

# Radiologie Interventionnelle Thoracique

E. de Kerviler, Hôpital Saint-Louis, APHP

Biopsies

Embolisations

Ponctions

Drainages

Ablations

Repérages

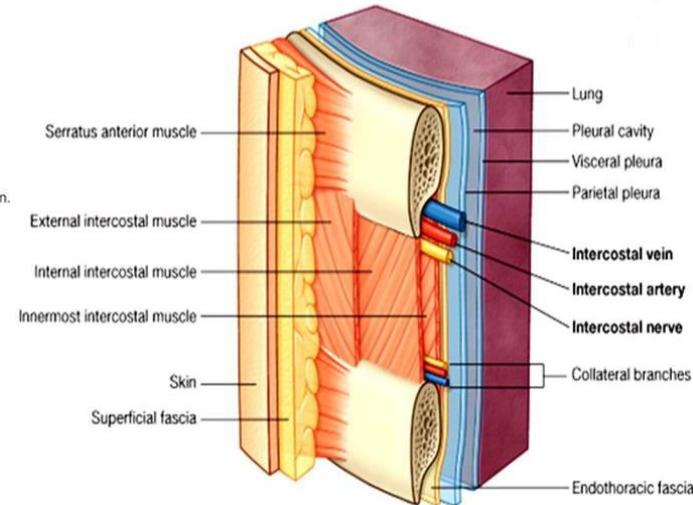
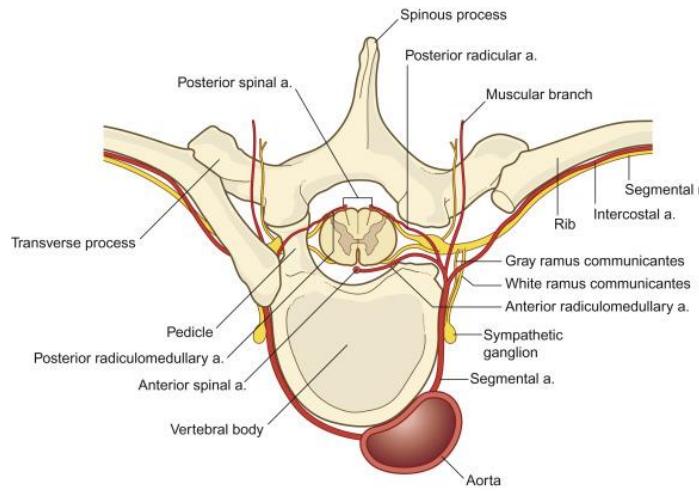
Reperméabilisations

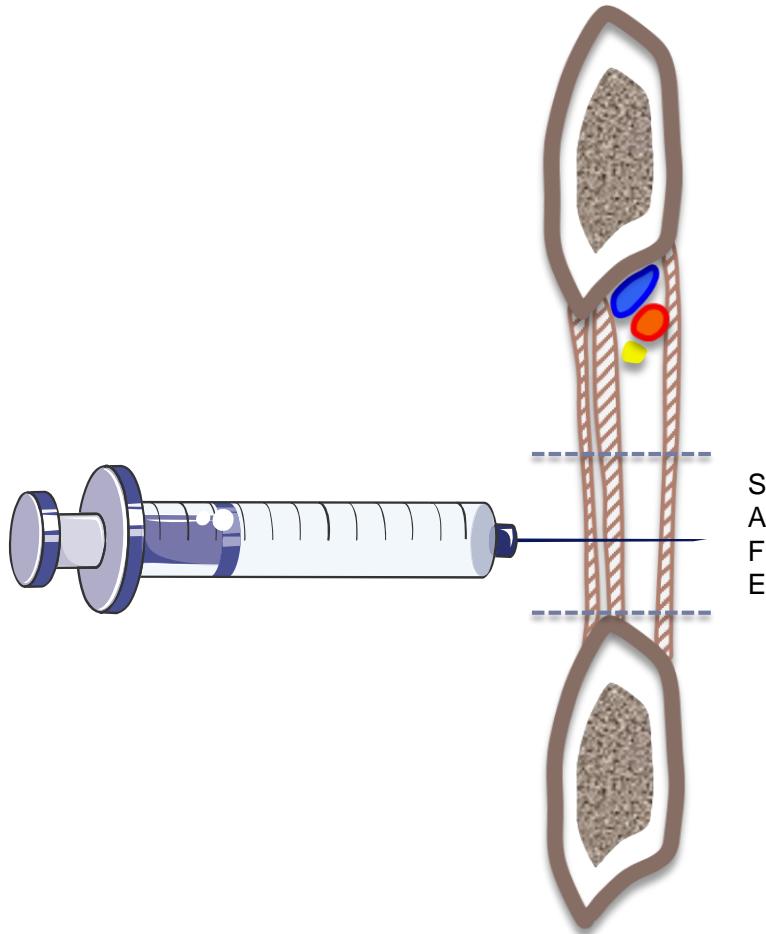


Biopsies Ablations Drainages

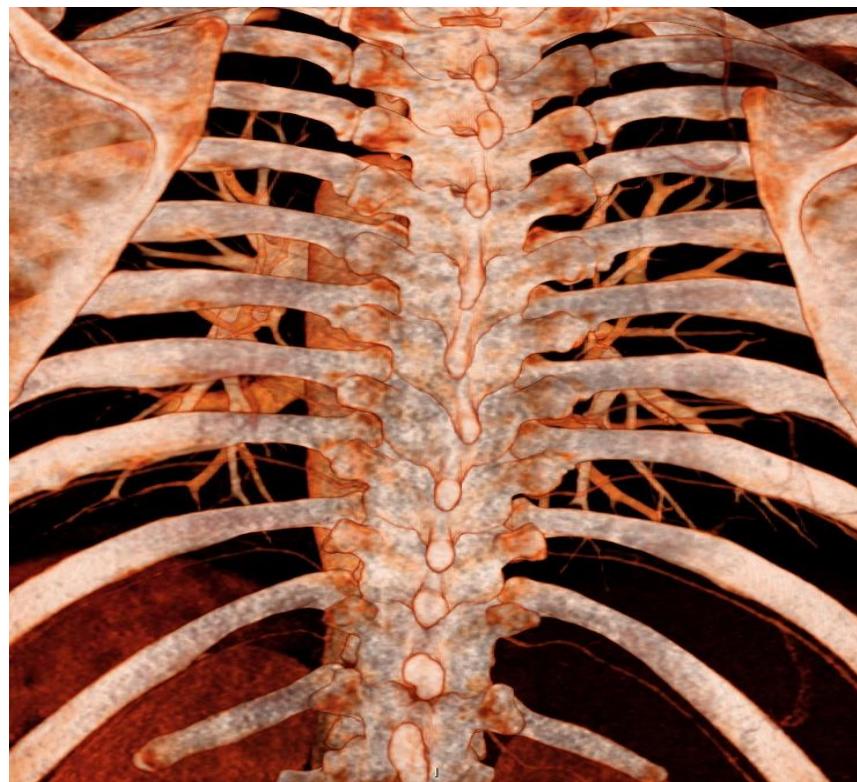
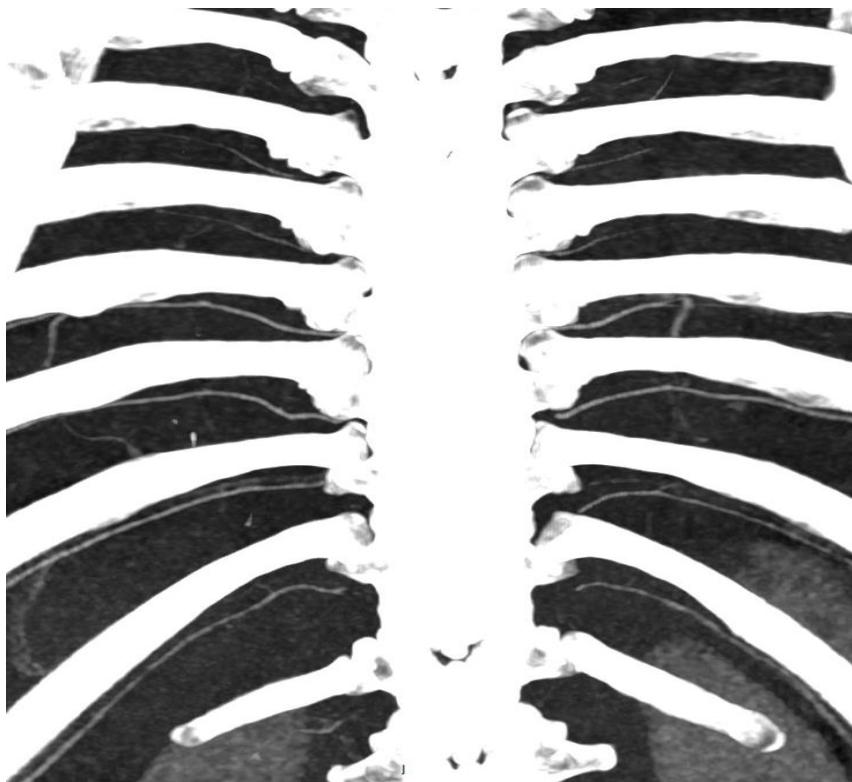
# Un serpent de mer ... Le pédicule intercostal

