

SRS und Tumorumfängen: Dosierungsempfehlung und optimale stereotaktische Radiotherapie in Abhängigkeit der Metastasengröße

Michael Mayinger

SRS bei cerebraler Metastasierung



WBRT +/- SRS

Andrews et al. 2004

SRS +/- WBRT

Kocher et al. 2010

SRS +/- WBRT

Asher et al. 2014

Sx +/- SRS

Mahajan et al. 2017

WBRT vs. SRS

Li et al. 2020

SRS +/- WBRT

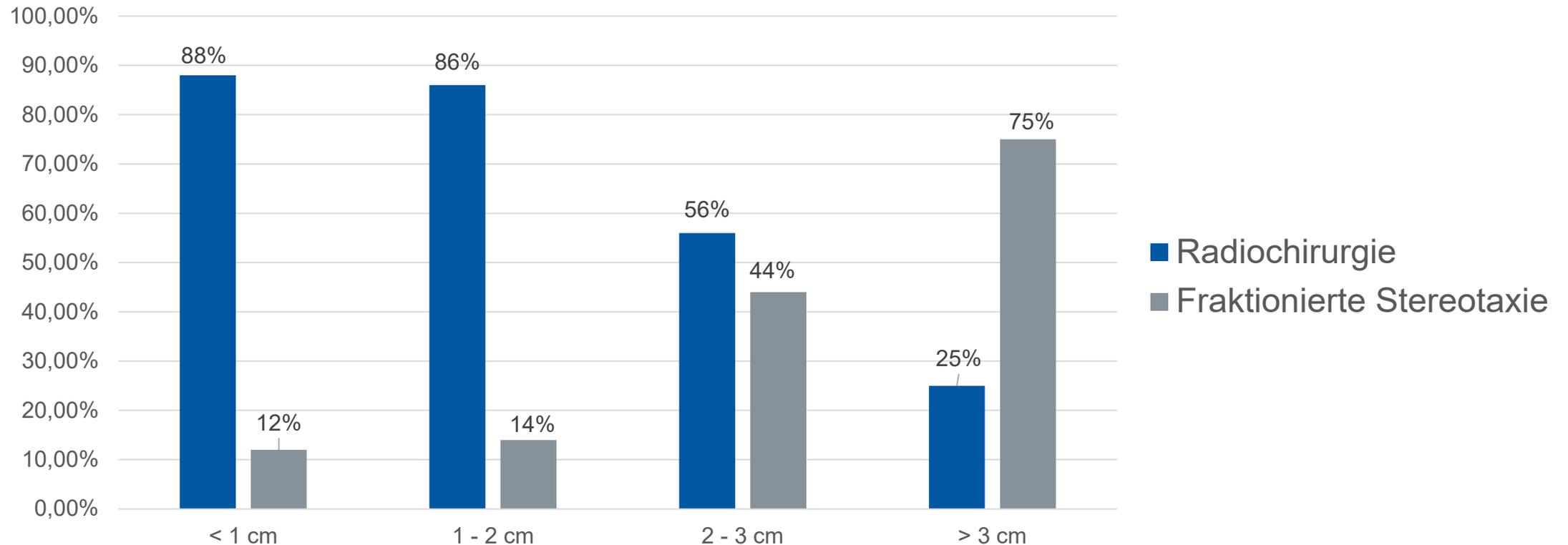
Aoyama et al. 2006

Sx + SRS vs. WBRT

Brown et al. 2017

Gute prospektive Evidenz für die SRS bei cerebraler Metastasierung

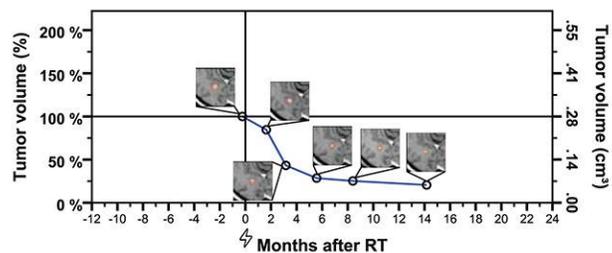
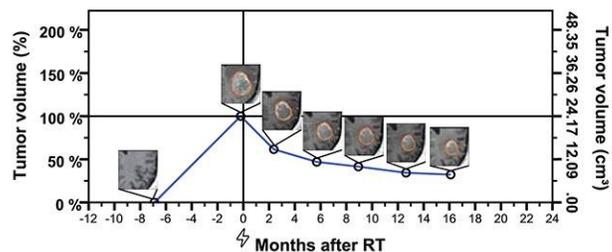
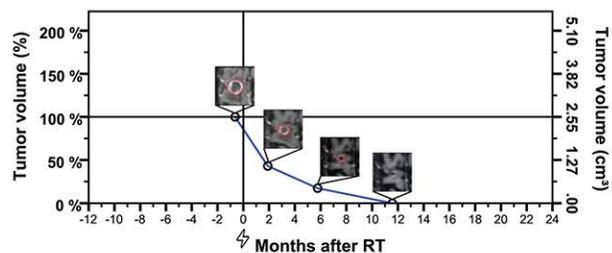
Verschreibungsdosis in Abhängigkeit der Metastasengröße



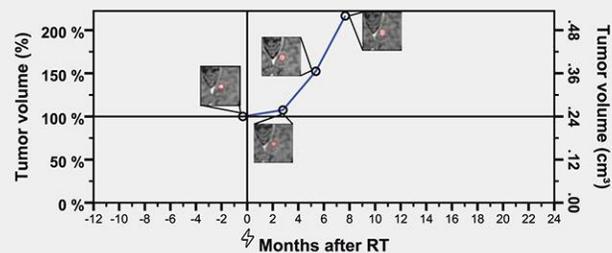
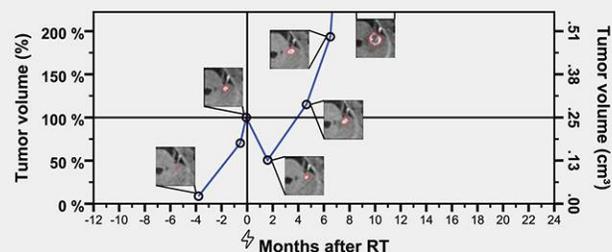
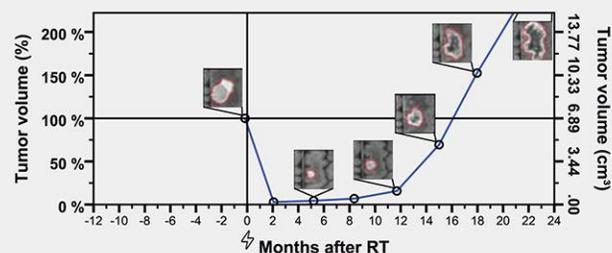
In der Praxis erfolgt häufig eine Fraktionierung

Volumetrischer Verlauf nach SRT

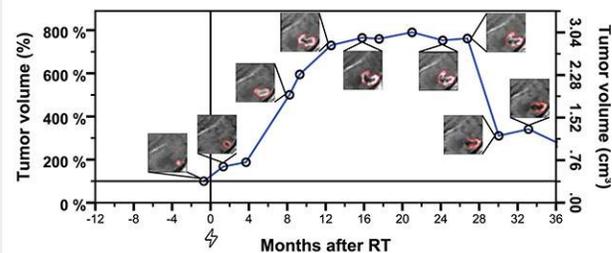
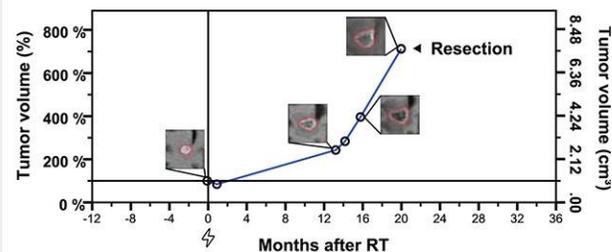
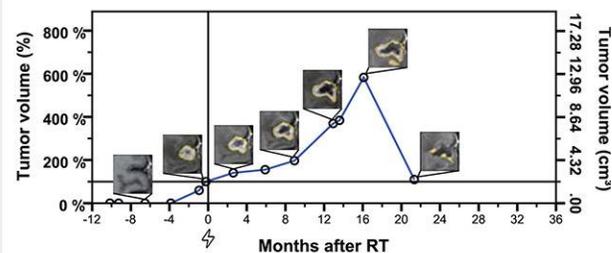
A Local control



