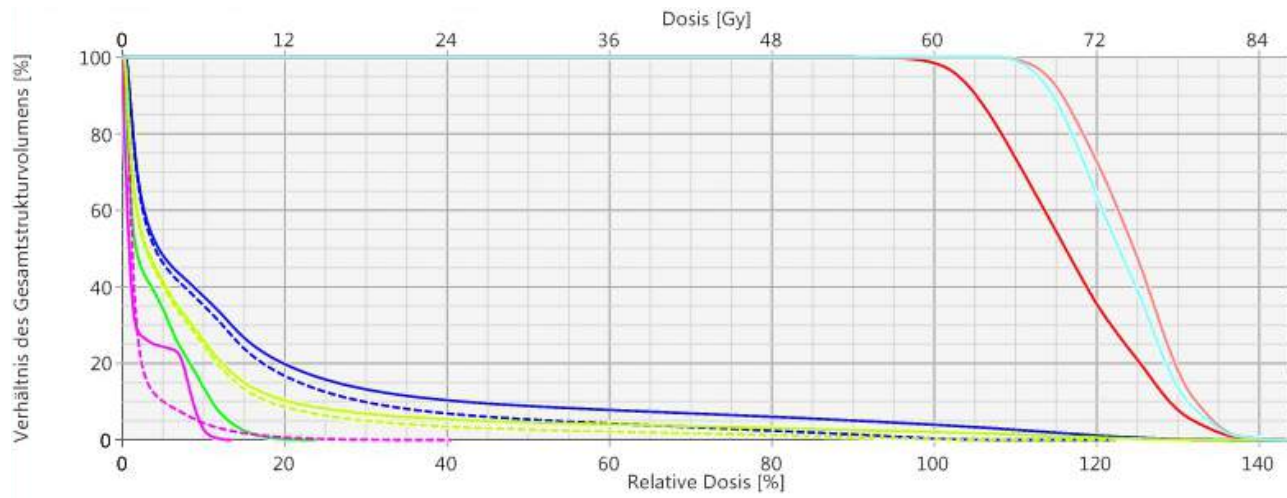


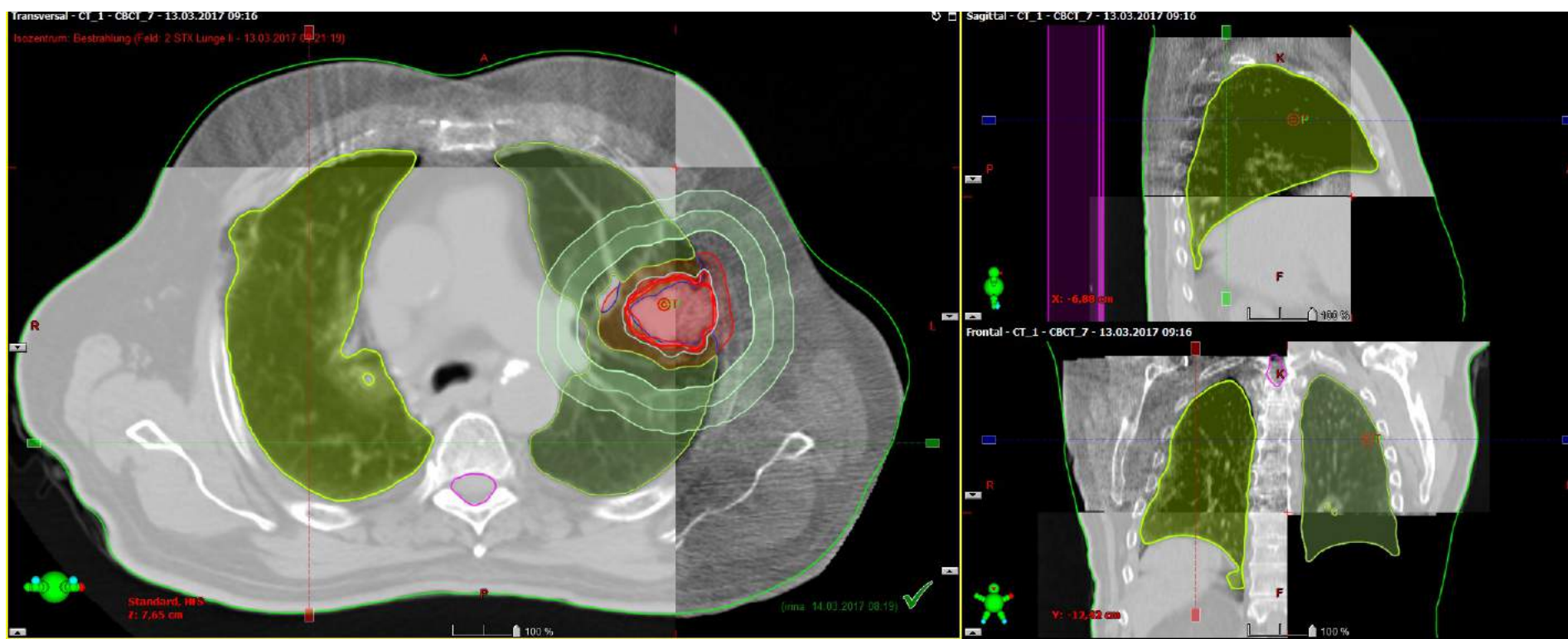
STX_OLlappen_0 - Bestrahlung abgezeichnet - Sagittal - CT_1

