

Endobronchial brachytherapy as a curative treatment

C. Hennequin
Hôpital Saint-Louis, Paris

Endobronchial brachytherapy

- Palliative treatment
 - Since 1985
 - Desobstruction of the bronchial lumen
 - With or without laser therapy
- Several retrospective and prospective studies:
 - Palliative effect: 60 - 90%
 - Tumor shrinkage: 50 - 80%
 - Long-term local control: 30 - 60%

EBBT is an effective palliative tool

	N° Pts	Previous EBRT	Laser before BT	Symptomatic improvement (%)	Endoscopic regression (%)
Seagren	18	18	4	94	CR: 33; PR:67
Macha	56	19	3	79	82
Mehta	52	31	12	70	-
Burt	91	0	-	66	-
Bedwinek	38	38	9	76	82
Speiser	94	-	7	89	70
Zajac	56	21	-	26-100	65
Gollins	406	65	7	46-92	-
Hernandez	29	29	3	24-69	42
Kelly	175	160	-	66	78

Palliative effect of EBBT

324 unpreviously treated pts

Effective Palliation:

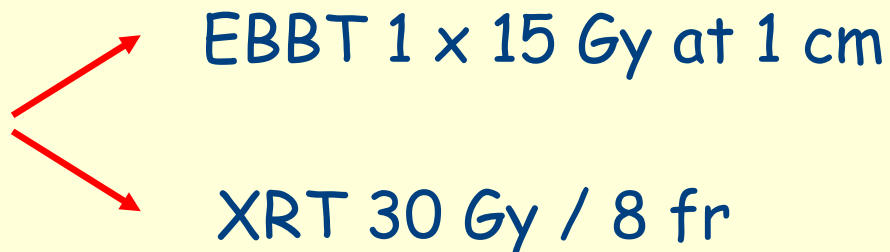
- Stridor	92 %
- Haemoptysis	88 %
- Cough	62 %
- Dyspnoea	60 %
- Pain	50 %
- Pulmonary collapse	46 %

Clinical and quality of life
after EBBT or external irradiation
in palliative treatment of lung cancer

Randomized trial

Non-small-cell lung cancer - 99 patients

Stage III, WHO performance status 0-2,
bronchial symptoms



Clinical and quality of life after EBBT or EBRT: Palliative treatment of lung cancer

End-Point	EBBT	XRT	P
n	49	50	
Massive haemoptysis	4	3	
Global palliation	76%	91%	0.09
Chest pain relief	43%	77%	0.003
Tiredness	30%	65%	0.003
1 yr-survival	22%	38%	
2 yr survival	2%	10%	0.04

Clinical and quality of life after EBBT or EBRT: Palliative treatment of lung cancer

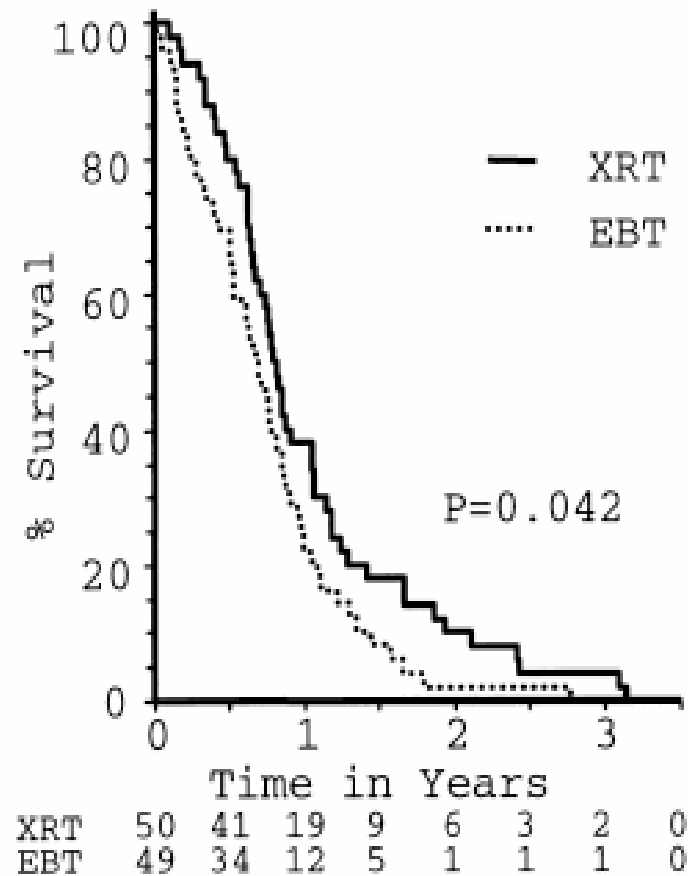


Fig. 1. Percentage crude survival by initial treatment. XRT $n = 50$. EBT $n = 49$.