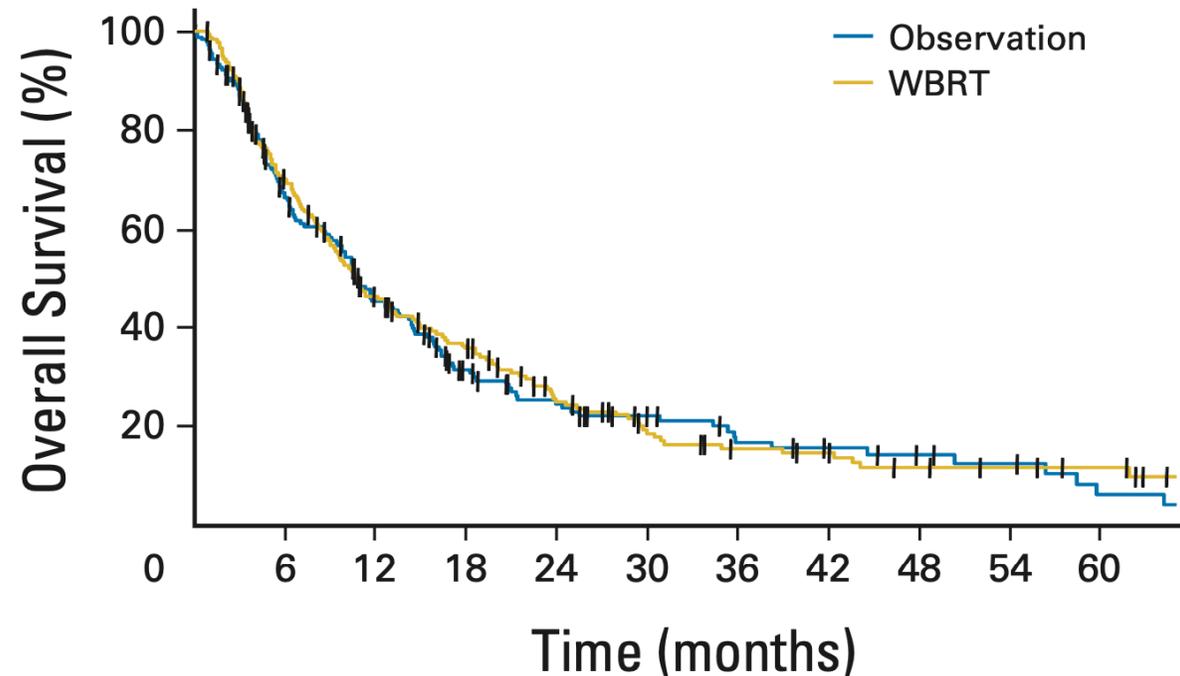
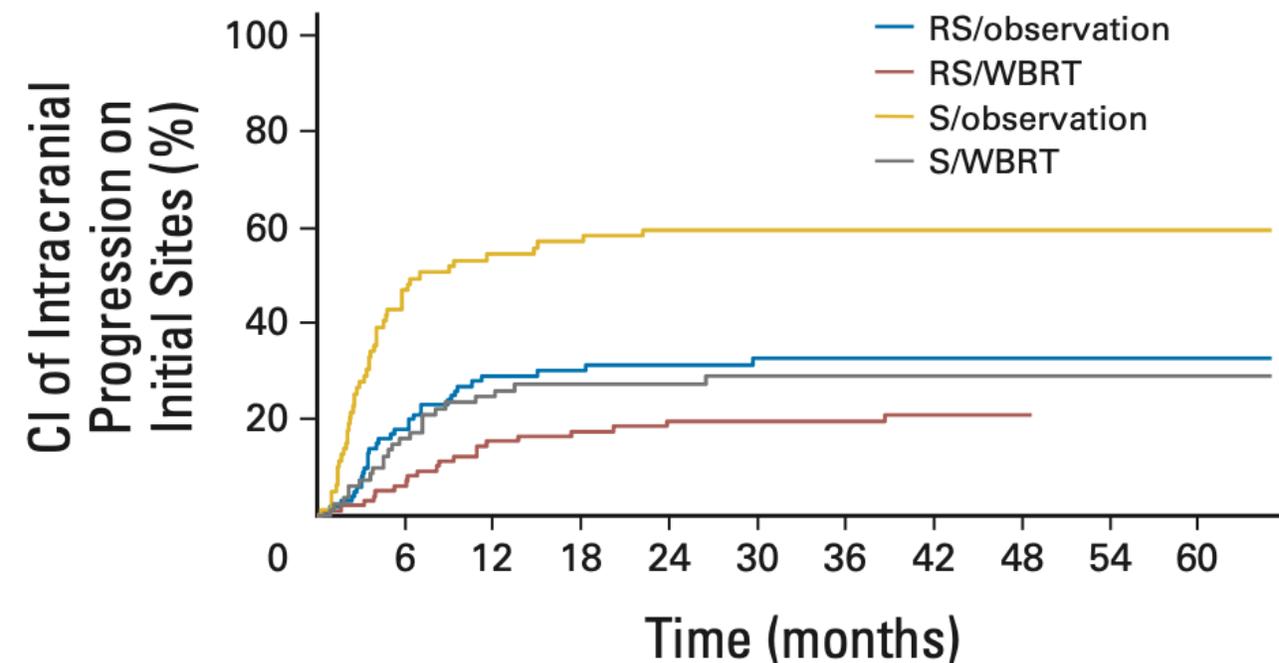
B Progression



C Radionecrosis



Prospektive Evidenz – SRS



- Lokale Kontrolle nach alleiniger SRS > Sx
- Kein verbessertes OS durch WBRT nach SRS oder Sx

