The ECLIPSE Study: Efficacy of Cryoablation in Patients with Metastatic Lung Cancer over 5 Years

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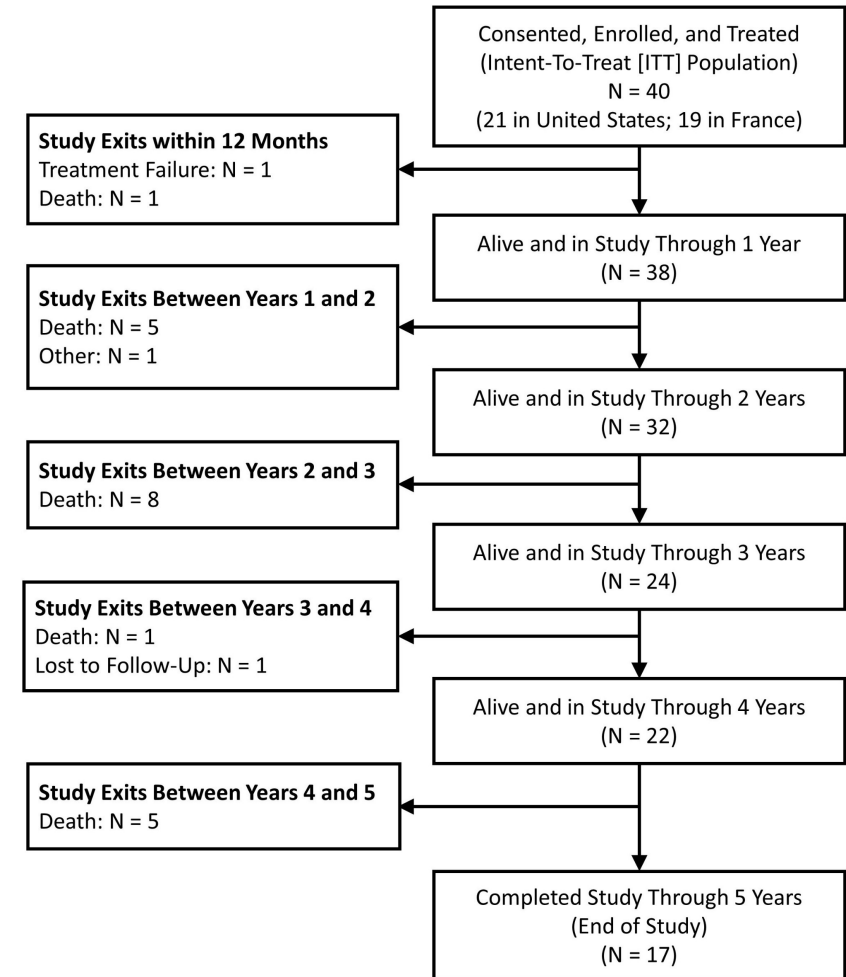
Purpose

The primary objective of ECLIPSE was to **assess long-term efficacy of cryoablation for local tumor control** in patients with pulmonary metastatic disease over the course of five years.

Methods

- Prospective, multicenter, single-arm study of cryoablation in patients with metastatic lung tumors

- Primary endpoint: local tumor control over five years of follow-up
  - Per tumor and per subject

- Secondary endpoints:
  - Disease-specific survival
  - Overall survival (OS)
  - Quality of life
    - Karnofsky Performance Score
    - ECOG Performance Score

ECOG: Eastern Cooperative Oncology Group

Methods

- Inclusion Criteria:
  - Aged 18 or older
  - Diagnosis of pulmonary metastatic disease
  - 1 to 5 metastatic lung tumors, each with a diameter of ≤ 3.5 cm
  - ECOG Performance Score of 0-2
  - Received no previous local therapy to currently targeted metastases

- Exclusion Criteria:
  - Platelet count of less than 50,000/mm3
  - International Normalized Ratio > 1.5
  - Evidence of infection or neutropenia (neutrophil count < 1000ml)

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Consented, Enrolled, and Treated
(Intent-To-Treat [ITT] Population)
N = 40
(21 in United States; 19 in France)

Study Exits within 12 Months
Treatment Failure: N = 1
Death: N = 1

Alive and in Study Through 1 Year
(N = 38)

