

Radiologie Interventionnelle Thoracique

E. de Kerviler, Hôpital Saint-Louis, APHP

Biopsies

Embolisations

Ponctions

Drainages

Ablations

Repérages

Reperméabilisations

1

2

3

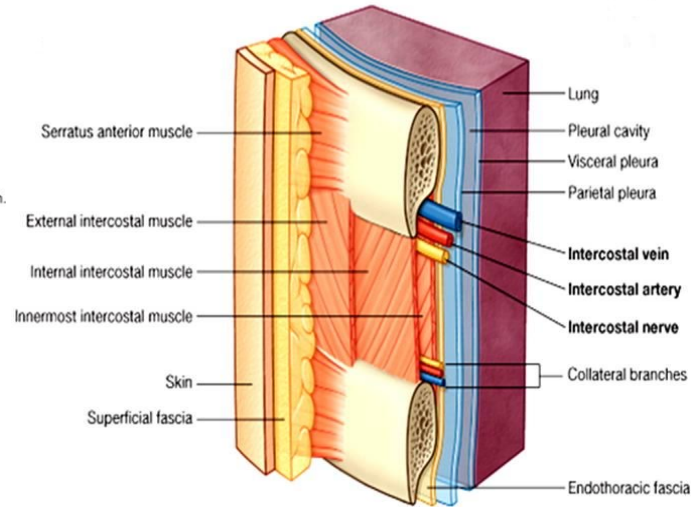
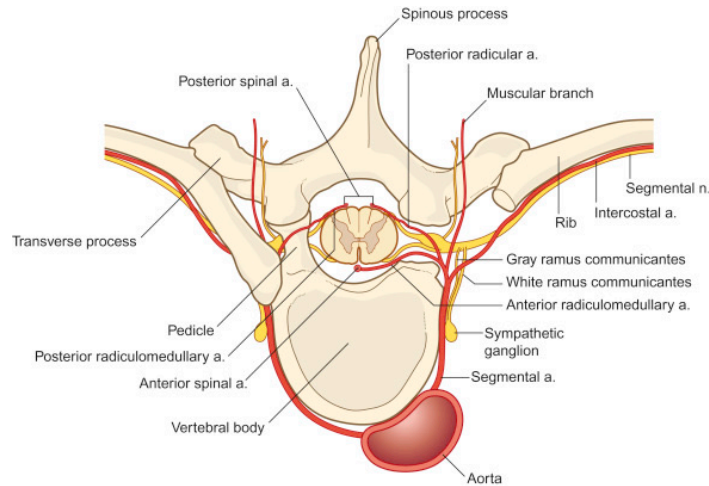
Biopsies

