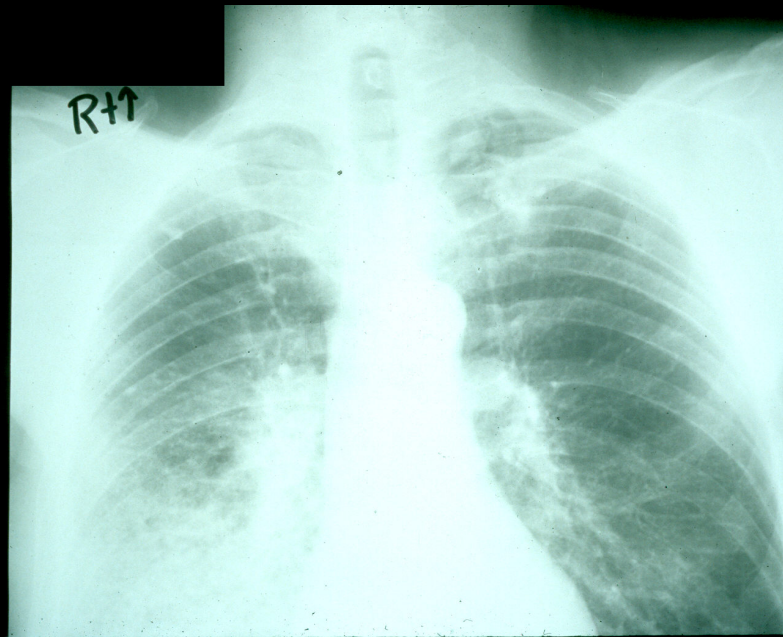


Preoperative Assessment of the Patient For Pulmonary Resection

55 y.o. Male, Carcinoma Right Middle and Lower Lobes, ? Pneumonectomy



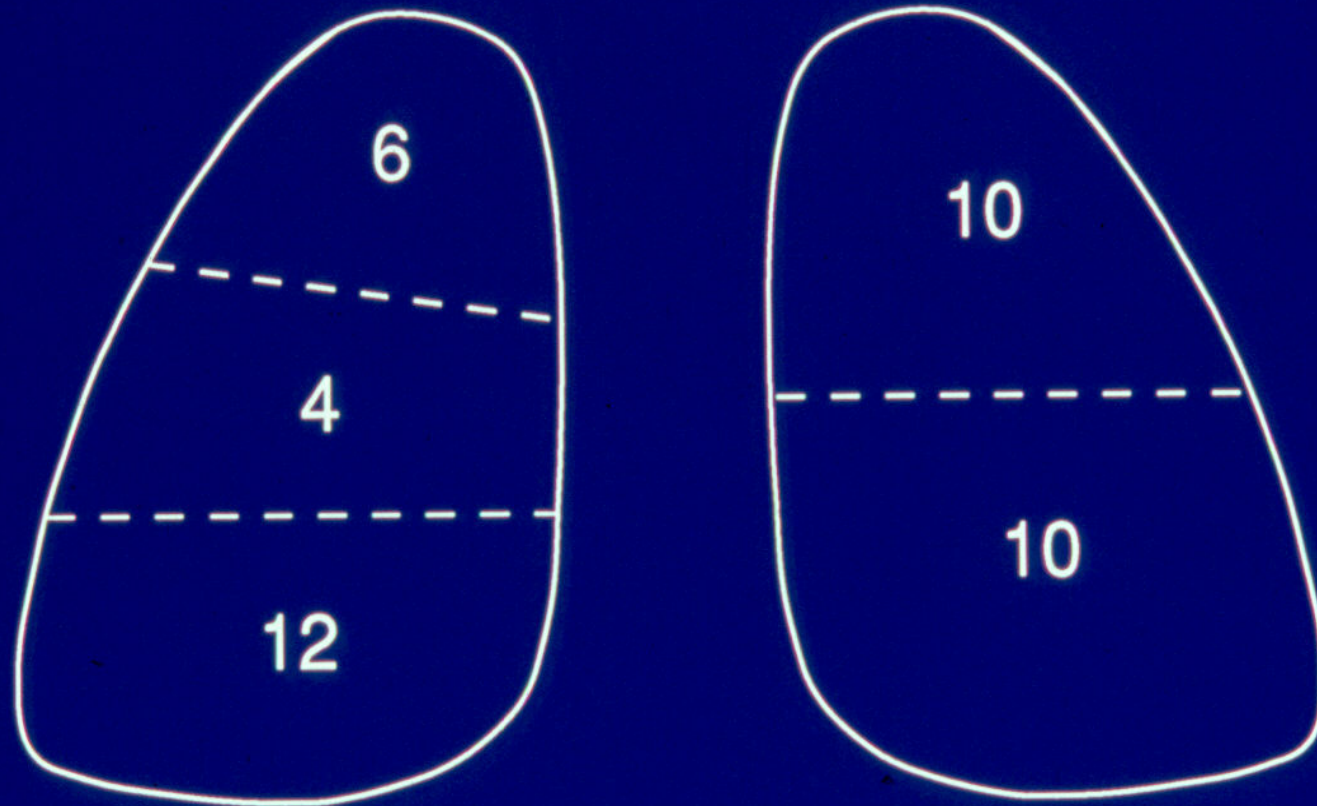
Peter Slinger MD, FRCPC

University of Toronto

Pulmonary Resection Morbidity and Mortality

	All Cases (LCSG '89)
Mortality	4%
Respiratory Complications	21%
Cardiac Complications	15%

