



BSc Medizintechnik Ergänzungsmodul Grundlagen der Strahlentherapie: Lunge

D. Zips

Universitätsklinik für Radioonkologie Tübingen

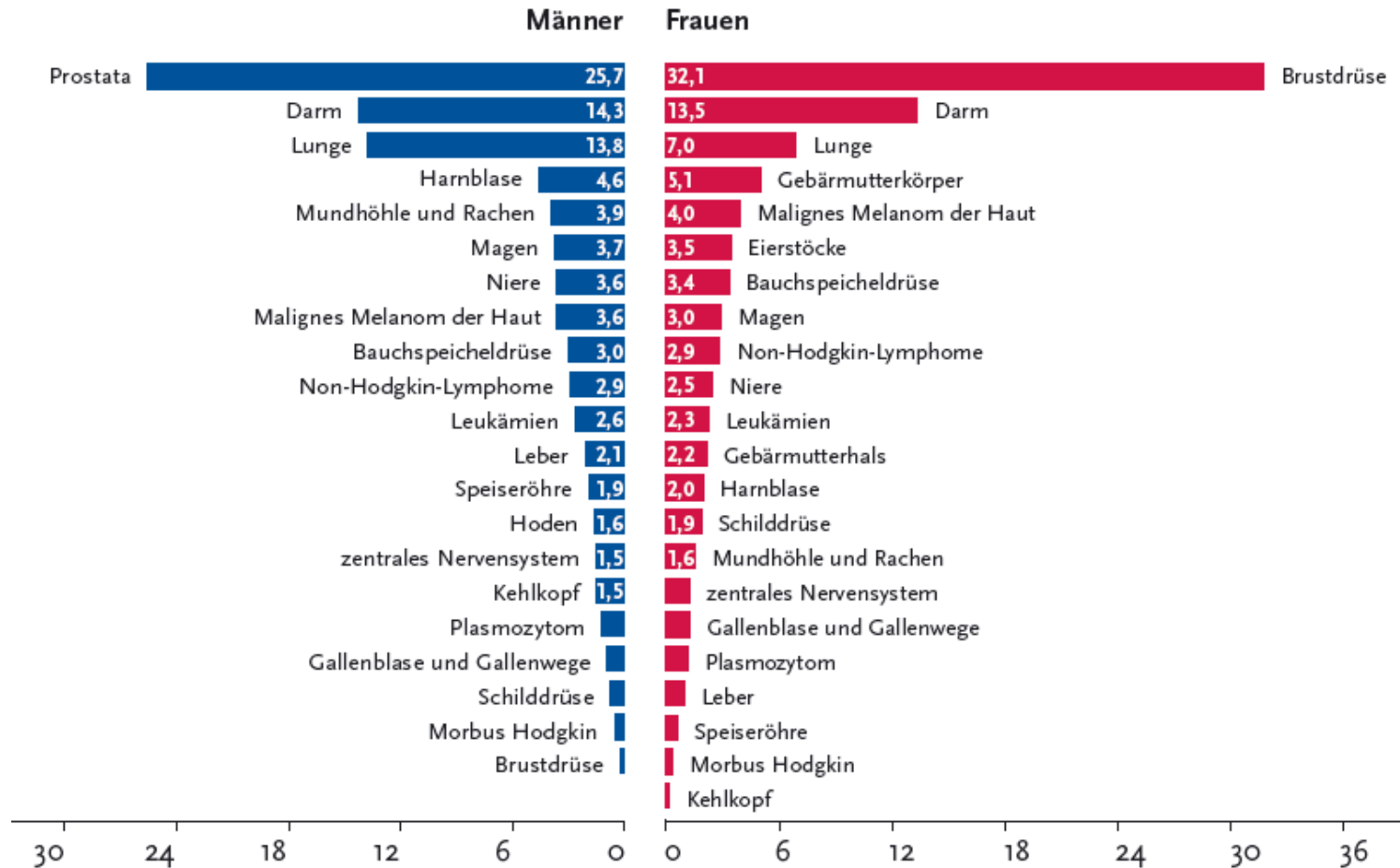


Lernziele Lungenkrebs

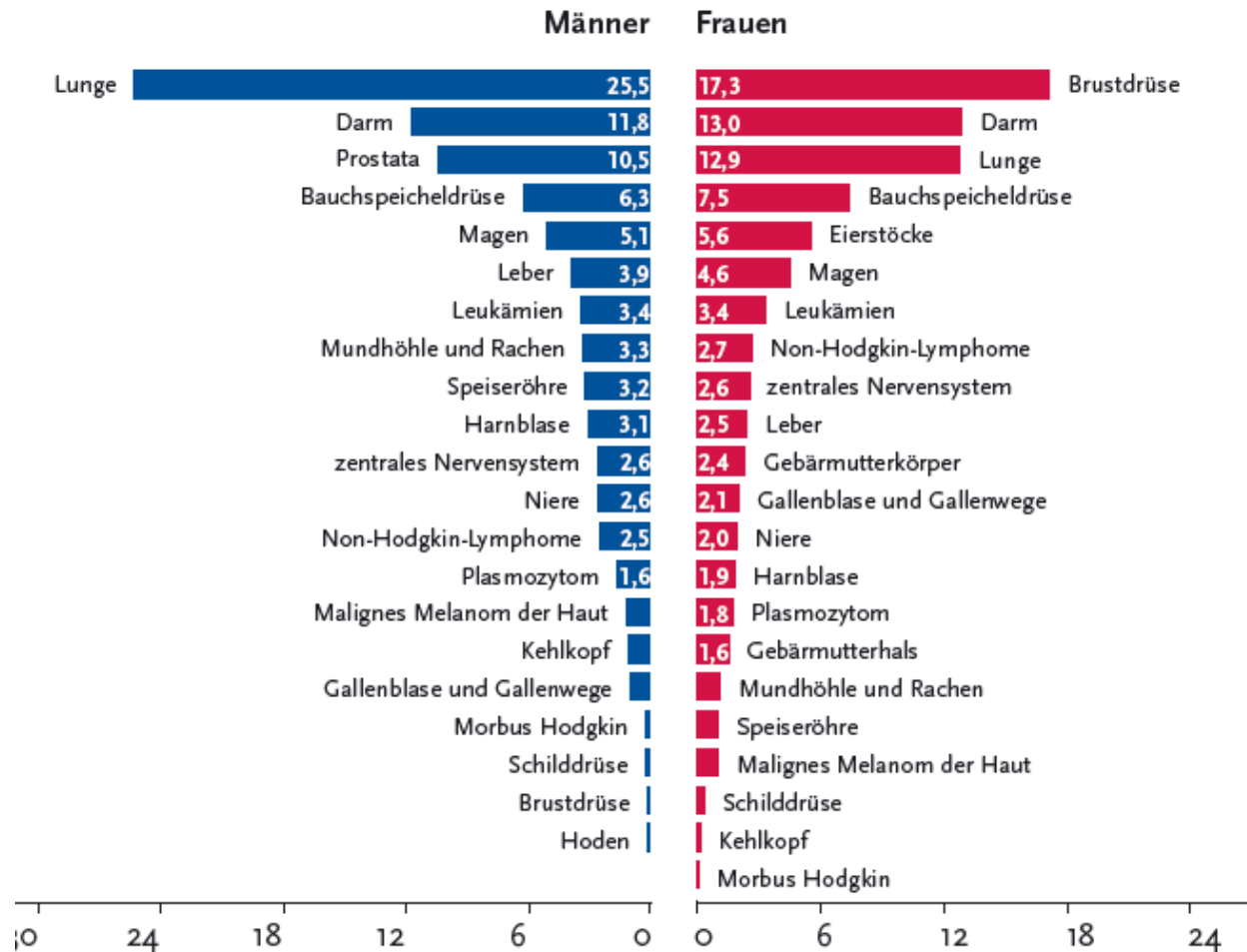
- Häufigkeit
- Therapieprinzipien
- Strahlentherapie-Indikationen, Ergebnisse
- Strahlentherapiedosis
- Grundlagen der Bestrahlungsplanung
- Nebenwirkungen