## ► Que nous disent les livres d'anatomie ?

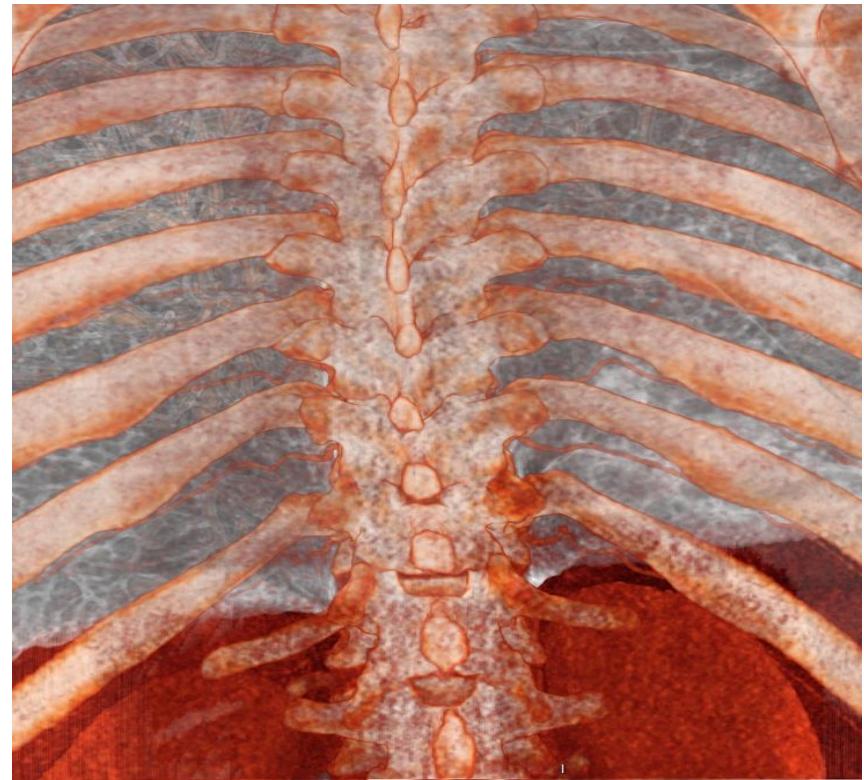




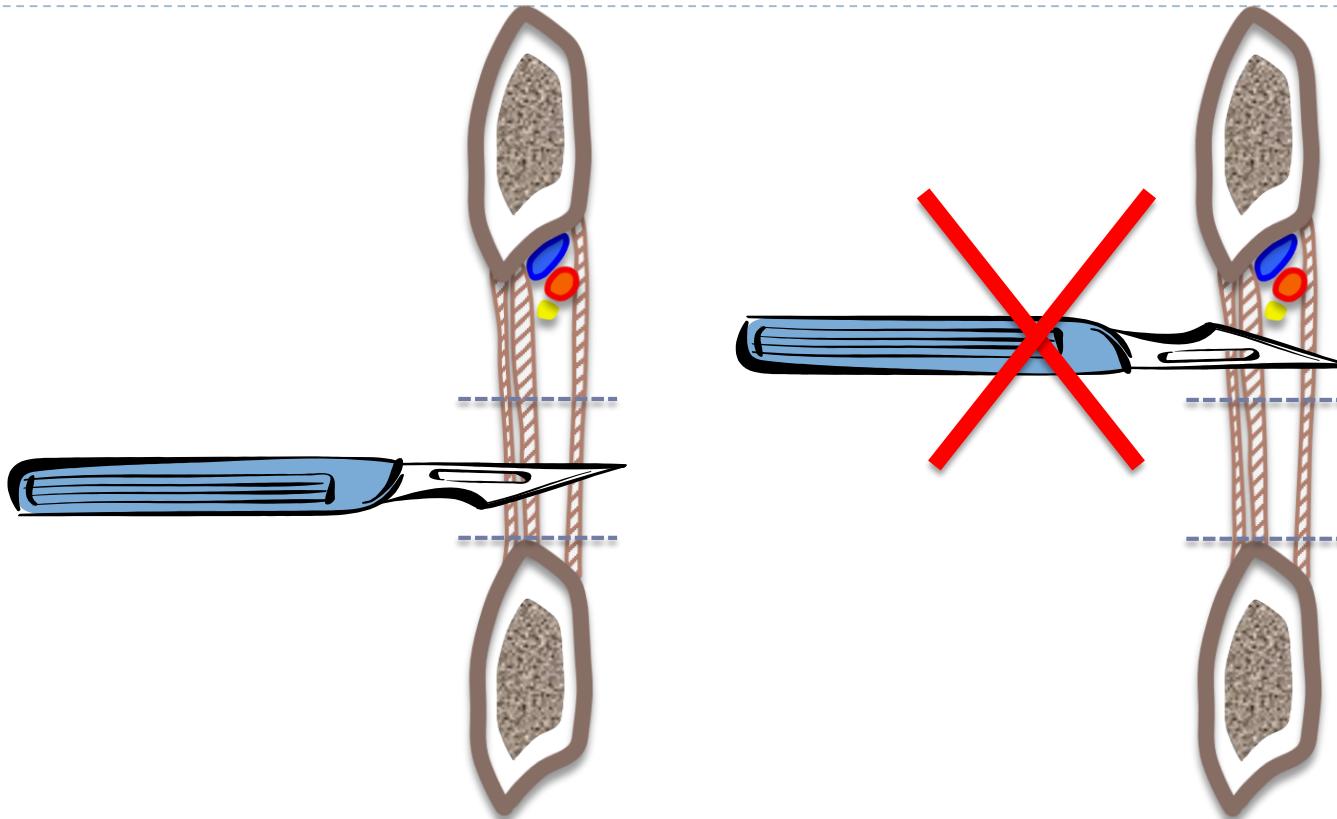
## La réalité : Sujet jeune



## La réalité : Sujet âgé hypertendu



# Comment réaliser l'incision ?



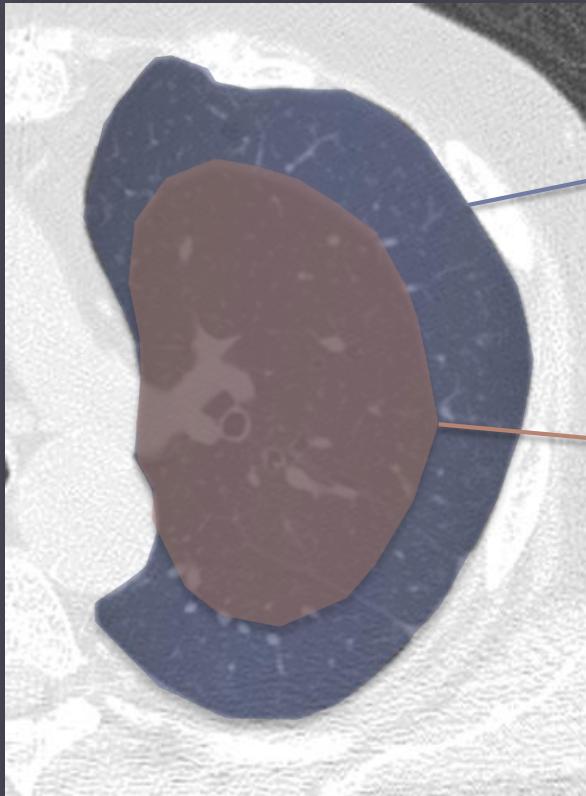


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## Les biopsies

## Où sont les lésions pulmonaires ?



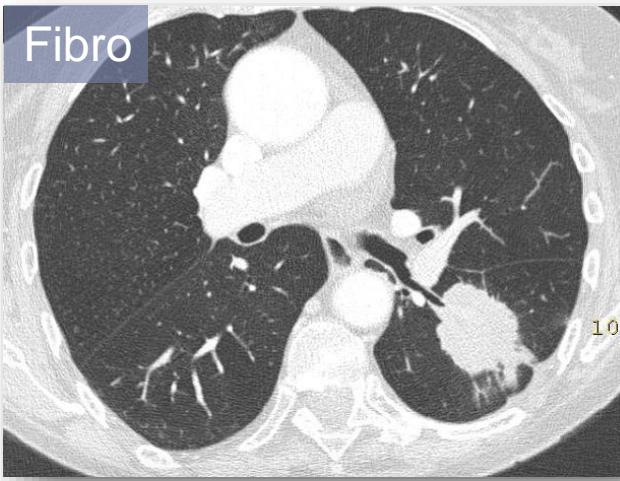
Adénocarcinome >> Carcinome épidermoïde

69% peripheral

31% central



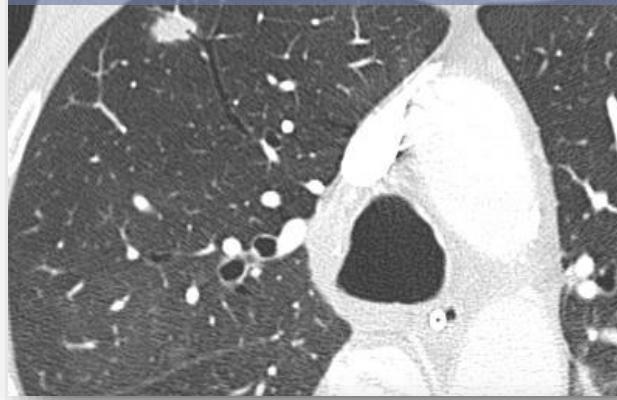
Fibro



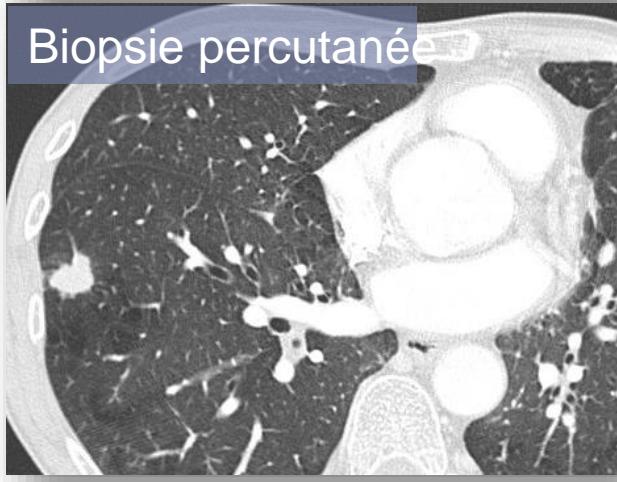
Fibro



Fibro ou Biopsie percutanée ?



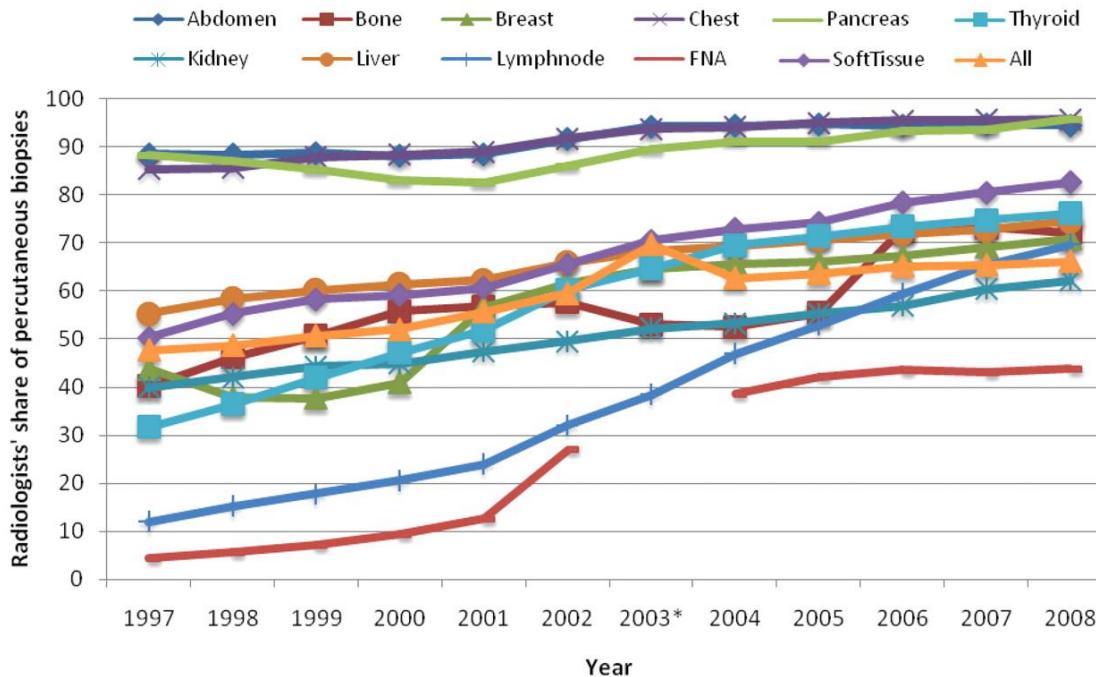
Biopsie percutanée



Sharon W. Kwan, MD  
Mythreyi Bhargavan, PhD  
Robert K. Kerlan, Jr, MD  
Jonathan H. Sunshine, PhD