Stout, Radioth. Oncol., 2000

Endobronchial brachytherapy: Late toxicity

- Haemoptysis
- Radiation Bronchitis

Endobronchial brachytherapy (EBBT): Curative treatment

1. Localized endobronchial tumors not suitable for surgery or EBRT
2. In combination with chemo-radiotherapy for locally advanced NSCLC

EBBT: Curative treatment St Louis' experience

- Between 1990 and 2000, 307 pts treated with EBBT
- Among them: **106** had:
 - Limited endobronchial tumor
 - NO - M0
 - Not visible on CT scan or ≤ 1 cm thickness
 - OMS 0 - 1 - 2
 - Contraindication for surgery or EBRT

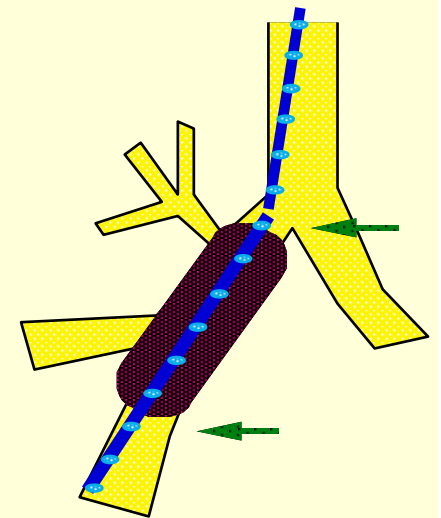
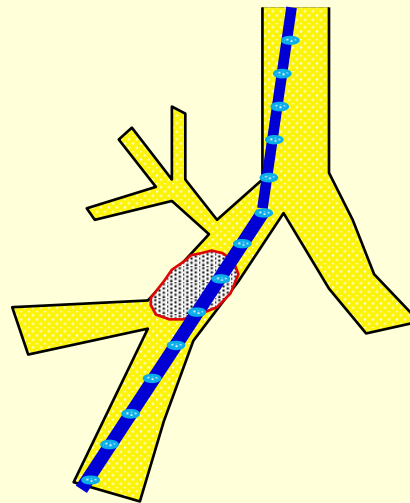
EBBT: Curative treatment - St Louis' experience

Indications for EBBT

Relapse after surgery	43	# 40%
Relapse after EBRT	27	# 25%
Chronic Respiratory insufficiency	27	# 25%
In Situ carcinoma	5	# 5%
Multiple sites	4	# 5%
Total	106	

EBBT: Technique

- Target Volume:
 - Endobronchial T
 - + 2 cm margins



- Dose /fractionation:
 - 5 or 7 Gy / weekly
 - 5 or 6 fractions
 - Total dose: 30-42 Gy

Curative EBBT: Results Response

- 4-8 weeks after the last session

Complete response	No visible tumor Negative biopsies	60%
Complete macroscopic response	No visible tumor No biopsy performed	22%
Partial response	Tumor shrinkage $\geq 50\%$ or positive biopsies	8.5%
No response	Tumor shrinkage $< 50\%$ Stabilization or progression	7.5%
Not evaluated		2%

Curative EBBT: Response

Author	Technique	N° pts	Response rate (%)
Perol	3-5 x 7 Gy	19	83
Marsiglia	6 x 5 Gy	34	94
Taulelle	3-5 x 7-10 Gy	22	96
Peiffert	6 x 5 Gy	33	95
Freitag	5 x 4 Gy + PDT	33	97
This study	5-6 x 5-7 Gy	106	82

Curative EBBT: Local control

- Actuarial local control:
 - At 2 yrs: 60.3%
 - At 5 yrs: 51.6%
- Prognostic factors for local control:

	Yes	No
T. Size \leq 2 cm	69.6%	39.7%
Bronchial obstruction \leq 25%	67.1%	34.6%
T. Not visible on CT scan	20.1%	59.5%

- Not significant:
Cancer History, Previous irradiated field,
brachytherapy dose

Curative EBBT: Local control

Author	N° pts	Follow-up (yrs)	Local control rate (%)
Perol	19	2	75
Marsiglia	34	2	85
Freitag	32	2	81
This study	106	2	60.3
		5	51.6

