



COMPARISON OF SBRT AND RFA FOR EARLY-STAGE NSCLC: A SYSTEMATIC REVIEW AND META-ANALYSIS

DR. ANIL TIBDEWAL

ASSOCIATE PROFESSOR

THORACIC RADIATION ONCOLOGY

TATA MEMORIAL HOSPITAL

MUMBAI



Original Article

Comparison of stereotactic body radiotherapy and radiofrequency ablation for early-stage non-small cell lung cancer: a systematic review and meta-analysis

Ran Zhang^{1,2#}, Jingjing Kang^{1#}, Shengxiang Ren², Ligang Xing³, Yaping Xu¹

Ann Transl Med 2022;10(2):104 | <https://dx.doi.org/10.21037/atm-21-6256>

The background is a solid dark blue color. In the four corners, there are decorative white line-art patterns that resemble circuit board traces or neural network connections. These patterns consist of straight lines of varying lengths and angles, ending in small white circles.

DISCLAIMER

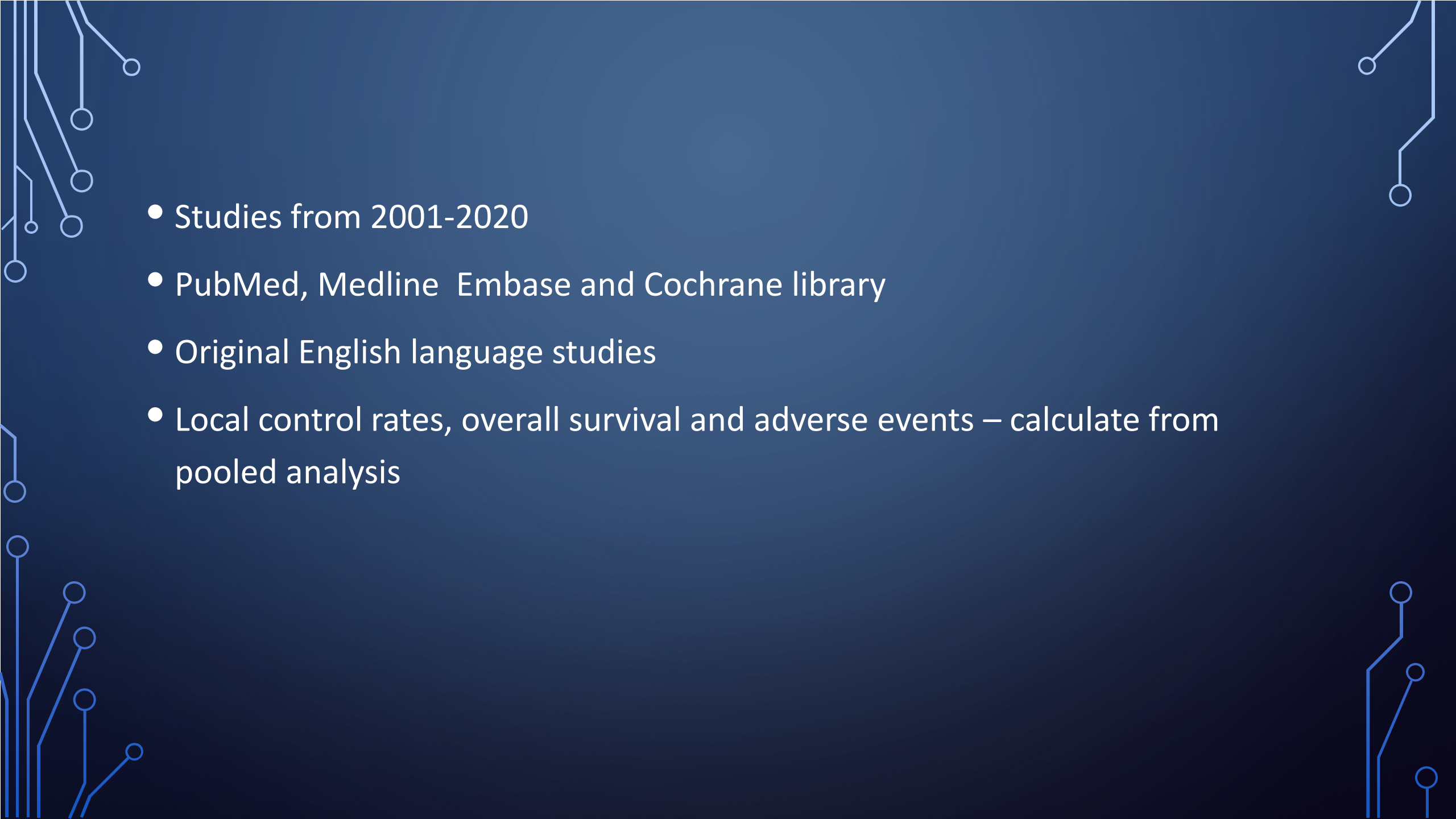
I am a Radiation Oncologist

INTRODUCTION

- Surgery with SMLND - SOC for Operable early lung cancer
- SBRT – Equal alternative for operable NSCLC
- SBRT – SOC for Inoperable ES-NSCLC

INTRODUCTION



- 
- Studies from 2001-2020
 - PubMed, Medline Embase and Cochrane library
 - Original English language studies
 - Local control rates, overall survival and adverse events – calculate from pooled analysis

ELIGIBILITY CRITERIA

Inclusion Criteria	Exclusion Criteria
Original English Studies	Case reports, comments, editorials, and reviews
Stage I NSCLC	Studies with <15 patients (SBRT) or <5 (RFA)
Unsuitable for Surgery	SBRT with fraction number >8 and fraction dose \leq 8 Gy
Clinical outcomes were reported	Other treatments including Sx, CT, RT and IT