LUNG SUBSEGMENTS



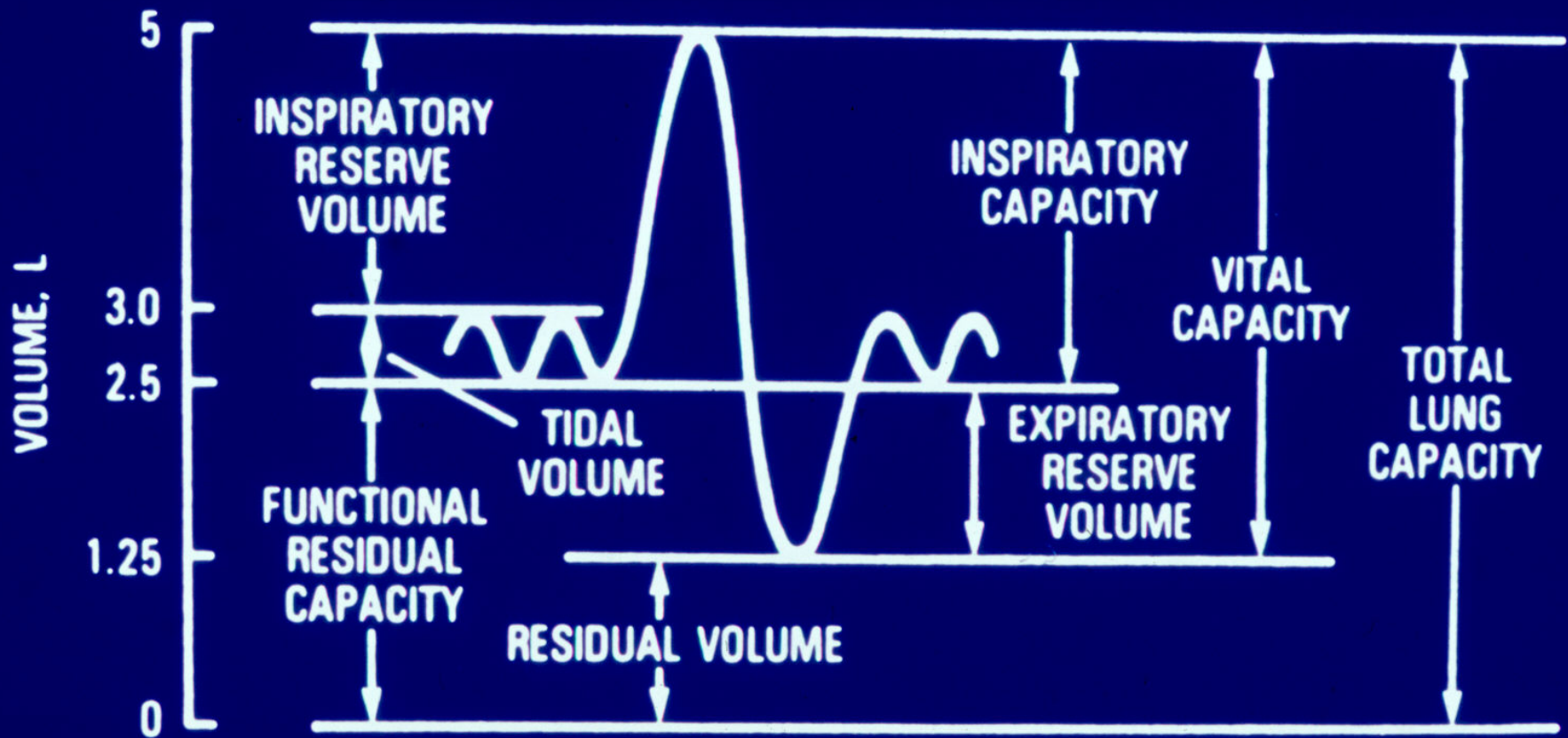
Total subsegments = 42

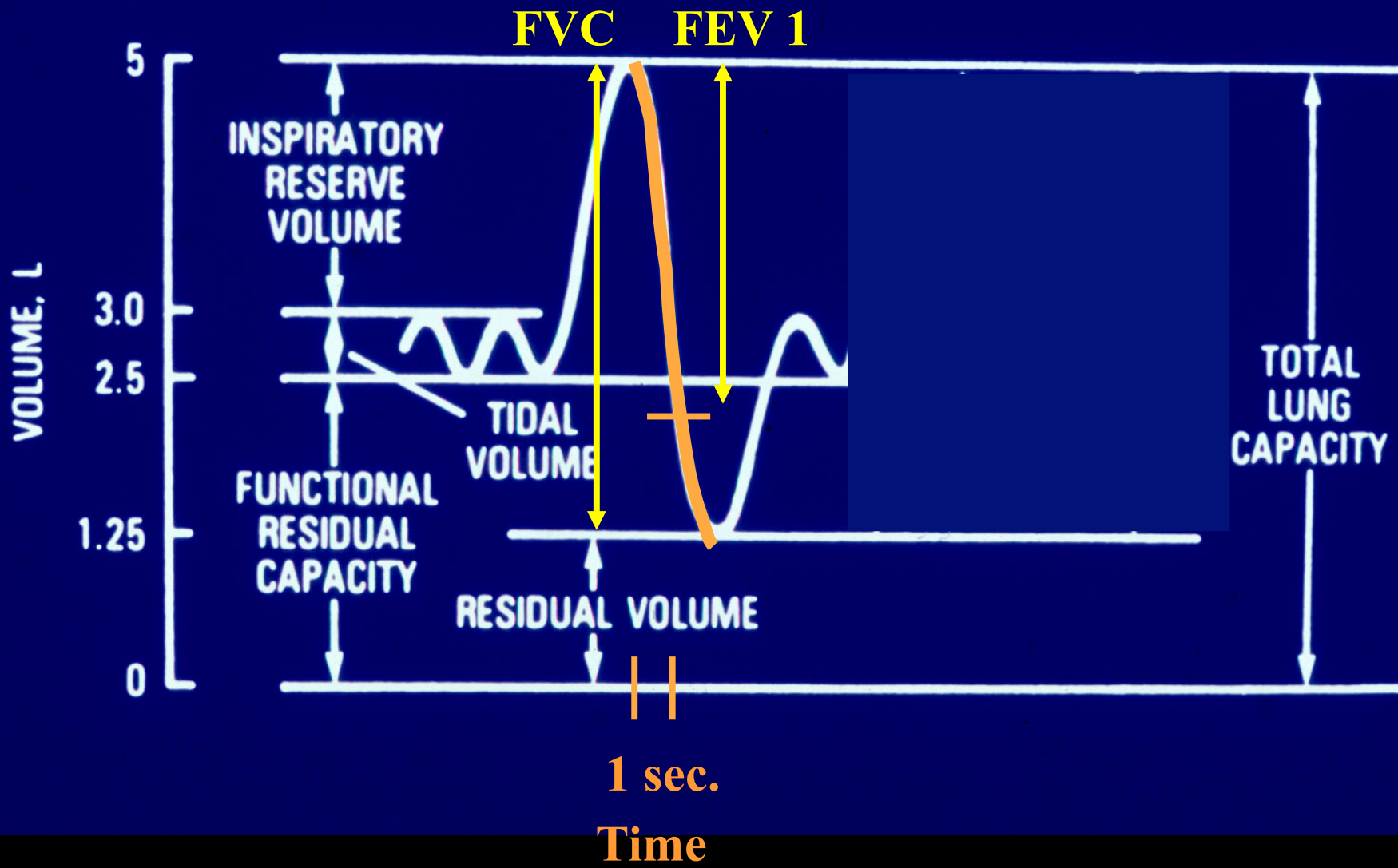
Example: right lower lobectomy

Postoperative FEV₁ decrease = 12/42 (29%)

Prediction of Postoperative Respiratory Failure in Patients Undergoing Lung Resection for Cancer

- 156 patients, lobect.88, pneumonect.26
respiratory complications 26%
- ppoFEV1 >50%: no/minor complic's.
- ppoFEV1 <40%: +/- major resp. complic's.
- ppoFEV1 <30%: 10/10 postop. ventilation
6/10 died





Relationship Between Pulmonary Function and Lung Cancer Surgical Outcome

N= 110, Lobx 60%, Px 33%, Segm./Wdg. 17% Age 69 +/- 8 yr., M/F 60/40 %

Survive/No Maj. Resp. Complic.: 96 (87%)

