

Patterns of First Recurrence and Survival Comparison Between Surgical Resection and Stereotactic Radiation Therapy for Stage I Non- Small Cell Lung Cancer

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Stage I NSCLC – Treatment Options

Medically operable

“High risk” operable
(Z4099)
(Z4032)

Medically inoperable



Surgery
(lobectomy)
CALGB ?

sublobar
resection
or SRT

SRT
or
RFA

Patterns of Recurrence for SRT

Study	N	Median f/u	Overall Survival (OS)	Local failure	Regional Failure	Distant Failure
<i>Onishi 2004</i>	245	24 mo	47% 5 yr OS	13.5%	8.2%	14.7%
<i>Nyman 2006</i>	45	43 mo	30% 5 yr OS	20%	4.4%	
<i>Lagerwaard 2008</i>	206	12 mo	64% 2 yr OS	3%	9%	15%
<i>Baumann 2008</i>	60	23 mo	65% 2 yr OS	3.2%	3.2%	11.7%
<i>Fakiris 2009</i>	70	50 mo	42.7 3 yr OS	11.9%	8.6%	
<i>Ricardi 2010</i>	62	28 mo	57.1% 3 yr OS	6.5%	12.9%	24.2%
<i>Timmerman 2010</i>	55	34 mo	55.8% 3 yr OS	7.3%	3.6%	
<i>Crabtree 2010</i>	79	18 mo	32% 3 yr OS	11%		
<i>Andratschke 2011</i>	92	21 mo	38% 3 yr OS	10.9%	18.5%	
<i>Senthi 2012</i>	676	24 mo		4.9%	7.8%	14.7%

Varying Definitions of Recurrence

“.....we defined local recurrence after SRT as being within or adjacent to the primary tumor volume, and all other ipsilateral lung recurrences were classed as either distant recurrence or second primary tumours in the lung.....”

Senthi et al. Patterns of disease recurrence after stereotactic ablative radiotherapy for early stage NSCLC: a retrospective analysis. Lancet Oncol 2012

METHODS

- Retrospective study of all patients with Clinical Stage I NSCLC treated with SRT or Surgery from June 2004-Jul 2010
- Unmatched and matched comparisons of overall and disease-free survival, and freedom from local recurrence
- Patients from each cohort were propensity matched based on age, tumor stage, and ACE comorbidity index.

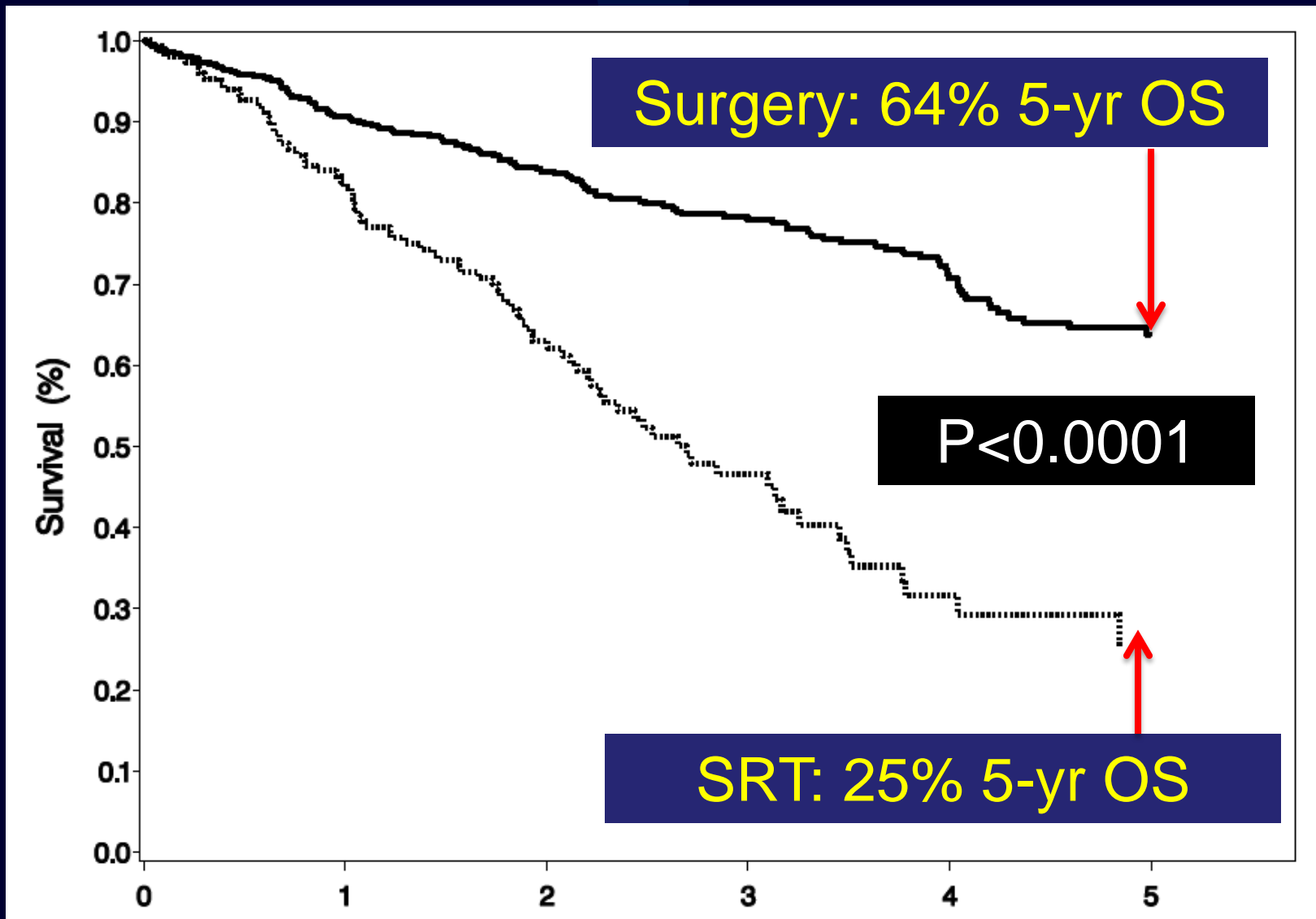
Local and Regional Recurrence Definitions for ACOSOG Z4099/RTOG 1021