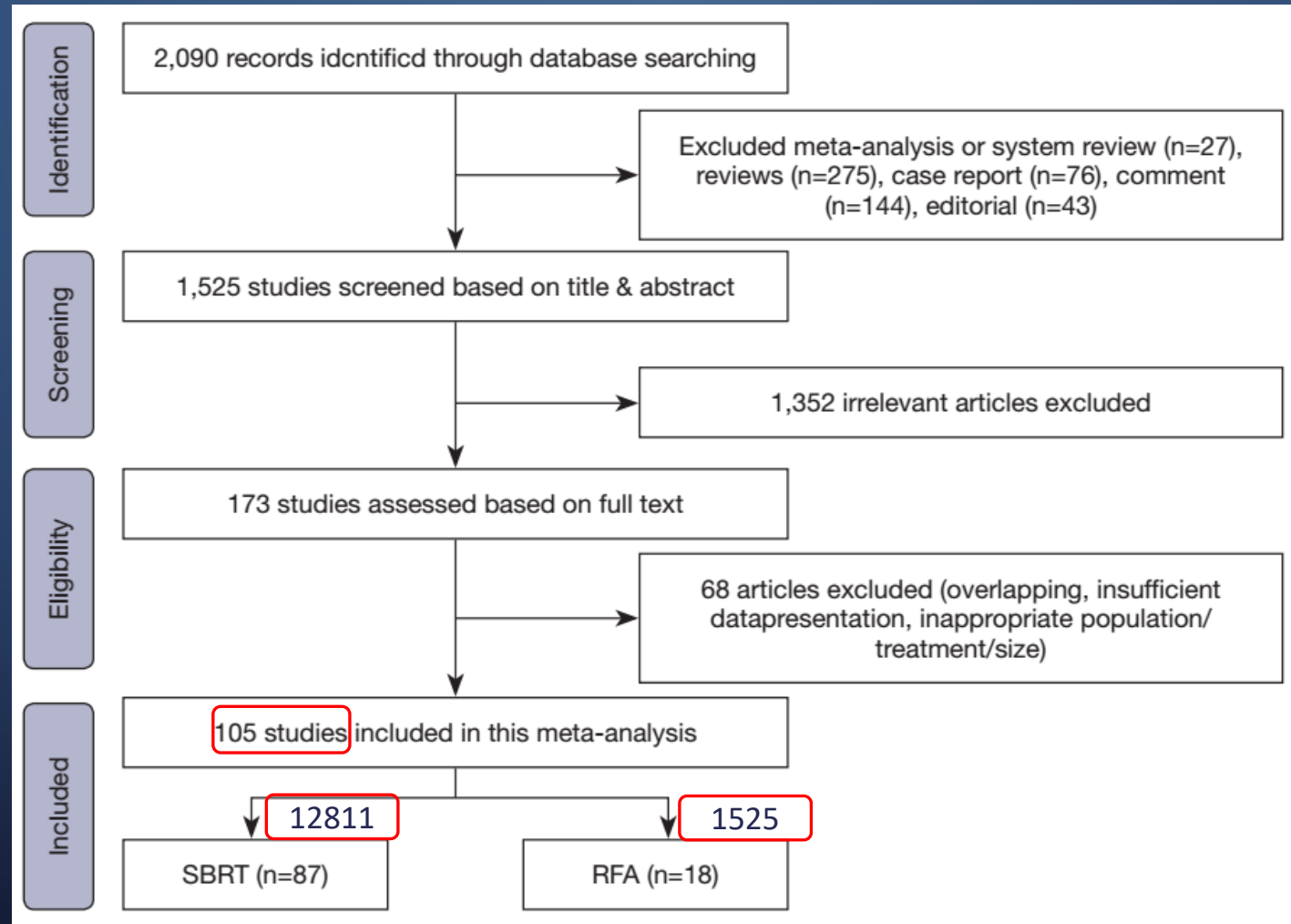
DATA EXTRACTION

- By 2 independent reviewers
- First author's name, publication year, country, study design, sample size, study participant age, the percentage of males, stage, and follow-up period
- SBRT – RT regimen, Total dose, dose per fraction, number of fraction, BED
- LC and OS – 1,2,3 and 5 year were obtained
- The LC rate was calculated based on freedom from local progression
- Survival outcomes were extracted from K-M survival curves
- Common and grade 3–5 events as per CTC