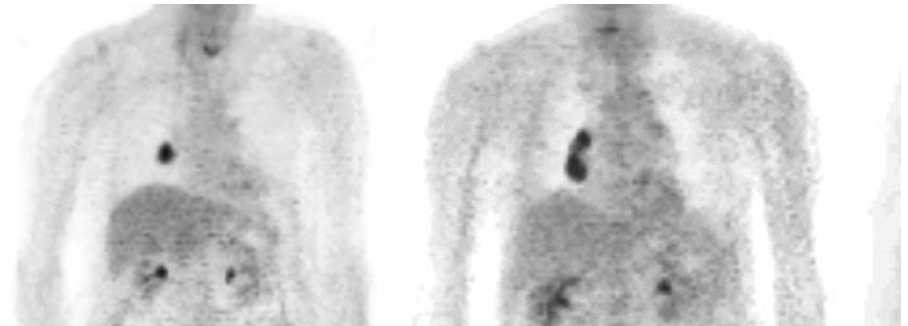
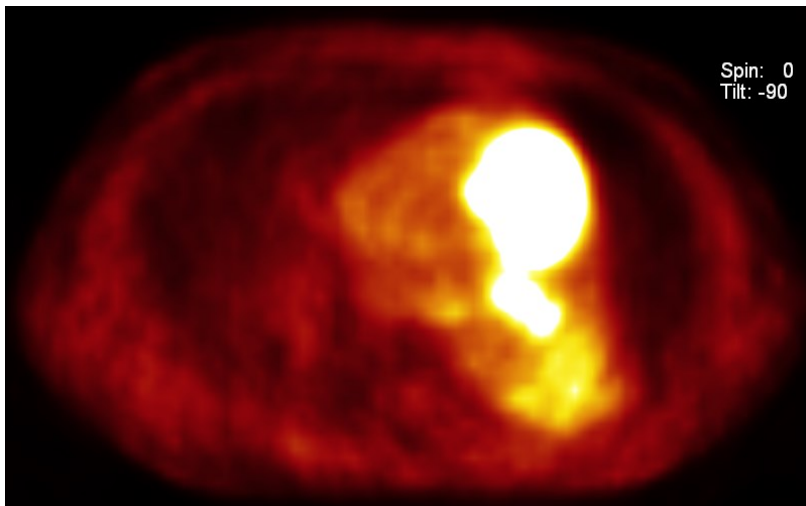
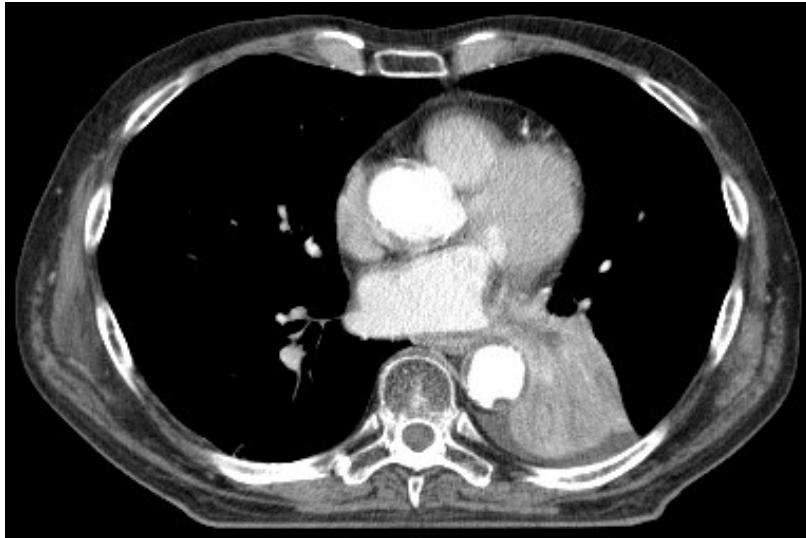
Neuerkrankung: 470.000/ Jahr