- **Local failure**
 - Primary tumor failure
 - Marginal Failure
 - Involved lobe failure
 - Port site/wound recurrence
- **Regional failure**
 - Non-primary ipsilateral lobe failure
 - Hilar node failure
 - Ipsilateral mediastinal node failure

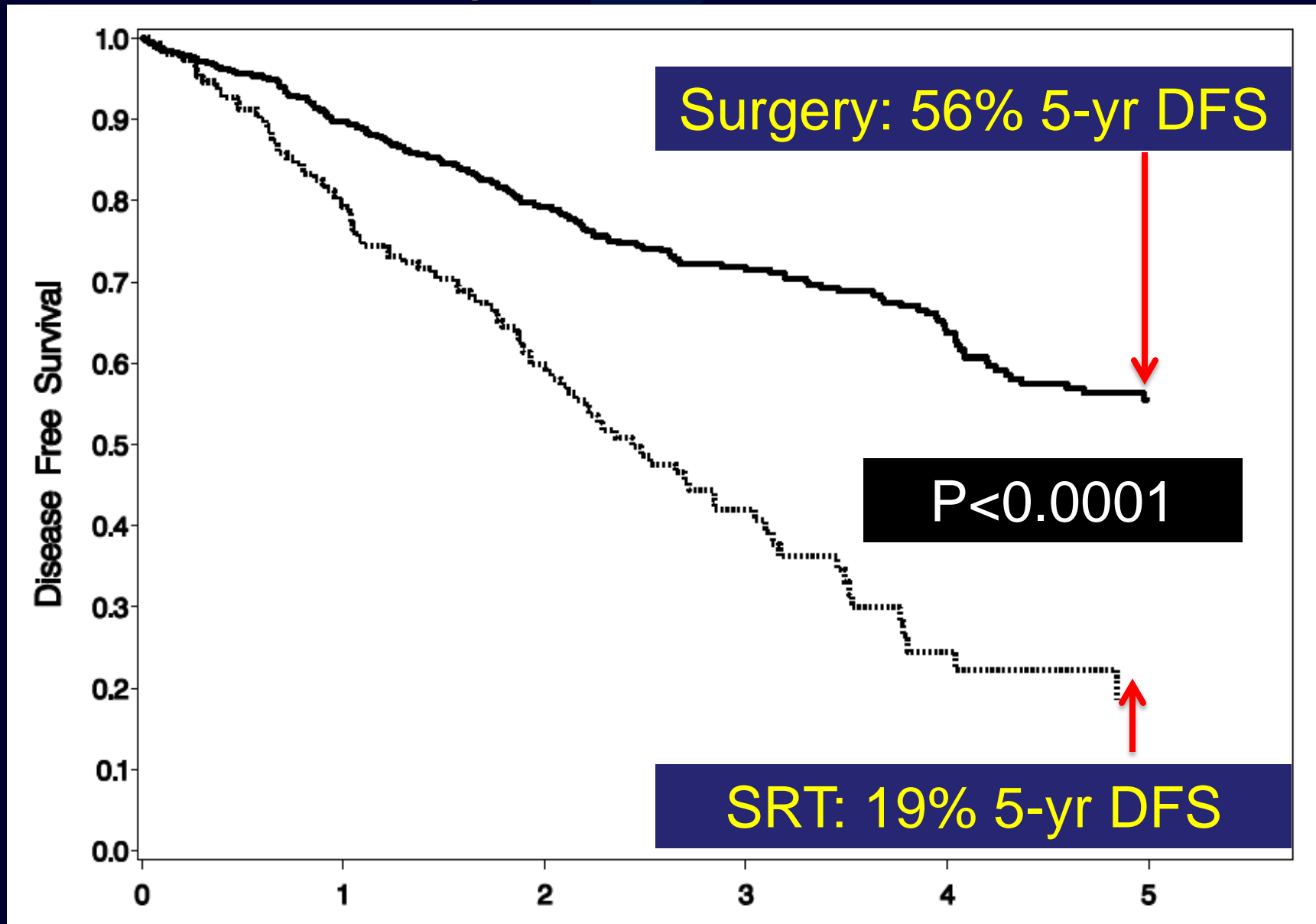
UNMATCHED COMPARISON

Variable	SRT	Surgery	P Value
N	151	458	
Age, Years (mean \pm SD)	74.4 \pm 9.4	65.8 \pm 10.5	<0.0001
Male	53%	46.3%	0.1535
T2 lesions	27.2%	36%	0.0456
ACE Comorbidity Score 2-3	67.3%	35.9%	<0.0001
Surgical Procedure			
Lobectomy		75.8%	
Pneumonectomy	NA	3.7%	
Bilobectomy		2.2%	
Segmentectomy		7.6%	
Wedge Resection		10.7%	