STATISTICAL ANALYSIS

- Both random effects and fixed effects models – pooled analysis
- I^2 statistic was used to measure the degree of heterogeneity
- SPSS and R software
- Meta-analysis using R package “meta”
- Funnel plots were constructed with the *funnel* function to estimate the publication bias
- A two-sided $P < 0.05$ represent the level of statistical significance

RESULTS



PUBLICATION BIAS

- No Publication bias after Trim and Fill Analysis

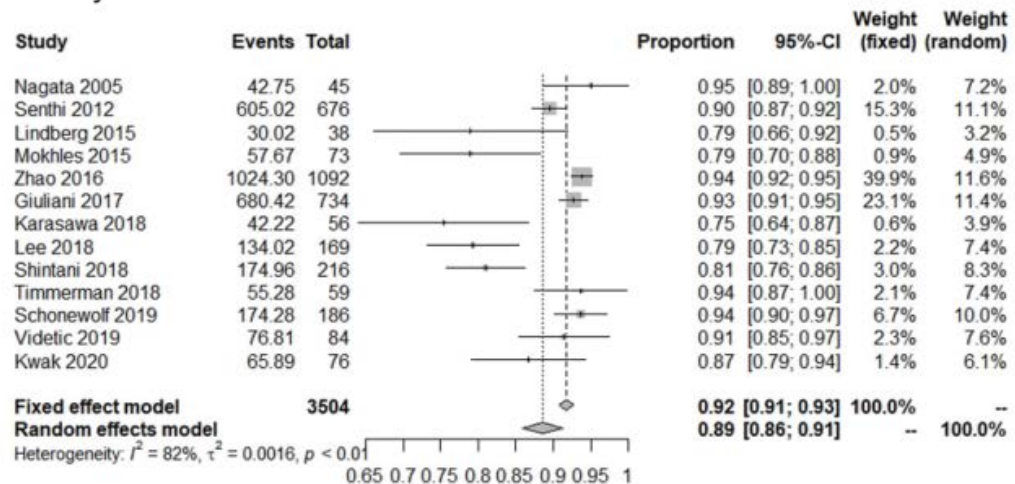
Table S1 Egger's test results for publication bias