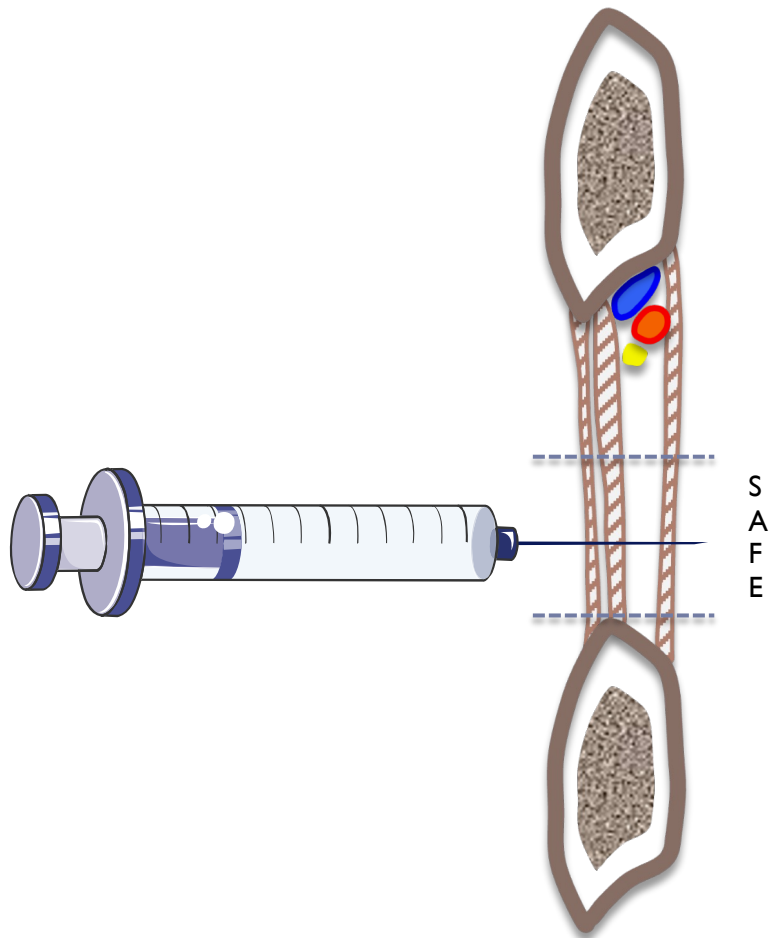
Ablations

Drainages

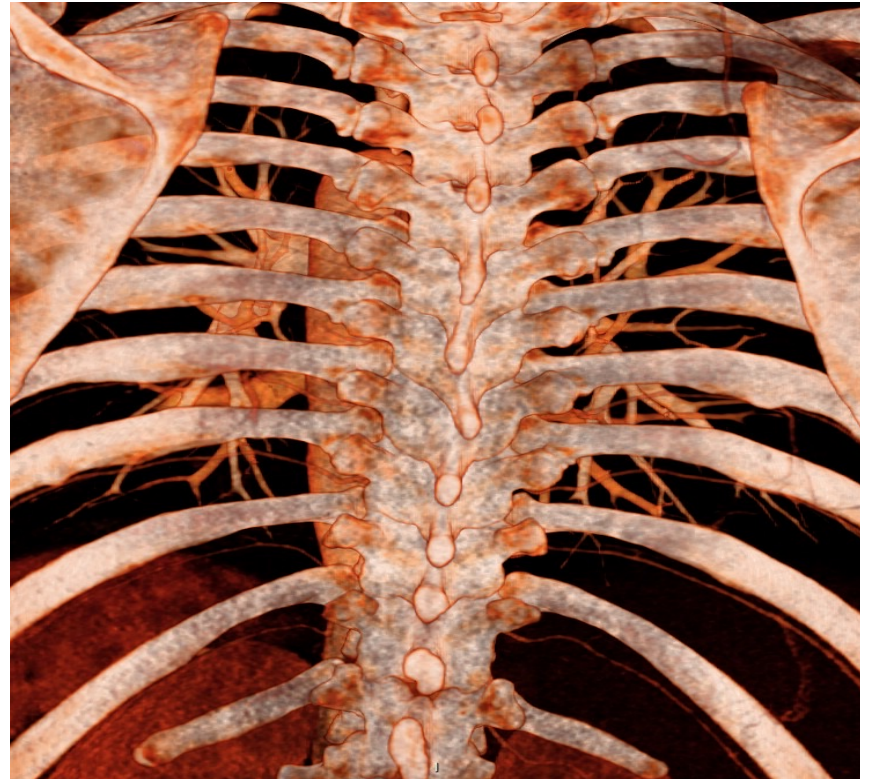