Unmatched Comparison: Overall Survival

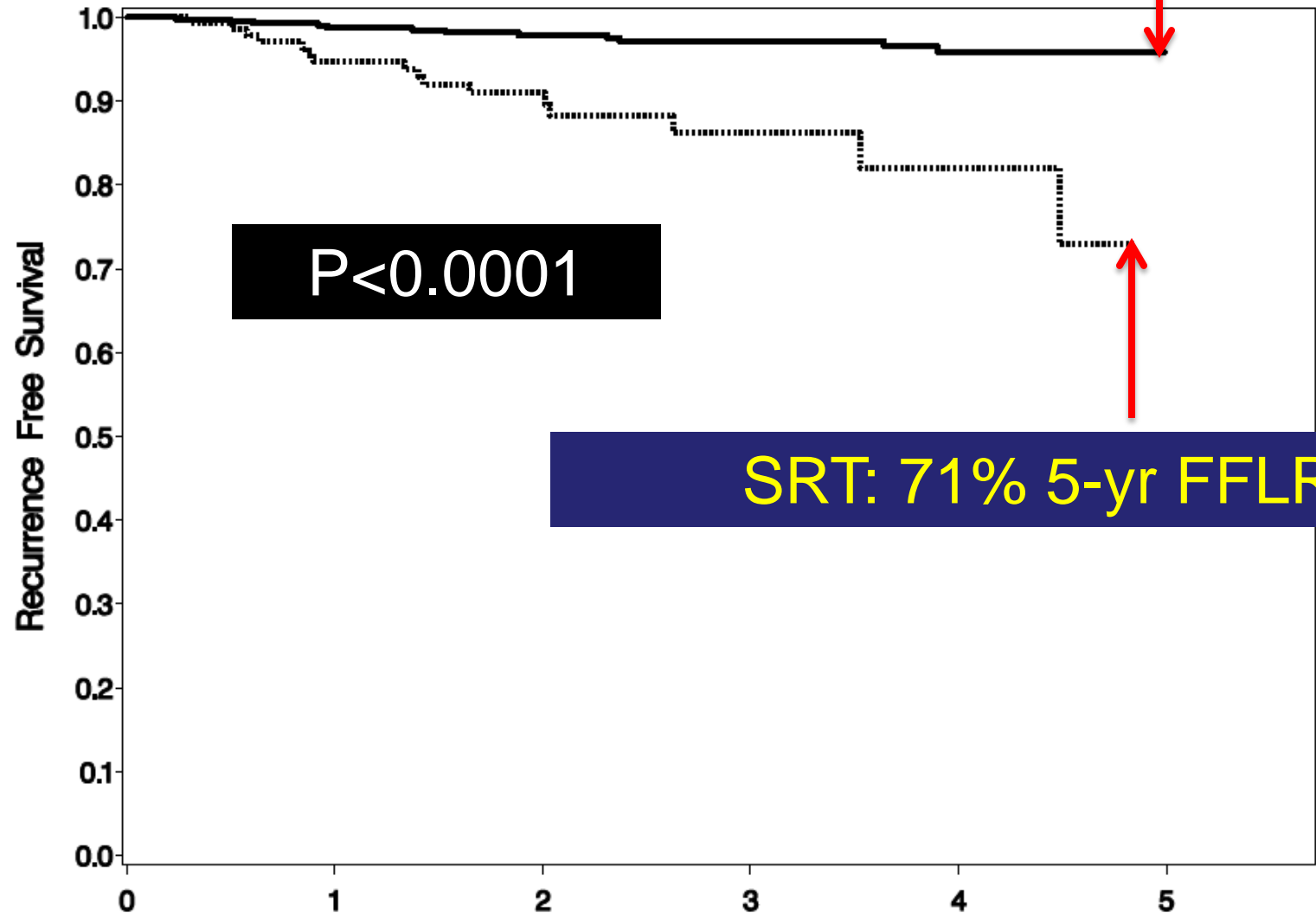


Unmatched Comparison: Disease Free Survival



Unmatched Comparison: Freedom From Local Recurrence

Surgery: 96% 5-yr FFLR



$P < 0.0001$

SRT: 71% 5-yr FFLR