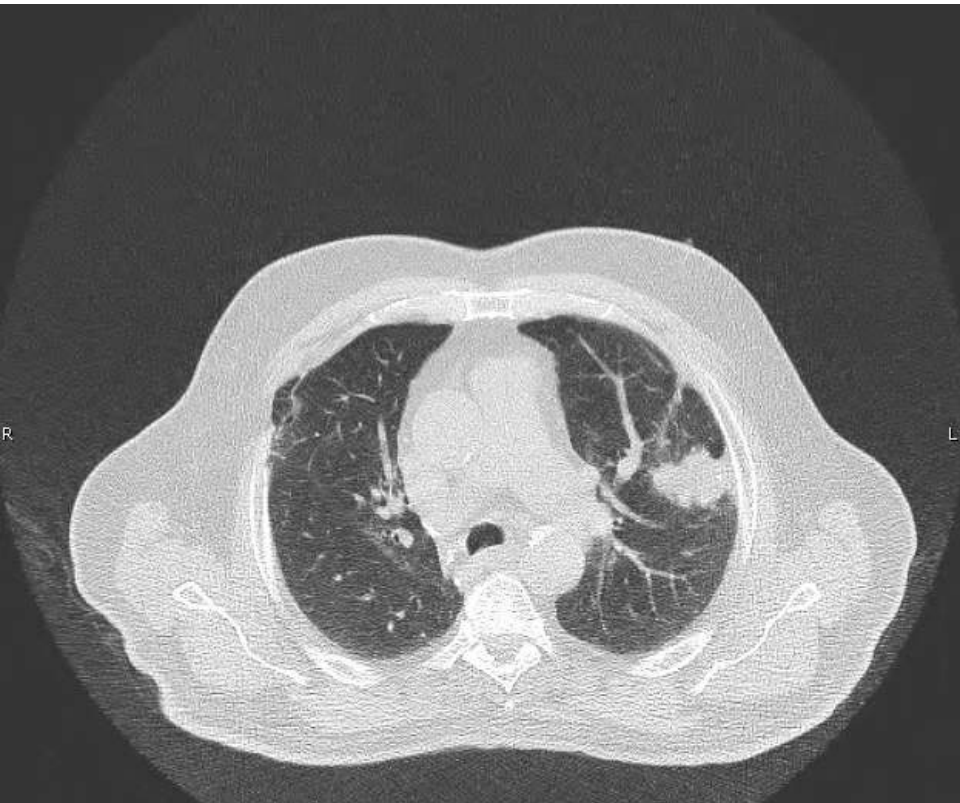


Felder Dosisverordnung Felddarstellungen Planzielvorgaben Optimierungszielvorgaben Dosisstatistik Berechnungsmodelle Plansumme