Krebssterbefälle: 215.000/Jahr

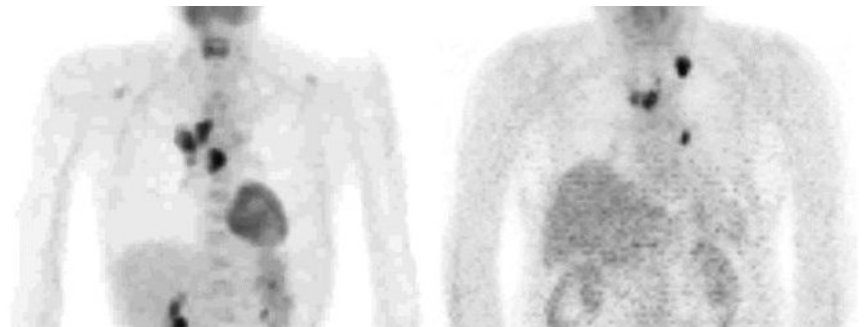


FDG PET/CT for treatment planning



N0

N1



N2

N3



	Beispiel	Dosis (Gy)	Tumorkontrolle (%)
Sensitiv	Seminom, Lymphom	≤ 45	≥ 90
Intermediär	Plattenepithel-Ca, Adeno-Ca	50 60 70	≥ 90 (subklinisch) ~ 85 (Ø 1 cm) ~ 70 (Ø 3 cm) ~ 30 (Ø 5 cm)
Resistent	Glioblastom	≥ 60	nie

Linearbeschleuniger



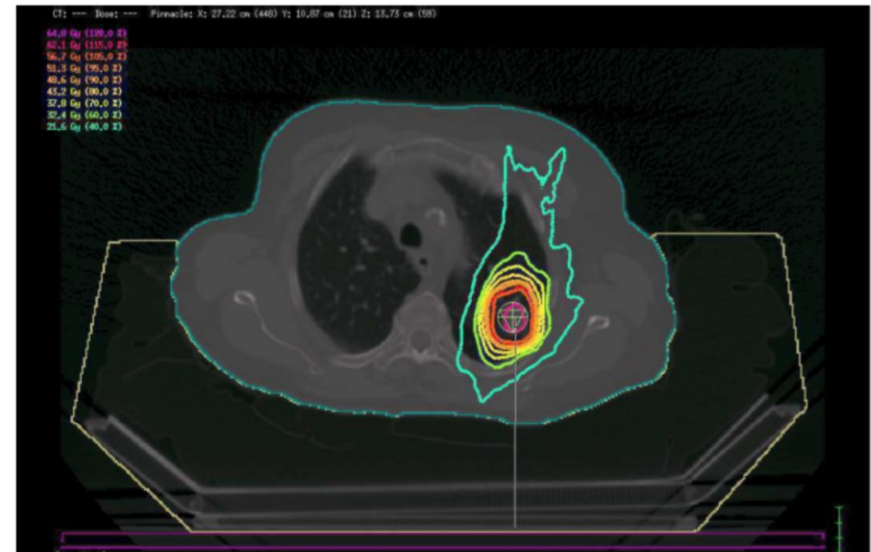
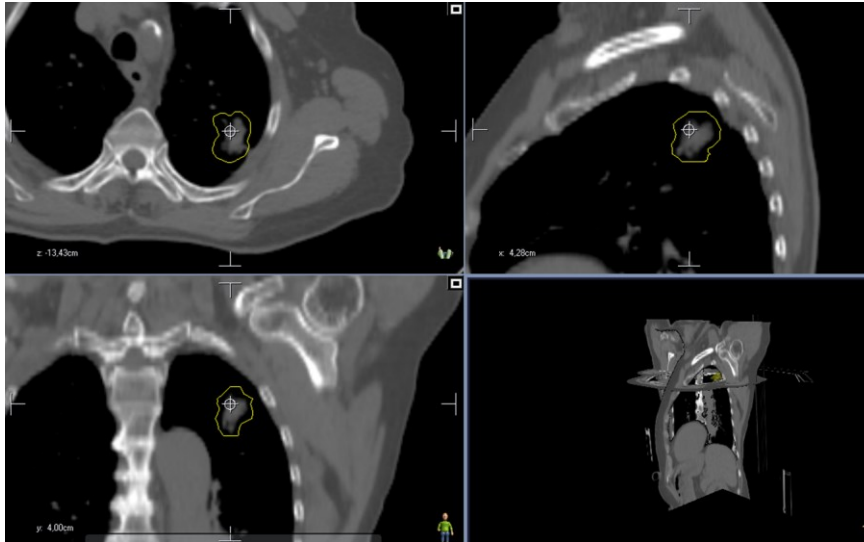
SBRT im Stadium I NSCLC

76 jährige Patientin, ED im Rahmen einer Lungenentzündung rechts, TTF1-positives Adenokarzinom, Stadium: cT1b (28 mm) cN0 cM0, FEV1 1.3 l, DLCOc SB 67%, Z.n. schwerer Pneumonie, pAVK, hypertrophe Kardiomyopathie, Polyarthrit, Z.n. Vulva-Ca, Z.n. MammaCa Therapie 3 x 18 Gy