Year	LC				OS	
	SBRT		RFA		SBRT	RFA
	P value	P value after TFA	P value	P value after TFA	P value	P value
1	0.001	0.148	0.024	0.104	0.767	0.835
2	0.001	0.069	0.332		0.767	0.116
3	0.164	NA	0.236		0.165	0.126
5	0.011	0.061	0.999		0.428	0.618

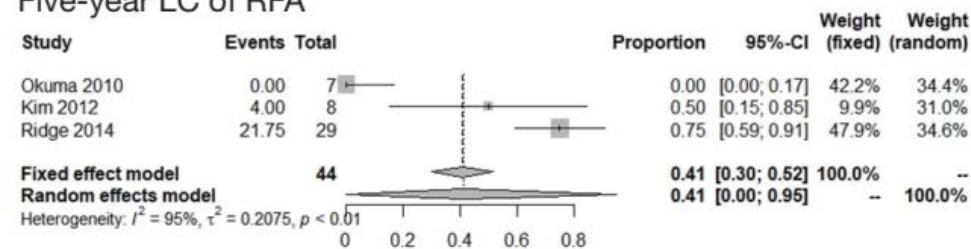
SBRT, stereotactic body radiation therapy; RFA, radiofrequency ablation; CI, confidence interval; OS, overall survival; TFA, trim-and-fill analysis.

5- YEAR LC

Five-year LC rate of SBRT



Five-year LC of RFA



LOCAL CONTROL

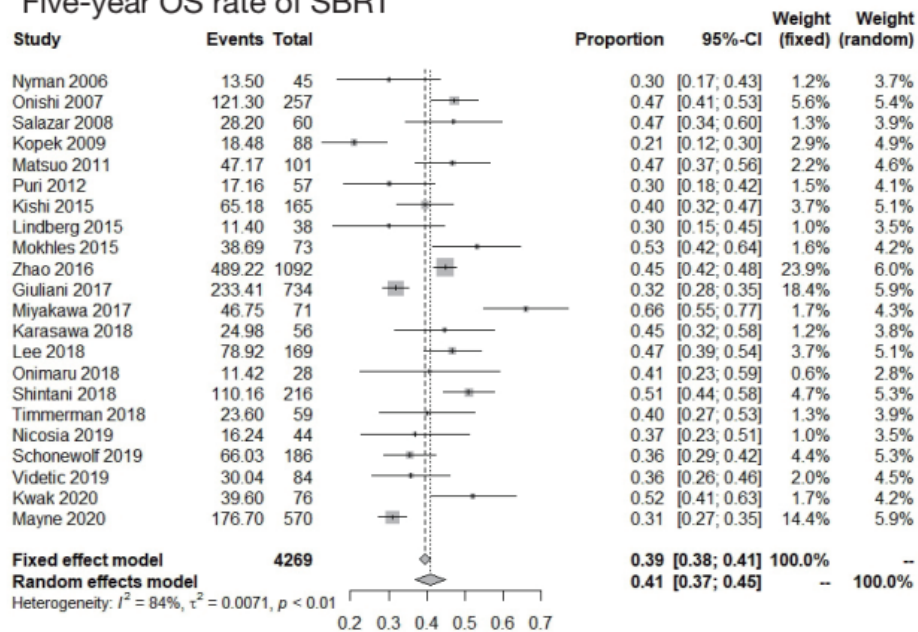
Table 3 Outcomes of pooled analysis for LC rates

Year	SBRT			RFA			P value
	Number of patients	LC rate (%)	95% CI (%)	Number of patients	LC rate (%)	95% CI	
1	2,123	98%	97–98%	156	75%	69–82%	0.01
2	4,783	95%	95–96%	85	31%	22–39%	0.01
3	4,828	92%	91–93%	83	67%	58–76%	0.01
5	3,504	92%	91–93%	44	41%	30–52%	0.01