Verträgliche Dosis – SRS

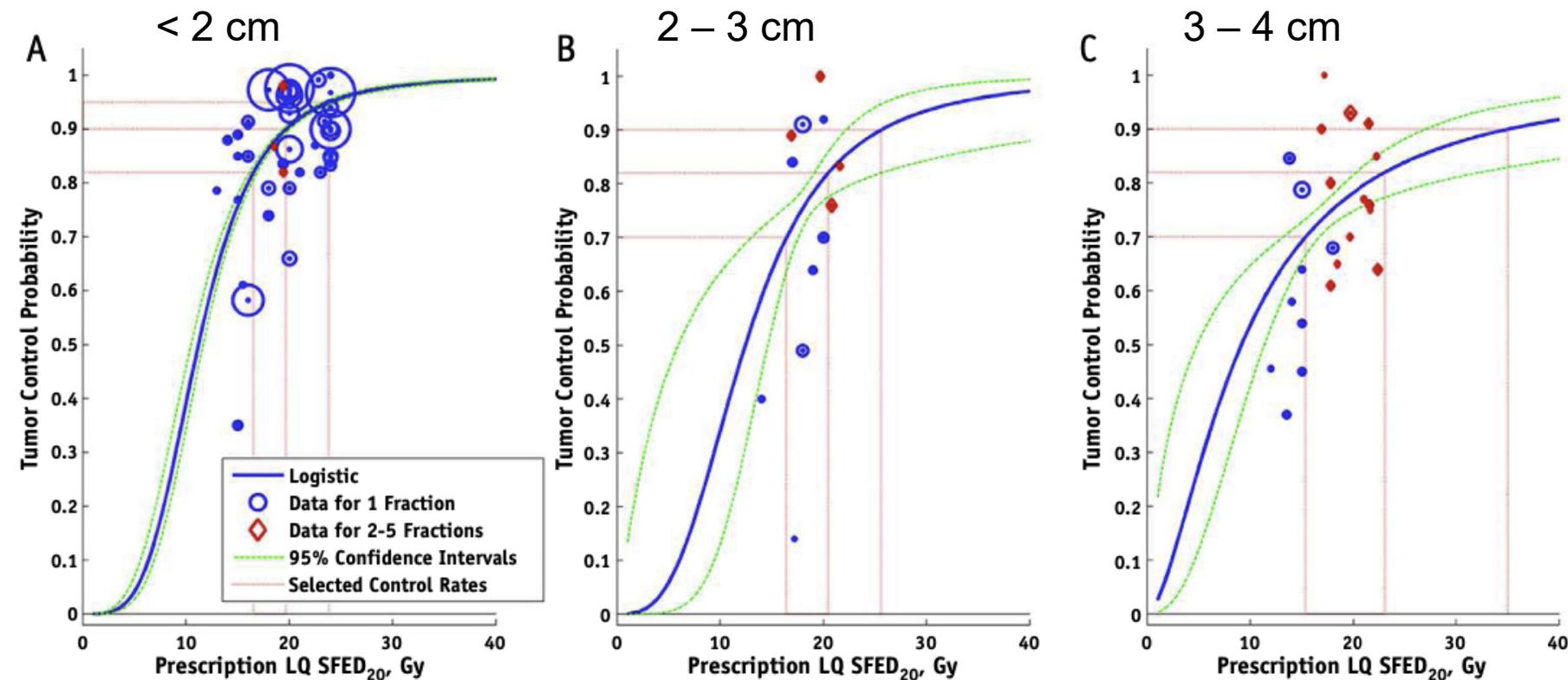
Incidence of Grade 3, 4, and 5 CNS Toxicity

Tumor size*	Arm	Dose	No. of patients	% of Patients With Toxicity		
				Acute	Chronic	Total
≤ 20 mm	1	18 Gy	12	0	8	8
	4	21 Gy	18	0	11	11
	7	24 Gy	10	0	10	10
21–30 mm	2	15 Gy	15	7	7	13
	5	18 Gy	15	0	20	20
	8	21 Gy	13	8	31	38
	11	24 Gy	12	33	25	58
31–40 mm	3	12 Gy	21	5	5	10
	6	15 Gy	22	0	14	14
	9	18 Gy	18	17	33	50

Maximal verträgliche Dosen

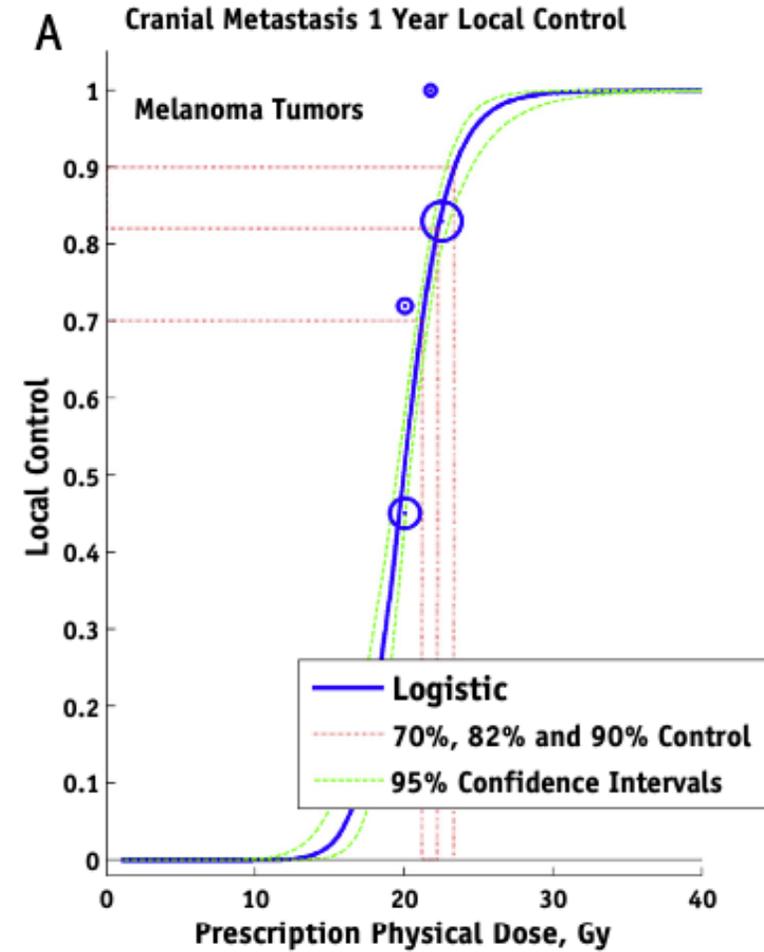
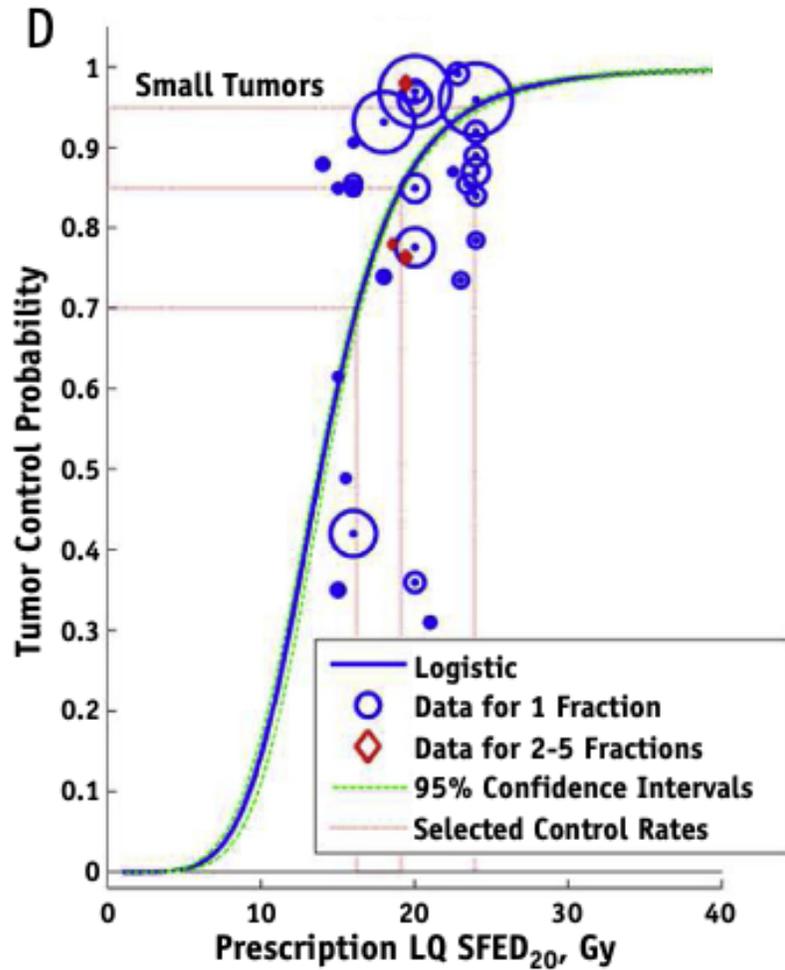
	< 2 cm	2 – 3 cm	3 – 4 cm
Dosis [Gy]	24 Gy	18 Gy	15 Gy