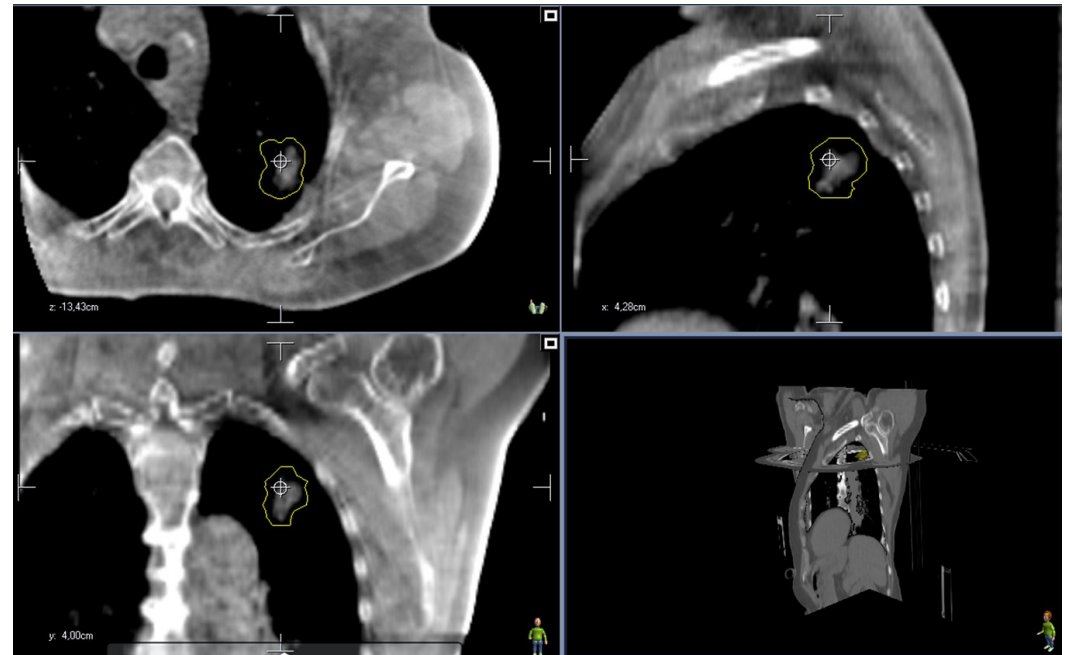


FDG-PET/CT
06/17

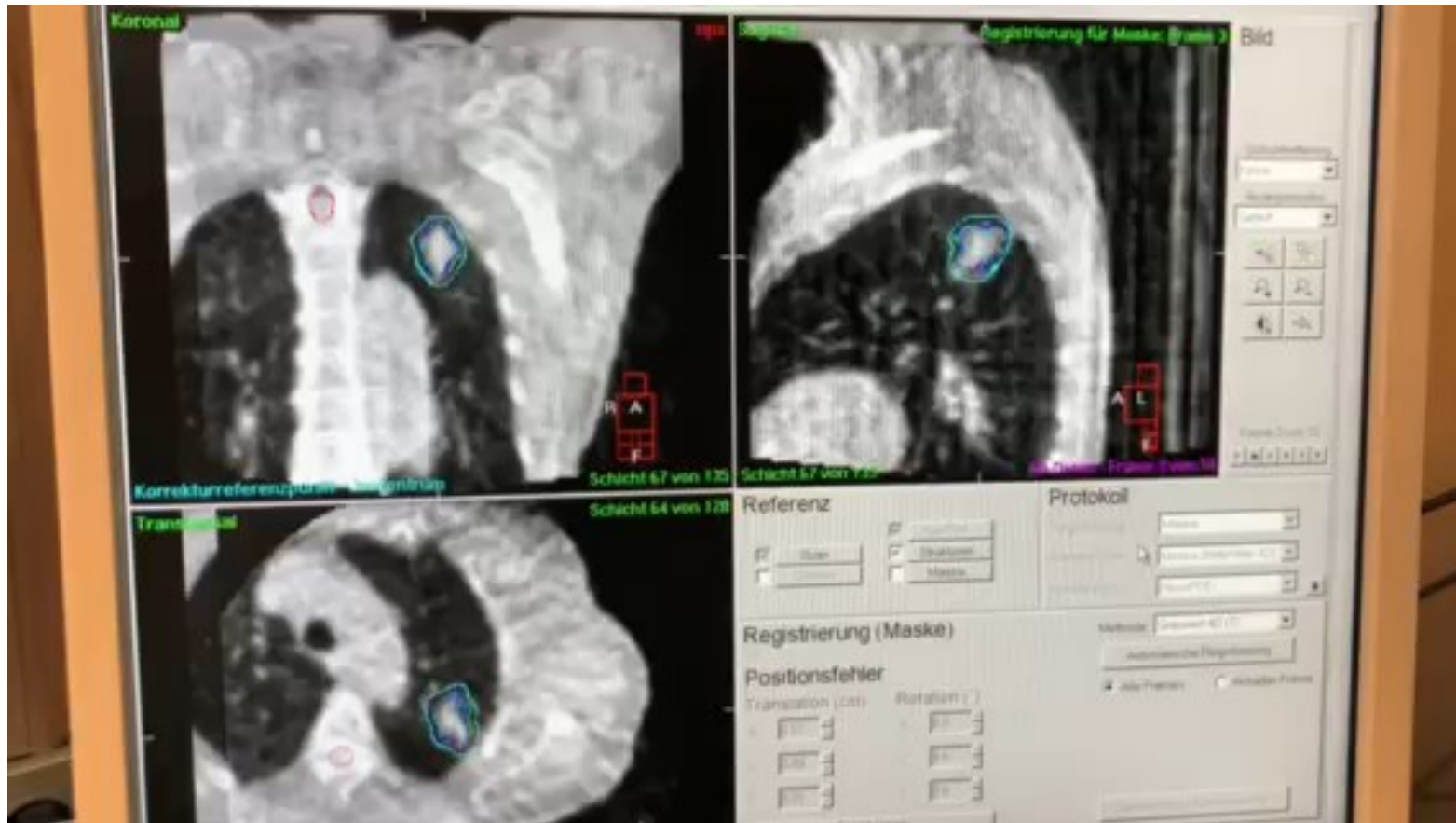
4D Planungs-CT/ VMAT-IMRT



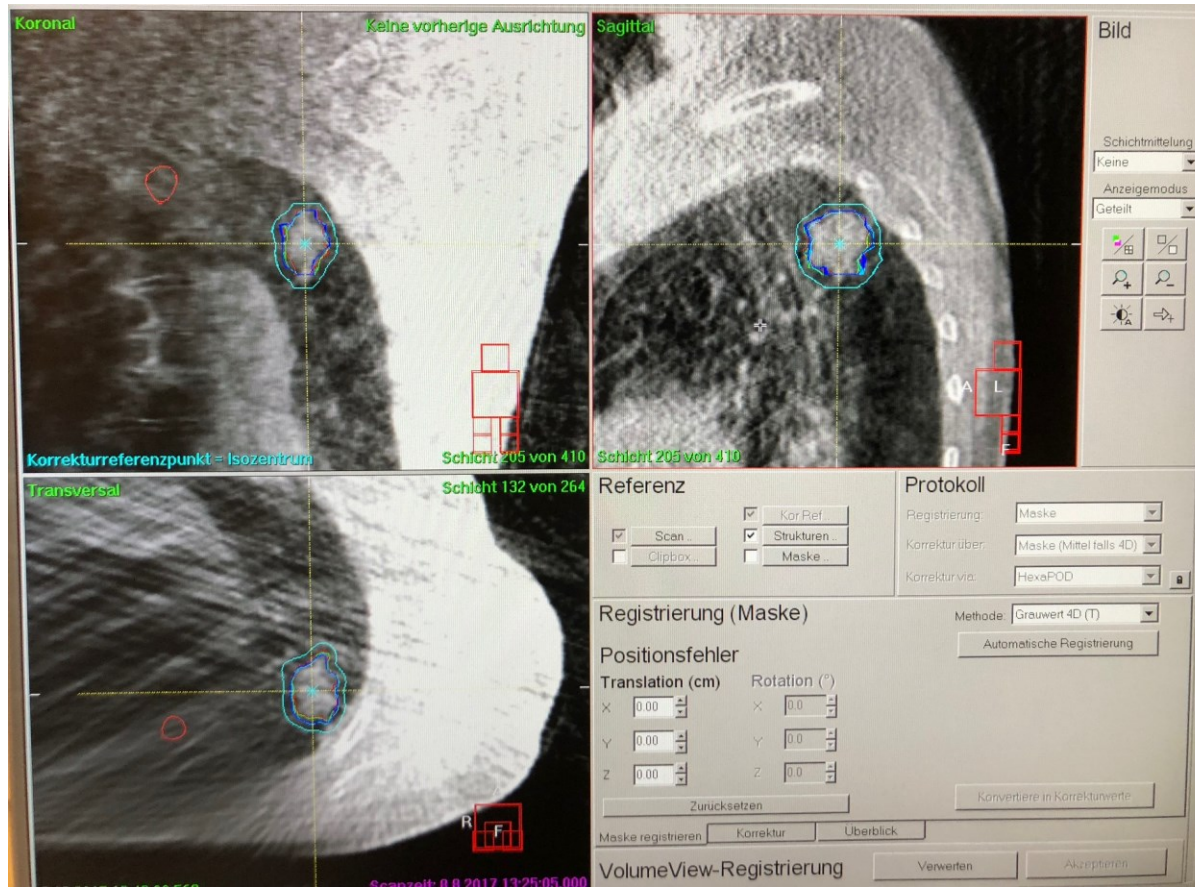
4D Cone-Beam CT (4D-IGRT)



4D Cone-Beam CT (4D-IGRT)