- ◆ ppoFEV1 = 58 % (+/- 15%)
- ◆ ppoFEV1 = 1.4 L

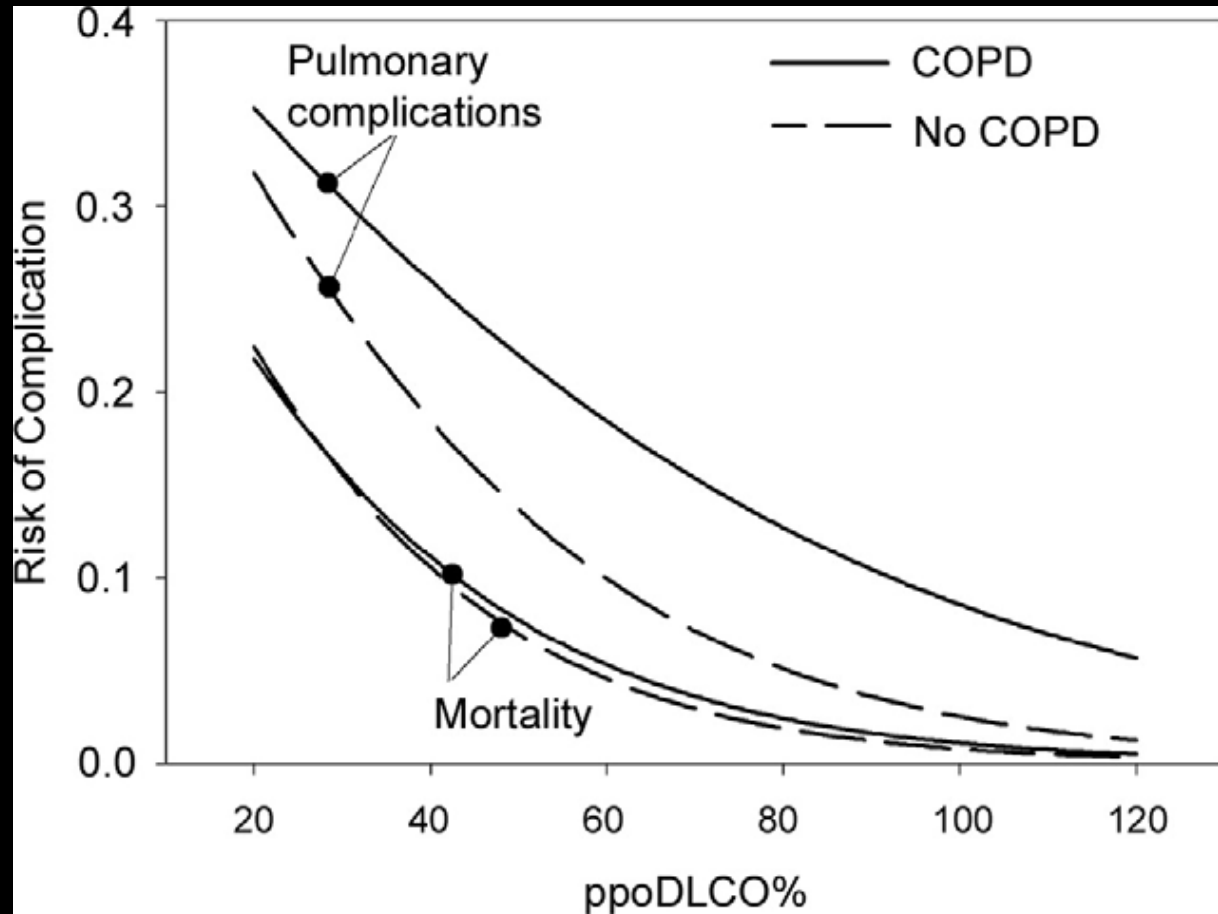
Death/Resp. Failure: 14 (13%)

- ◆ ppoFEV1= 42% (+/- 13%) p< .001
- ◆ ppoFEV1 = 1.0 L (n.s.)

Suggested Threshold: ppoFEV1 = 40%

Win T, et al. Eur Respir J 2005, 28 : 594-9

Diffusing Capacity Predicts Morbidity after Lung Resection



Ferguson MK, Vigneswaran WT. Ann Thorac Surg 2008, 85: 1158-64

National Emphysema Treatment Trial

NEJM 348: 2059-78, 2003

Increased Risk of Death:

- ◆ Homogeneous Emphysema
- ◆ FEV1 < 20%
- ◆ DLCO < 20%

Resection of Lung Cancer Is Justified in High-risk Patients Selected by Exercise Oxygen Consumption

mean preop. FEV1 =41%, lobect./wedge/segment.

VO2 max	n	complic's.	mortal.
> 20 ml/kg/min	10	1	0
15-20 ml/kg/min	5	3	0
<15 ml/kg/min	5	5	1



Lance Armstrong

- ◆ $\text{VO}_2 \text{ max} = 85 \text{ ml/kg/min}$
- ◆ J Appl Physiol 98: 2191, 2005

The “3-Legged Stool” of Pre-Thoracotomy Respiratory Assessment:

Lung

Mechanics

FEV 1
(ppo < 40%)

MVV, FVC

RV/TLC

Parenchymal

Function

DLCO
(ppo < 40%)

PaO₂ < 65

PaCO₂ > 45

Cardio-Pulm.

Reserve

VO₂ max
(15 ml/kg/min)

Stair climb >2 ft.

6 min walk (/30)

Exercise SpO₂

Post-thoracotomy Anesthetic Management:

Predicted Postop. FEV1 (ppo FEV1%)

> 40%

Extubate in OR if patient "AWaC"

(alert, warm and comfortable)

40-30%

Extubate if other factors favorable:

Exercise Tol.,
DLCO, V/Q scan
Assoc. diseases

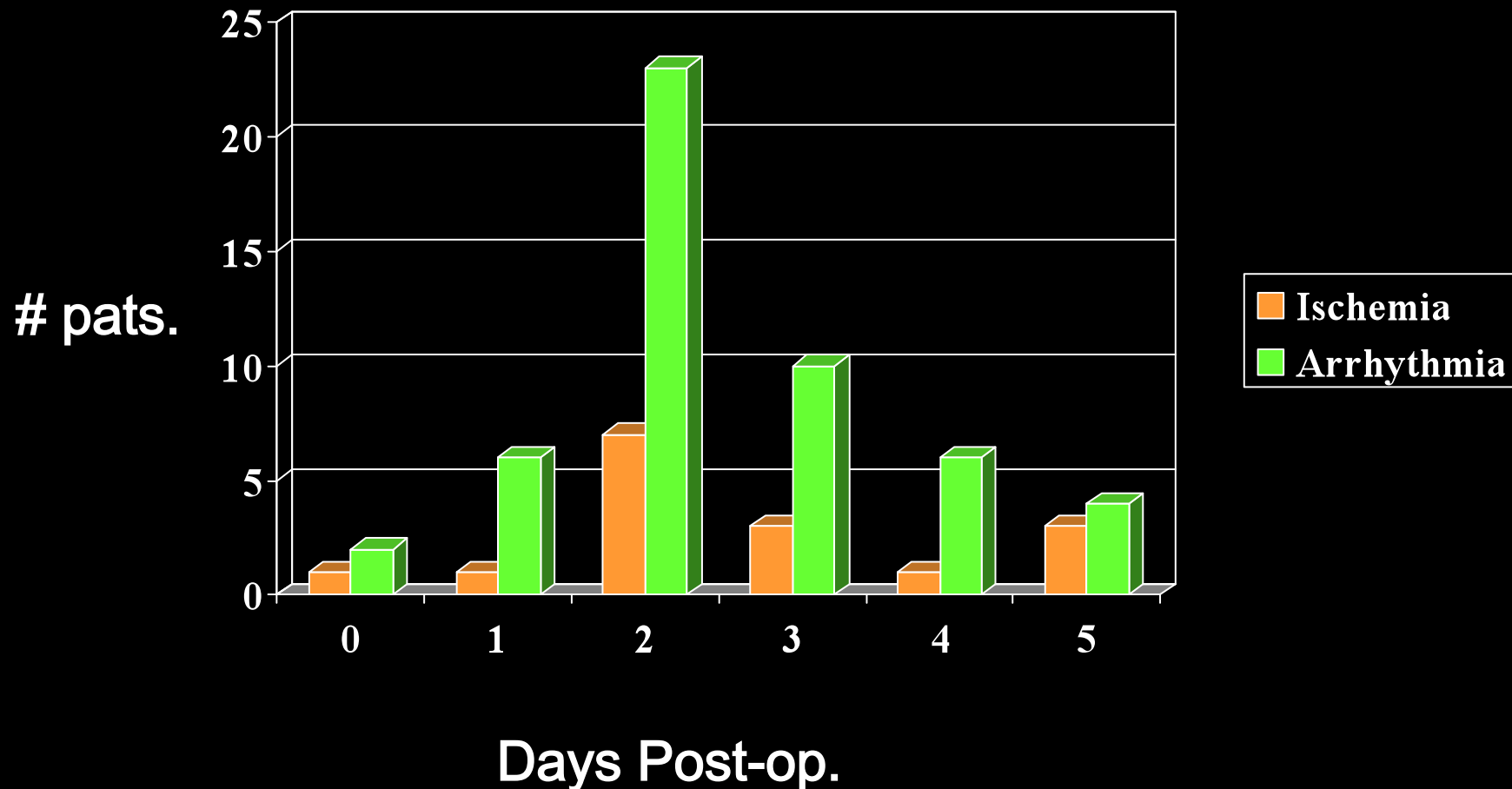
30-20%

Consider Extub. if all favorable plus TEA

Other patients: staged wean of ventilation

Post-thoracotomy Cardiac Complications

von Knorring, et al. Ann Thorac Surg 1992, 53:642



Cardiac Risk Assessment for Thoracotomy

(ACC/AHA Guidelines, Anesth Analg 2007, 104:15-26)

Intermediate Clinical Predictors

- Mild Stable Angina, Prev. MI
- Diabetes
- Compensated /prev. CHF

Poor Functional Capacity

Adequate Functional Capacity

Non-Invasive Testing

OR

Abnormal

OK





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*Make your next pack Chesterfields...regardless
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EVERYWHERE YOU GO They Satisfy

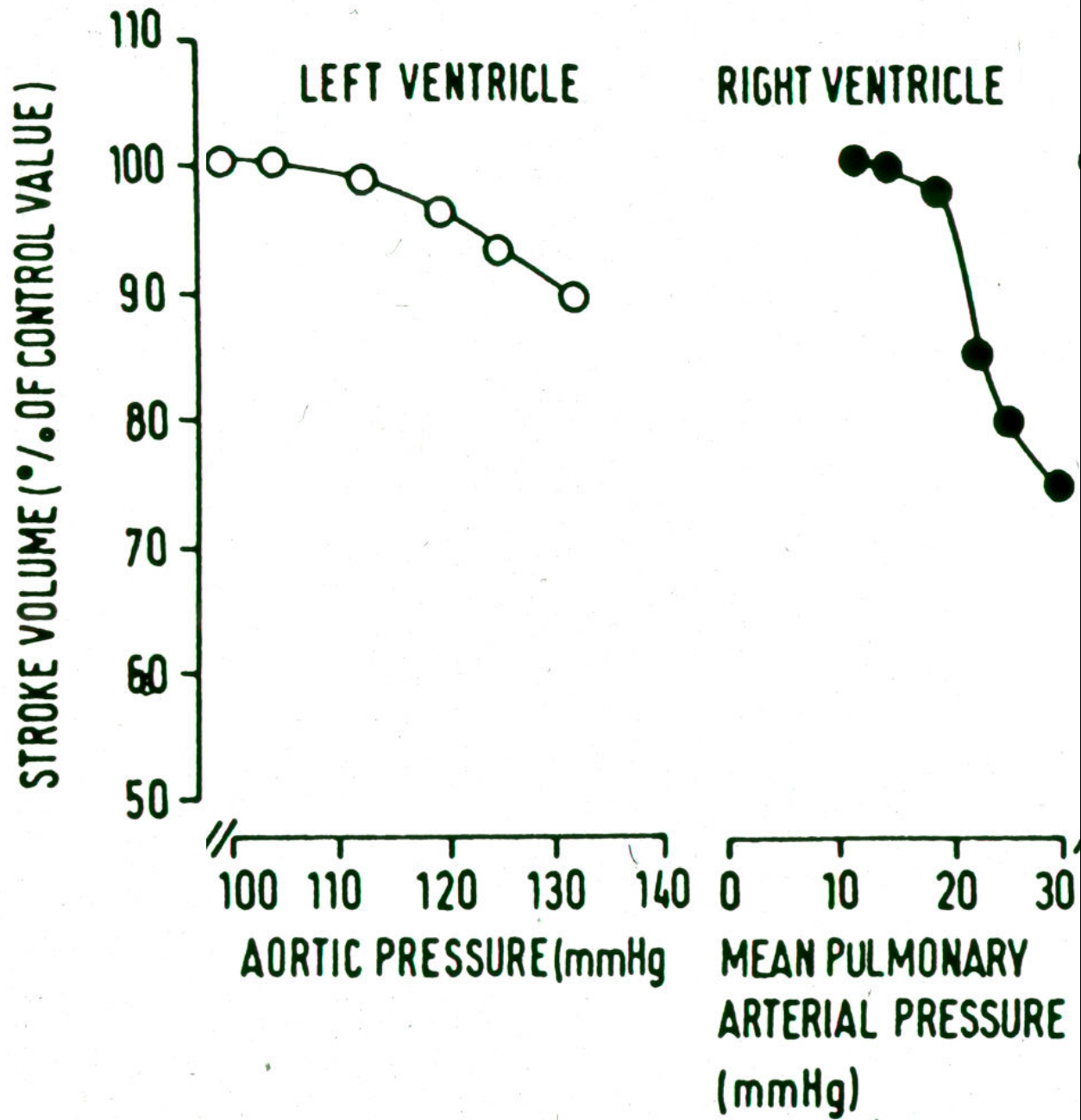


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Pulmonary Resection Morbidity and Mortality

	All Cases (LCSG '89)	>80 Years (Osaki '94)
Mortality	4%	3%
Respiratory Complications	21%	44%
Cardiac Complications	15%	44%