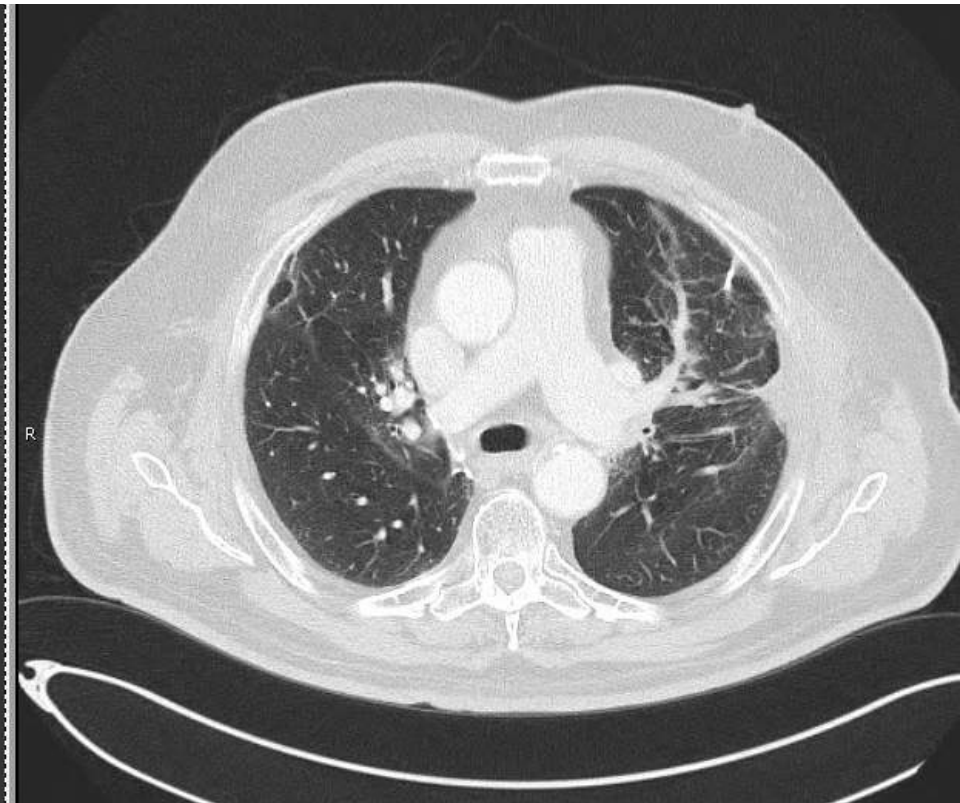
Gruppe	Feld-ID	Technik	Gerät/Energie	MLC	Feldgewichtung	Skalieren	Gantry Rtn [deg]	Coll Rtn [deg]	Couch Rtn [deg]	Keil	Field X [cm]	X1 [cm]	X2 [cm]	Field Y [cm]	Y1 [cm]	Y2 [cm]	X [cm]	Y [cm]	Z [cm]	SSD [cm] berechnet	MU [ME]	Ref. D [Gy]
<input checked="" type="checkbox"/>	Setup Lunge li	STATIC-I	Clinac-1N - 6X		0.000	Varian IEC	0.0	0.0	0.0	Keine	16.0	+11.0	+5.0	14.0	+5.0	+9.0	10.50	-19.20	7.70	88.5		
<input checked="" type="checkbox"/>	2 STX Lunge li	ARC-I	Clinac-1N - 6X	VMAT	2.012	Varian IEC	179.0 GUZ 0.0	355.0	0.0	Keine	7.7	+3.8	+3.9	5.4	+2.9	+2.5	10.50	-19.20	7.70	84.9	1556	
<input checked="" type="checkbox"/>	1 STX Lunge li	ARC-I	Clinac-1N - 6X	VMAT	1.953	Varian IEC	0.0 UZ 179.0	5.0	0.0	Keine	7.6	+3.7	+3.9	5.4	+2.9	+2.5	10.50	-19.20	7.70	88.5	1510	
<input checked="" type="checkbox"/>	Setup OL li 270	STATIC-I	Clinac-1N - 6X		0.000	Varian IEC	270.0	0.0	0.0	Keine	17.0	+11.5	+5.5	15.0	+5.5	+9.5	10.50	-19.20	7.70	69.4		