Radiology 2010;256:751-8

# Effect of Advanced Imaging Technology on How Biopsies Are Done and Who Does Them<sup>1</sup>



# Molecular markers: Beyond morphology

## Morphology

### NSCLC

- ▶ Adenocarcinoma
- ▶ Squamous
- ▶ Large cell
- ▶ SCLC



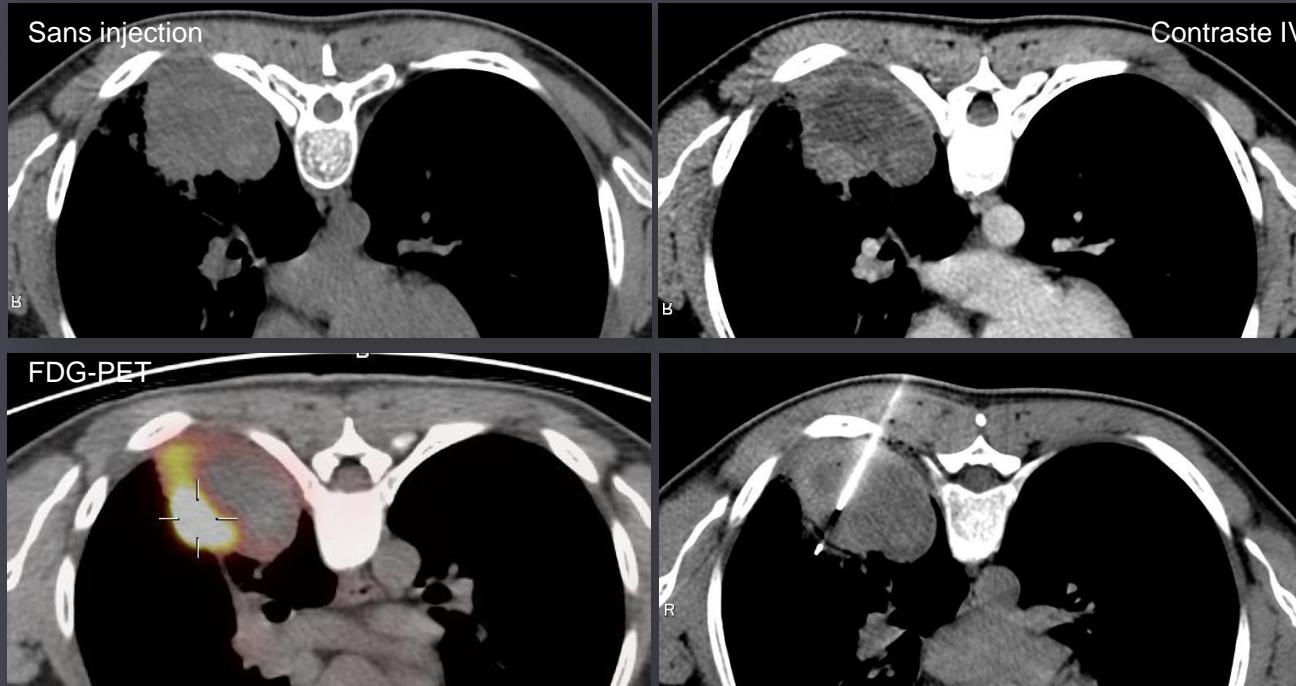
## Molecular studies

- ▶ EGFR mutations
- ▶ EML4-ALK translocation
- ▶ KRAS mutations
- ▶ HER2 mutations
- ▶ BRAF mutations
- ▶ P13K mutations



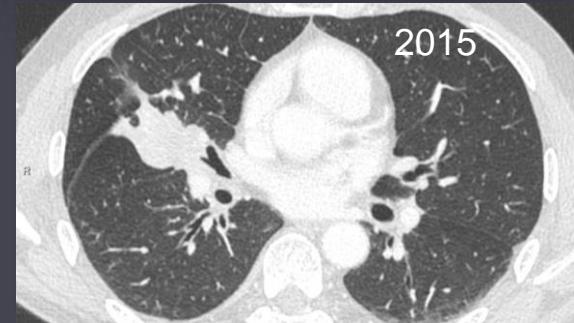
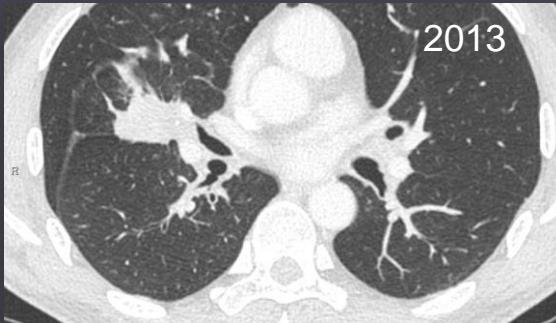
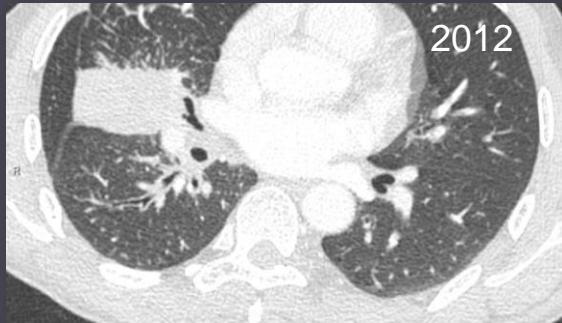
# La morphologie est insuffisante pour cibler une biopsie

Fumeur. Tumeur homogène sans injection



## Re-biopsie dans le cancer du poumon

Adénocarcinome bronchique EGFR+ en 2012. Mise sous Gefitinib (Iressa®). Réponse initiale puis progression



Re-Biopsie :

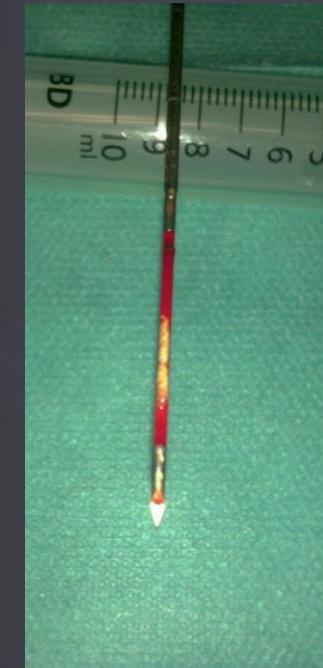
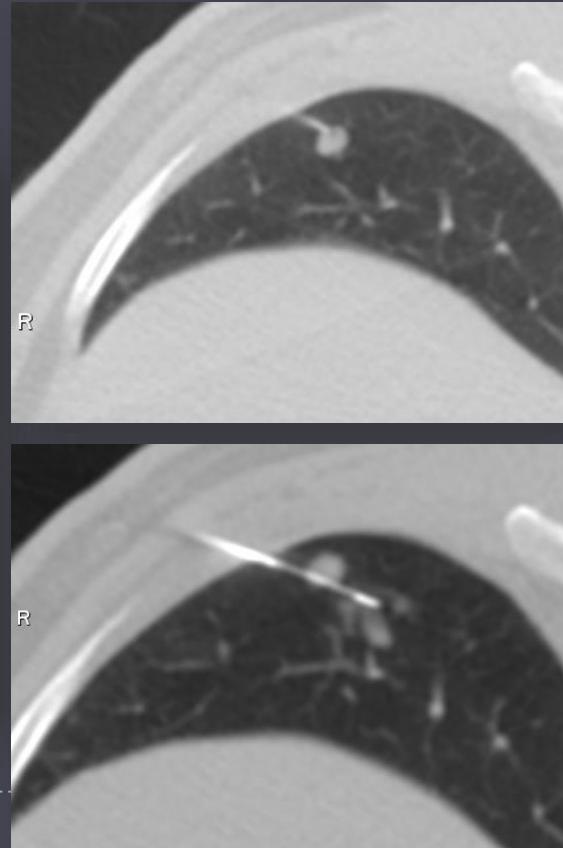
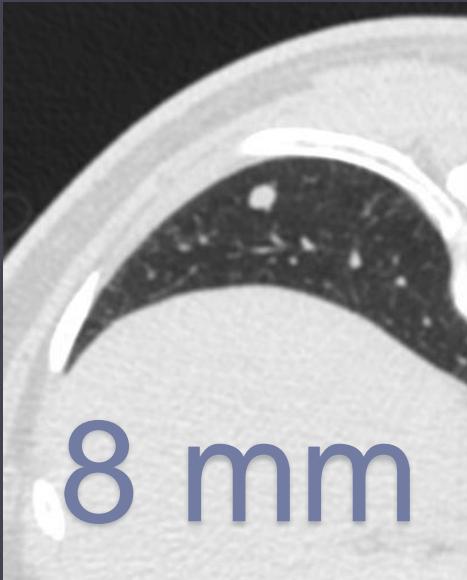
- Adénocarcinome bronchique
  - TTF1+, Alk-
  - Mutation T790M
- Mise sous Osimertinib

# Performance des biopsies pulmonaires

	Sensitivity (%)	Accuracy (%)	No of Procedures	Ref.
<b>Overall</b>	82%	88%	111	Wallace MJ, Radiology 2002
	87%	77%	162	Ohno Y, AJR 2003
	91%	89%	86	Geraghty PR, Radiology 2003
<b>Malignancy</b>	89%	91%	60	Montaudon M, Eur Radiol 2004
- <10mm	88%	92%	47	Wallace MJ, Radiology 2002
- <10mm	67%	88%	10	Hur J, AJR 2009
- <15mm	72%	74%	70	Li H, AJR 1996
- >15mm	94%	96%	27	Li H, AJR 1996
- >20mm	75%	88%	8	Hur J, AJR 2009
<b>Infection</b>				
*Wilson M et al. CT-guided percutaneous lung biopsy: Correlation between diagnostic yield, lung lesion size, and lobar distribution. Am J Interv Radiol 2021				
Fungal		70.6%	76.4%	17
				Nosari A, Haematologica 2003