Lokale Kontrolle – Dosis SRS



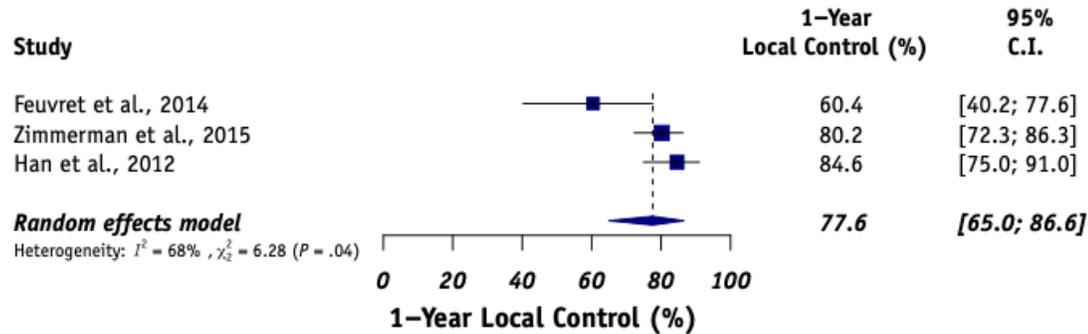
Lokale Kontrollrate nach 2 Jahren			
Dosis [Gy]	< 2 cm	2 – 3 cm	3 – 4 cm
24	95%		
22	92%	84%	
20	88%	77%	70%
18	80%	66%	63%

Lokale Kontrolle – SRS Melanom

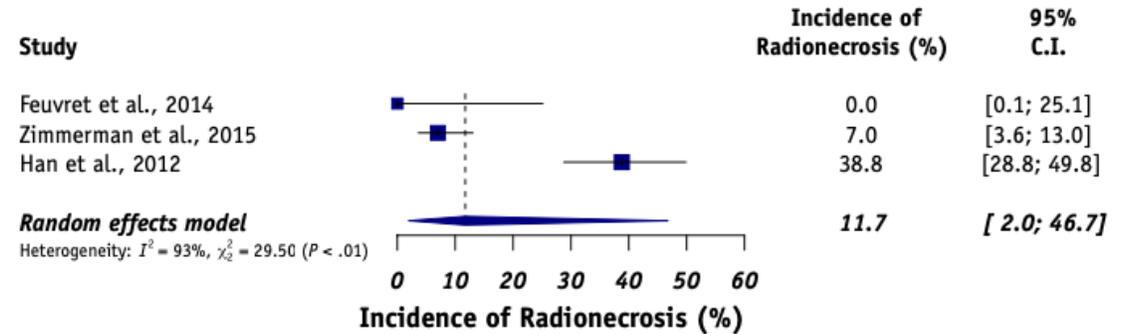


SRS/fSRT > 3 cm

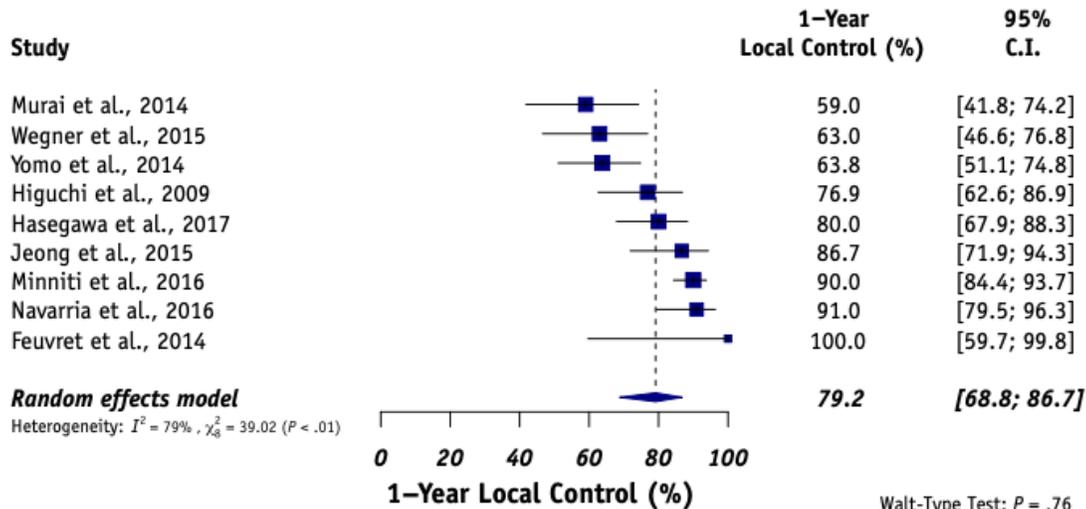
A Definitive Treatment: Single Fraction SRS/RTOG 90-05 Group B



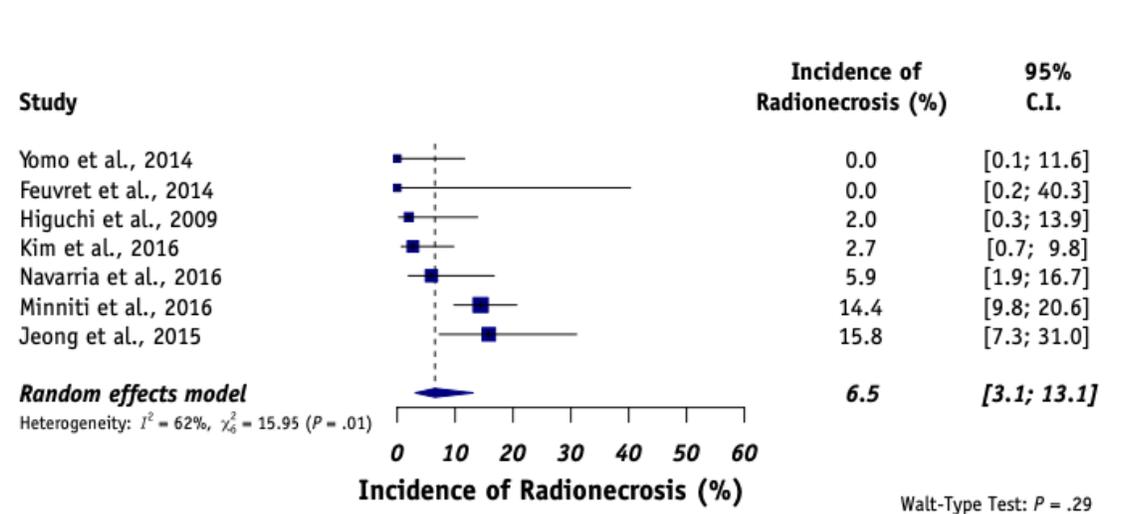
B Definitive Treatment: Single Fraction SRS/RTOG 90-05 Group B