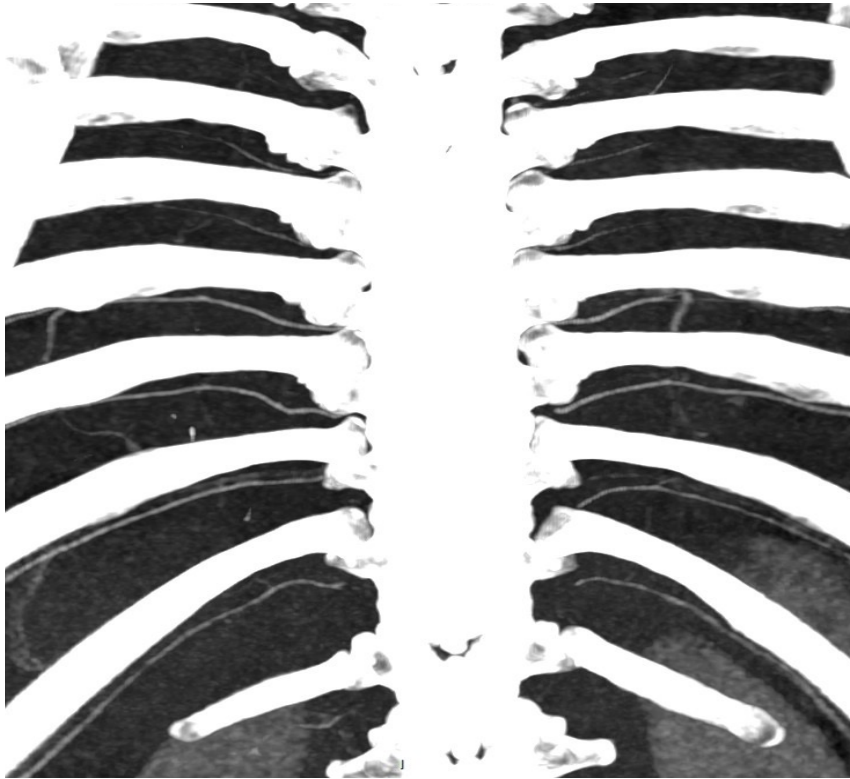
Un serpent de mer ... Le pédicule intercostal