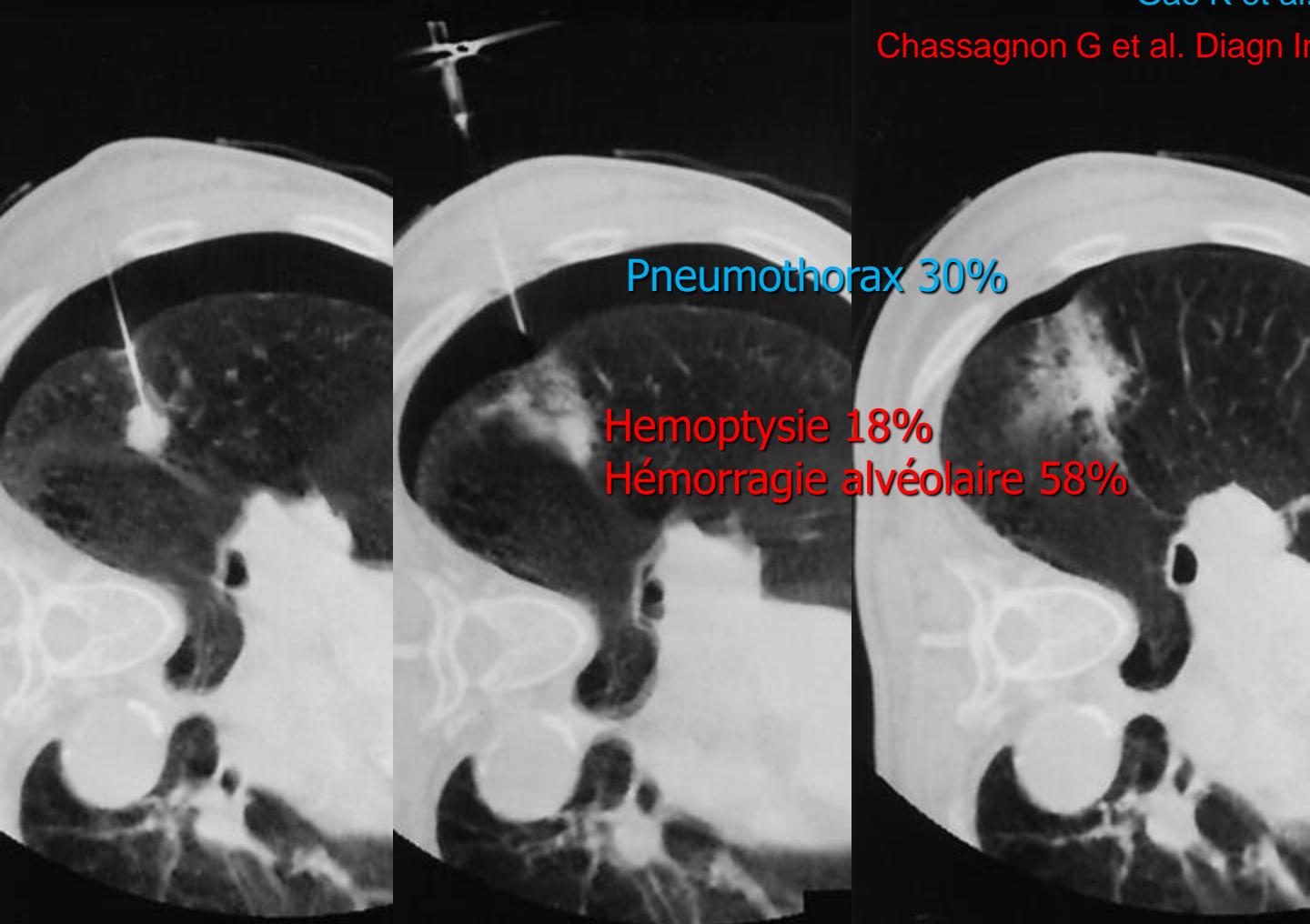
Taille minimale

ATCD de K urothélial. Nodule unique de 8 mm



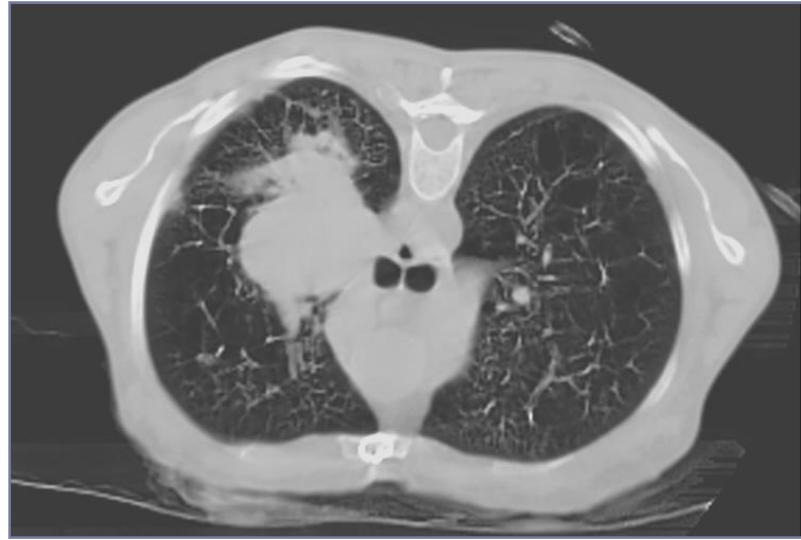
# Complications

	Risk	No of Procedures	Needle	Ref.
<b>Pneumothorax (total/chest tube)</b>	23% / 5%	660	19G CNB	Yeoh KM, Chest 2004
	62% / 31%	61	18G PNAB	Wallace MJ, Radiology 2002
	28% / 2.5%	162	22G PNAB	Ohno Y, AJR 2003
	26% / 8%	846	19G PNAB	Geraghty PR, Radiology 2003
	21% / 2%	97	19G PNAB	Li H, AJR 1996
	17% / 2%	135	17G CNB	Khan MF, Eur Radiol 2008
	17% / 0.5%	605	19G CNB	Montaudon M, Eur Radiol 2004
<b>Bleeding (total/hemoptysis)</b>	30% / 4%	660	19G CNB	Yeoh KM, Chest 2004
	-/ 2%	846	19G PNAB	Geraghty PR, Radiology 2003
	27% / 6%	135	17G CNB	Khan MF, Eur Radiol 2008
	20% / 3.8%	604	19G CNB	Montaudon M, Eur Radiol 2004
<b>Vasovagal response</b>	0.3%	846	19G PNAB	Geraghty PR, Radiology 2003
<b>Air embolism</b>	0.061%	9783		Tomiyama N. Eur J Radiol 2006
<b>Dissémination tumorale</b>	0.012-0.061%	68346		Ayar D. J Thorac Imaging 1998



## Attention cependant ...

- ▶ BPCO, emphysème
- ▶ HTAP
- ▶ Anticoagulants/antiagrégants



# Diagnostic Yield and Safety of Computed Tomography-guided Mediastinal Core Needle Biopsies

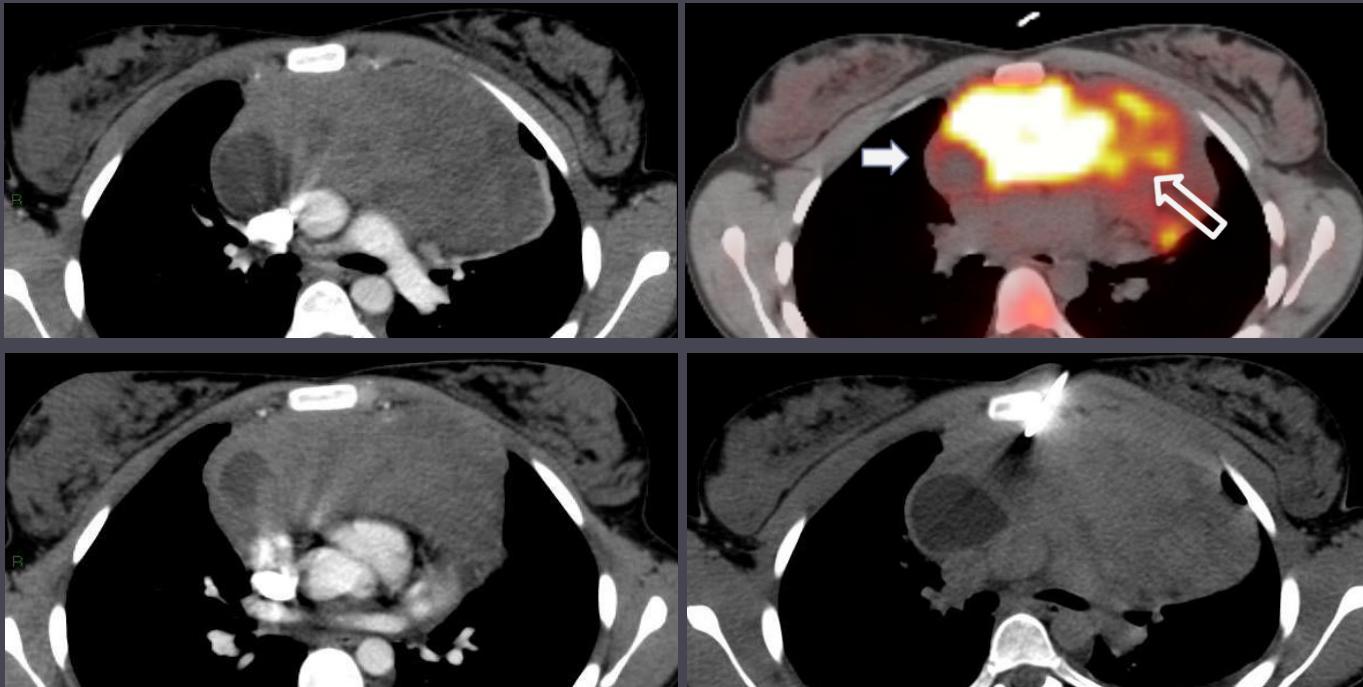
*Constance de Margerie-Mellan, MD,\* Cédric de Bazelaire, PhD, MD,\*  
Sandy Amorim, MD,† Pauline Brice, MD,† Abdellatif Tazi, PhD, MD,‡  
Josette Brière, MD,§ Jacques Frija, MD,\* and Eric de Kerviler, MD\**

J Thorac Imaging 2015

- ▶ 293 biopsies in 285 patients
- ▶ Overall diagnostic yield 87%
- ▶ Malignant condition in 233 cases (82%)
  - ▶ Hematological malignancies in 151 patients
  - ▶ Solid tumors in 54 patients

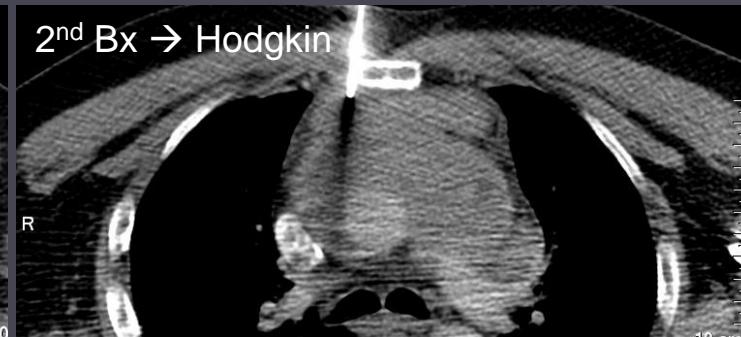
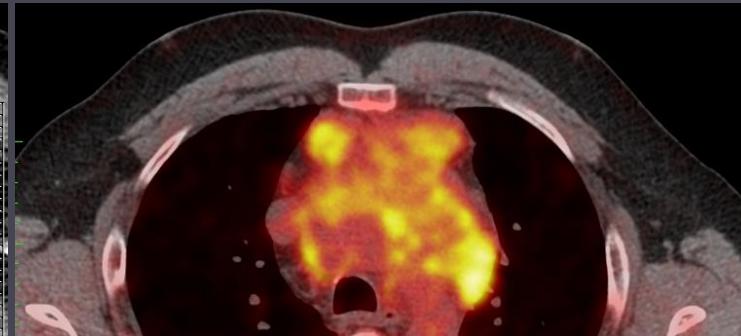
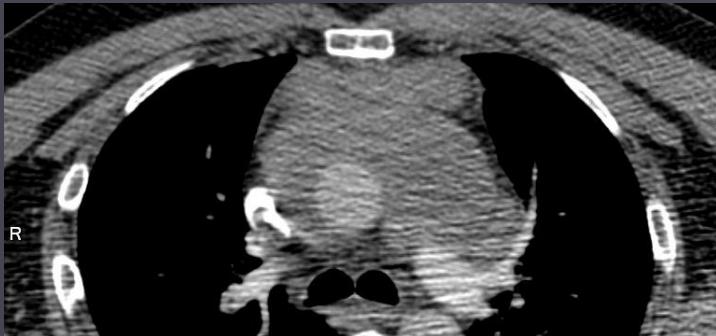
## S'aider d'autres modalités d'imagerie pour mieux cibler