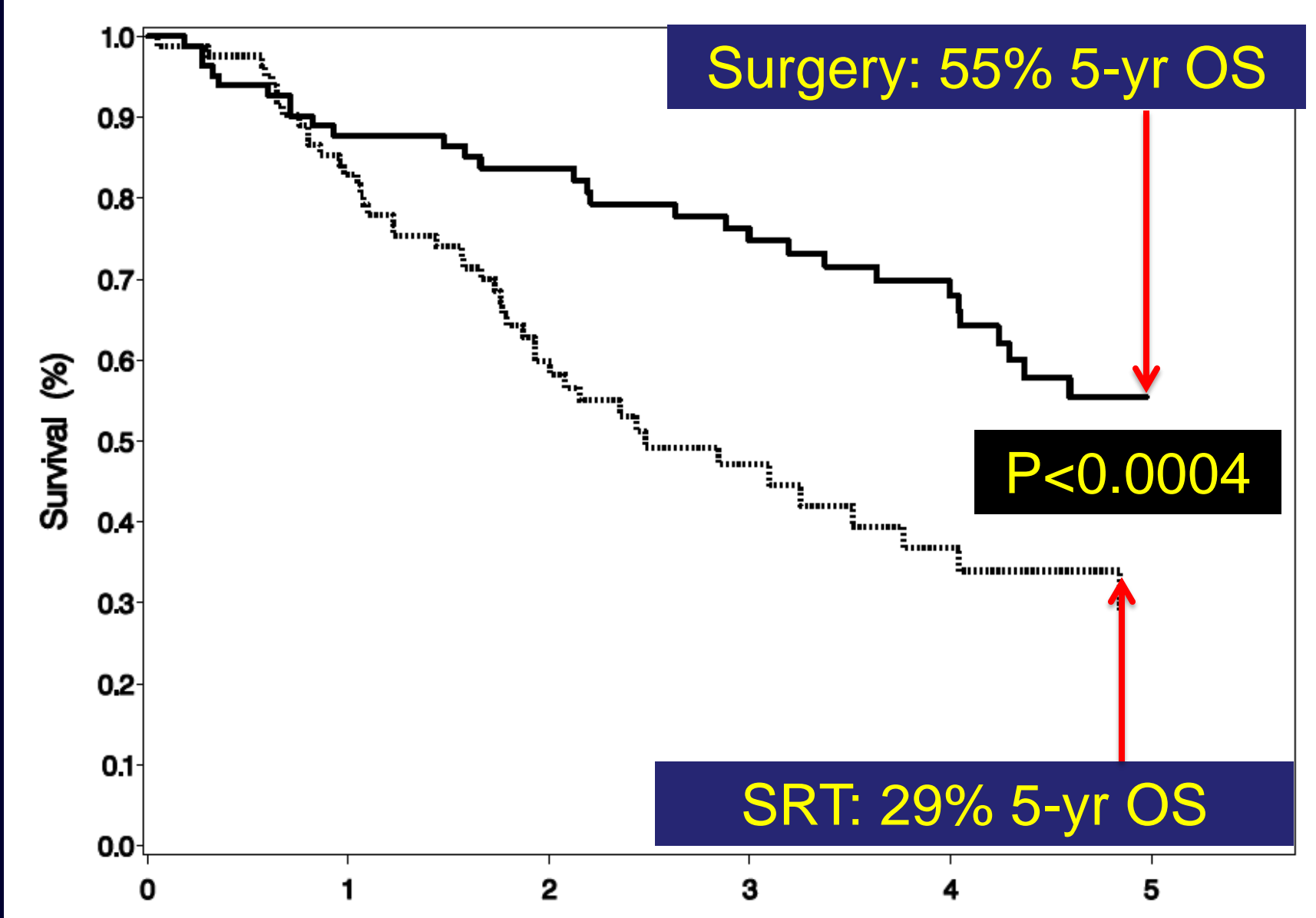
Pathologic Stage in Clinical Stage I Surgical Patients

- 11.8% pN1
- 3.0% pN2
- 3.1% pT3
- 2.2% pT4
- 18.4% of clinical T1 tumors found to be pT2
- 30-day mortality for surgery was 1.0% vs. 0.6% for the SRT cohort (p=NS)