Definitive Treatment: Multi Fraction SRS/RTOG 90-05 Group B

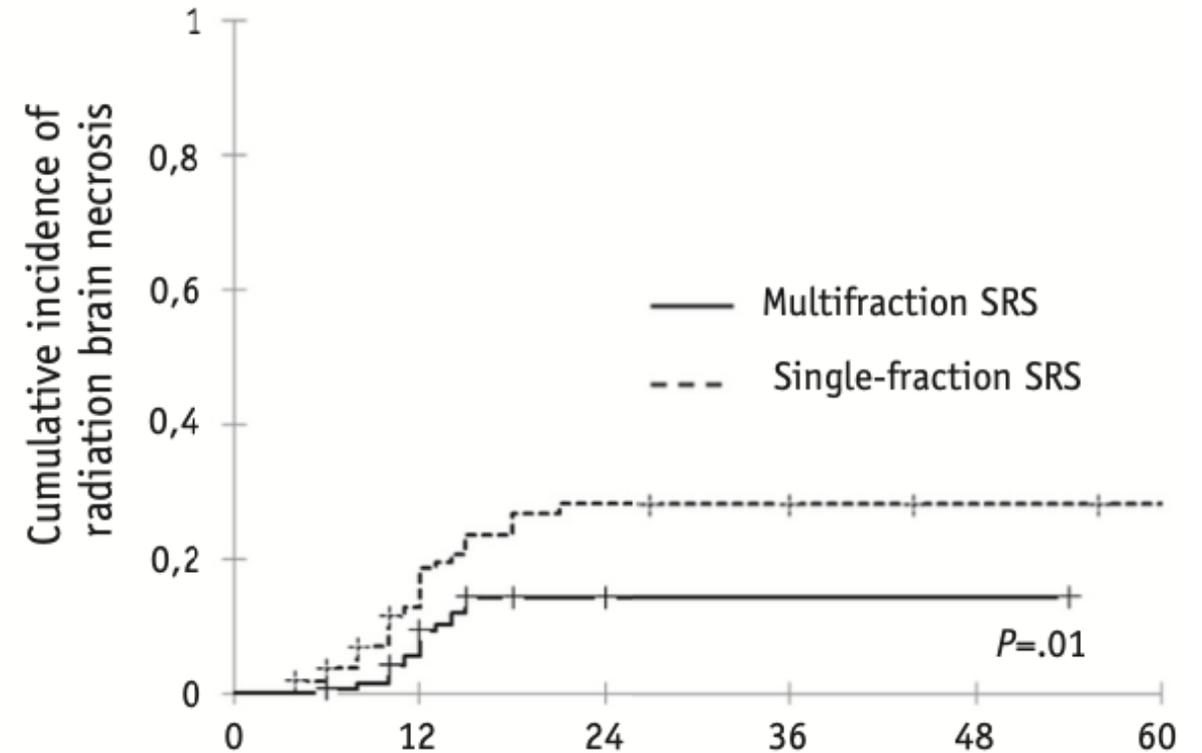
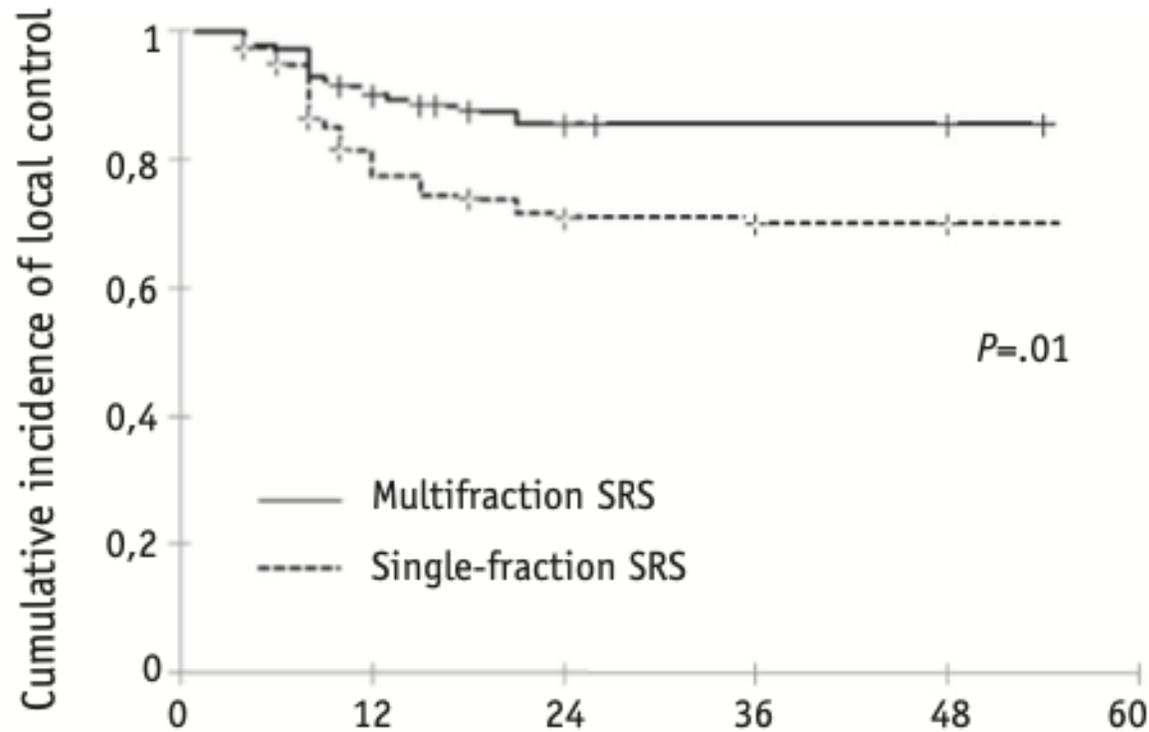


Definitive Treatment: Multi Fraction SRS/RTOG 90-05 Group B



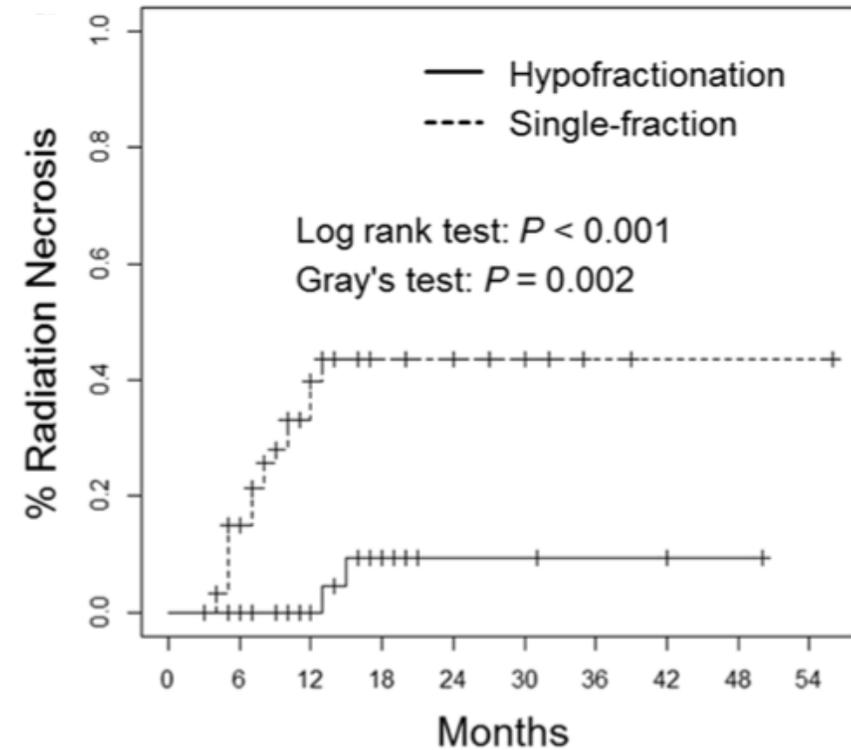
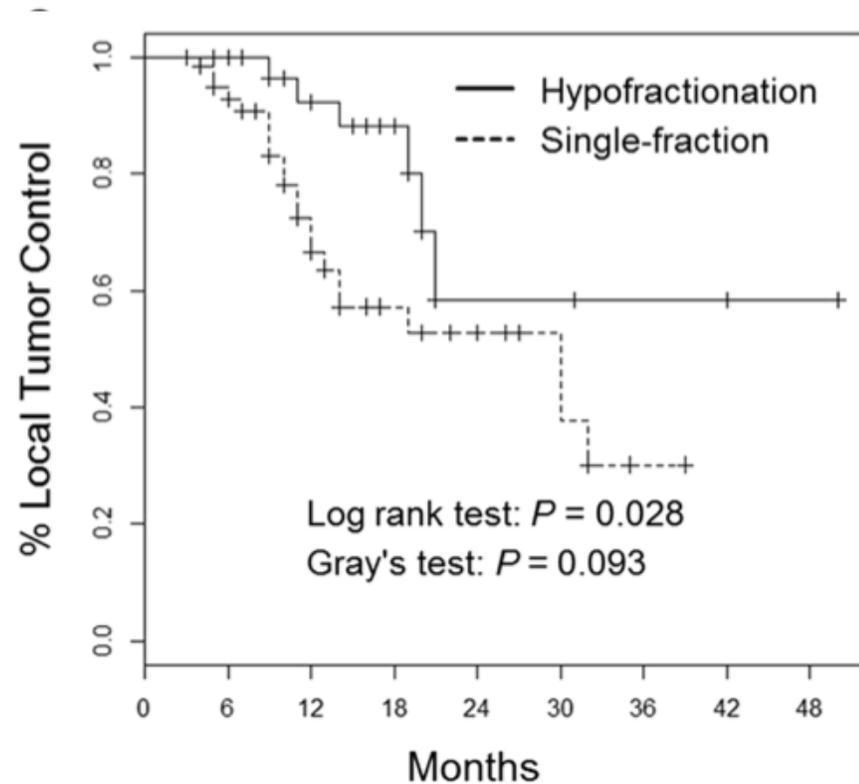
SRS/fSRT > 2 cm