Confirmation de récidive de Hodgkin



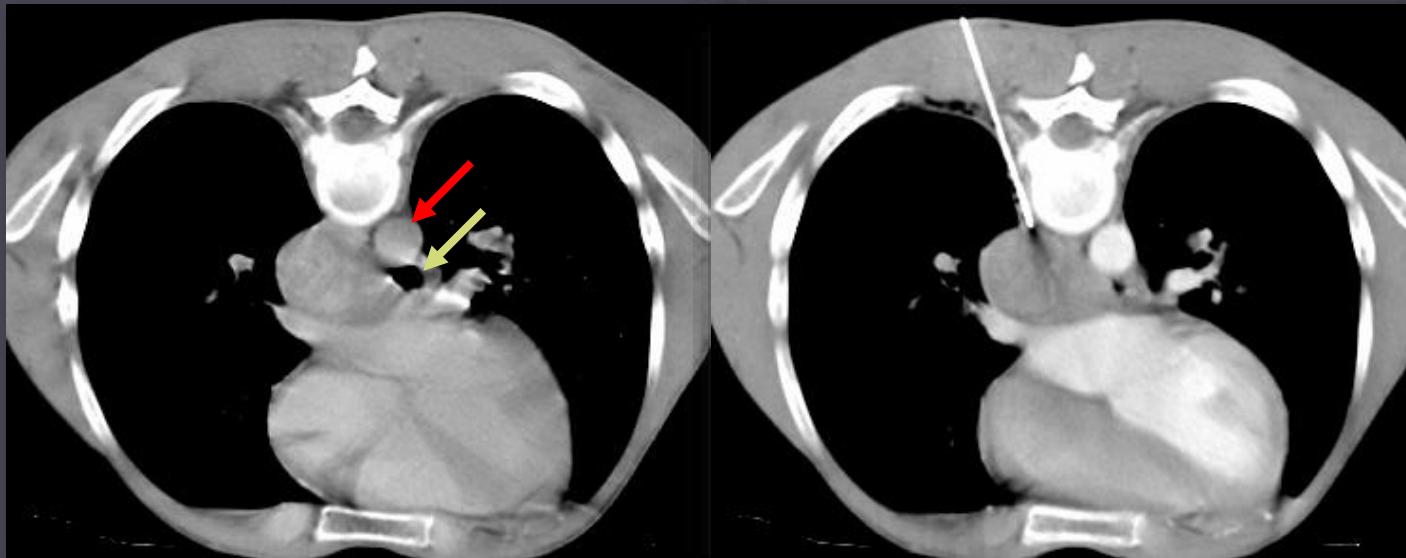
## S'aider d'autres modalités d'imagerie pour mieux cibler

Patient adressé pour biopsie d'une masse médiastinale antérieure



## Masse du médiastin postérieur

Injection de sérum physiologique

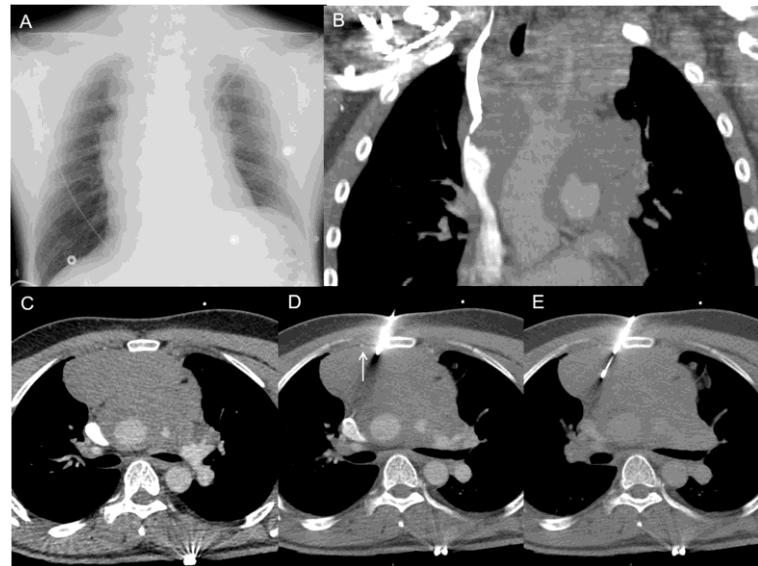
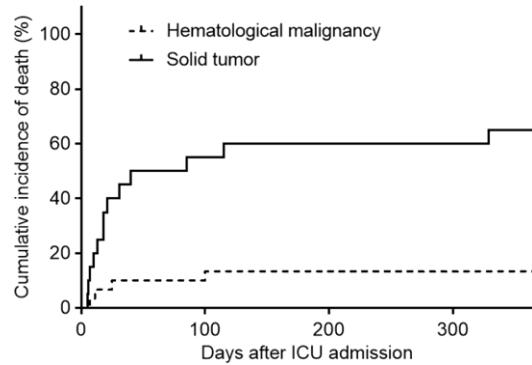


ORIGINAL ARTICLE

## Management of superior vena cava syndrome in critically ill cancer patients

Sarah Morin<sup>1</sup> & Adeline Grateau<sup>1</sup> & Danielle Reuter<sup>1</sup> & Eric de Kerfivel<sup>2,3</sup> &  
Constance de Margerie-Mellon<sup>2</sup> & Cédric de Bazelaire<sup>2,3</sup> & Lara Zafrani<sup>1,3</sup> &  
Benoit Schlemmer<sup>1,3</sup> & Elie Azoulay<sup>1,3</sup> & Emmanuel Canet<sup>1</sup> 

- ▶ 50 patients
- ▶ 60% hematological malignancies



# 2

## Les ablations

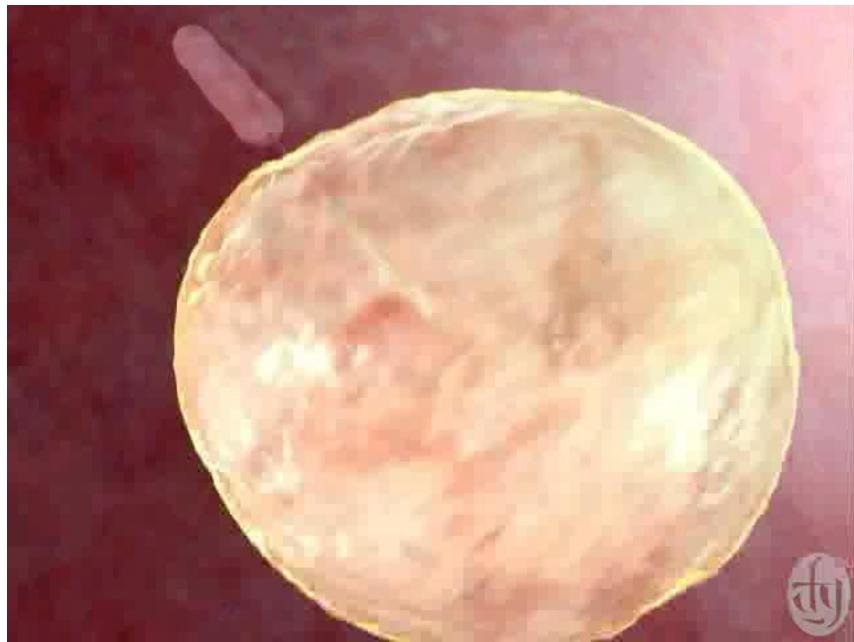
# Indications en France

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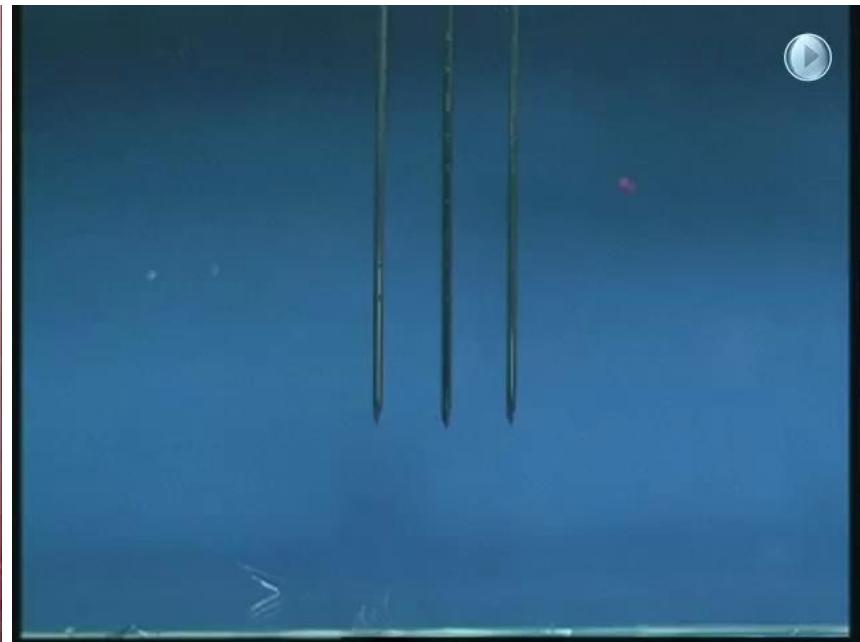
- ▶ Maladie oligo-métastatique pulmonaire +++
  - ▶ Mélanome
  - ▶ Rein-vessie
  - ▶ Colo-rectal
  - ▶ Sarcomes
- ▶ Discuté
  - ▶ K bronchique primitif non opérable

# Ablations tumorales : Le chaud ou le froid ?

Radiofréquence



Cryoablation

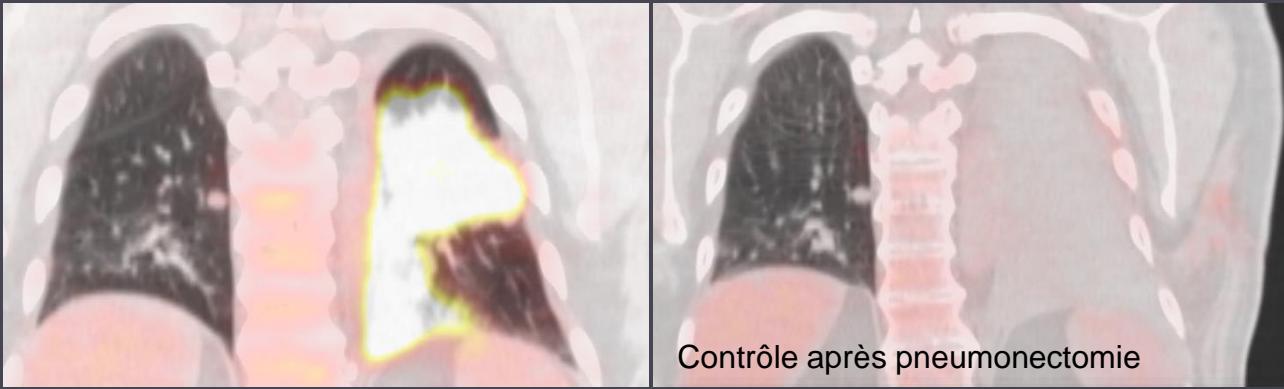




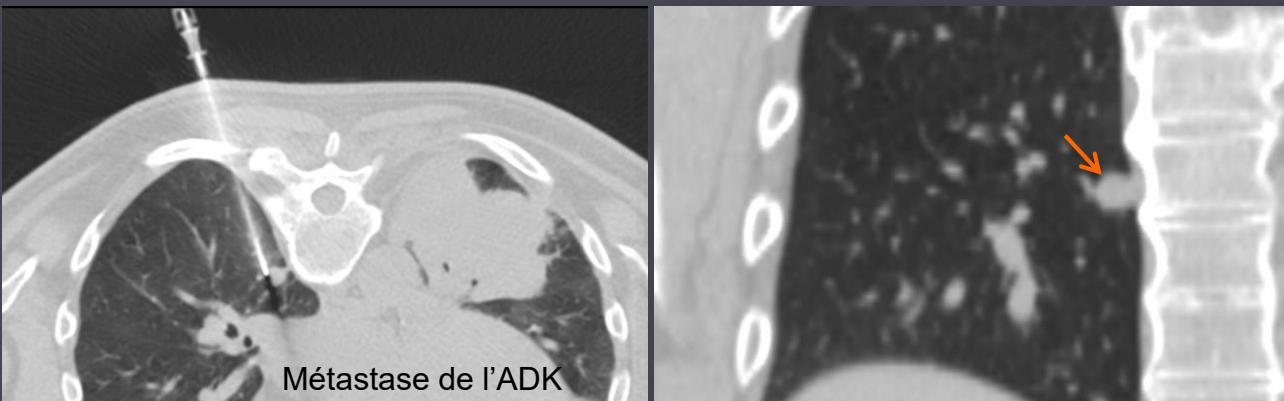
6 mois post RFA

RFA RFA RFA RFA RFA RFA diat) se)