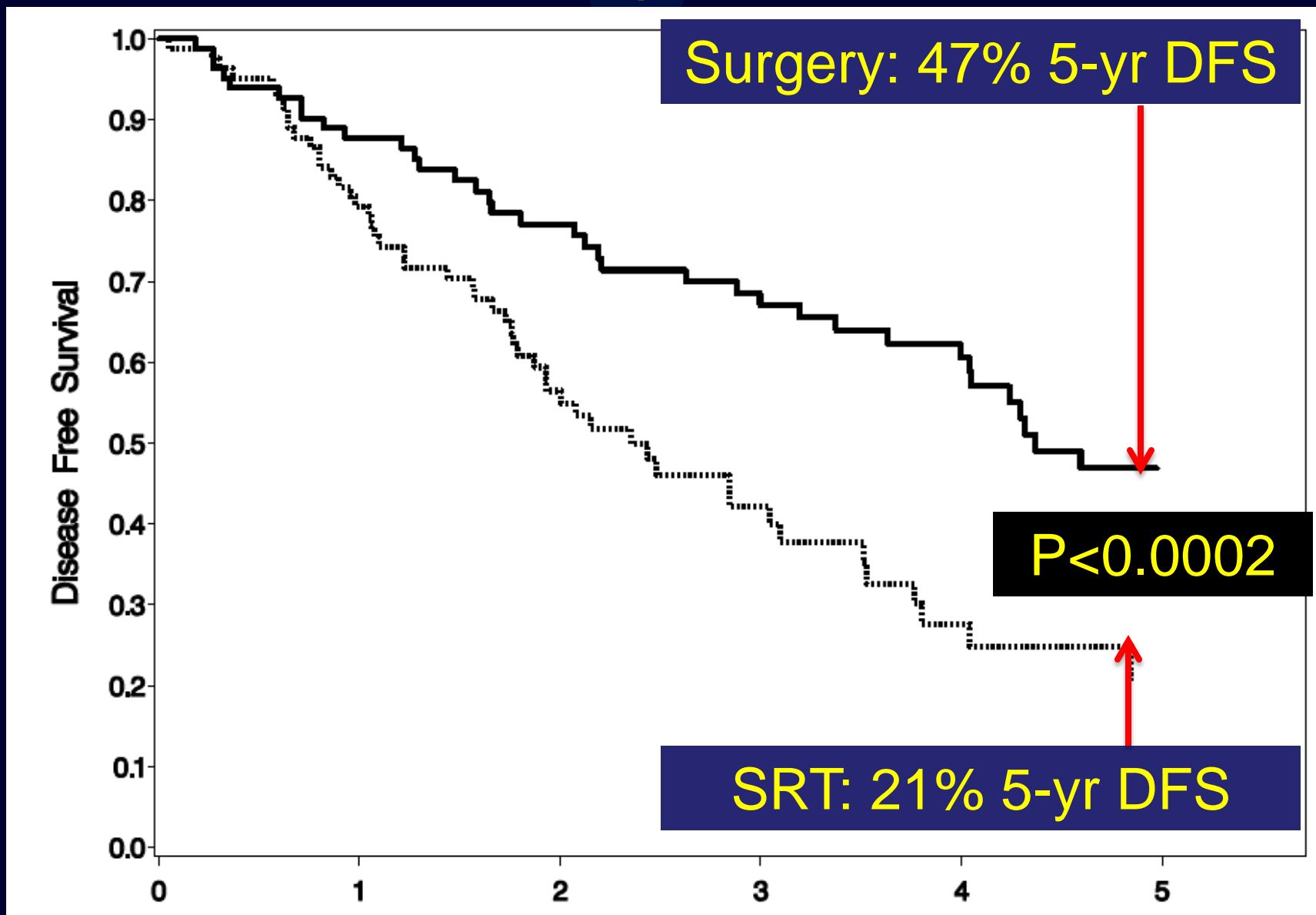
PROPENSITY MATCHED COMPARISON

Variable	SRT	Surgery	P Value
N	83	83	
Age, Years (mean \pm SD)	71.5 \pm 9.0	71.8 \pm 8.2	0.9807
Male	50.6%	54.2%	0.6410
T2 lesions	26.5%	27.7%	0.8614
ACE Comorbidity Score 2-3	68.7%	67.5%	0.8678
Surgical Procedure			
Lobectomy		77.1%	
Pneumonectomy		2.4%	
Bilobectomy	NA	0	
Segmentectomy		6.0%	
Wedge Resection		14.5%	