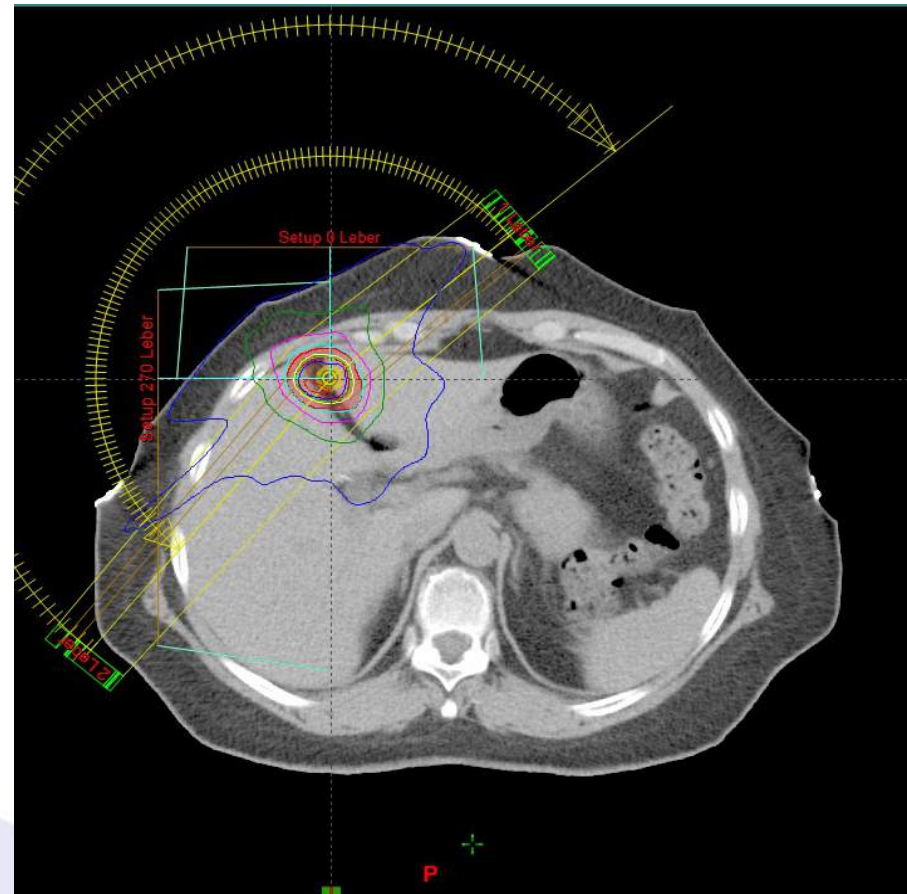
vor STX-RT



9 Monate nach STX-RT



vor STX-RT



6 Monate nach STX-RT



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Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com



Original article

Stereotactic body radiotherapy dose and its impact on local control and overall survival of patients for locally advanced intrahepatic and extrahepatic cholangiocarcinoma



Thomas B. Brunner^{a,1,*}, Oliver Blanck^b, Victor Lewitzki^c, Nasrin Abbasi-Senger^d, Felix Momm^e, Oliver Riesterer^f, Marciana Nona Duma^{g,h}, Stefan Wachterⁱ, Wolfgang Baus^j, Sabine Gerum^k, Matthias Guckenberger^f, Eleni Gkika^a