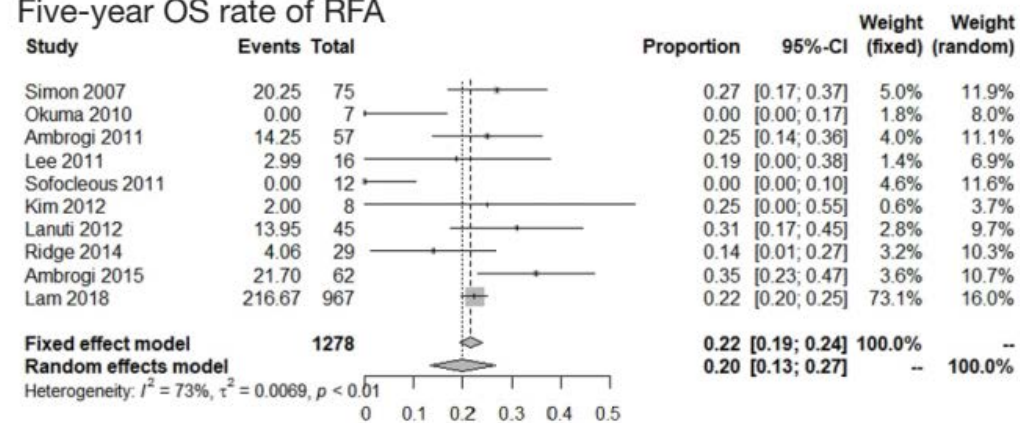
SBRT, stereotactic body radiation therapy; RFA, radiofrequency ablation; CI, confidence interval; LC, local control.

5- YEAR OS

Five-year OS rate of SBRT



Five-year OS rate of RFA



OVERALL SURVIVAL

Table 4 Outcomes of pooled analysis for OS rates

Year	SBRT			RFA			P value
	Number of patients	OS rate (%)	95% CI (%)	Number of patients	OS rate (%)	95% CI	
1	2,703	87%	86–88%	1,461	89%	88–91%	0.07
2	5,587	71%	69–72%	348	69%	64–74%	0.42
3	6,939	58%	56–59%	1,289	48%	45–51%	0.01
5	4,269	39%	37–40%	1,278	21%	19–23%	0.01

SBRT, stereotactic body radiation therapy; RFA, radiofrequency ablation; CI, confidence interval; OS, overall survival.

ADVERSE EVENTS

SBRT	RFA
RIP – 9.1%	Pneumothorax – 27.2%
Esophagitis -0.2%	Pleural effusion – 4%
Rib fracture - 4%	Haemoptysis – 2.2%

LITERATURE REVIEW

Is radiofrequency ablation more effective than stereotactic ablative radiotherapy in patients with early stage medically inoperable non-small cell lung cancer?

Haris Bilal^a, Sarah Mahmood^b, Bala Rajashanker^c and Rajesh Shah^{a,*}

SABR is associated with higher 5-year survival rates compared with RFA and conventional radical radiotherapy (40–47% vs. 20.1–27 vs. 19%) [18] and local control rates up to 80–90% [19] are two to three times greater than conventional fractionated radiotherapy. This modality has a favourable toxicity profile in peripheral

Comparison of the Effectiveness of Radiofrequency Ablation with Stereotactic Body Radiation Therapy in Inoperable Stage I Non-Small Cell Lung Cancer: A Systemic Review and Pooled Analysis

Nan Bi, MD, PhD^{1,2}, Kerby Shedden, PhD³, Xiangpeng Zheng, MD¹, and Feng-Ming (Spring)

Results of Meta-analysis for Local Control Rate (LCR)

	SBRT			RFA			P value	P value*
	No. of study	LCR	95% CI	No. of study	LCR	95% CI		
1 year	20	0.97	0.96–0.98	5	0.77	0.70–0.85	< .001	< .001
2 year	22	0.92	0.91–0.94	4	0.48	0.37–0.58	< .001	< .001
3 year	21	0.88	0.86–0.90	6	0.55	0.47–0.62	< .001	< .001
5 year	6	0.86	0.85–0.88	4	0.42	0.30–0.54	< .001	.04

The image features a dark blue background with white, stylized circuit board traces in the corners. These traces consist of straight lines of varying lengths and angles, ending in small circles, resembling a network or data flow diagram. The traces are located in the top-left, top-right, bottom-left, and bottom-right corners, framing the central text.

THANK YOU