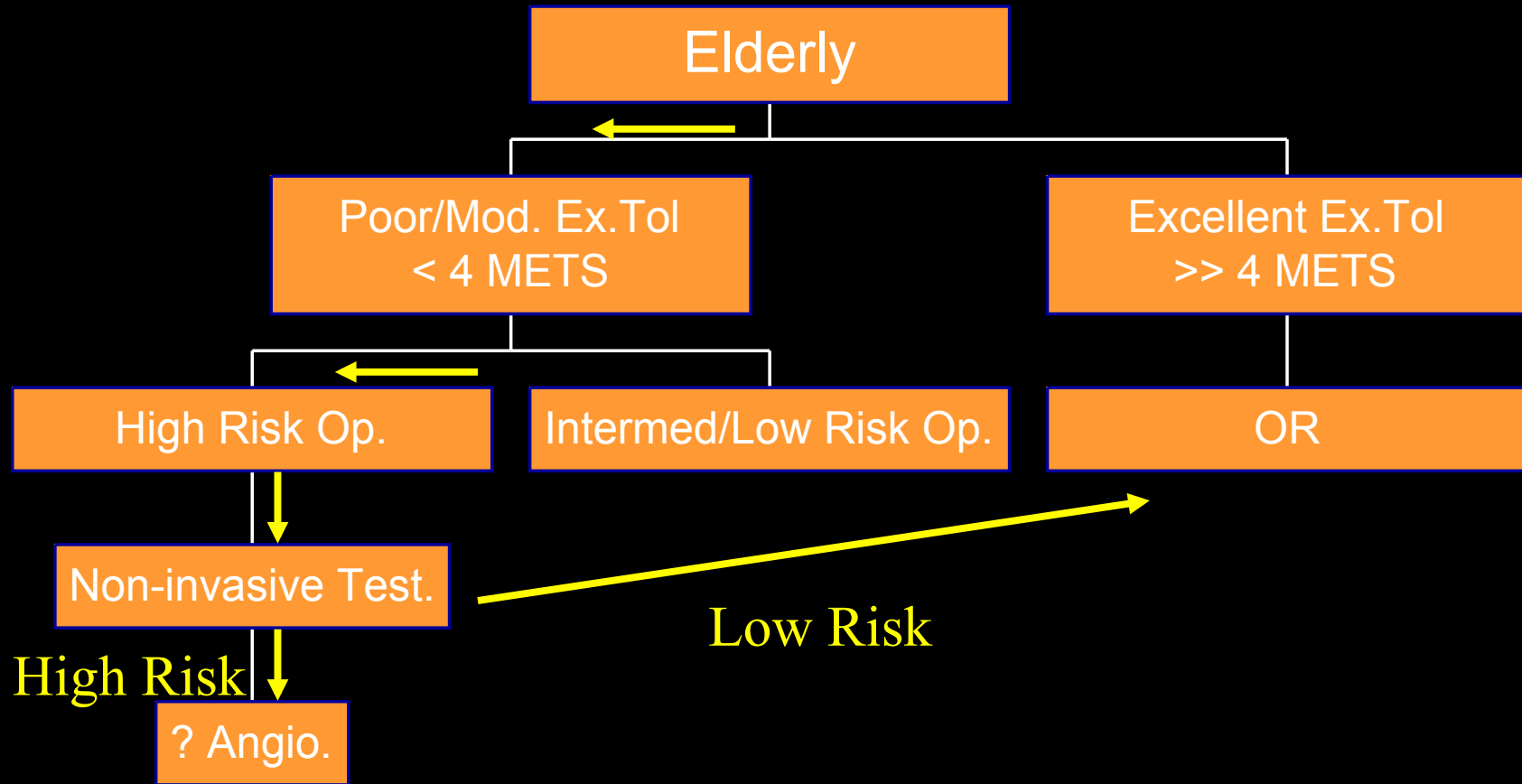
Stair Climbing Predicts Post-lobectomy Complications in the Elderly

n= 109, Age >70, mortal. 3%, morbid. 27%

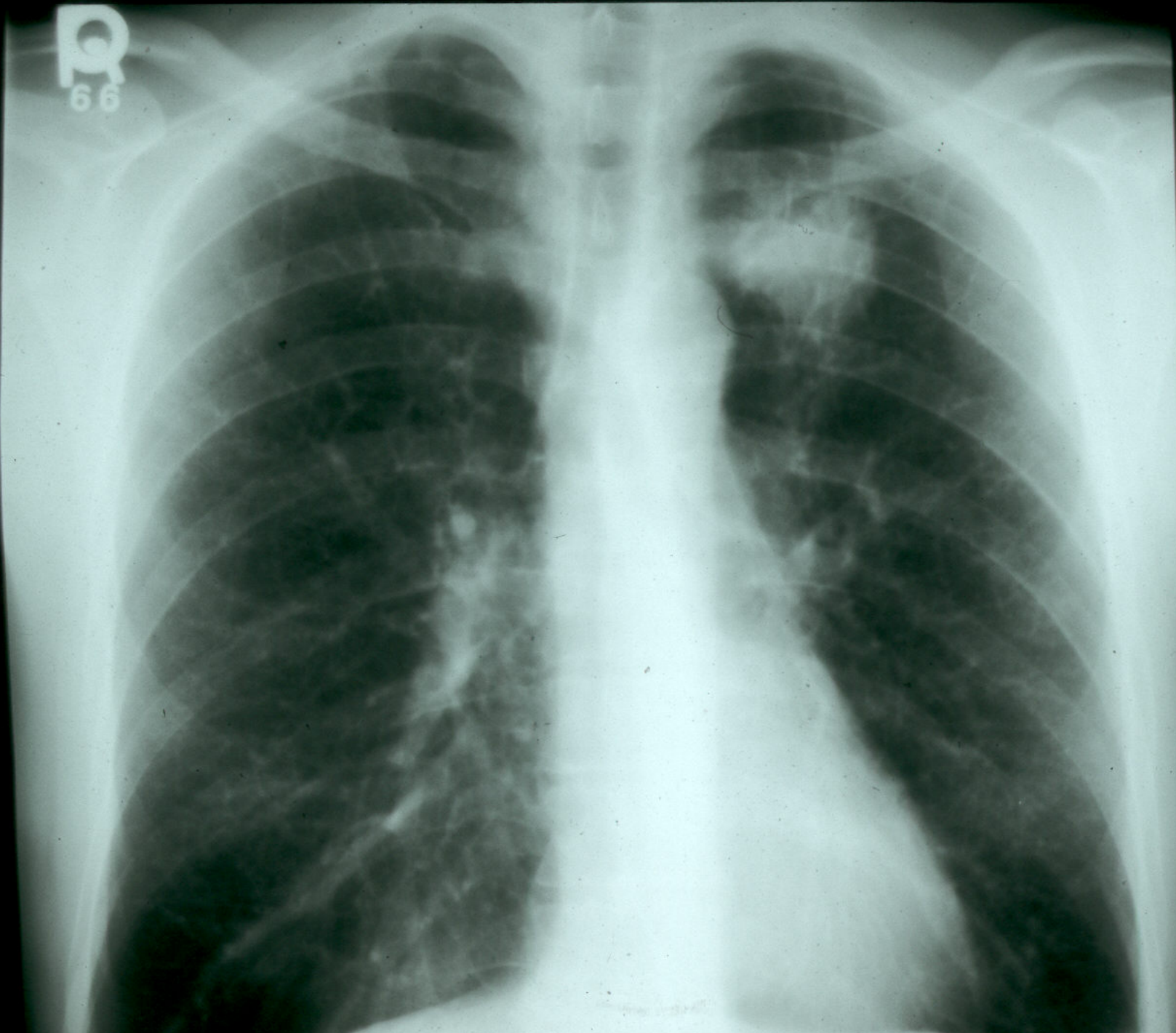
- ◆ ppo FEV1 % p= 0.05
- ◆ Cardiac co-morbidity p= 0.02
- ◆ Stair climbing p= .002