^a Department of Radiation Oncology, University Hospitals Freiburg; ^b Department of Radiation Oncology, University Medical Center Schleswig-Holstein; ^c Department of Radiation Oncology, University Würzburg; ^d Department of Radiation Oncology, Friedrich-Schiller-University Jena; ^e Department of Radiation Oncology, Offenburg Hospital, Germany; ^f University Hospital Zürich, Department of Radiation Oncology, Switzerland; ^g Institute of Innovative Radiotherapy, Department of Radiation Sciences, Helmholtz Zentrum Munich; ^h Department of Radiation Oncology, Klinikum Rechts der Isar, TU Munich; ⁱ Klinikum Passau, Radiation Oncology; ^j University Hospital of Cologne, Department of Radiation-Oncology; ^k Department of Radiation Oncology, Ludwig-Maximilians-University, Munich; and ¹ Department of Radiation Oncology, Otto-von-Guericke-University, Magdeburg, Germany

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Stereotactic body radiotherapy

Unresectable

ABSTRACT

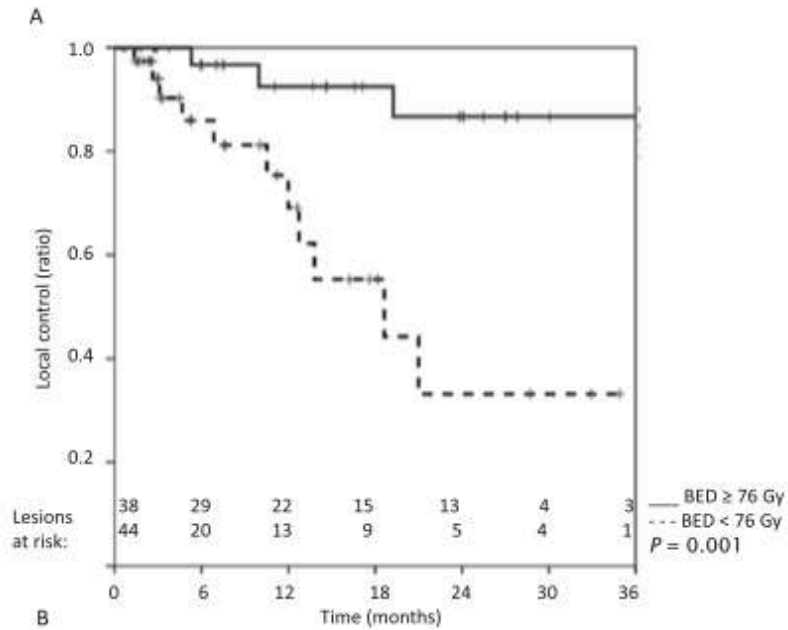
Purpose: Non-resectable cholangiocarcinoma (CCC) is a significant therapeutic challenge because of bad prognosis. This study analyzed the outcome after SBRT for intra- and extrahepatic CCC.

Material and methods: Sixty-four patients with 82 CCC lesions from a retrospective multicenter database were analyzed. Available parameters were analyzed for local control (LC), overall survival (OS) and toxicity.

