Patterns of disease recurrence after SABR for early stage NSCLC:

Optimizing follow-up schedules for salvage therapy

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Conflicts of interest

- The Department of Radiation Oncology, VUMC, has a research agreement with Varian Medical Systems

- FLA, MDA, BSL, SSE have received speakers honoraria from Varian Medical Systems

Background

- SABR is the recommended treatment for inoperable early-stage NSCLC
- We treat increasing numbers of fitter patients who:
  - have longer follow-up periods due to fewer co-morbidities
  - are more likely to be fit for salvage treatment
- Current ESMO follow-up recommendations:
  - CT-imaging every 3-6 months for 2-3 years, annually thereafter, especially in patients suitable for salvage
- **Limited clinical data available on SABR to base follow-up schedules**

Materials & Methods

- Patients from a single institutional database treated with SABR for NSCLC (N = 1211), but **excluding**:
  - *TNM-stage other than T1-2N0M0*
  - *Synchronous lung tumors*
  - *Previous treatment for index tumor*
  - *Biologically effective dose <100Gy$_{10}$*

- Post treatment follow-up:
  - CT at 3, 6, 12, 18, 24 months, annually thereafter

Materials & Methods: Definitions

- **Local recurrence**: in, or adjacent to planning target volume (PTV)
- **Loco-regiona**l **recurrence**: local recurrence ± regional recurrence
- **Regiona**l **recurrences only:** (not a subject of this study)

- **Second primary lung cancer** (Martini et al. 1995):
  - Different histology
  - Same histology if:
    - Free interval between cancers at least 2 years or,
    - Origin from carcinoma in-situ or,
    - Second cancer in different lobe or lung without lymph node metastasis and no extra-pulmonary metastasis

Results

- 855 patients treated with SABR for early stage NSCLC
- Median follow-up: 52 months

Characteristics of 855 patients	**N(%) of Median (range)**
Age (years)	74 (45-91)
Gender -Male -Female	 516 (60%) 339(40%)
Pathological diagnosis -Yes - No	 308 (36%) 547 (64%)
WHO-performance score -0 -1 -2 -3	 **111 (13%)** **446 (52%)** 256 (30%) 38 (4%)
Charlson co-morbidity index	2 (0-11)
Medically inoperable -Yes -No	 613 (72%) 242 (28%)