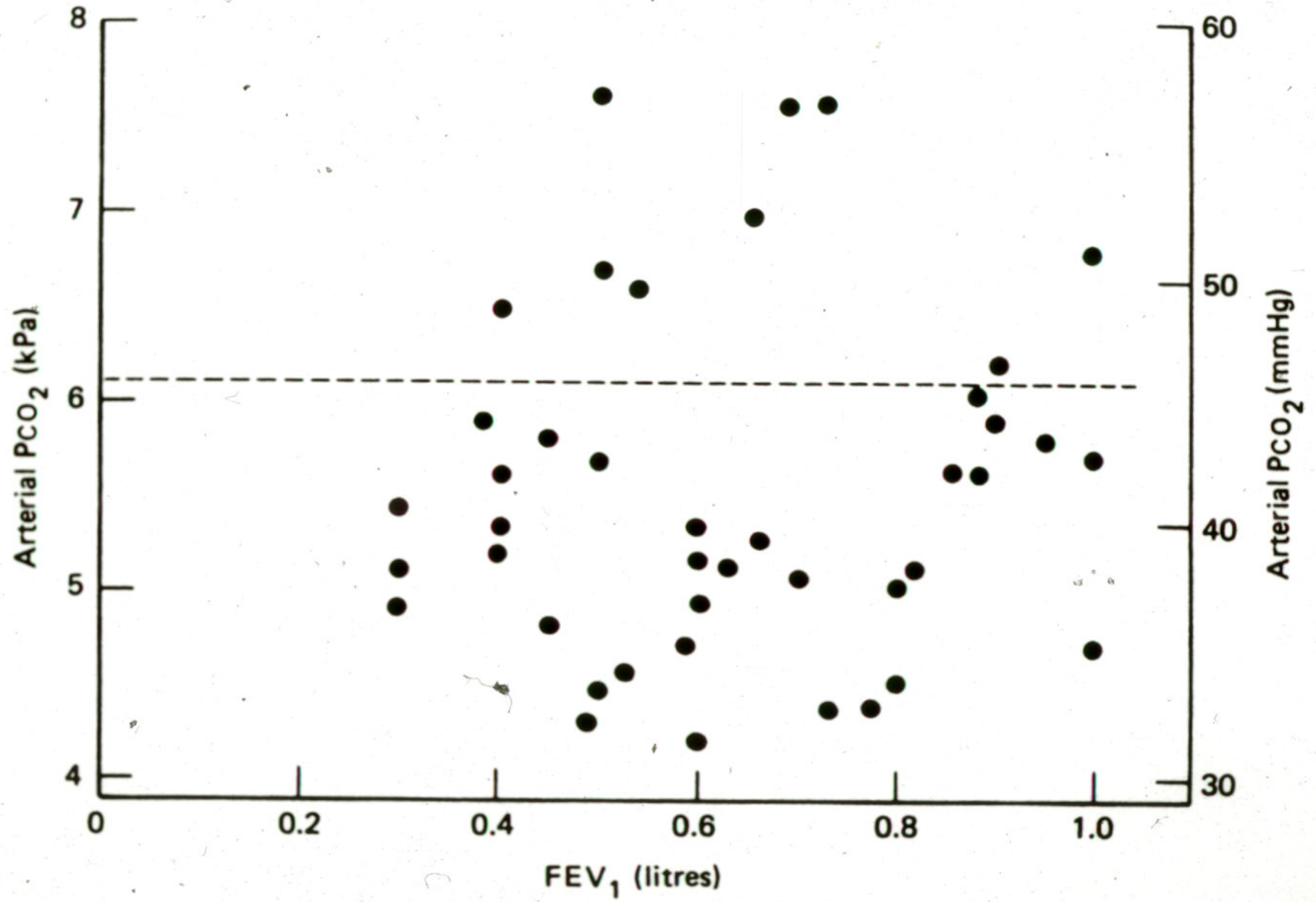
Brunelli A, et al. Ann Thorac Surg 77: 226-70, 2004

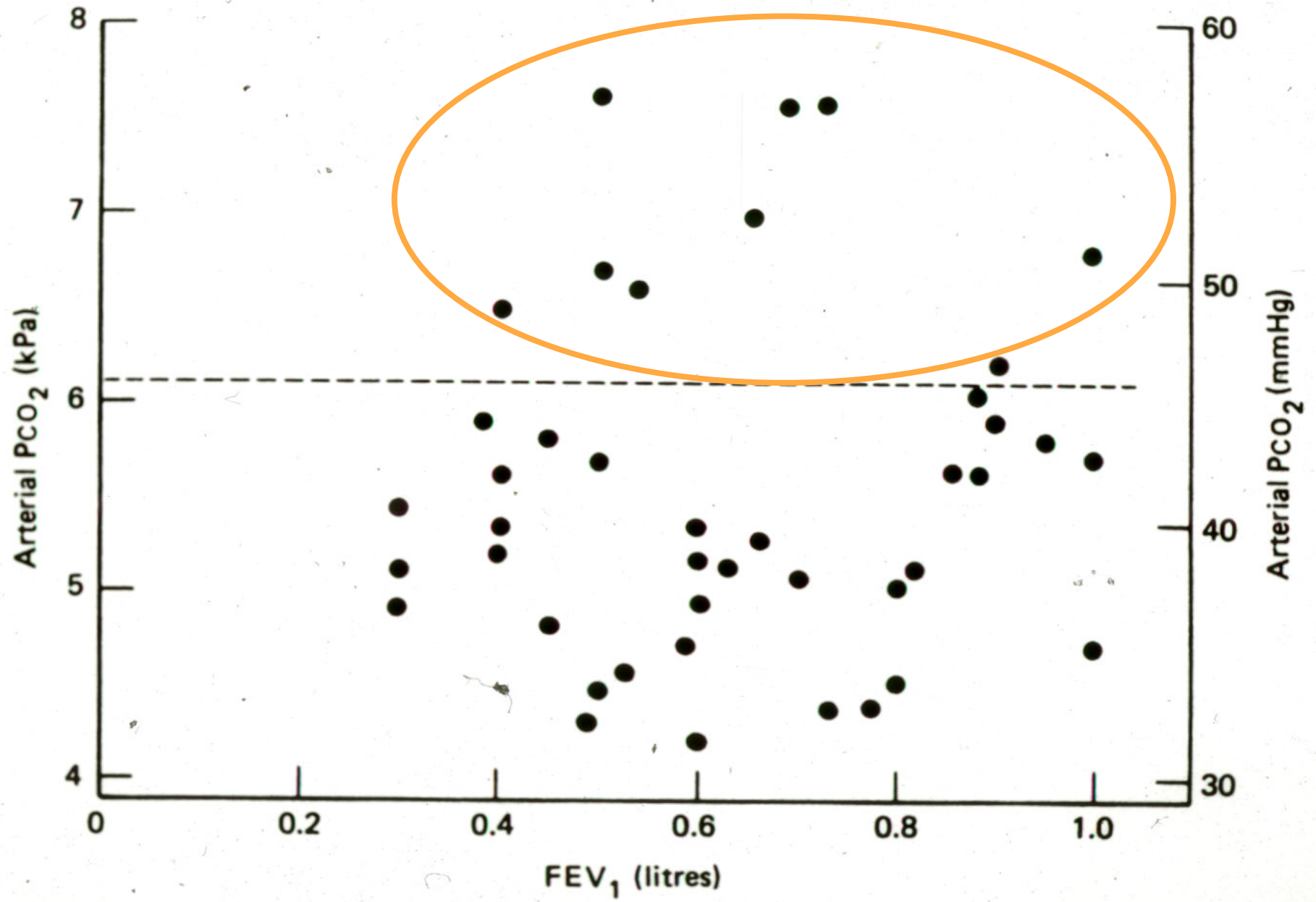
Pre-thoracotomy Cardiac Risk Assessment



R
66







Intercurrent Respiratory Problems in COPD

- ◆ Infection
- ◆ Bronchospasm
- ◆ Atelectasis
- ◆ Nutrition/exercise

Pre-anesthetic Considerations for Lung Cancer (the “4 Ms”)

- ◆ **M**ass Effects
- ◆ **M**etabolic Effects: Na^+ , Ca^{++} , Eaton-Lambert
- ◆ **M**etastases
- ◆ **M**edications: Bleomycin, Adriamycin, Cis-Platinum

Helping Surgical Patients Quit Smoking

Warner DO, Anesth Analg 2005; 101: 481-7

Surgical Benefits:

- ◆ Decrease ST changes intraop.: 2 days
- ◆ Decrease wound complic's: ≥ 4 wk.
- ◆ **Decrease Resp. Complications :**

Cardiac: ≥ 8 wk.