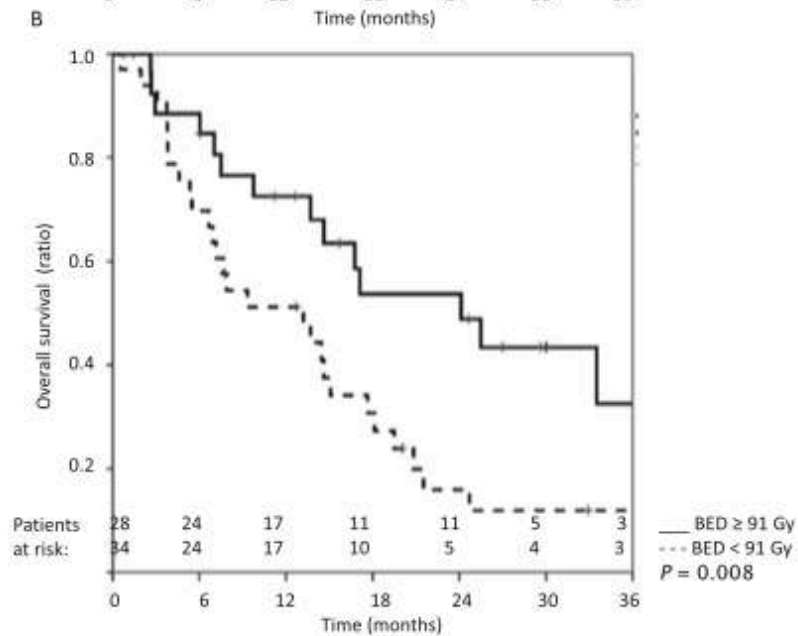
Results: Median follow-up time for patients alive was 35 months (range 7–91 months). Median overall survival (OS) time was 15 months; 2-year and 3-year OS rates were 32% and 21%. Median prescribed biological effective radiation dose (BED, $\alpha/\beta = 10$) was 67.2 Gy₁₀ (range, 36–115 Gy₁₀; SD: 20 Gy₁₀) in median 8 fractions (range, 3–17; 95% CI: 3–12), median BED_{max} was 91 Gy₁₀. BED was the only prognostic factor for LC and OS. Patients receiving BED_{max} >91 Gy₁₀ had a median OS of 24 months vs. 13 months for those receiving lower doses ($p = 0.008$). LC rates at 12 and 24 months were 91% and 80% for BED_{max} >91 Gy₁₀ vs. 66% and 39% for lower doses ($p = 0.009$). Of note, tumor size and PTV were neither predictive nor prognostic for LC and OS. Treatment tolerance was good with 17% of grade 1 gastroduodenitis, 11% of grade 2–3 cholangitis and 4.7% of grade 3 gastrointestinal bleeding.

Conclusion: This is the largest reported series on SBRT in cholangiocarcinoma. Overall survival and local control were significantly improved after higher doses (BED) and tolerance was excellent.