## Cryoablation du poumon



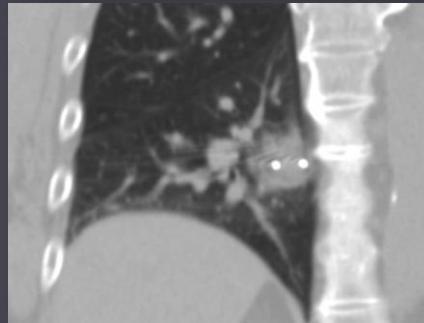
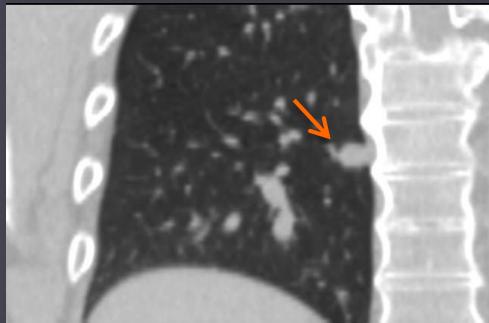
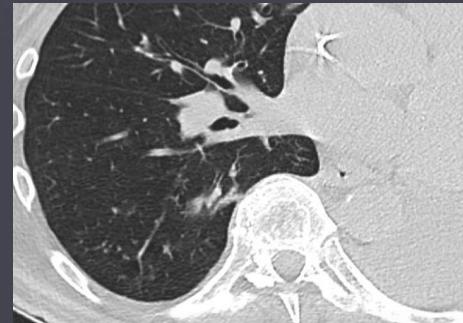
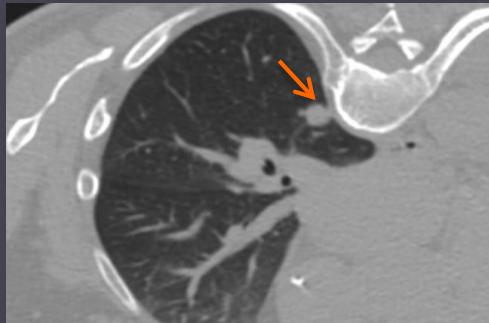
Contrôle après pneumonectomie



Métastase de l'ADK

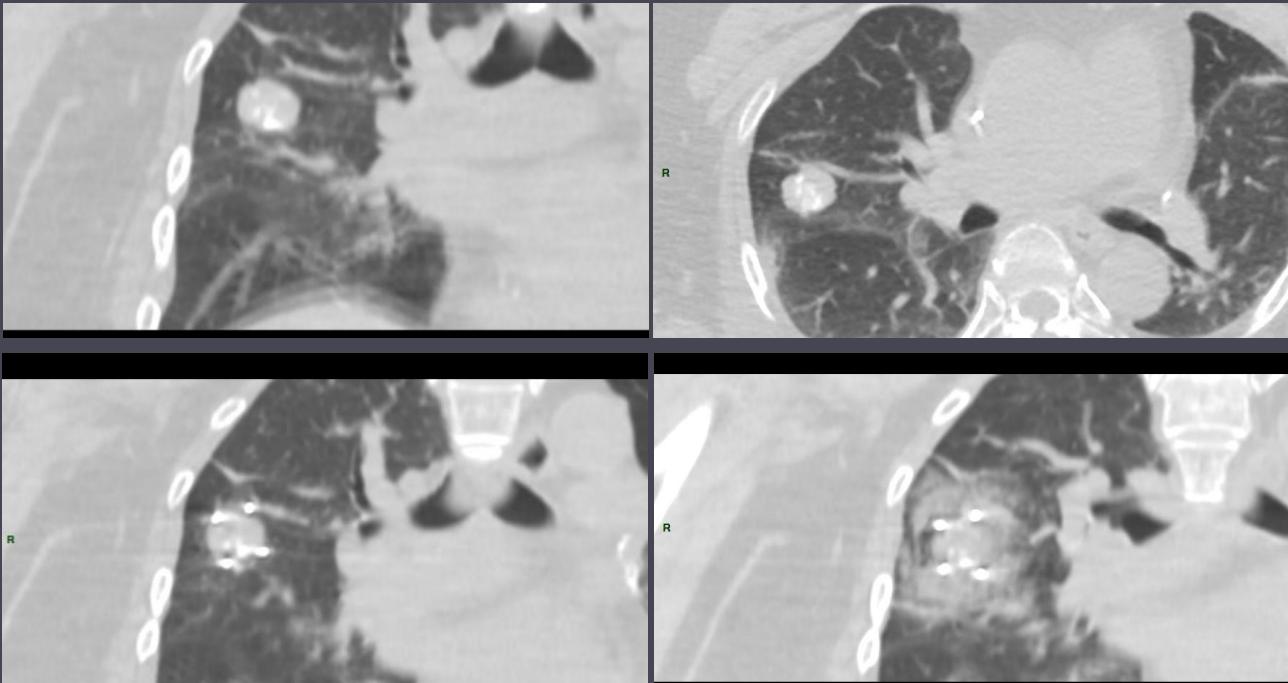
## Cryoablation du poumon

Adénocarcinome du poumon gauche traité par pneumonectomie. Nodule unique du poumon droit



## Cryoablation

Chondrosarcome métastatique. 3 résections, 4 cryothérapies



CRC metastasis



## original article

**Radiofrequency ablation is a valid treatment option for lung metastases: experience in 566 patients with 1037 metastases**

T. de Baère<sup>1,\*</sup>, A. Aupérin<sup>2</sup>, F. Deschamps<sup>1</sup>, P. Chevallier<sup>3</sup>, Y. Gaubert<sup>4</sup>, V. Boige<sup>5</sup>, M. Fonck<sup>6</sup>, B. Escudier<sup>6</sup> & J. Palussière<sup>7</sup>

<sup>1</sup>Departments of <sup>1</sup>Image Guided Therapy, <sup>2</sup>Biostatistics, Gustave Roussy Cancer Campus, Villejuif; <sup>2</sup>Department of Imaging, Hospital Archet 2, Nîmes; <sup>3</sup>Department of Imaging, Hôpital de la Timone, Marseille; <sup>4</sup>Department of Medical Oncology, Gustave Roussy Cancer Campus, Villejuif; <sup>5</sup>Departments of <sup>5</sup>Medical Oncology, <sup>6</sup>Imaging, Institut Bergonie, Bordeaux, France

**Table 1.** Rates (standard error) of overall survival, progression-free survival and treatment failure according to the primary

Primary	Colon (N = 191)	Rectum (N = 102)	Kidney (N = 68)	Sarcoma (N = 51)	Other (N = 154)
Overall survival					
1 year	92.9% (1.9)	93.6% (2.5)	95.5% (2.6)	94.1% (3.3)	89.0% (2.6)
3 years	75.1% (3.7)	64.9% (6.3)	73.5% (6.5)	58.0% (8.2)	59.1% (4.6)
5 years	56.0% (6.0)	49.6% (8.4)	53.8% (9.1)	41.5% (9.3)	49.4% (6.4)
Progression-free survival					
1 year	37.6% (3.6)	30.4% (4.8)	39.7% (5.9)	43.0% (7.0)	49.0% (4.1)
3 years	17.0% (3.0)	8.6% (3.2)	13.8% (4.9)	26.5% (6.6)	17.6% (3.4)
5 years	14.8% (3.0)	6.4% (3.0)	9.2% (5.0)	15.9% (6.2)	7.6% (3.9)
Treatment failure					
1 year	10.9% (2.4)	14.5% (3.7)	7.4% (3.2)	6.1% (3.4)	9.9% (2.5)
2 years	16.2% (3.0)	30.7% (5.7)	13.0% (5.0)	8.3% (4.0)	16.4% (3.5)
3 years	16.2% (3.0)	30.7% (5.7)	25.1% (9.3)	8.3% (4.0)	16.4% (3.5)

- ▶ Métastases de 2-3 cm maximum
- ▶ Survie médiane 62 mois
- ▶ Efficacité locale à 4 ans 89%
- ▶ Contrôle pulmonaire à 4 ans 44,1%
- ▶ 24% patients retraités

**The ECLIPSE Study: Efficacy of Cryoablation on Metastatic Lung Tumors With a 5-Year Follow-Up**

Thierry de Baère, MD,<sup>a,\*</sup> David Woodrum, MD, PhD,<sup>b</sup> Lambros Tselikas, MD,<sup>a</sup> Fereidoun Abtin, MD,<sup>c</sup> Peter Littrup, MD,<sup>d</sup> Frederic Deschamps, MD,<sup>a</sup> Robert Suh, MD,<sup>c</sup> Hussein D. Aoun, MD,<sup>d</sup> Matthew Callstrom, MD<sup>b</sup>

J Thor Oncol 2021

- ▶ 40 patients, 60 métastases <3,5 cm
- ▶ Suivi > 60 mois
- ▶ Contrôle pulmonaire 87,9 % à 3 ans et 79,2% à 5 ans

# Multicenter Study of Metastatic Lung Tumors Targeted by Interventional Cryoablation Evaluation (SOLSTICE)



Matthew R. Callstrom, MD, PhD,<sup>a,\*</sup> David A. Woodrum, MD, PhD,<sup>a</sup>  
Francis C. Nichols, MD,<sup>b</sup> Jean Palussiere, MD,<sup>c</sup> Xavier Buy, MD,<sup>c</sup> Robert D. Suh, MD,<sup>d</sup>  
Fereidoun G. Abtin, MD,<sup>d</sup> Bradley B. Pua, MD,<sup>e</sup> David C. Madoff, MD,<sup>e</sup>  
Sandeep L. Bagla, MD,<sup>f</sup> Dimitrios C. Papadouris, MD,<sup>f</sup> Hiran C. Fernando, MD,<sup>g</sup>  
Damian E. Dupuy, MD,<sup>h</sup> Terrance T. Healey, MD,<sup>h</sup> William H. Moore, MD,<sup>i</sup>  
Thomas V. Bilfinger, MD,<sup>i</sup> Stephen B. Solomon, MD,<sup>j</sup> Hooman Yarmohammadi, MD,<sup>j</sup>  
Henry J. Krebs, MD,<sup>k</sup> Charles J. Fulp, MD,<sup>k</sup> Antoine Hakime, MD,<sup>l</sup>  
Lambros Tselikas, MD,<sup>l</sup> Thierry de Baere, MD<sup>l</sup>

- ▶ 128 patients, 224 lung metastases treated by cryo
- ▶ Recurrence-free survival 85.1% @12 months and 77.2% @24 months
- ▶ After a second cryo, recurrence-free survival 91.1% @12 months and 84.4% @24 months

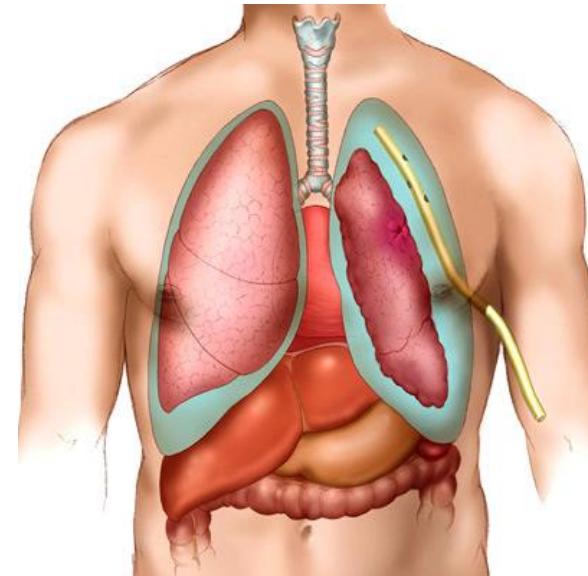
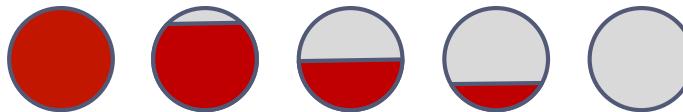