- 18 Gy (2 – 3 cm) / 15 Gy (> 3 cm) @ 80% vs. 27 Gy in 3 Fraktionen @ 80%
- Lokale Kontrolle nach einem Jahr 91% in der fSRT-Gruppe im Vergleich zu 77% in der SRS-Gruppe



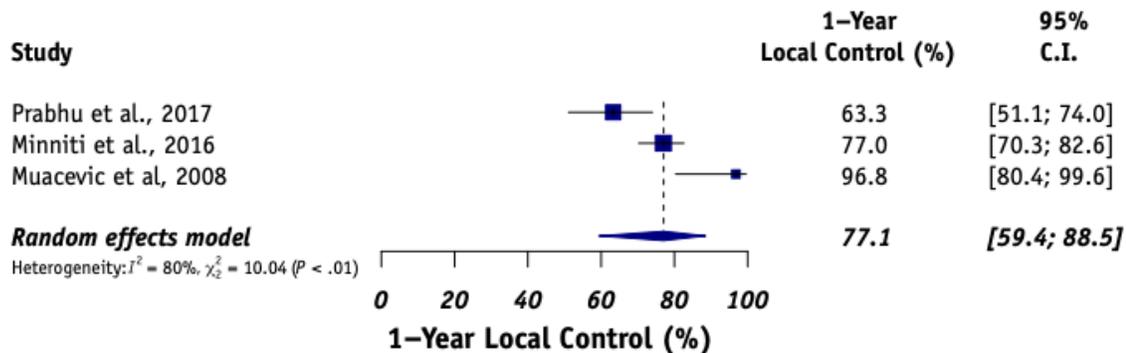
SRS/fSRT 2.5 – 3 cm

- Gammaknife: Median 20 Gy (18 – 22 Gy) @ 50% vs. Cyberknife: 35 Gy in 3 – 7 Fraktionen @ 80%
- Lokale Kontrolle nach einem Jahr 92% in der fSRT-Gruppe im Vergleich zu 67% in der SRS-Gruppe

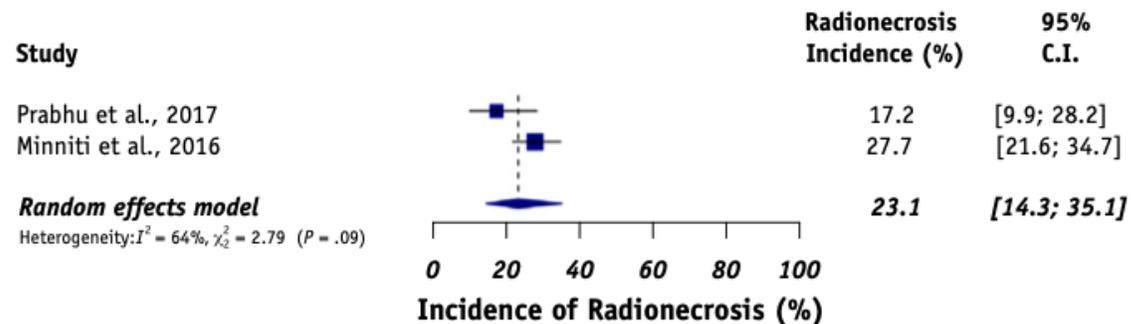


SRS/fSRT 2 – 3 cm

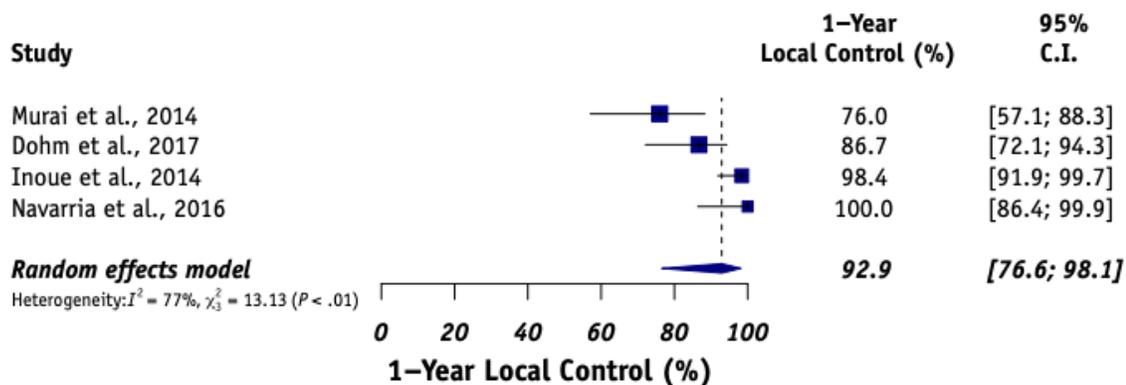
A Definitive Treatment: Single Fraction SRS/RTOG 90-05 Group A



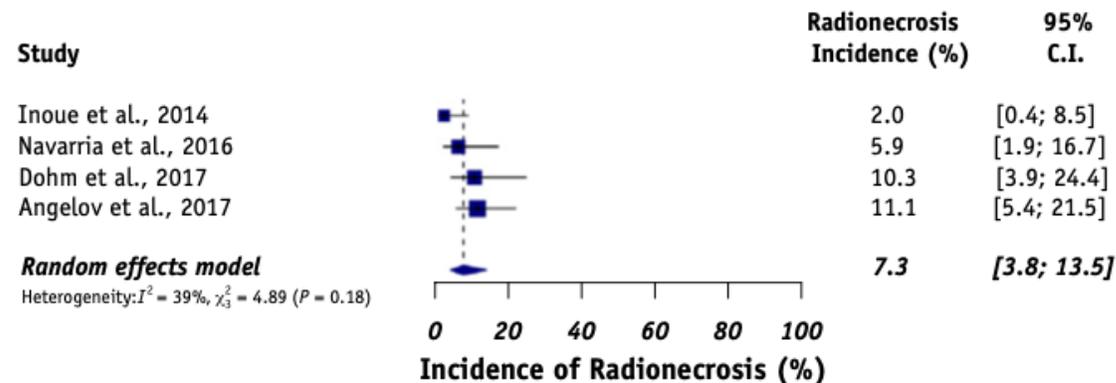
B Definitive Treatment: Single Fraction SRS/RTOG 90-05 Group A