Propensity Matched Comparison: Overall Survival

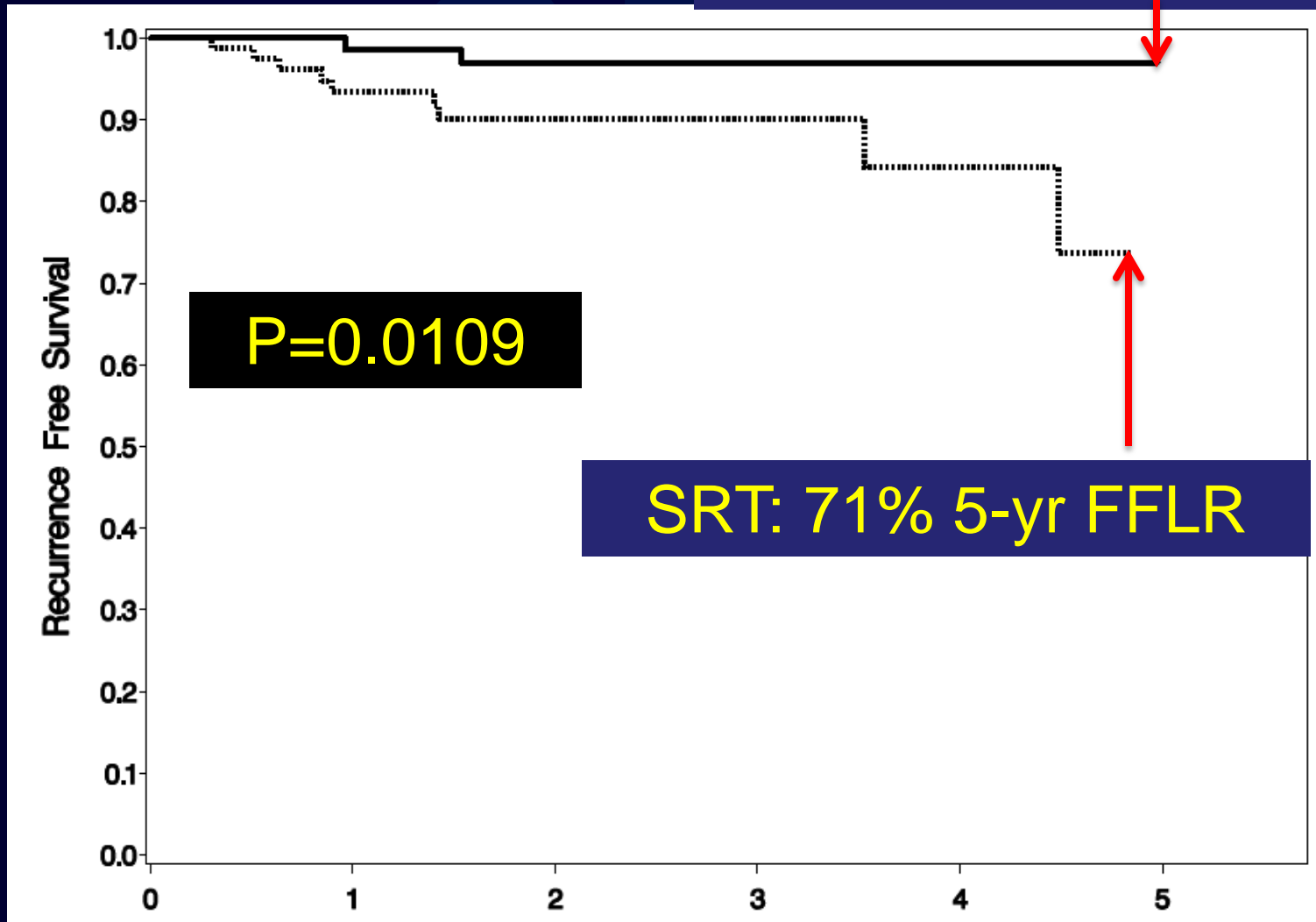


Propensity Matched Comparison: Disease Free Survival



Propensity Matched Comparison: Freedom From Local Recurrence