► Que nous disent les livres d'anatomie ?

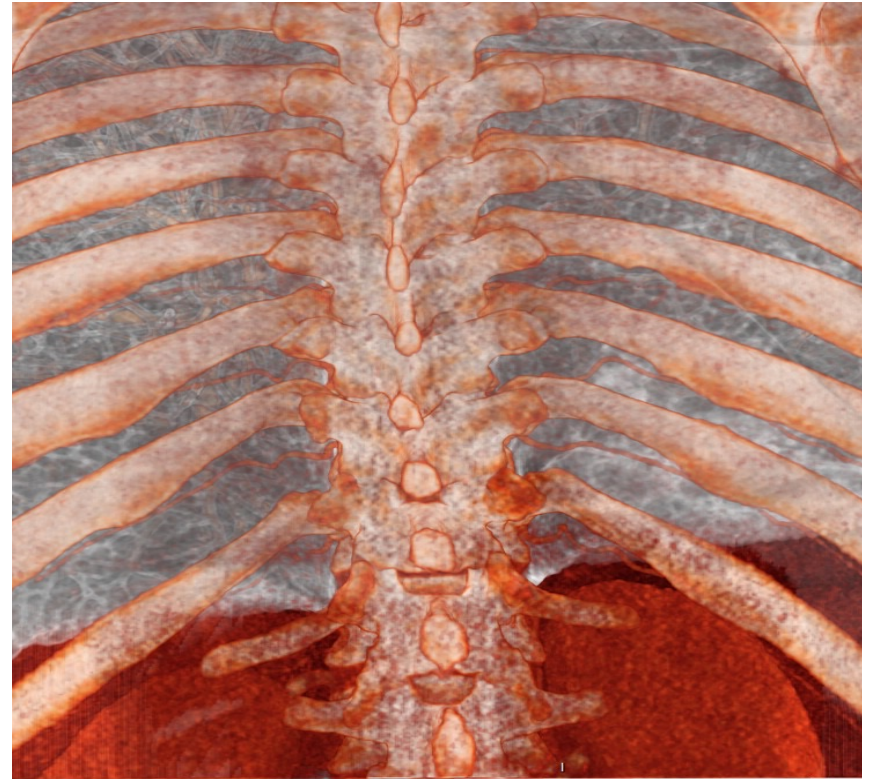




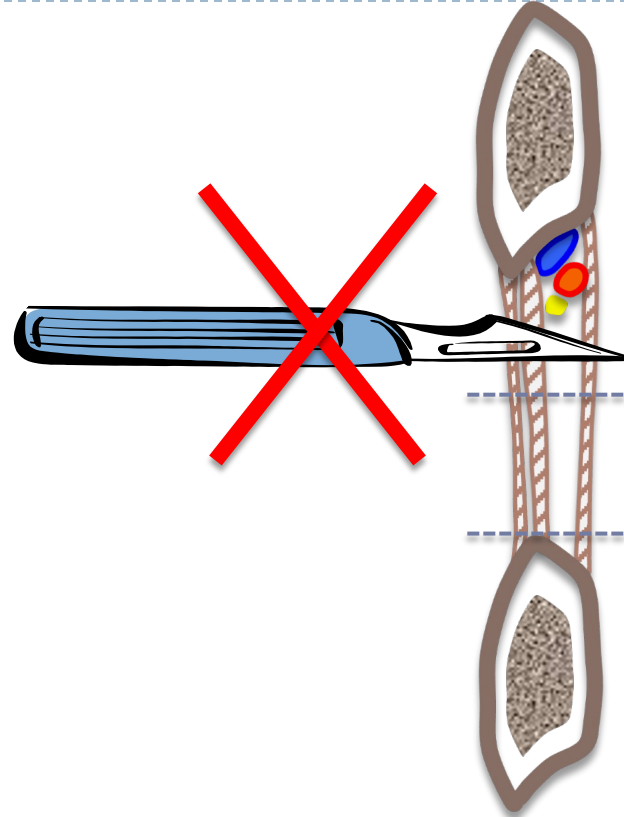
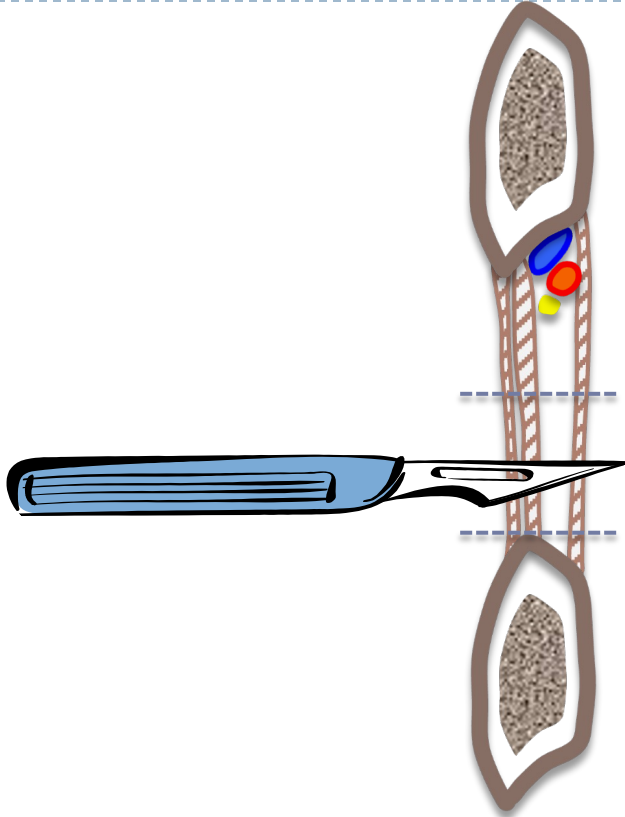
La réalité : Sujet jeune



La réalité : Sujet âgé hypertendu



Comment réaliser l'incision ?