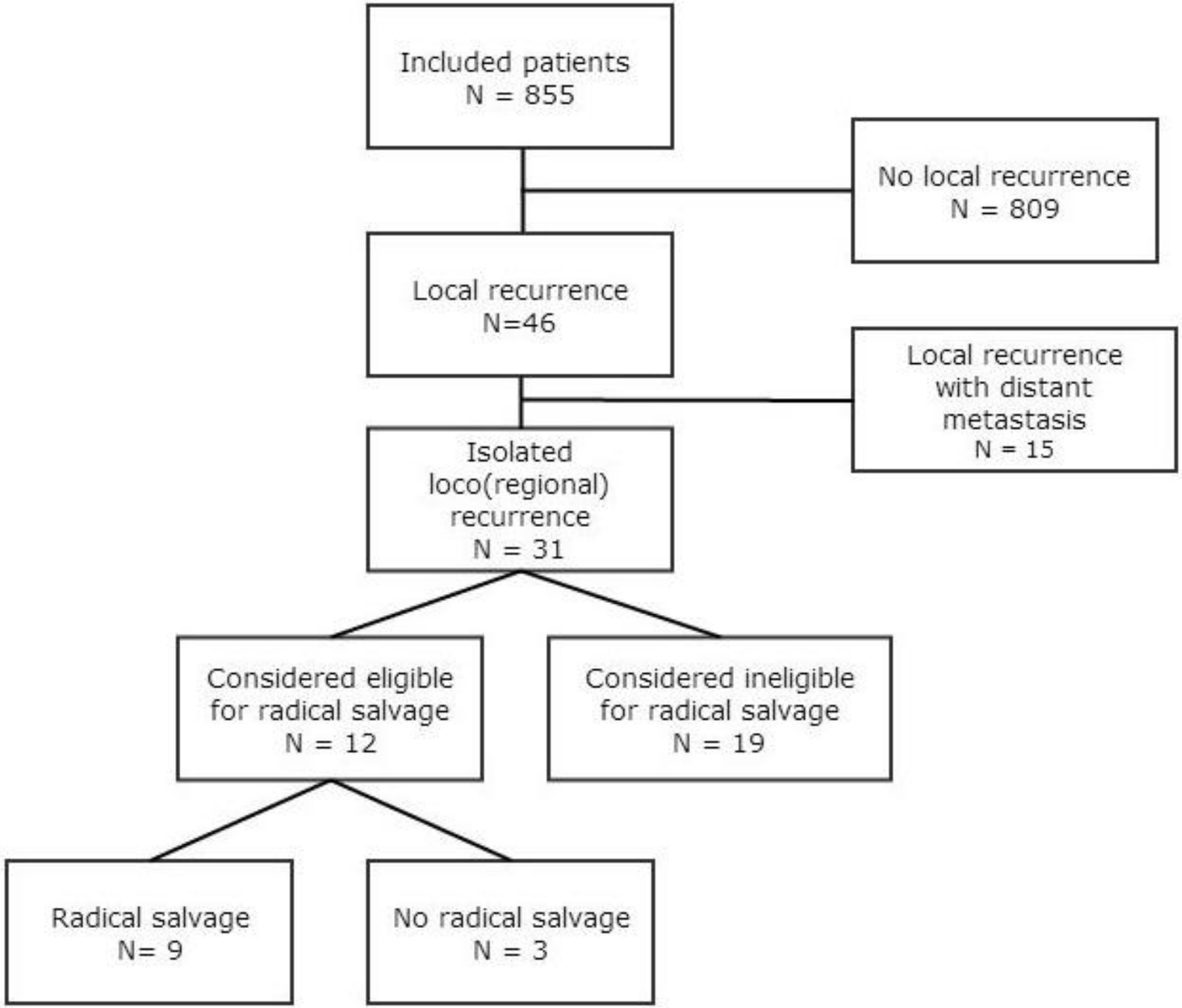
Results: Local recurrence

- Local control:
  - 1 year: 98.9%
  - 3 year: 92.4%
  - 5 year 90.9%

- **46 patients**; median time to local recurrence 22 months (7-87 months)
- 39% had pathology confirmation, 61% had only PET-confirmation

- No significant correlation of any of the investigated factors:
  - Age
  - Gender
  - Tumor stage
  - Pathology / histology
  - Fractionation scheme
  - Treatment delivery technique
  - PTV-size
  - Prior (pulmonary) malignancy

Results: Salvage therapies



Results: Survival after local recurrence

- Median overall survival after **radical treatment** of local recurrence:
  - **36** months (95%CI: 17 – 54 months)
  - 2 year overall survival: 64%

- Median overall survival following **any local recurrence**:
  - **13** months (95% CI: 9 – 17 months)
  - 2 year overall survival: 23%