Thoracic: > 4 weeks

Abstinence @ 1yr:

- ◆ After ACB: 55%
- ◆ Angioplasty : 25%
- ◆ Angiography: 14%

(Effect of preoperative smoking cessation interventions on postoperative complications and smoking cessation.

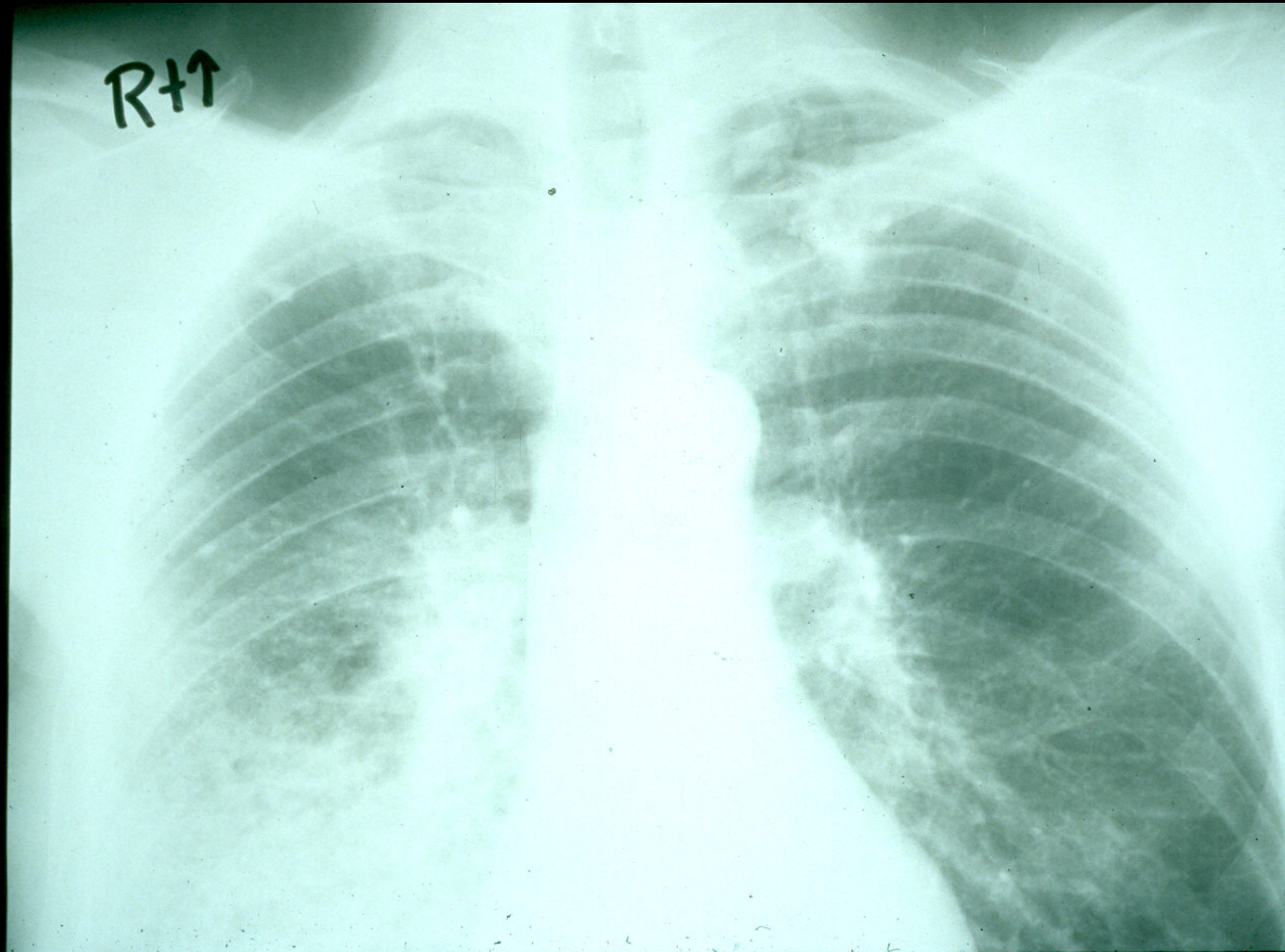
Thomsen T, et al. Br J Surg 2009; 96: 45-61)

Preoperative Physiotherapy

- ◆ Proven decrease in pulmonary complications in COPD
- ◆ Particularly in patients with excessive secretions
- ◆ No proven superior modality

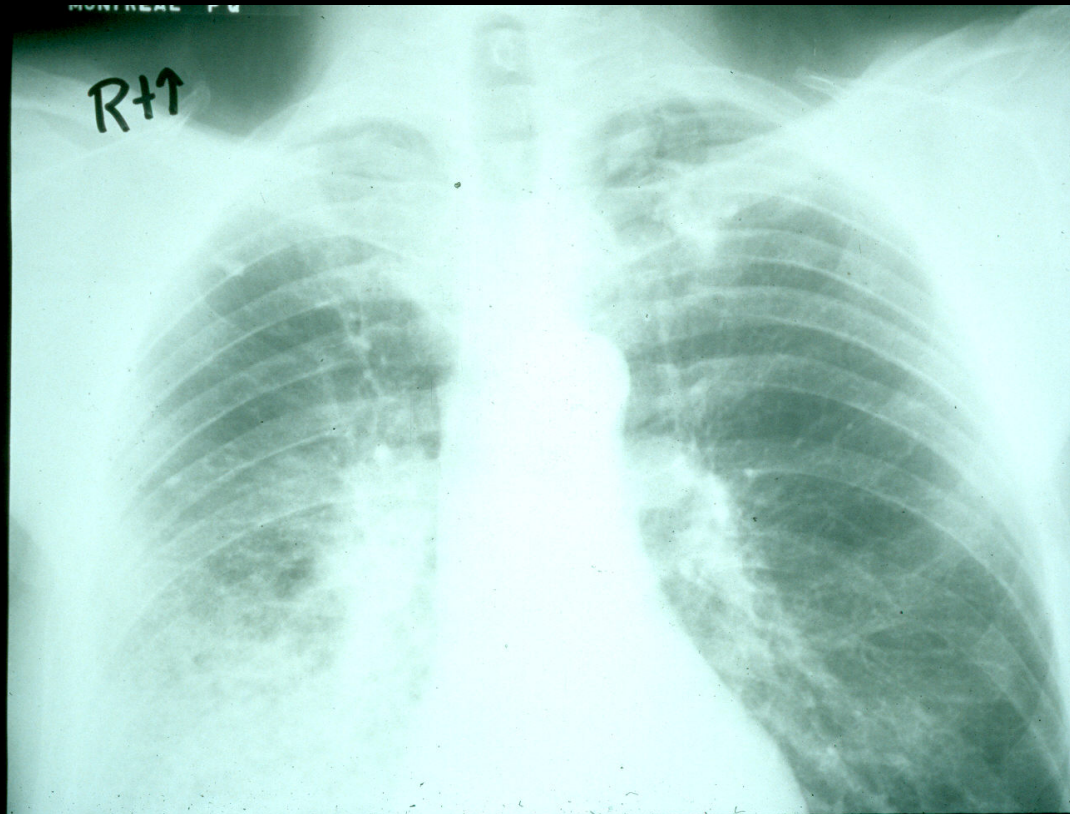
Warner DO, Anesthesiology 2000, 92: 1467