Study Exits Between Years 1 and 2
Death: N = 5
Other: N = 1

Alive and in Study Through 2 Years
(N = 32)

Study Exits Between Years 2 and 3
Death: N = 8

Alive and in Study Through 3 Years
(N = 24)

Study Exits Between Years 3 and 4
Death: N = 1
Lost to Follow-Up: N = 1

Alive and in Study Through 4 Years
(N = 22)

Study Exits Between Years 4 and 5
Death: N = 5

Completed Study Through 5 Years
(End of Study)
(N = 17)
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Patient Characteristics

	N (%)
Age, years (Mean, ± SD)	62.6 ± 13.3
Male	24 (60%)
BMI (Mean, ± SD)	26.7 ± 5.3
Patients with Prior treatment(s)	30
Systemic chemotherapy	17 (42.5%)
Surgery	14 (35.0%)
Radiofrequency ablation	7 (17.5%)
Radiation treatment	5 (12.5%)
Cryotherapy / Microwave / Other	3 (7.5%) / 2 (5.0%) / 4 (10.0%)
Primary cancer diagnosis	N=40
Colorectal	17 (42.5%)
Renal cell carcinoma	7 (17.5%)
Sarcoma	4 (10%)
Other	12 (30%)

	N (%)
Tumor Size, cm	N=60
0.05-1.0	18 (30%)
1.1-2.0	30 (50%)
2.1-3.0	11 (18.3%)
≥ 3.1	1 (1.7%)
Tumor diameter, cm (Mean, ± SD, range)	1.4 ± 0.7 (0.3, 3.4)
Tumor Distribution	N=40
Unilateral	32 (80%)
Bilateral	8 (20%)

SD: Standard Deviation; BMI: Body Mass Index

Treatment Characteristics

	N (%)
Number of tumors treated per patient (Mean, ± SD, range)	1.8 ± 1.0 (1.0, 4.0)
Procedure time, minutes (Mean, ± SD)	101.2 ± 38.7
Freeze duration per tumor (Mean, ± SD)	21.2 ± 4.6
Anesthesia	
General	32 (67%)
Conscious sedation	15 (31%)
Regional	1 (2%)
Number of cryoablation needles per tumor (Mean, ± SD)	1.6 ± 0.9
Number of freeze-thaw cycles	
2	2 (3%)
3	53 (88%)
4	5 (8%)
Hospital Stay (Mean, ± SD)	1 day (0-4 days); 25.3 ± 21 hrs (7-99 hrs)

SD: Standard Deviation; BMI: Body Mass Index

Local Tumor Control

	Freedom from local failure	
	3 Years	**5 Years**
Per Tumor	91.3%	81.1%
Per Subject	87.1%	74.6%