3



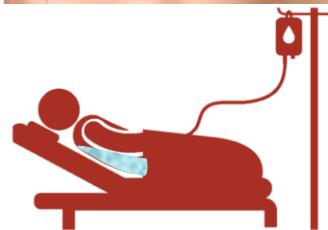
## Les drainages

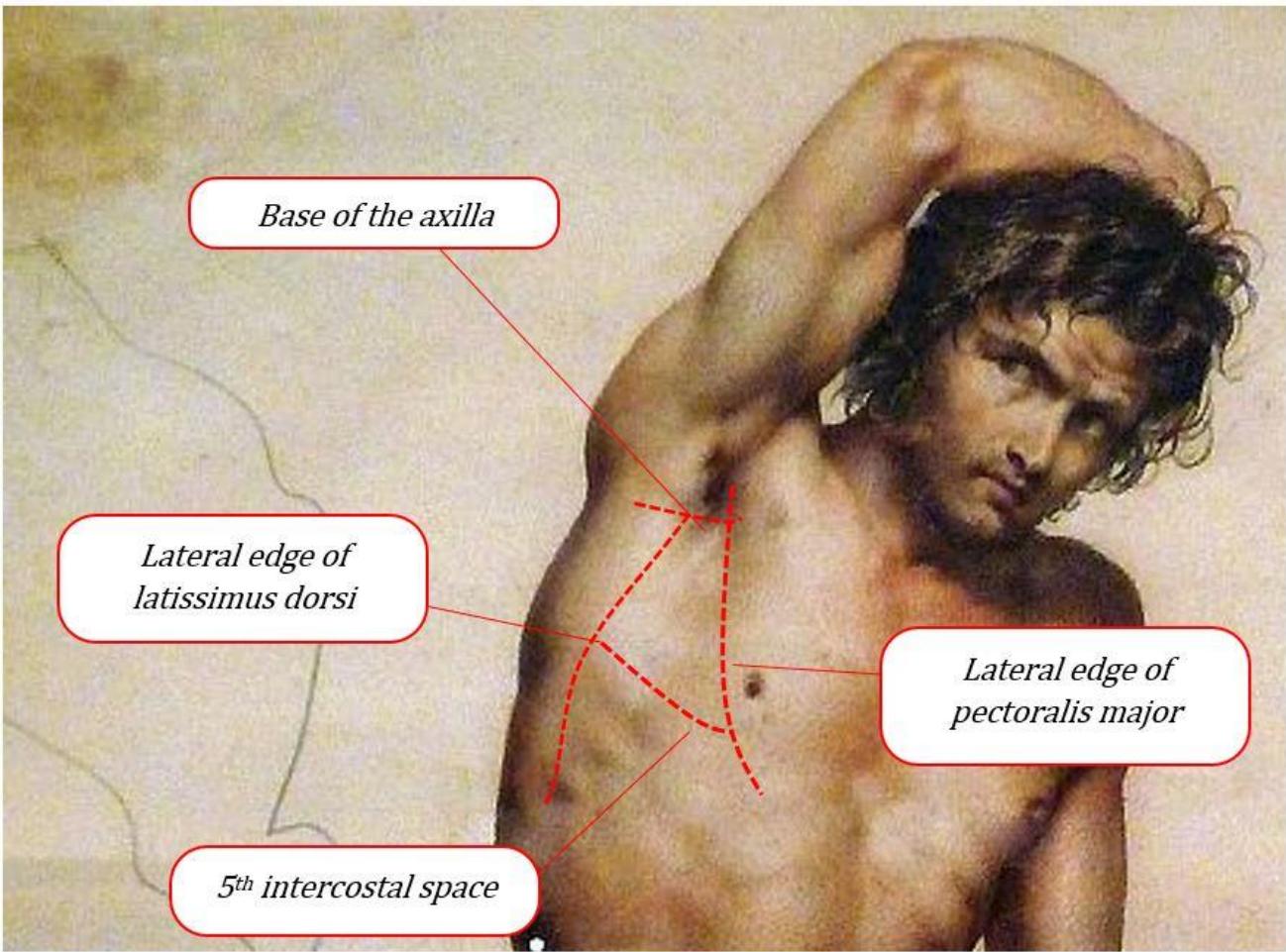
# Position du drain fonction du drainage !



Postéro-inférieur → Antéro-supérieur

Liquide Air





**Attention au point  
d'entrée et au trajet**

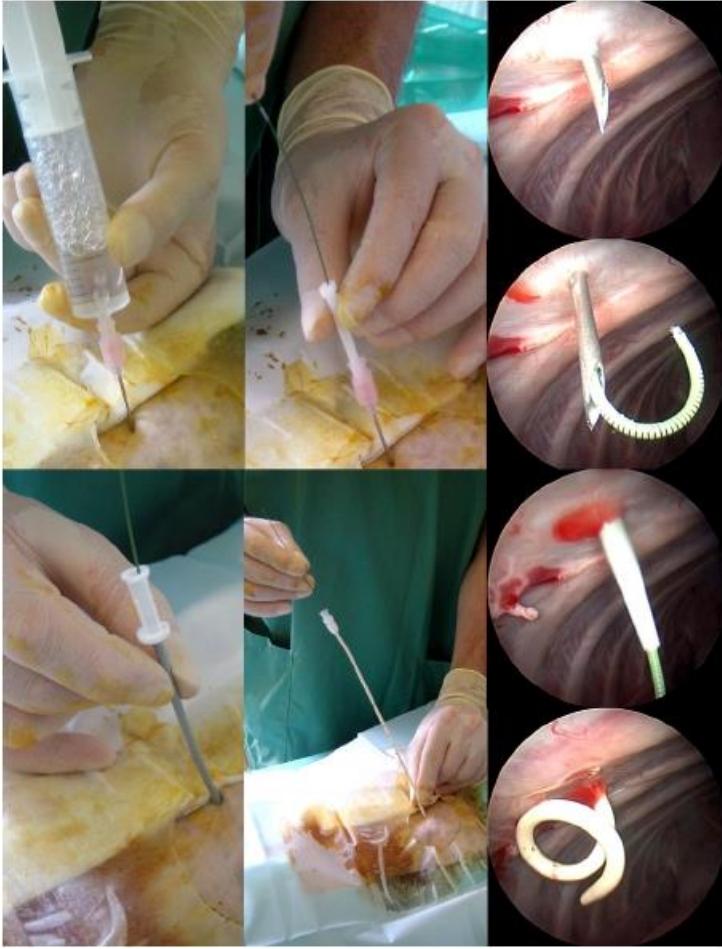
Eviter les muscles

Eviter le dos

# Les drains

- ▶ Taille
- ▶ Point d'entrée
- ▶ Orientation ...





## Le drainage pour le pneumothorax

Abord antérieur

Technique de Seldinger

Dilatation

**Petit drain 8F ou 10F**



## Drainage par technique de Seldinger : Pleurocath®



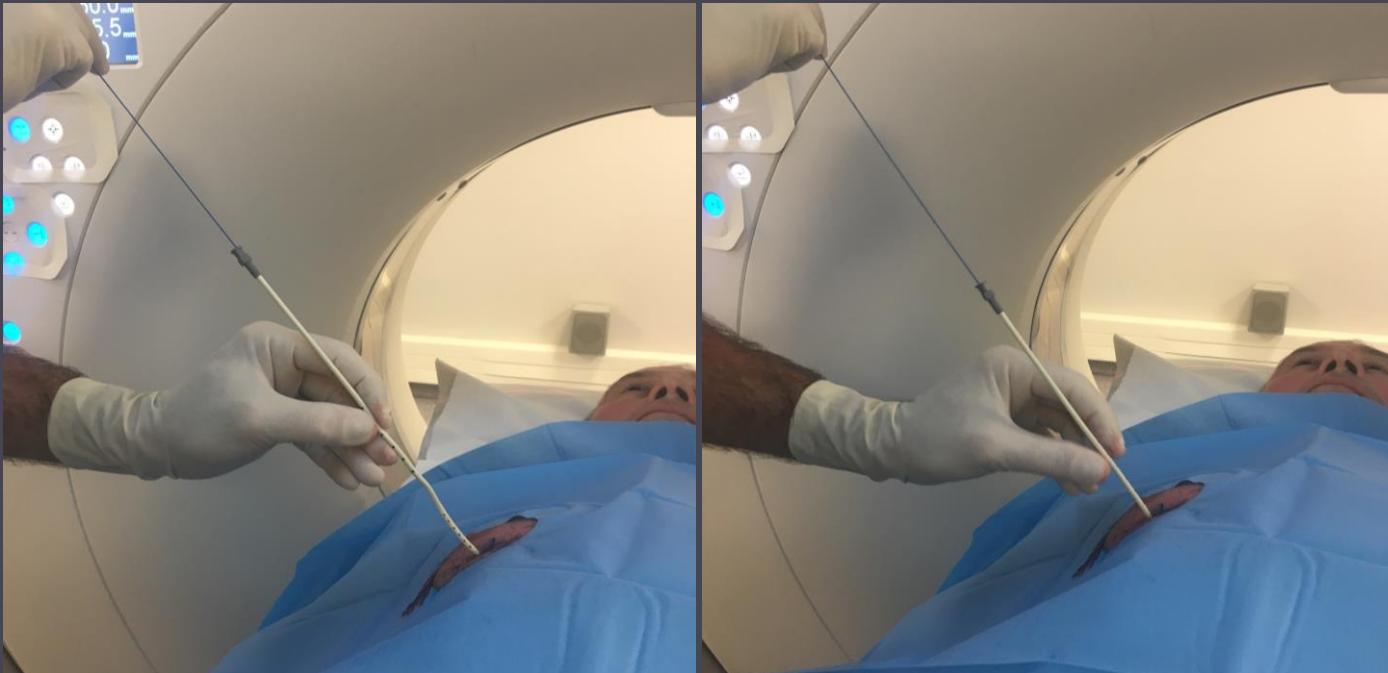
## Drainage par technique de Seldinger : Pleurocath®