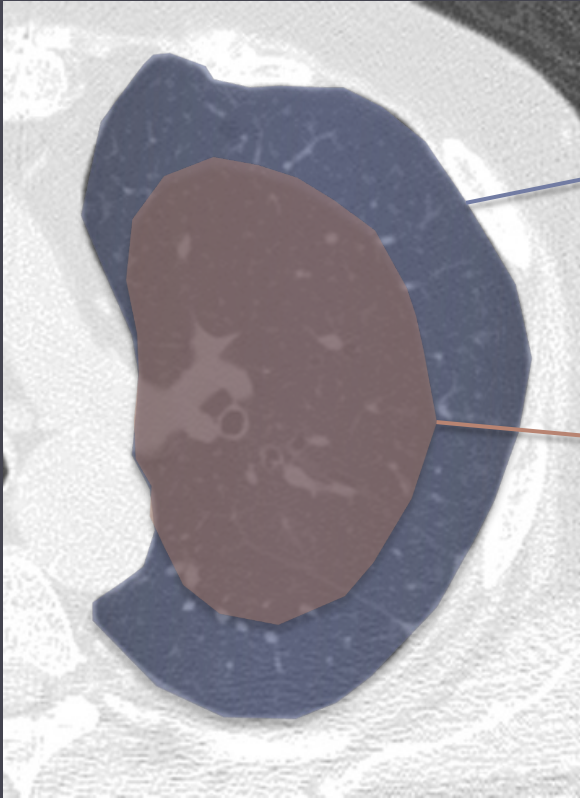


1

Les biopsies

Où sont les lésions pulmonaires ?