Number of tumors at risk

<2cm	26	16	13	9	8	1
≥2cm	30	25	18	13	10	2
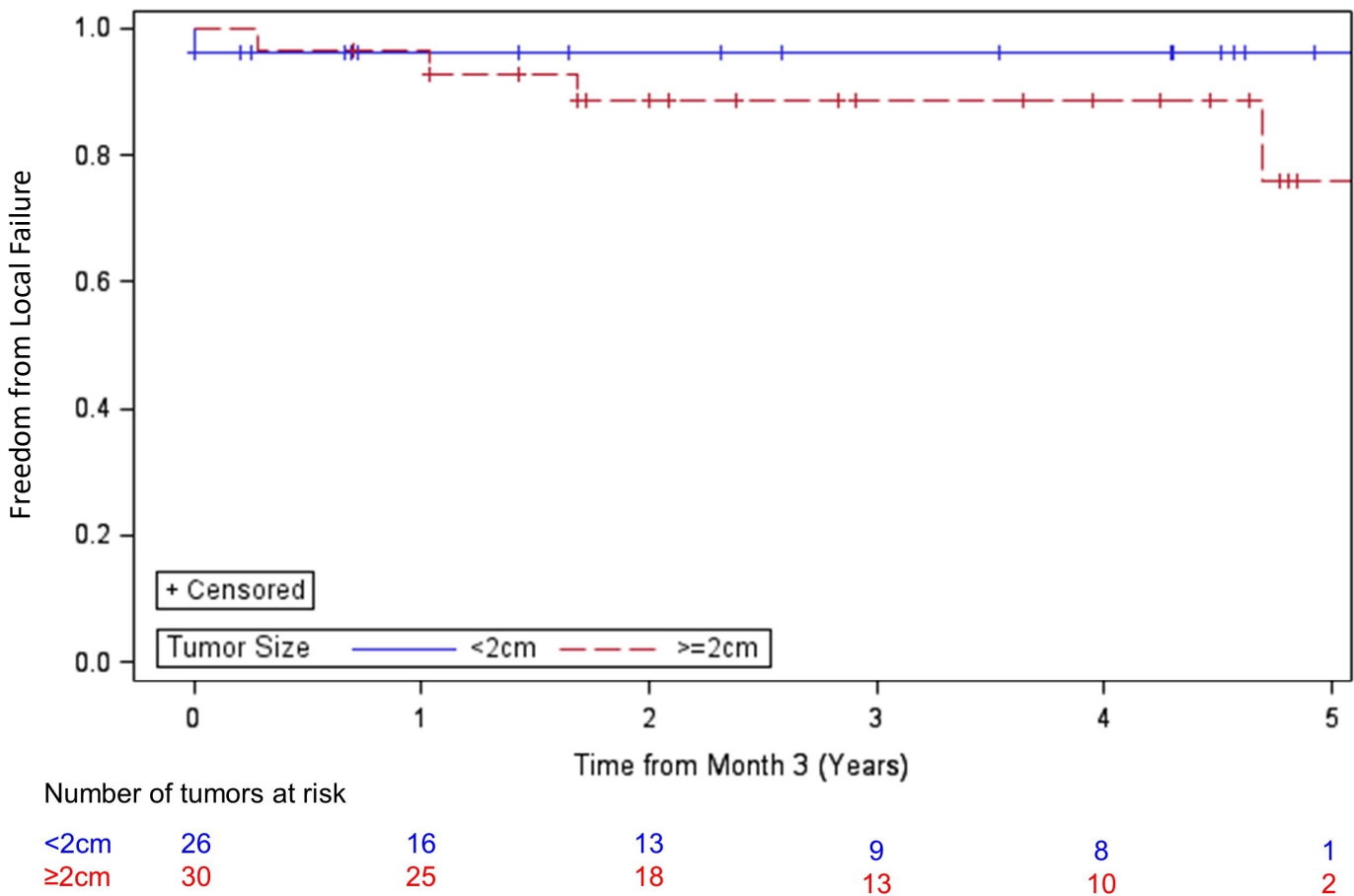
Local Progression and Survival