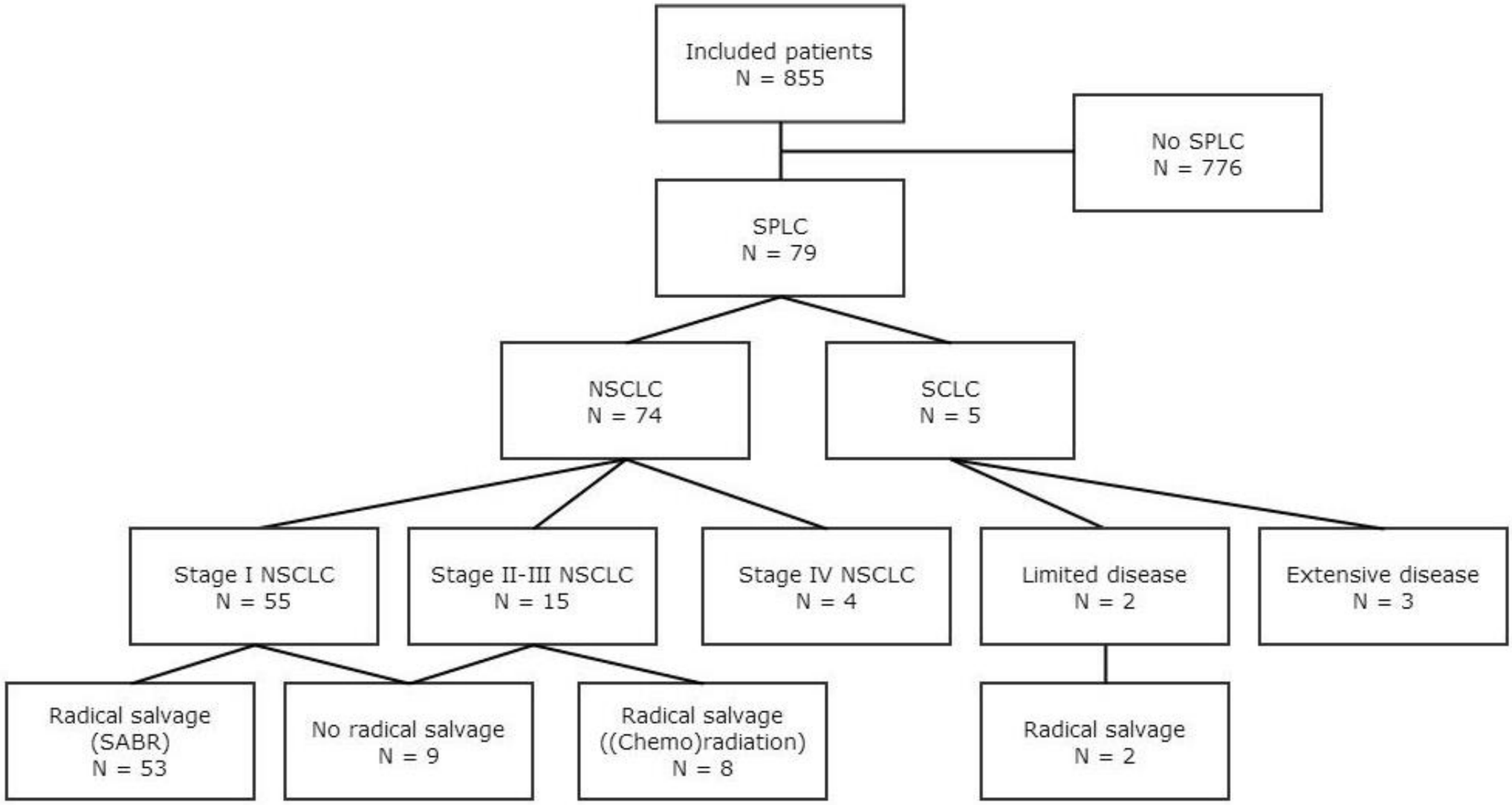
Results: SPLC

- Actuarial cumulative incidence of a second primary lung cancer (SPLC):
  - 1 year: 1.9%
  - 3 year: 11.7%
  - 5 year: 16.7%