Adénocarcinome >> Carcinome épidermoïde

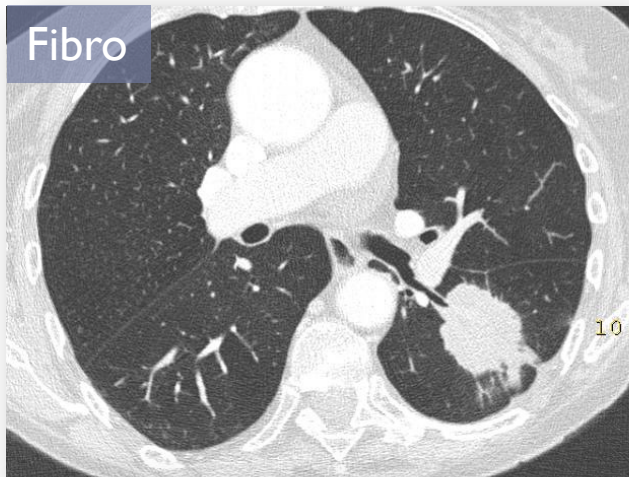


69% peripheral

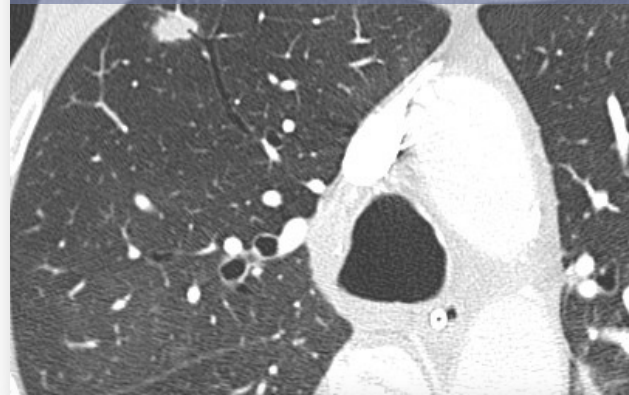
31% central



Fibro



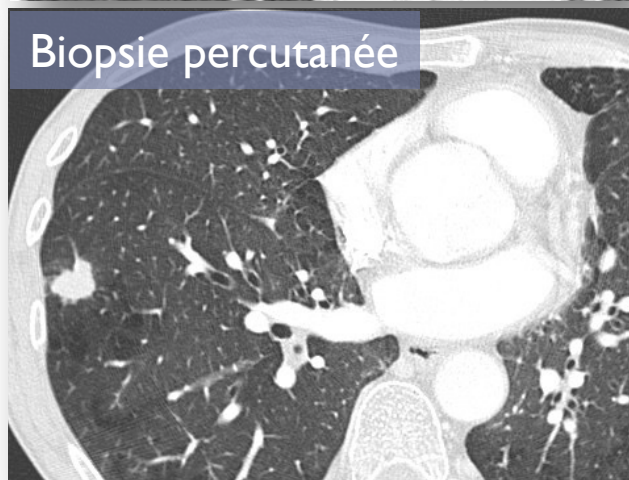
Fibro ou Biopsie percutanée ?