4D Intrafraction CBCT





SBRT im Stadium I NSCLC

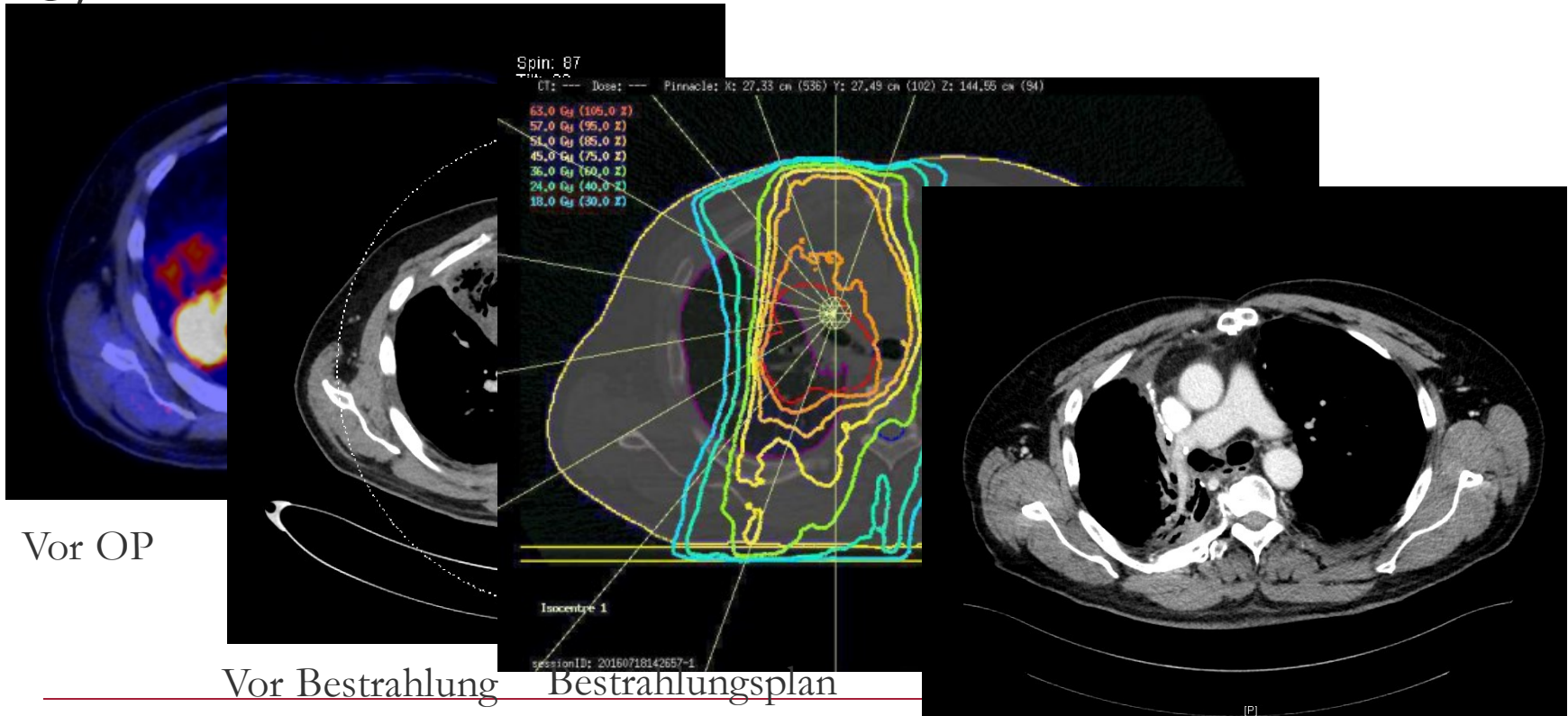
5 Zentren, n=483 Pat., 78% inoperable, 64% histologisch gesichert, mittleres GTV 2.6cm (0.9-8.5 cm), 63% Stadium IA, 33% IB