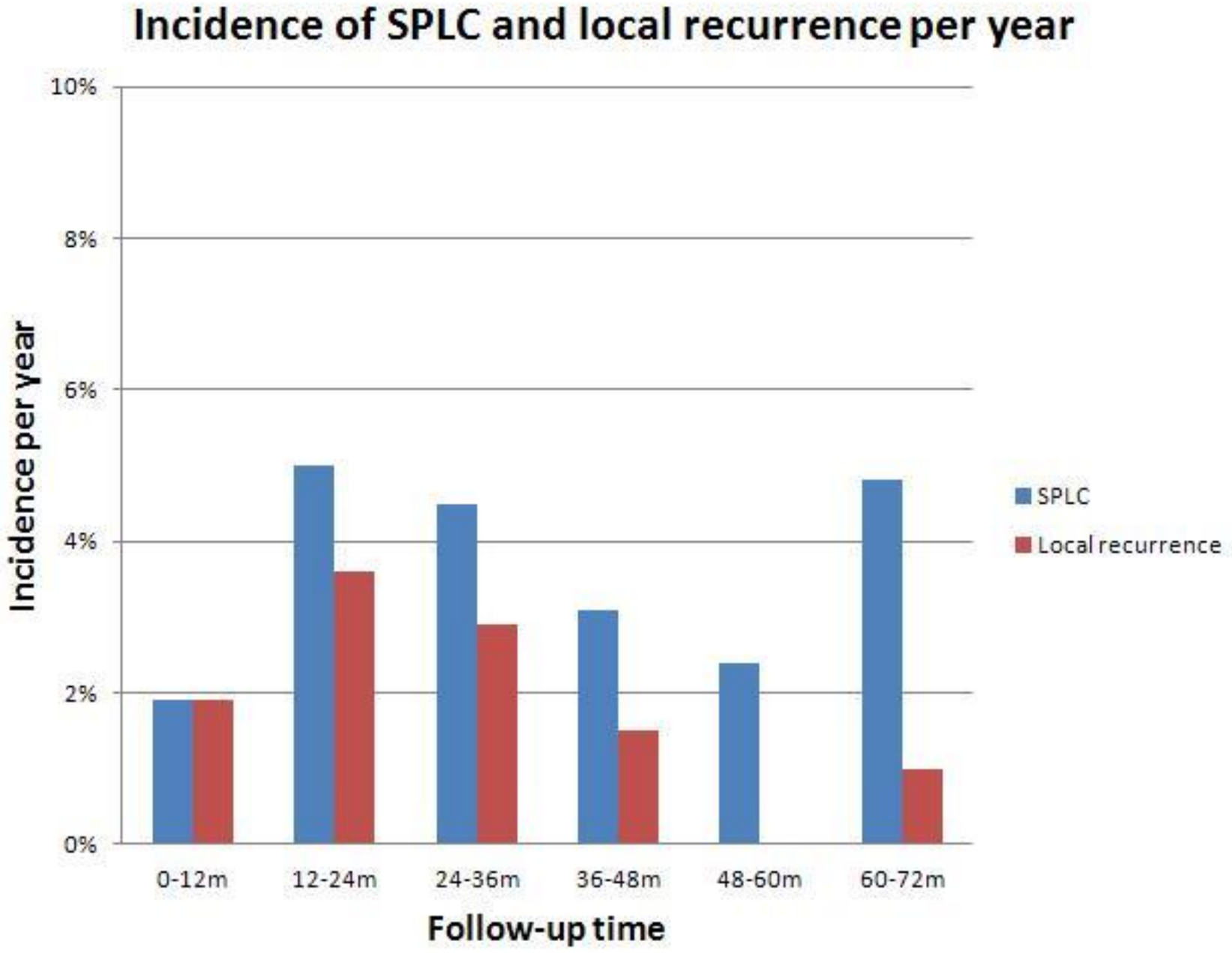
- **79 patients** with a diagnosis of a second primary lung cancer
- Median time to diagnosis of SPLC: 34 months (range 3-105 months)

- Pathological confirmation available in only 27%

Results: Salvage therapies of SPLC



Results: Recurrence Patterns



Conclusions

- Local recurrences occurred up to **87** months post-SABR
- **2/3** of local recurrences were either isolated local or loco-regional
- Only **22%** of patients with local recurrence underwent salvage (*predominantly unfit patients in early years of SABR program*)

- Incidence of second primary lung cancer: 2-5% per year
- However, **80%** of second primary lung cancers underwent radical salvage treatment

- **Our results support long term follow-up with CT-imaging for all patients fit for any type of salvage.**