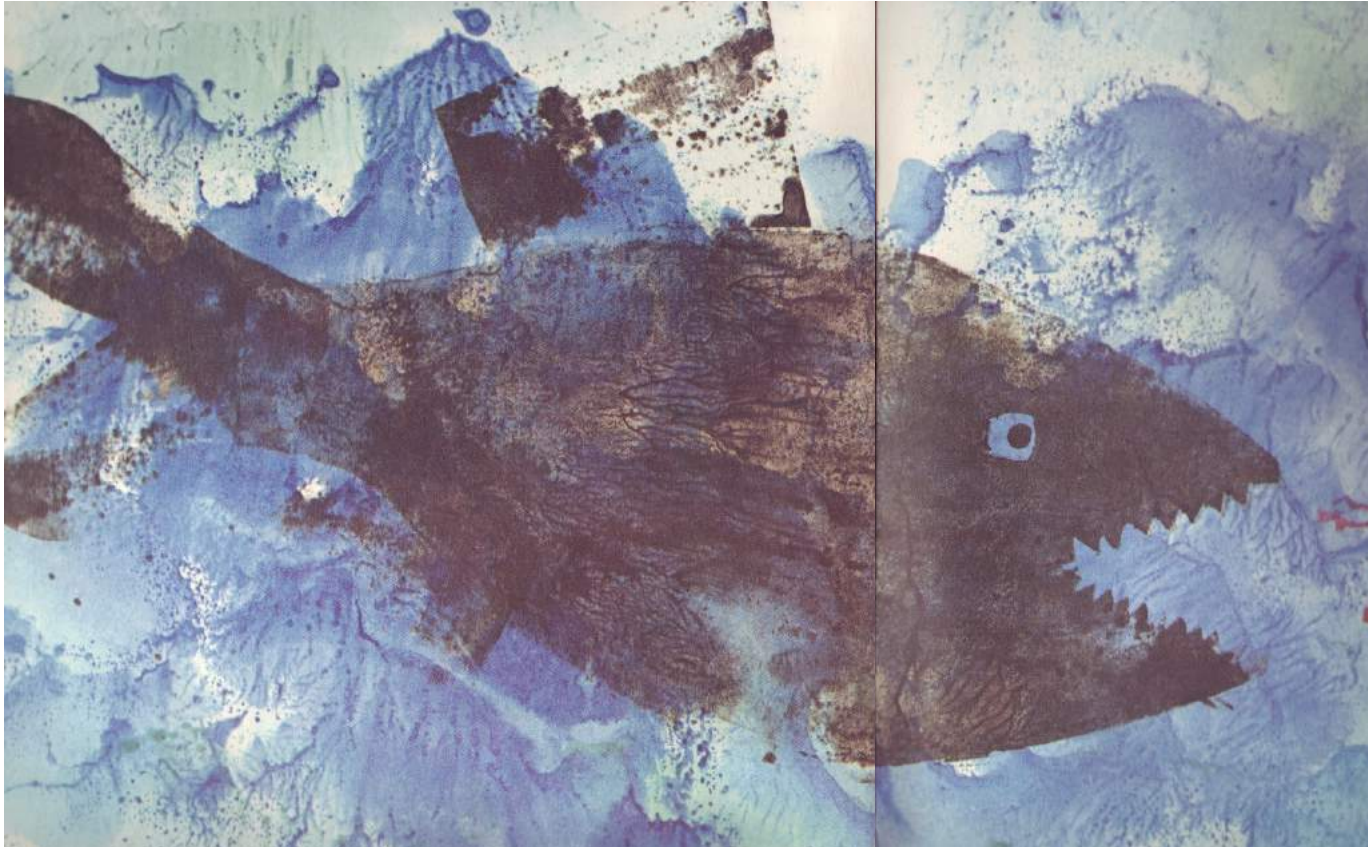
© 2018 Elsevier B.V. All rights reserved. Radiotherapy and Oncology xxx (2018) xxx–xxx