2-Jahres-Ergebnisse	IA (T1N0M0)	IB (T2N0M0)
Lokale Kontrolle	96%	92%
Regionäre Kontrolle	90%	90%
Distante Kontrolle	85%	63%

7% $\geq$ Grad 2 Pneumonitis, 2% $\geq$ Grad 3 Pneumonitis, n=1 Grad 5 Pneumonitis, 8% Rippenfrakturen (5% Grad 1)

Postoperative Radiochemotherapie Stadium III NSCLC (pN2 u./o. R1)

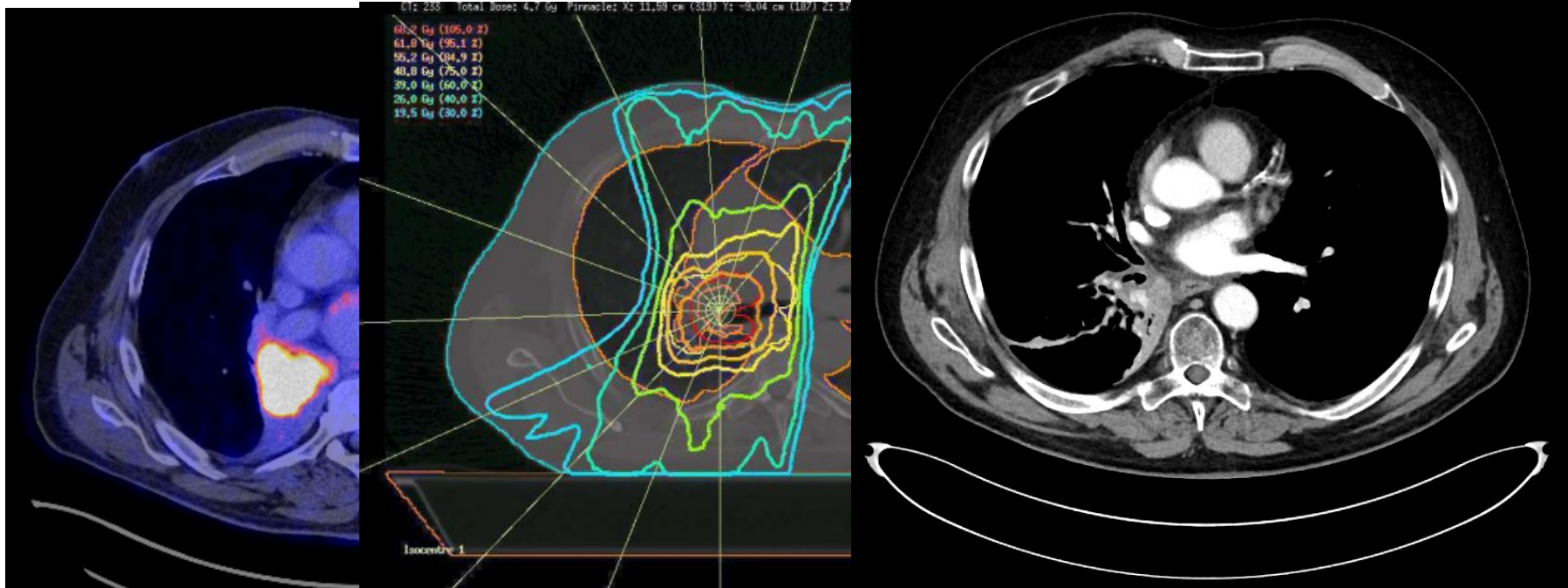
- 63 jähriger Patient, ED 12/2015, gering differenziertes Adenokarzinom
- pT2b pN2 (3/19) cM0
- Adjuvante Bestrahlung: PORTAF 5x2 Gy bis 60 Gy vs. 7x2 Gy bis 60 Gy



1 Jahr nach Bestrahlung

Radiochemotherapie +/- Resektion Stadium III lokoregionär fortgeschrittene NSCLC

- 63 J m, ED 02/2017, Plattenepithelkarzinom, cT4 cN3 cM0, Induktionschemotherapie Paclitaxel/Carboplatin, Radiochemotherapie analog ESPATÜ 2x1.5 Gy/d bis 45 Gy, Boost bis 65 Gy, parallel Chemotherapie Cisplatin/Vinorelbin