Definitive Treatment: Multi Fraction SRS/RTOG 90-05 Group A



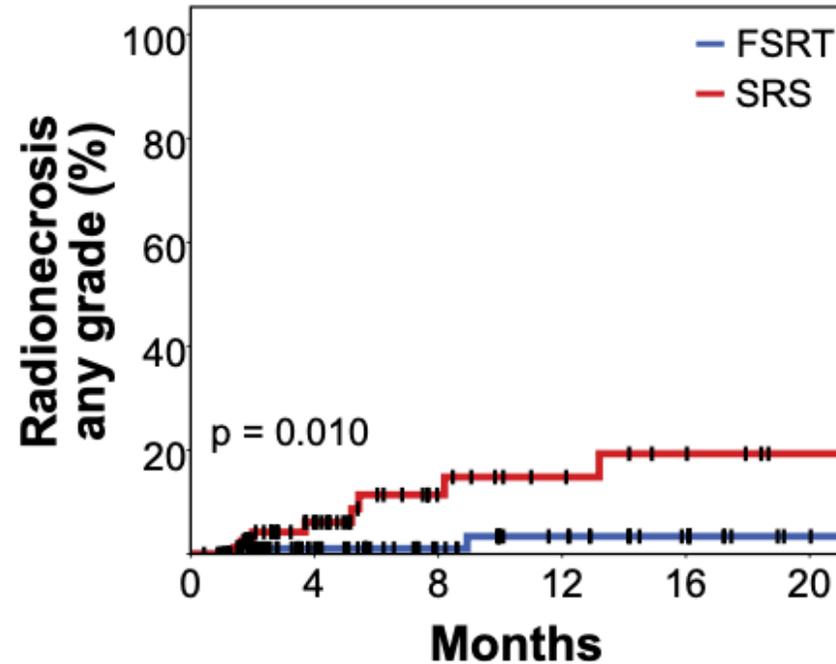
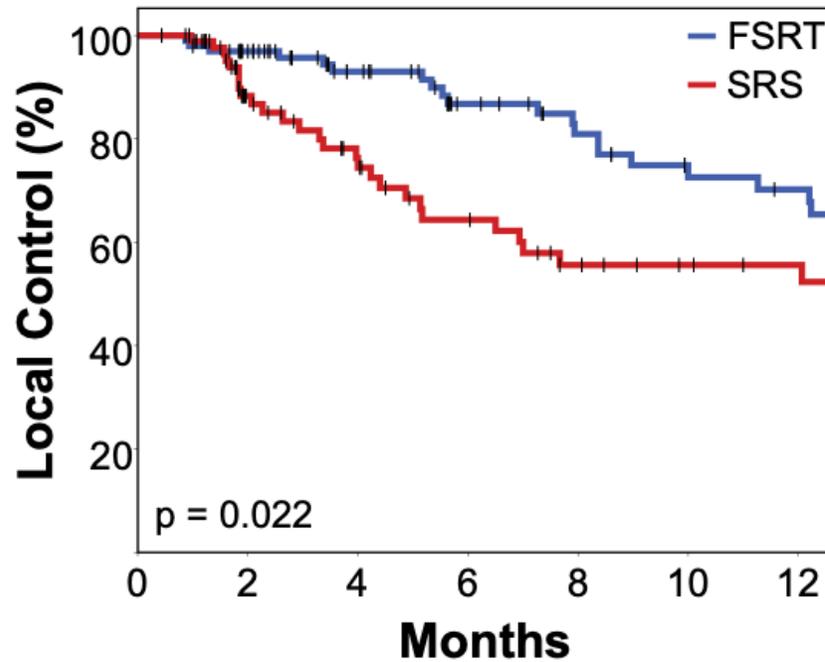
Definitive Treatment: Multi Fraction SRS/RTOG 90-05 Group A