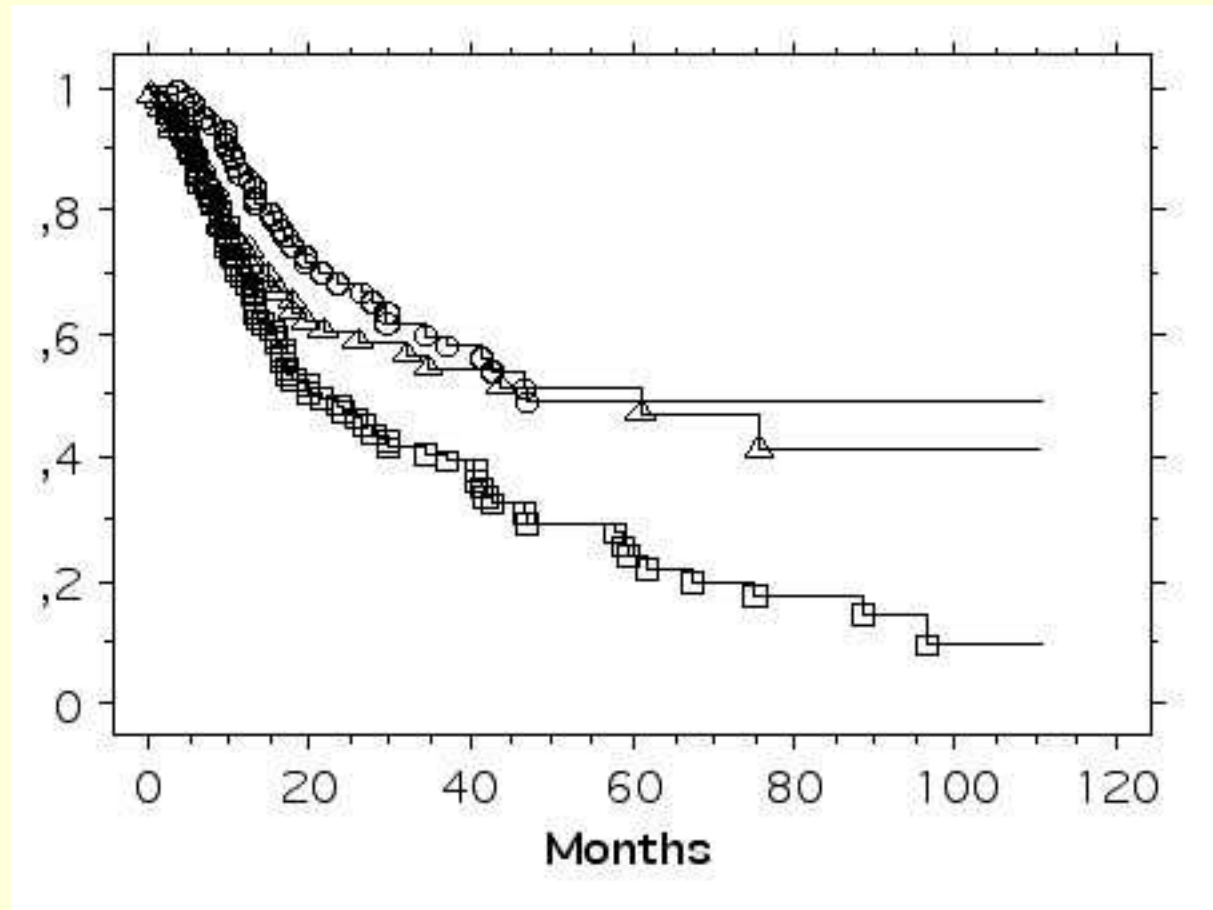
EBBT: Survival at 5 yrs

- Overall survival : 24%
- Cause-specific survival: 48.5%

Causes of deaths:

Lung cancer:	48%
Toxicity of EBBT:	6.7%
Respiratory failure:	17.6%
Cardiac failure:	18.7%
Second cancer:	2.6%
Other intercurrent disease:	2.6%
Unknown (Not lung cancer):	2.6%

- Local Control
- △ Cause-specific survival
- Overall survival



Survival after EBBT

Author	N° pts	Follow-up (yrs)	Survival rate (%)
Perol	19	2	58
Marsiglia	34	2	78
Taulelle	22	2.5	46
Peiffert	33	2	53
This study	106	2	47.4
		5	24

Prognostic factors for survival

- Overall survival:

- **Cancer History:**

- No previous treatment: 45.4%
 - Relapse after surgery: 47%
 - Relapse after EBRT: 24.2%

- Not significant: Tumour volume, Dose, local control
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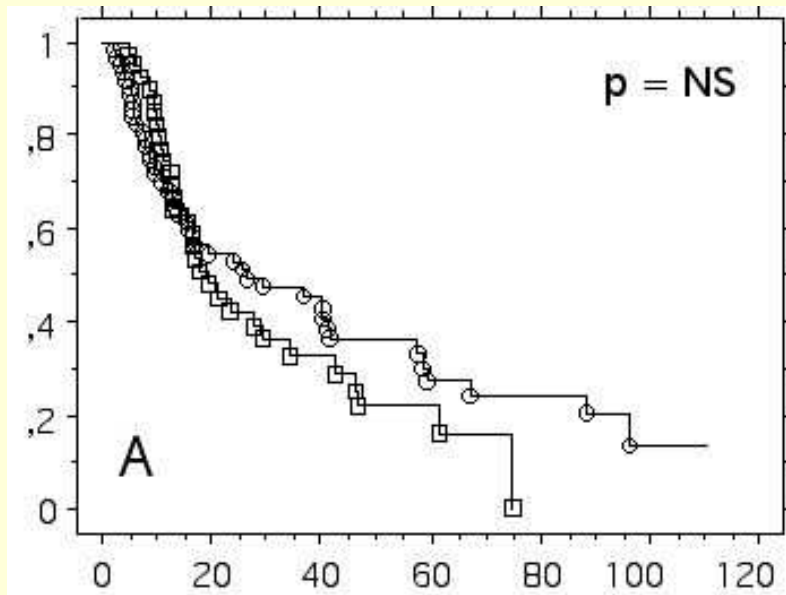
- Cause-specific survival:

- **Local control**

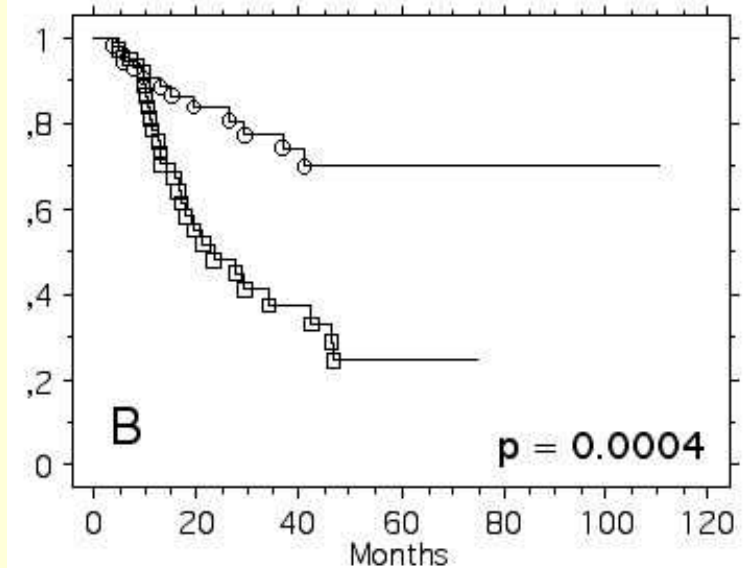
- Not significant: Tumour volume, Dose, Cancer History

Survival and local control

Overall Survival



Cause-specific survival



- Locally controlled
- Local failure after EBBT

Toxicity

- Toxic deaths: 5
 - Massive hemoptysis: 2
 - One uncontrolled disease
 - One upper right lobe tumour
 - Necrosis of the bronchial wall: 3
 - With 2 post-pneumonectomy stump relapses
- Radiation bronchitis: 13
 - Grade 2*: 9
 - Grade 3*: 4

* Speiser classification

HDR-Brachytherapy
In combination of EBRT
for first line treatment
of locally advanced NSCLC

Combination of HDR-BT and EBRT for initial treatment of NSCLC

Author	EBRT (Gy)	Brachyth.		Population	N° pts
		Dose rate	Dose/fraction		
Huber*, 1997	50	HDR	10/2	IIIB-IV	56
Furuta, 1999	40	HDR	18/3	Occult NSCLC	5
Horms, 1999	50	HDR	15/3-5	Trachea	7
Saito, 2000	40	LDR	25/1	Occult NSCLC	71
Fuwa, 2001	45	MDR	28/1	Medically inoperable	39
Mantz, 2004	54-70	HDR	30/2-4	Medically inoperable	39

* Randomised study

EBRT vs EBRT + EBBT

- 98 pts - Stage I to IIIB (*Langendjik, Radioth.Oncol., 2001*)

	EBRT alone	EBRT + EBBT	P
Improvement in:			
Dyspnea (%)	37	46	NS
Atelectasia (%)	35	57	0.009
Response (%)	36	46	NS
Median survival (mths)	8.5	7.0	NS

EBRT + EBBT for medically inoperable NSCLC

- *Mantz, Brachytherapy, 2004*
- Two groups, unsuitable for surgery, T1-3, N0, M0
- Matching: T stage, T size, Age, gender, KPS, EBRT dose, fractionation, ...

	EBRT+ BT	EBRT	
N° pts	39	78	
5yr local control (%)	58	32	0.031
3 yr DFS (%)	19	11	
5 yr OS (%)	15	9	

Which patients benefit from BT ? T1-T2; T size \leq 5 cm

Summary:
HDR-Brachytherapy as a curative treatment
in lung cancer

- In combination with EBRT
 - For first line therapy of NSCLC
 - No definitive conclusion
- Alone for purely endobronchial tumour
 - Unsuitable for surgery or EBRT
 - Long-term local control: > 50%
 - **Must be proposed** +++