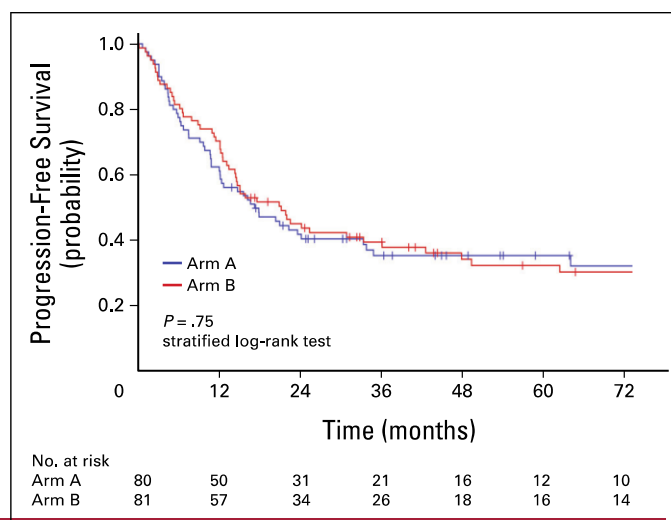
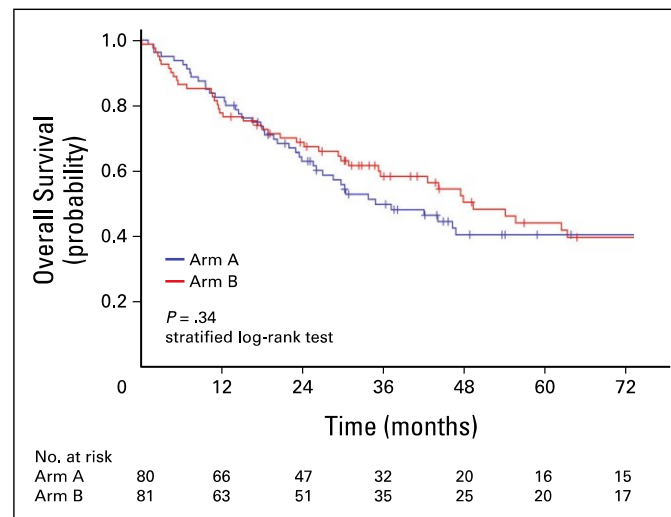
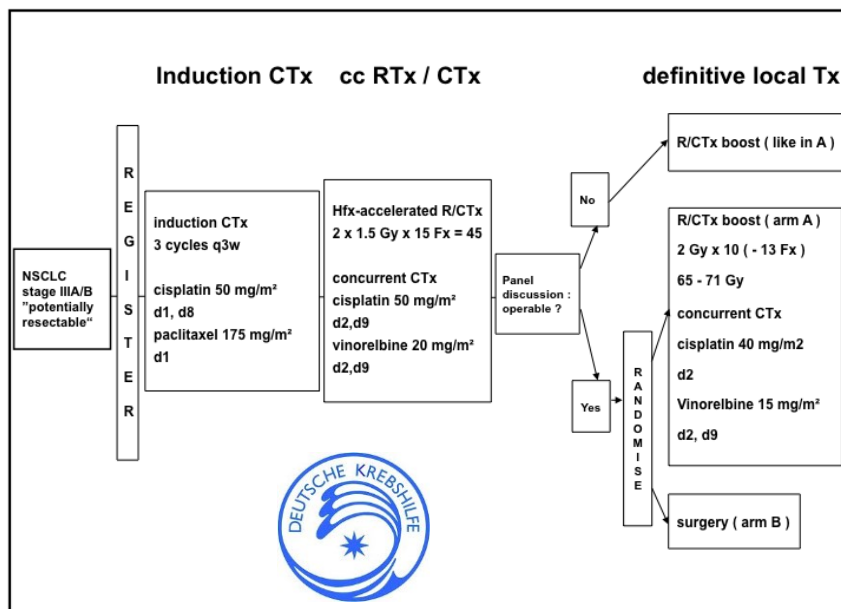


Vor Therapie

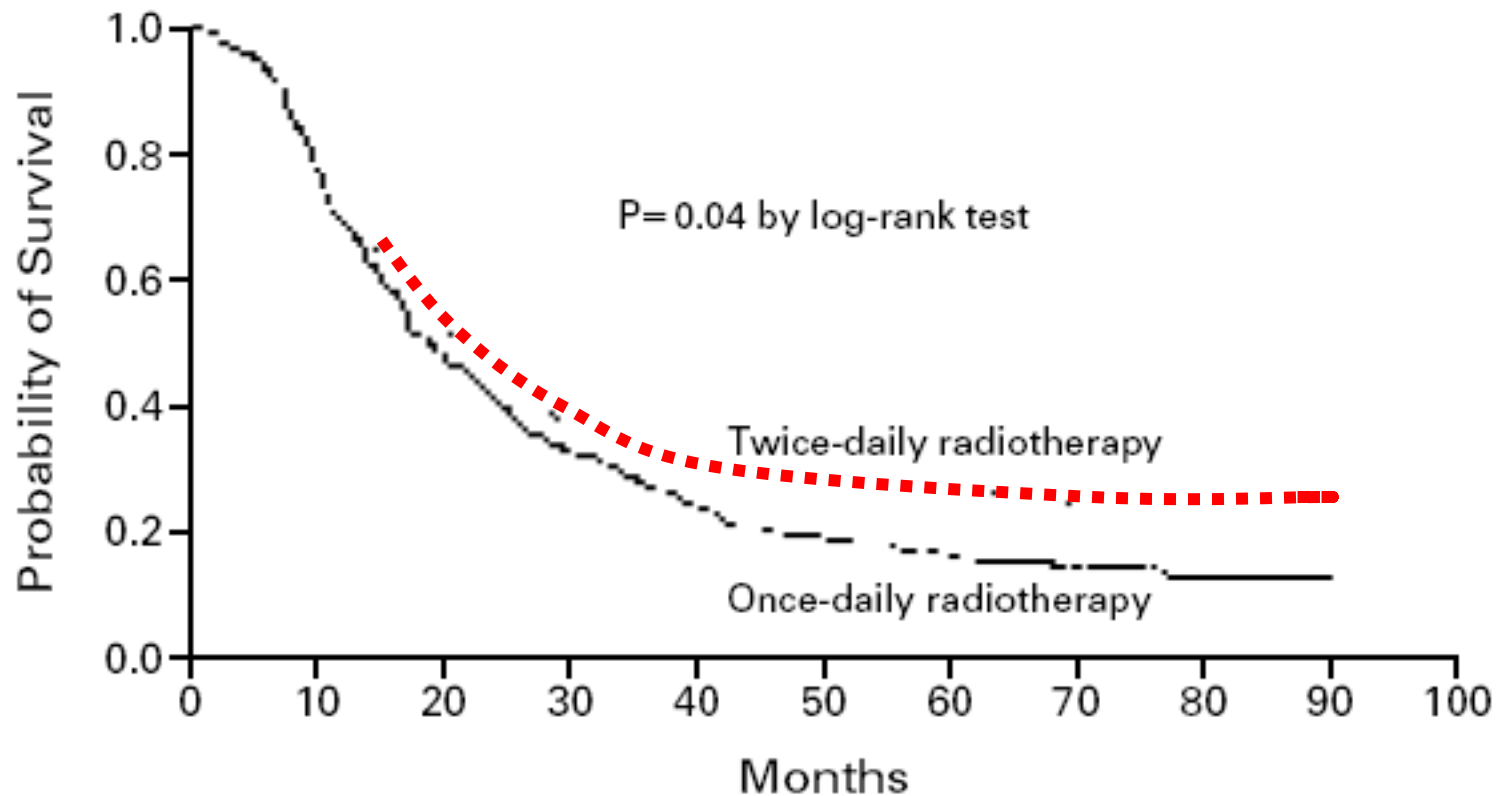
Bestrahlungsplan

3 Monate nach Bestrahlung

Trimodal therapy versus radiochemotherapy (ESPATÜ)