	3 Years	5 Years
Freedom from Local Disease Recurrence/ Progression	89.3%	78.2%
Disease-Specific Survival	74.8%	55.3%
Overall Survival	63.2%	46.7%
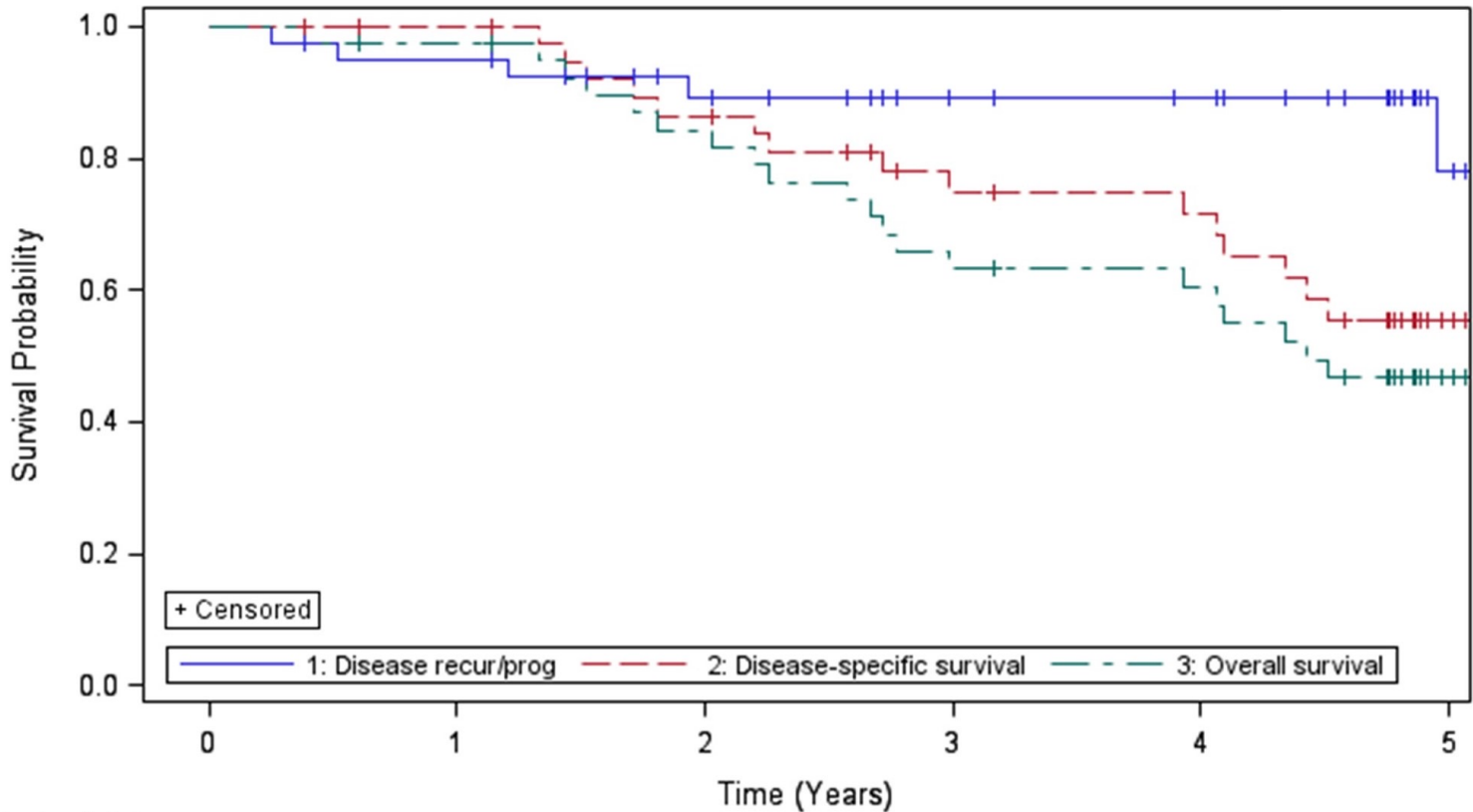
Number of subjects at risk

Disease recur/prog	40	37	30	23	21	7
Disease-specific survival	40	38	32	24	22	7
Overall Survival	40	38	32	24	22	7

ECOG Score

Score	Meaning
0	Fully active, able to carry on all pre-disease performance without restriction
1	Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature
2	Ambulatory and capable of all self-care but unable to carry out any work activities. Up and about more than 50% of waking hours
3	Capable of only limited self-care, confined to bed or chair more than 50% of waking hours
4	Completely disabled. Cannot carry on self-care. Totally confined to bed or chair.

Year	n	ECOG Score Mean (SD) [Range]
Baseline	40	0.3 (+/-0.5) [0.0, 2.0]
1	27	0.4 (+/-0.6) [0.0, 2.0]
2	20	0.4 (+/-0.6) [0.0, 2.0]
3	15	0.1 (+/-0.4) [0.0, 1.0]
4	14	0.4 (+/-0.6) [0.0, 2.0]
5	12	0.8 (+/-0.9) [0.0, 3.0]

- Scores did not significantly change over time

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Summary

- First reported five-year data of cryoablation in patients with lung metastases

- Over five years, cryoablation yielded strong rates of
  - Local tumor control (81.1%)
  - Freedom from local disease (78.2%)

- Cryoablation resulted in five-year disease-specific and overall survival for this population of patients of 55.3% and 46.7%, respectively

- Patient quality of life, as measured by ECOG performance scores, trended upwards over time, but was not statistically significant

Conclusions

Cryoablation is effective for long-term local tumor control in patients with metastatic pulmonary tumors.

Most patients who received cryoablation maintained local tumor control of the treated tumor and maintained quality of life over the course of five years.