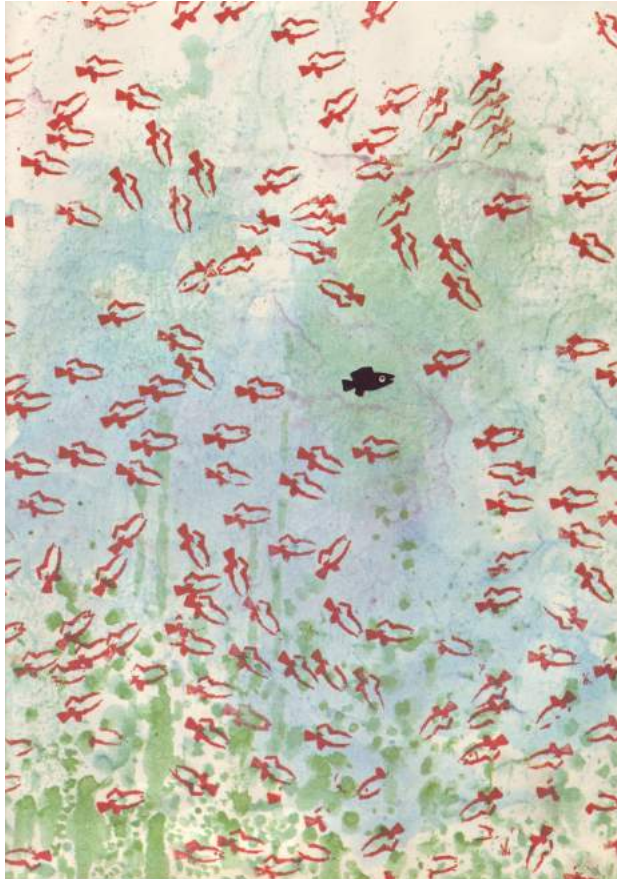
mean dose
82 lesions

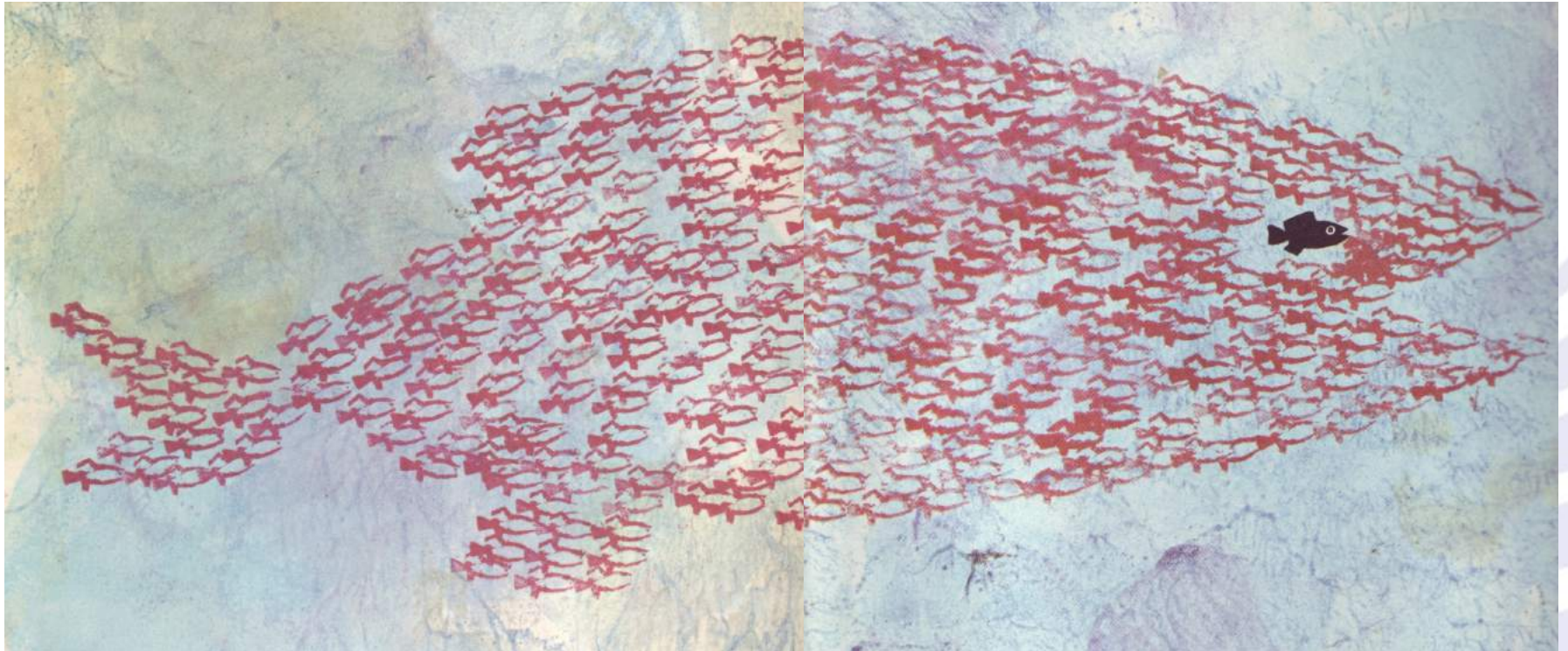


max dose
64 patients



Bilder aus: Leo Lionni „Swimmy“, Middelhaue Verlag
(Deutscher Bilderbuchpreis 1965)





Onkologie heißt Teamarbeit!

Vielen Dank für Ihre Aufmerksamkeit!