Will this patient tolerate a pneumonectomy?



Will this patient tolerate a pneumonectomy?

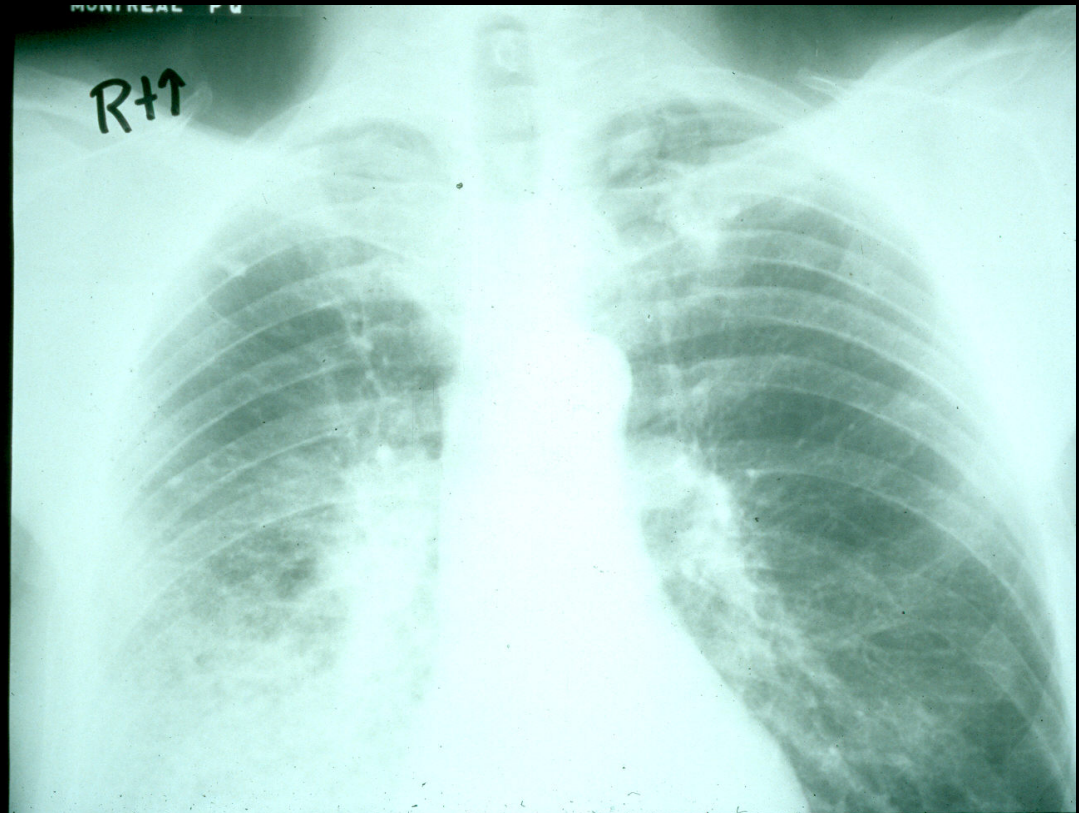
- Age 55
- FEV1 50%
- DLCO 45%
- Exercise tol.
3 flights
- V/Q R:L
40: 60
- pH 7.44
PaCO₂ 48
PaO₂ 68



Will this patient will tolerate a pulmonary resection?

Surgical Options:

- Sleeve Resection
- Bi-lobectomy
- Segment/Wedge Resection
- VATS
- Emphysema Surg. LVR/Bullectomy



Initial Pre-Anesthetic Assessment for Pulmonary Resection

- ◆ All patients: Exercise tolerance, ppoFEV1%, D/C smoking, Regional analg., ? Imaging
- ◆ ppoFEV1 < 40 %: DLCO, Exercise test, V/Q scan
- ◆ Cancer patients: the “4-Ms”, s. electrolytes
- ◆ COPD: ABG, chest physio., bronchodilators

Final Pre-Anesthetic Assessment for Pulmonary Resection

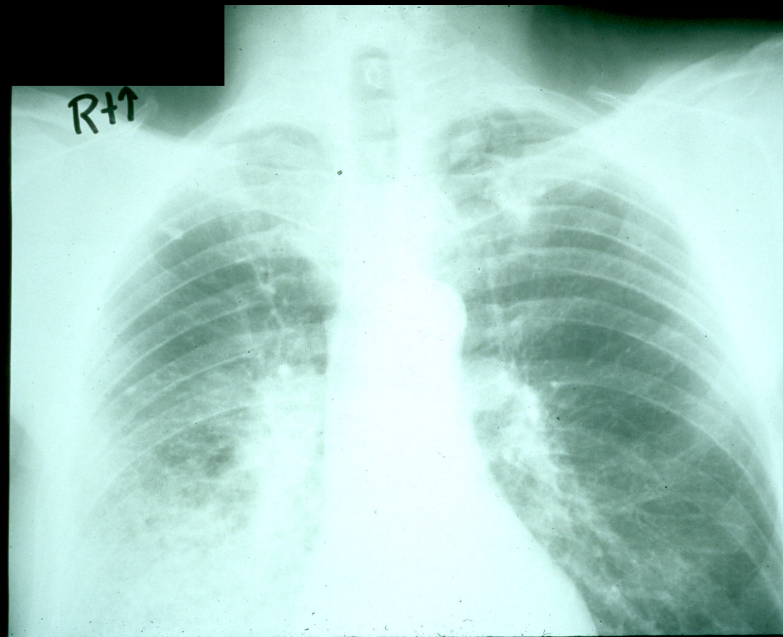
- ◆ Review Initial Assessment and Test Results
- ◆ Examine the Chest X-ray and CT scan
- ◆ Assess the Risk of Hypoxemia During One-Lung Ventilation
(Lohser J. *Anesth Clin* 2008; 26: 241-72)

Preoperative Assessment for Thoracic Surgery, References:

- Poonyagariyagorn H, Mazzone PJ. Lung cancer: preoperative pulmonary evaluation of the lung resection candidate. *Sem Resp Crit Care Med* 2008, 29: 271-284
- Collice GL, et al. Physiologic evaluation of the patient with lung cancer being considered for resectional surgery: ACCP evidenced-based clinical practice guidelines. *Chest* 2007, 132: 161s-177s

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