Wald-Type Test : $P = .18$

Wald-Type Test : $P = .003$

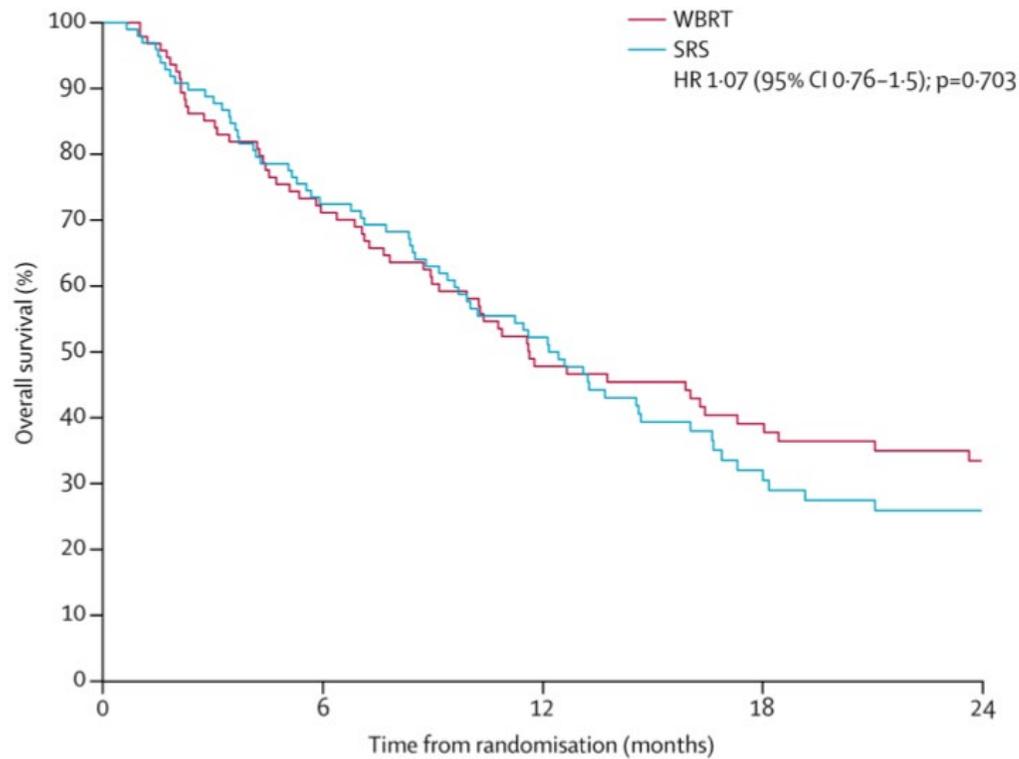
SRS/fSRT < 2 cm



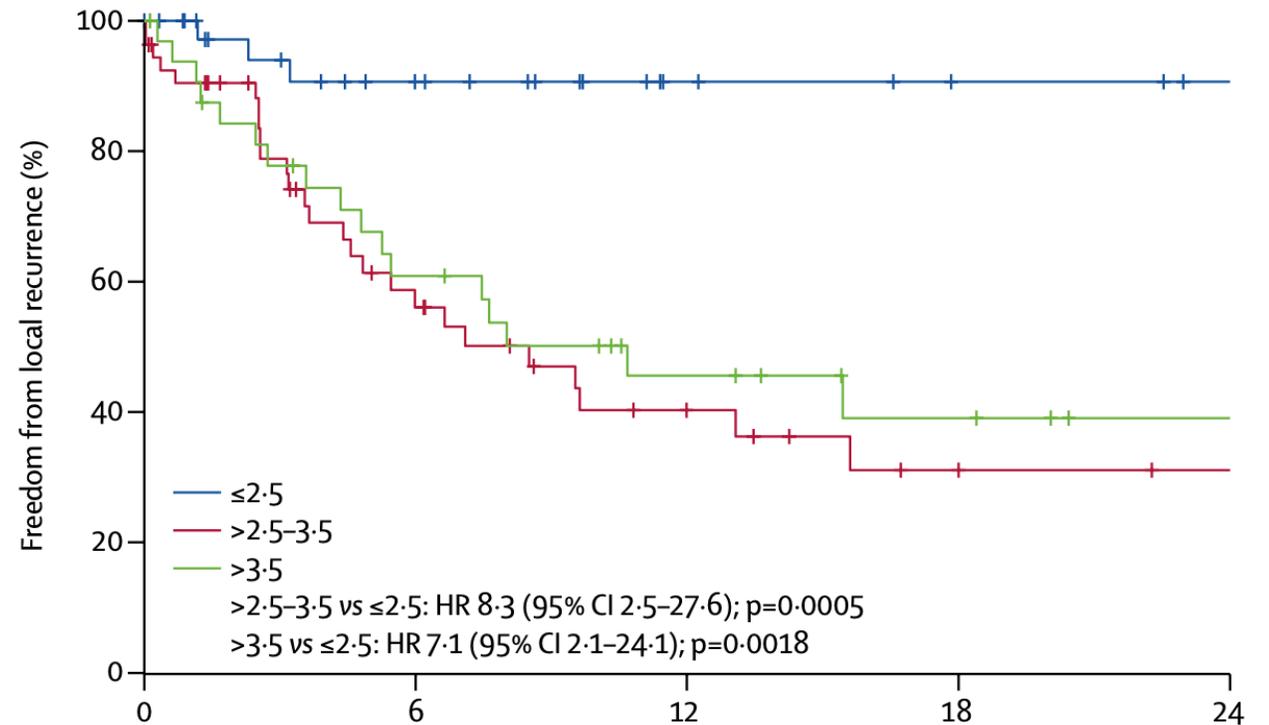
Metastasengröße	
SRS	1 cm
FSRT	1.8 cm

fSRT evtl. auch bei kleineren Metastasen überlegen

PostOp Trials

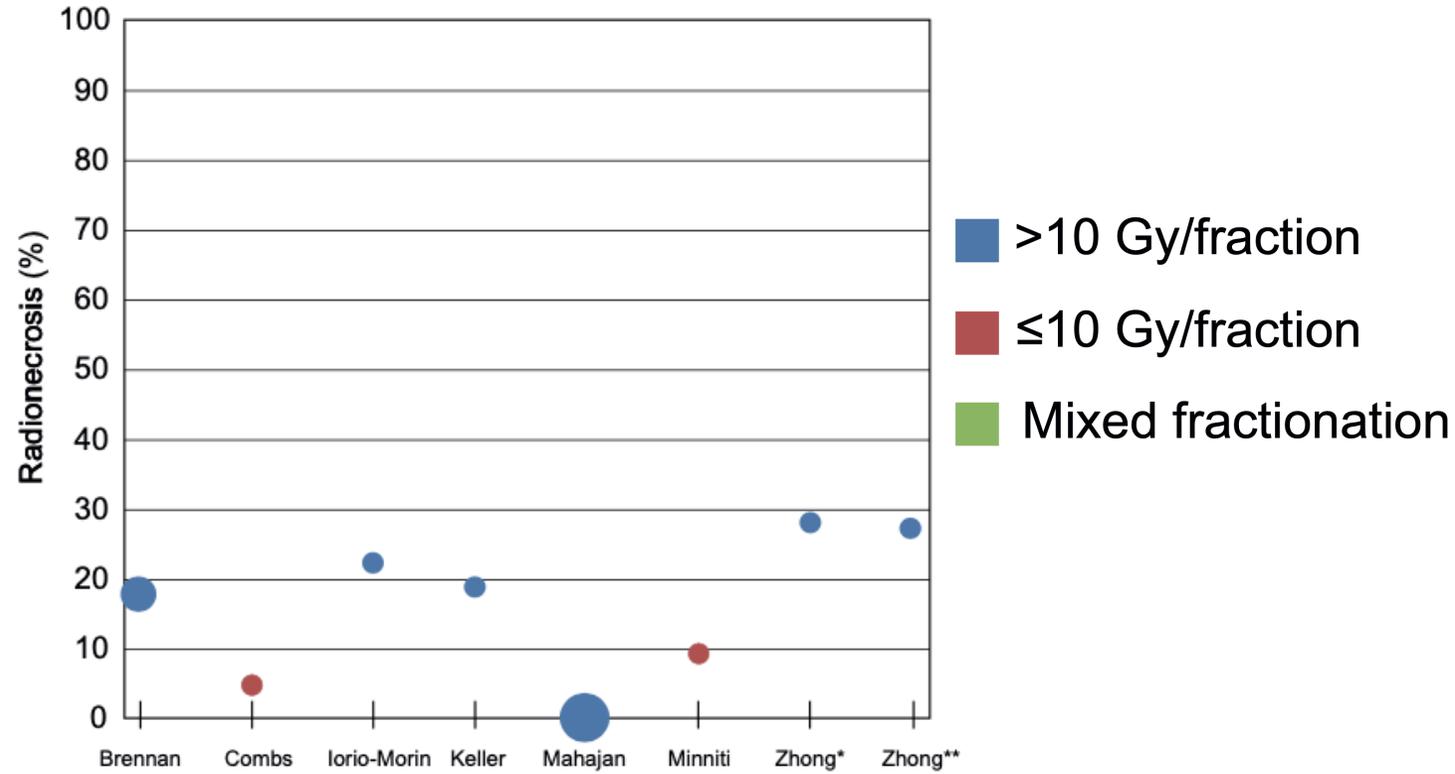
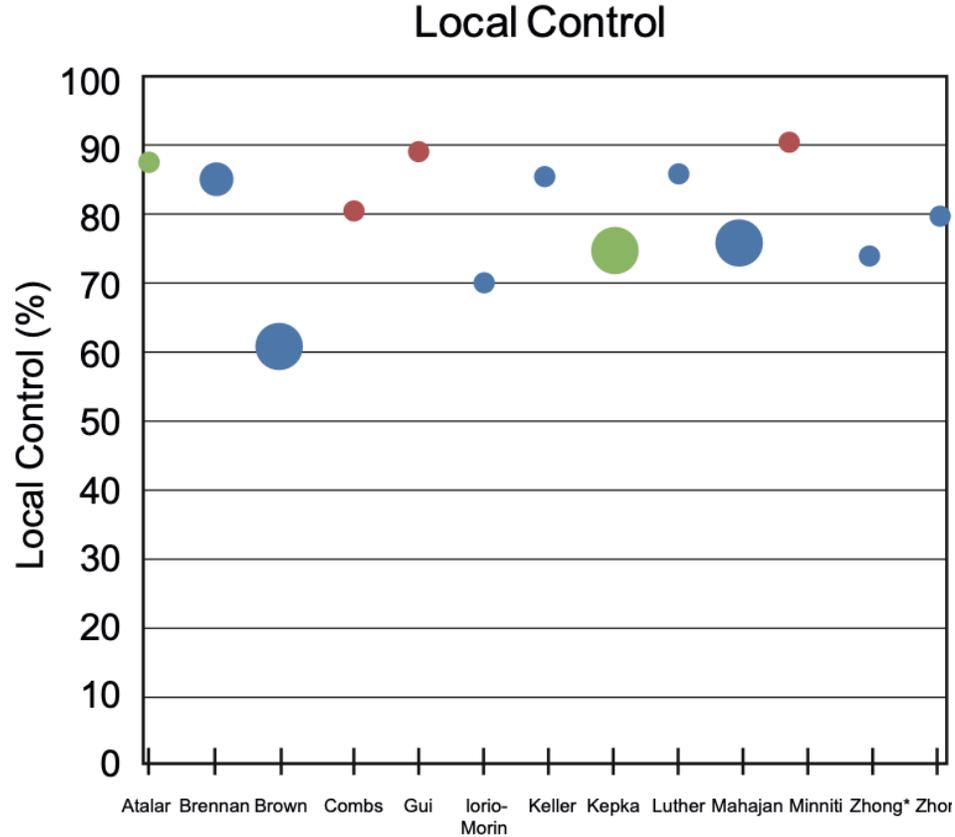


Brown, 2017



Mahajan, 2017

ISRS Empfehlung – postOp



Fraktionierte Therapien bei Patienten mit großen Resektionshöhlen (2,5 – 3 cm) bessere lokale Kontrolle als SRS

Zusammenfassung

	< 2 cm	2 – 3 cm	3 – 4 cm
Primär	SRS (SFED \geq 20 Gy)	fSRT	fSRT
PostOp	SRS (SFED 18 – 20 Gy)	fSRT	fSRT