Radiochemotherapie beim LD SCLC



TREATMENT GROUP	0–20 Mo	20–40 Mo	40–60 Mo	60–80 Mo	80–100 Mo
	no. of deaths/no. at risk				
Once daily	108/206	48/96	15/47	4/21	0/5
Twice daily	100/211	47/109	7/62	5/42	1/14

Strahlentherapie Lungenkrebs: Akute Nebenwirkungen

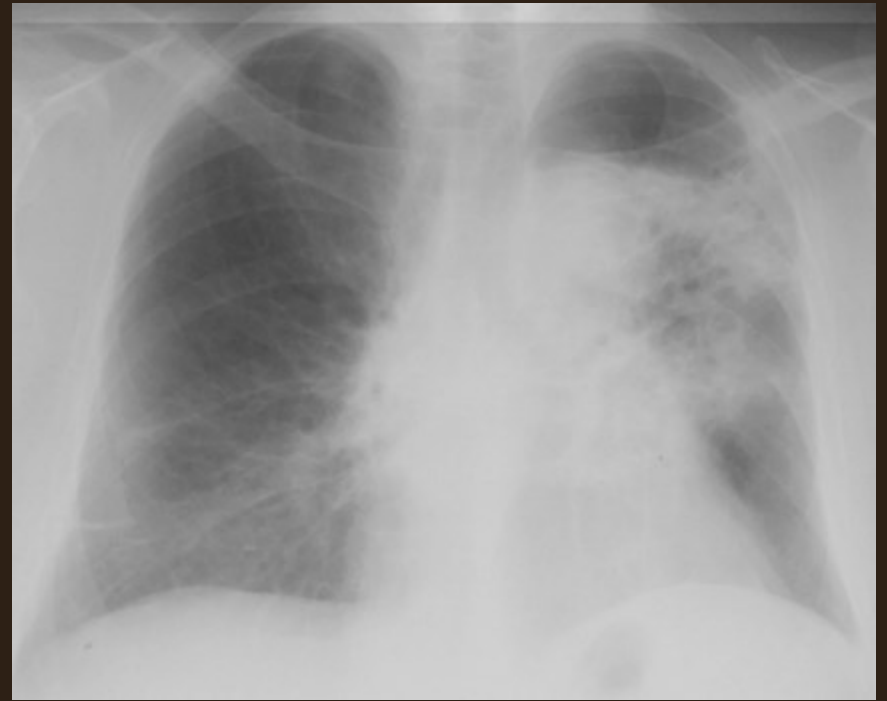
Haut	Erythem, feuchte Schuppung
Ösophagitis	Schluckbeschwerden, Inappetenz, Gewichtsverlust
Pneumonitis	Dyspnoe, Fieber, AZ ↓
Herz	Rhythmusstörungen

Radiogene Pneumonitis

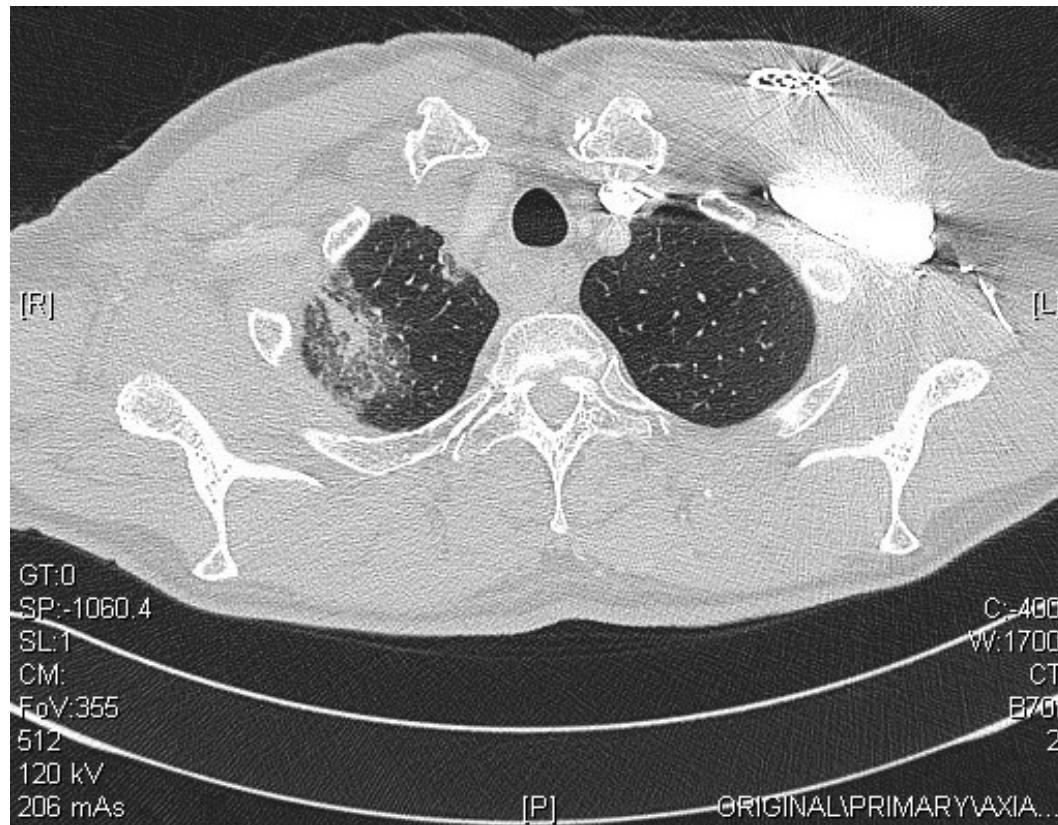
vor RT



6 Wochen nach 66 Gy/ 2 Gy



Radiogene Pneumonitis





Strahlentherapie Lungenkrebs: Chronische Nebenwirkungen

Lungenfibrose

dauerhafte Schluckbeschwerden

erhöhtes Risiko für Herzinfarkt