Surgery: 97% 5-yr FFLR

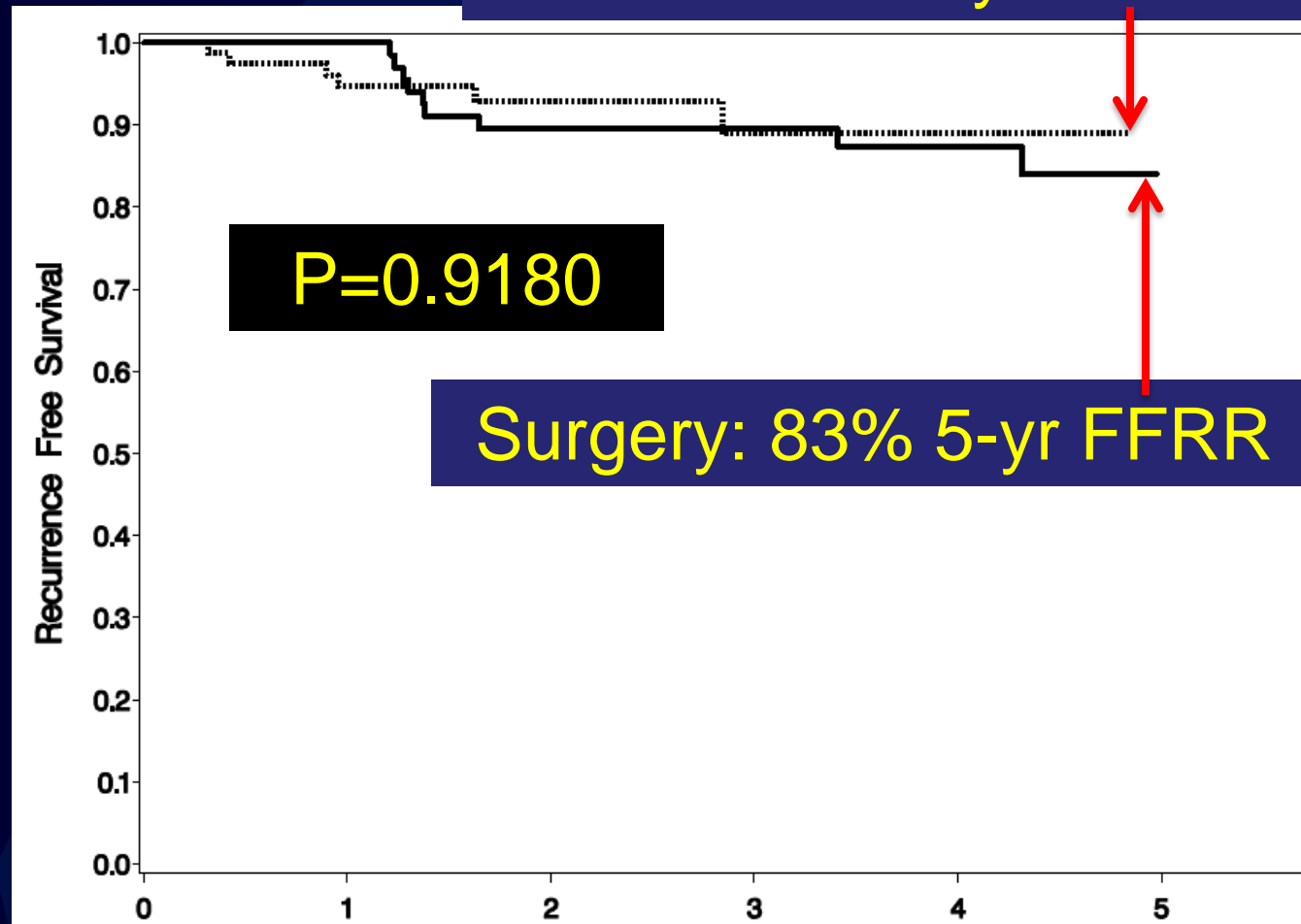


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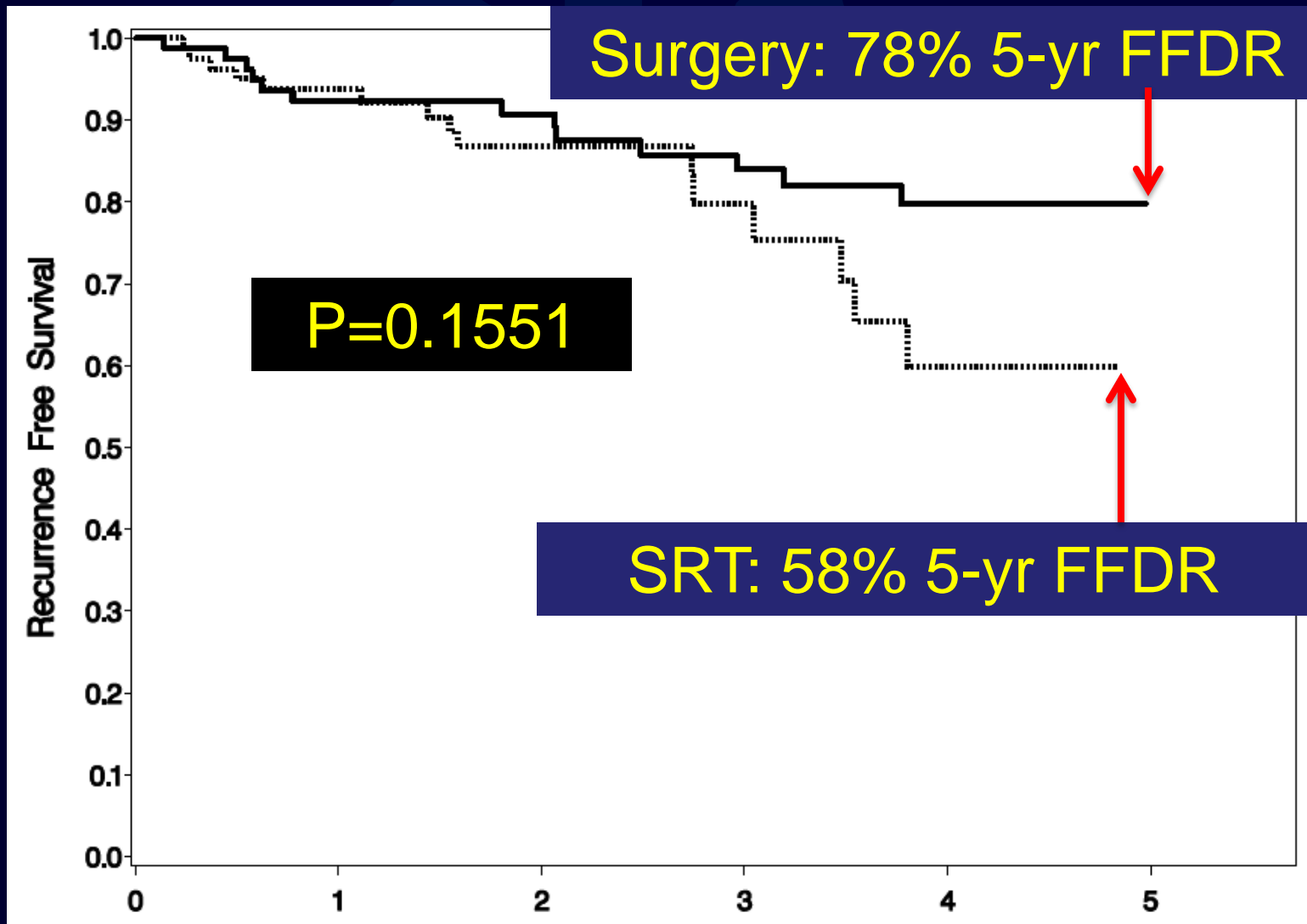
SRT: 71% 5-yr FFLR

