Curative radiotherapy for early-stage lung cancer

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DISCLOSURE: Varian Medical Systems (research support, speakers fees)
Radiotherapy outcomes in 2 eras

**Era of conventional radiotherapy** [Wisnivesky JP, 2010]

SEER database (1992-2002): 6065 unresected patients with histologically confirmed stages I-II NSCLC

Median overall survival (OS) after radiotherapy was 13 months (95% CI, 13-14 months) versus 7 months (95% CI, 6-8 months) in untreated patients.
Stereotactic ablative radiotherapy (SABR)

High-precision image-guided RT characterized by:

- Accurate target definition
- Reproducible tumor positioning
- High doses delivered in 3-8 fractions

4D CT scan  On-table CT scan pre-treatment  Delivery in < 5 mins possible
SABR possible on many machines: Axesse, Cyberknife, Novalis Tx, Tomotherapy, Trilogy, TrueBeam, Vero, ... (alphabetical order)
• T1 tumors - 3 fractions of 18 Gy (*delivered in 1 week*)
• T1 tumors with broad contact with chest wall/mediastinum & T2 tumors 5 fractions of 11 Gy (*1.5 weeks*)
• Tumors close to pericardium or hilus - 8 fractions of 7.5 Gy (*2.5 weeks*)

Patient positioned on a linear accelerator equipped with on-board imaging
- Grade 3 or higher toxicity uncommon [Chi A, 2010]
- Well tolerated by elderly patients [Haasbeek CJ, 2010]
- Quality of life maintained [van der Voort van Zyp N, 2010; Senan S, 2010; Widder J, 2011]
- Little decline in pulmonary function [Henderson M, 2008; Stephans KL, 2009; Phernambucq E, 2011]
Overall survival across entire period (1999-2007)

- 843 elderly patients in North Holland
- Surgical 30-day mortality: 7.4%.
- SBRT 30-day mortality: 1.0%

Palma D, JCO 2010
Stage I NSCLC in elderly patients: A population-based matched-pair comparison of stereotactic radiotherapy versus surgery [Palma D, 2011]

Withholding stereotactic radiotherapy in elderly patients with stage I NSCLC and co-existing COPD is not justified: Outcomes of a Markov model analysis [Louie A, 2011]
4605 stage I NSCLC patients aged ≥75 years

- **2001-2003**
  - Surgery: 37%
  - Radiotherapy: 31%
  - Neither: 32%

- **2004-2006**
  - Surgery: 36%
  - Radiotherapy: 33%
  - Neither: 31%

- **2007-2009**
  - Surgery: 37%
  - Radiotherapy: 38%*
  - Neither: 25%

* estimated utilization of SABR in radiotherapy group was >75%,
4605 stage I NSCLC patients aged ≥75 years

All patients
Median 16.4→24.4 months

No treatment
Median 6.6 months
Radiotherapy outcomes in 2 eras

**Era of conventional radiotherapy** [Wisinvesky JP, 2010]

SEER database (1992-2002): **6065** unresected patients with histologically confirmed stages I-II NSCLC

Median overall survival (OS) after radiotherapy was **13 months** (95% CI, 13-14 months) versus **7 months** (95% CI, 6-8 months) in untreated patients

**Era of stereotactic radiotherapy (or SABR)**

Time-trend analysis in **843** stage I patients aged ≥75 years in 2 provinces (1999-2007). Median OS for all patients increased from **16 to 21 months**; statistically significant for radiotherapy cases, where OS increased by 6 months [Palma D, 2010]

Time-trends analysis in Dutch national population identified **4605** patients with stage I NSCLC aged ≥ 75 years (2001-2009). For radiotherapy cases, median OS increased from **16.8 to 26.1 months** [Haasbeek CJ, Proc WCLC 2011]
Acute changes post-SABR

Diffuse Consolidation (>5 cm)  Patchy Consolidation (≤5 cm)

Diffuse GGO (>5 cm)  Patchy GGO (≤5 cm)

Dahele M, JTO 2011
Radiological follow-up post-SABR

Expert multi-disciplinary follow-up required

Modified Conventional

Mass-like

Scar-like

Dahele M, J Thorac Oncol 2011
• Local control rates of >90% with limited toxicity [Baumann P, 2009; Timmerman R, 2010]
• Population-based survival improvements in elderly patients [Palma D, 2010; Haasbeek C, WCLC abstract 2011]
• SABR accepted as a standard of care in Japanese and Dutch patients with a stage I NSCLC who are unfit for surgery

SIOG posters 113 and 142: Patient participation in treatment decisions for stage I NSCLC and An evaluation of websites providing patient information on SABR for stage I NSCLC."