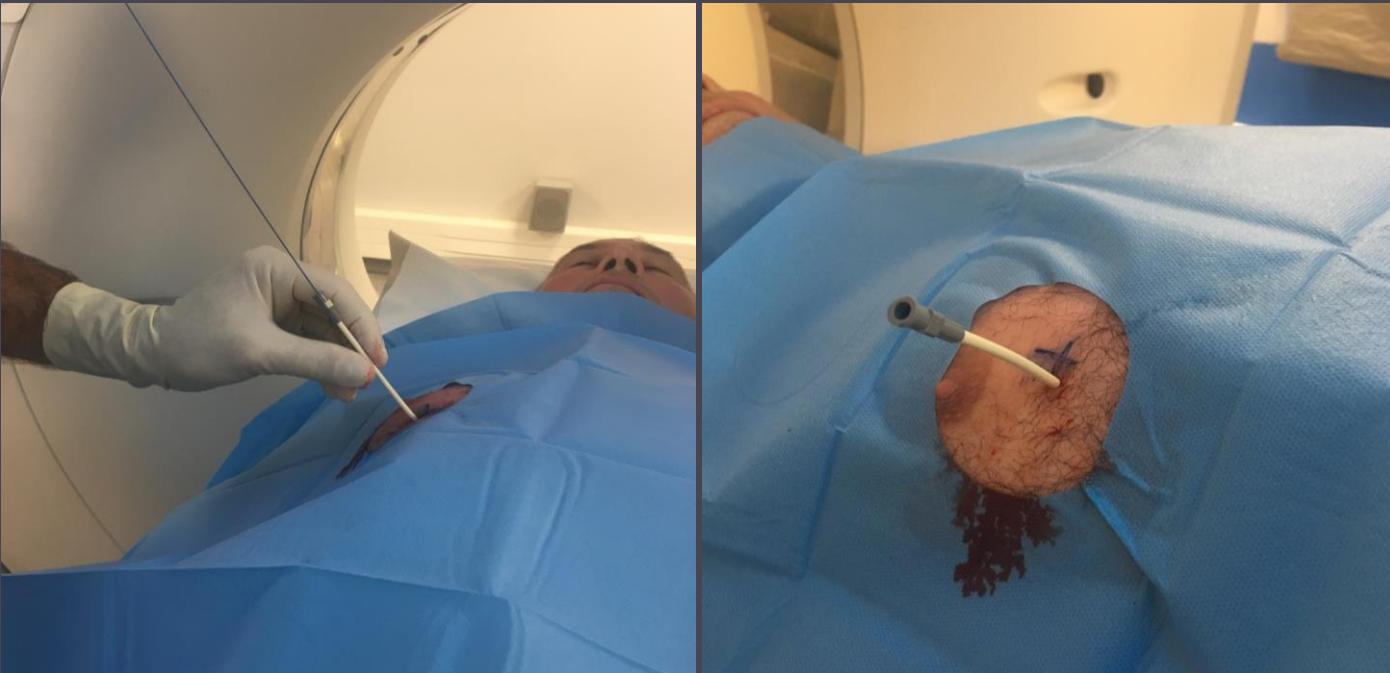
## Drainage par technique de Seldinger : Pleurocath®



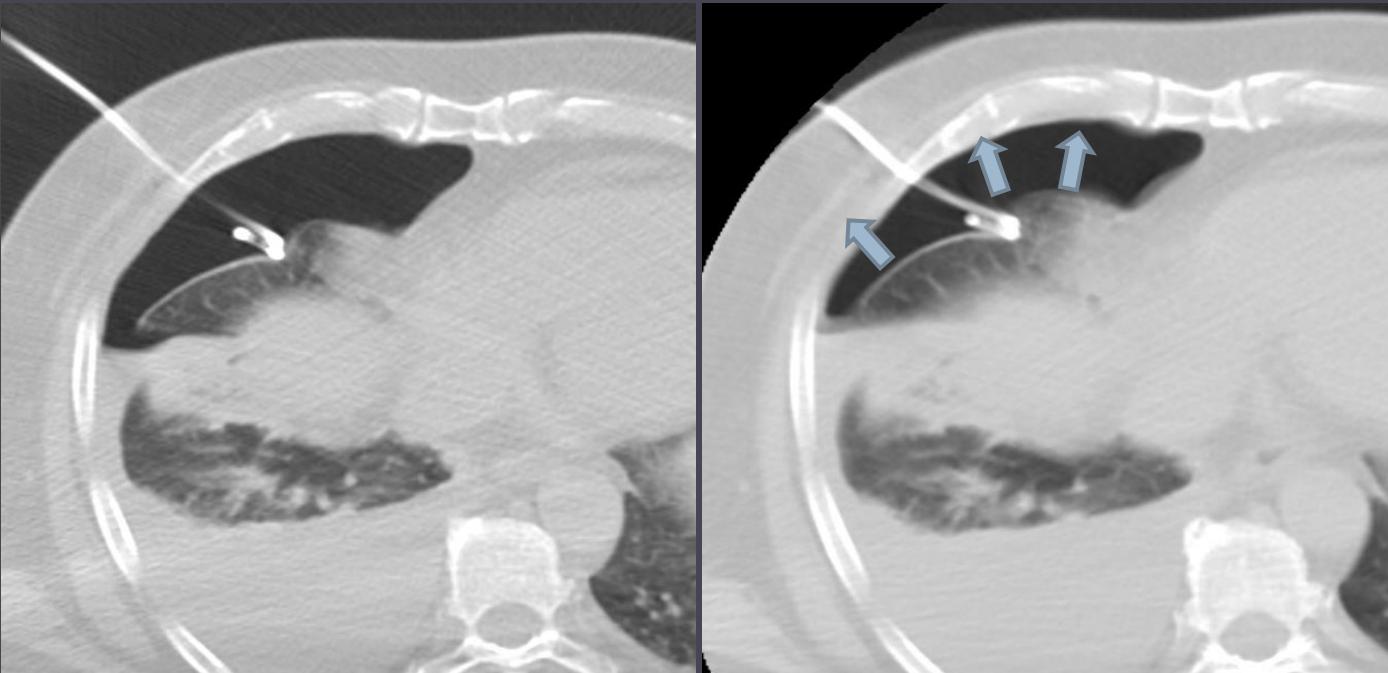
## Drainage par technique de Seldinger : Pleurocath®



## Drainage par technique de Seldinger : Pleurocath®



## Drainage par technique de Seldinger : Pleurocath®



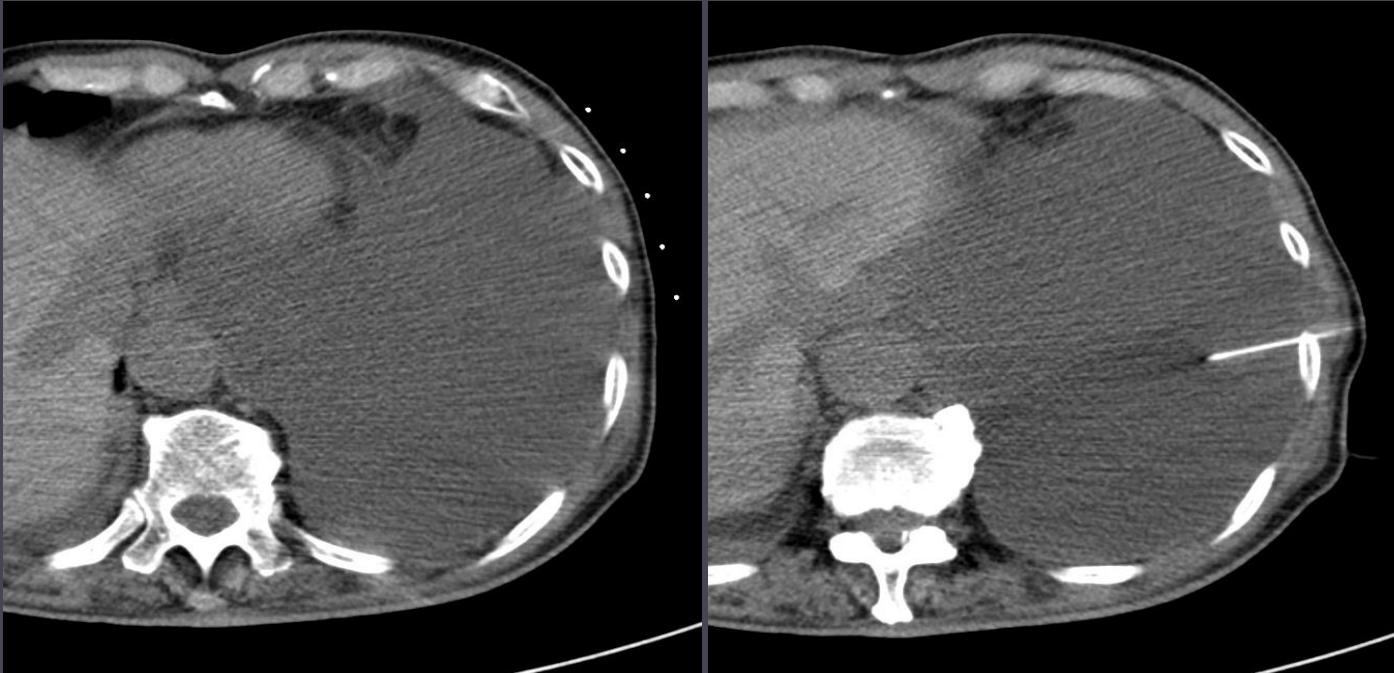
# Le drainage d'un épanchement liquide

- ▶ Gros drain à bout mousse monté sur un rigidificateur



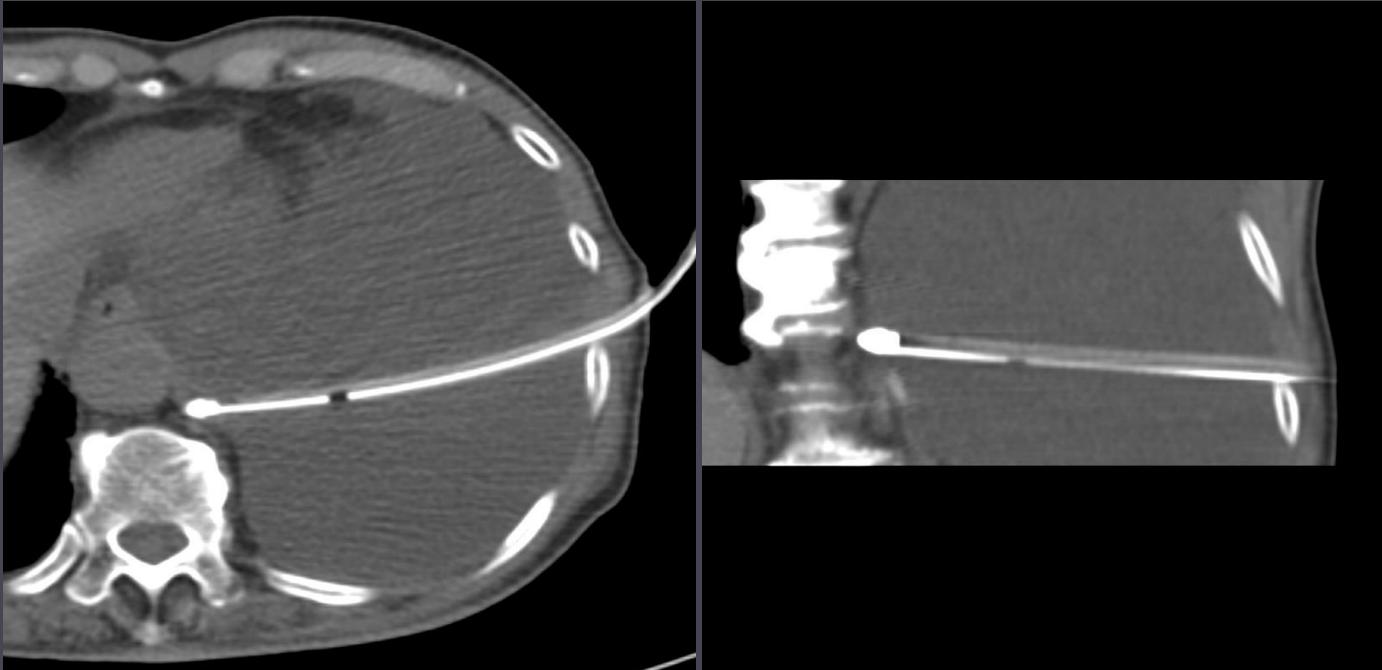
## Drainage pleural

Patient mince, épanchement abondant → Ponction directe



## Drainage pleural

Patient mince, épanchement abondant → Ponction directe



## Epanchement pleural cloisonné

Epanchement apical



## Epanchement pleural cloisonné

Epanchement apical



## Epanchement pleural cloisonné

Epanchement apical



# Conclusion

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- ▶ Pas beaucoup de limites pour les gestes percutanés
- ▶ La biopsie percutanée est devenue incontournable
- ▶ Nombre d'ablations en augmentation : Cryoablation +++
- ▶ Les drainages sont de plus en plus souvent réalisés avec un guidage par l'image