Propensity Matched Comparison: Freedom From Regional Recurrence

SRT: 87% 5-yr FFRR



Propensity Matched Comparison: Freedom From Distant Recurrence



SUMMARY

- In Stage I NSCLC patients matched for age, T stage, and ACE comorbidity, surgery offers better overall and disease-free survival, and lower local recurrence rates vs. SRT
- 38.5% of clinical stage I cancers were found to have a higher pathologic stage at surgery with occult nodal disease in 15%

CONCLUSIONS

- Current comparative studies are limited because of difficulty matching patients
- Recurrence patterns and survival do NOT justify routine use of SRT in low risk operable patients
- Current data are inadequate to define the role of SRT and surgery in high risk patients

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Small Cell Lung Cancer

THANK YOU!



Patterns Of Disease Recurrence Following Either Stereotactic Ablative Radiotherapy (sabr) Or Lobectomy By Video-assisted Thoracoscopic Surgery (vats) In Stage I-II Non-small Cell Lung Cancer: Outcomes Of A Propensity Score-matched Analysis

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- In total 86 VATS- and 527 SABR patients were eligible for matching
- The matched cohort consisted of patients with cT1-3N0 NSCLC following SABR (n=64) or VATS-lobectomy (n=64).
- Pre-treatment histological confirmation of stage I NSCLC was available in 53% of SABR patients and 50% of VATS patients
- SABR patients had a better loco-regional control rates at 1- and 3-years (96.8% and 93.3% vs. 86.9% and 82.6%, respectively, p= .03).
- Three-year progression-free survival did not significantly differ between groups (79.3% versus 63.2%, p = .09).

Presented at ASTRO Oct. 2012

SBRT for Inoperable Early Stage Lung Cancer: RTOG 0236

Timmerman et al. JAMA 2010

- 55 inoperable pts. 80% T1.
- Primary endpoint: Primary tumor control
 - Primary tumor failure defined as local enlargement at least 20% by CT AND evidence of tumor viability based on PET
 - Recurrence within the lobe >1cm away from the primary tumor was NOT a primary tumor failure
 - Local failure defined separately
- 3-year primary tumor control 97.6%

Metachronous Primary Lung Cancers after Treatment of Stage I Lung Ca

Study	N	Median F/U	Local failure	Distant Mets	Metachronous Primary
SRT <i>(Onishi 2010)</i>	87	55 mo	24.1%	21.8%	0
SRT <i>(Bradley 2010)</i>	91	18 mo	7.7%	20.8%	16.5%
Surgery <i>(Flores 2011)</i>	590	24 mo	4%	6%	3%
Surgery <i>(Martini 1995)</i>	598	7 yrs	27%		7.5%

Stage I NSCLC – Treatment Options According to Some Radiation Oncologists

Medically
operable

“High risk”
operable

Medically
inoperable



SRT

Stage I NSCLC – Treatment Options According to Some Surgeons

Medically
operable

“High risk”
operable

Medically
inoperable



SURGERY

Stage I NSCLC – Treatment Options

Medically operable

“High risk” operable

Medically inoperable



Surgery
(lobectomy)

sublobar
resection
or SRT

SRT
or
RFA