Fibro



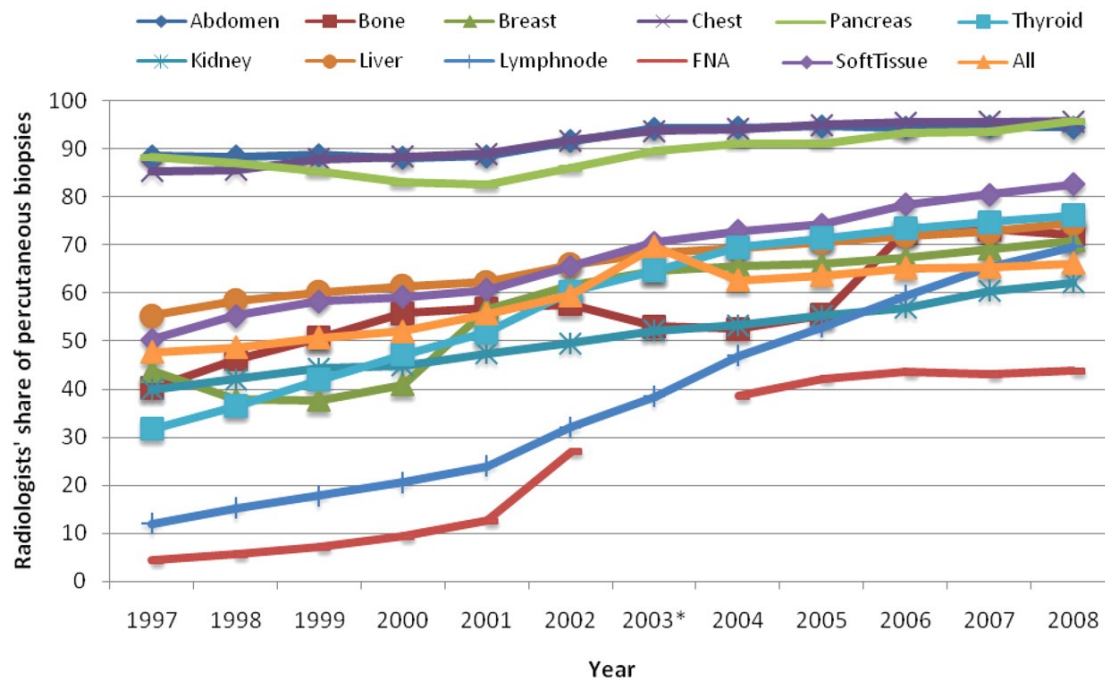
Biopsie percutanée



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 Them¹



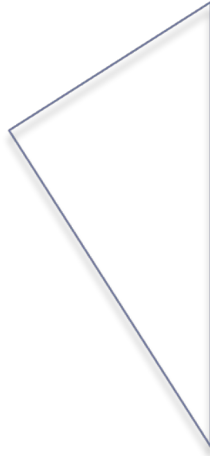
Molecular markers: Beyond morphology

Morphology

NSCLC

- ▶ Adenocarcinoma
- ▶ Squamous
- ▶ Large cell

▶ SCLC



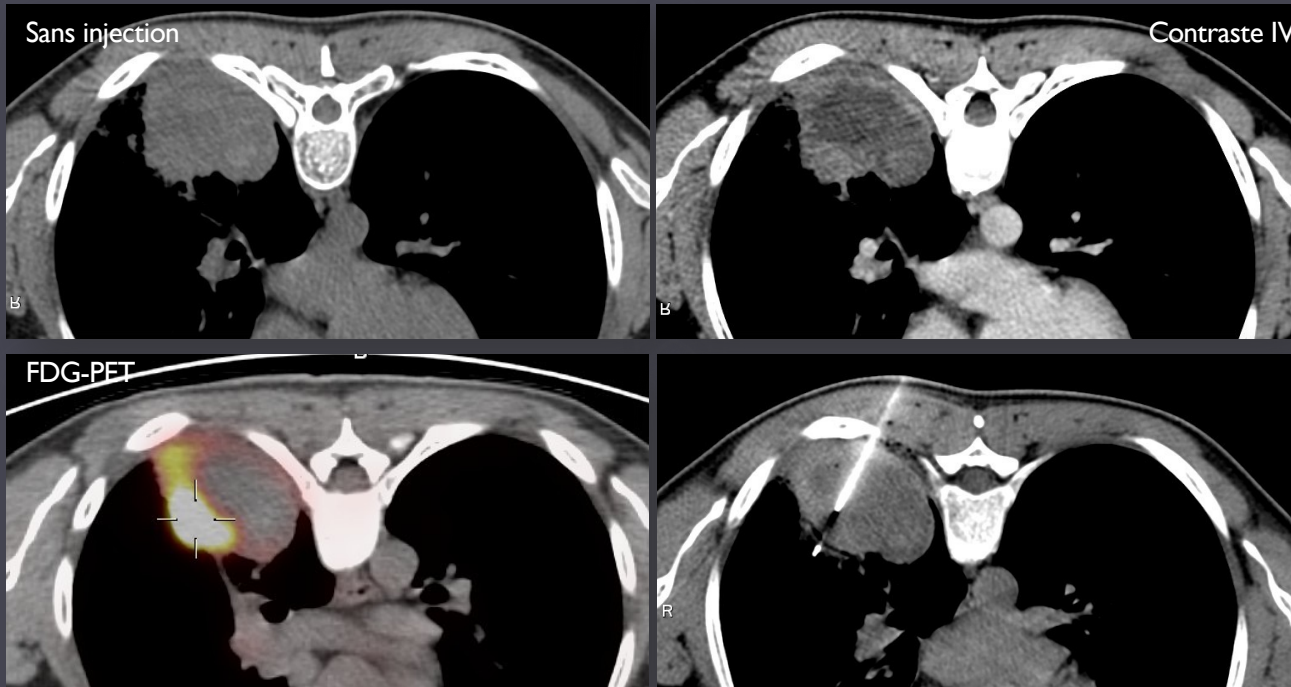
Molecular studies

- ▶ EGFR mutations
- ▶ EML4-ALK translocation
- ▶ KRAS mutations
- ▶ HER2 mutations
- ▶ BRAF mutations
- ▶ PI3K mutations



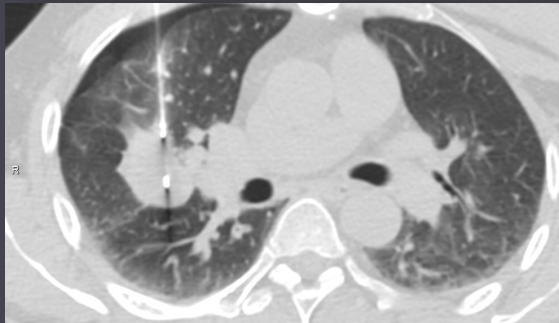
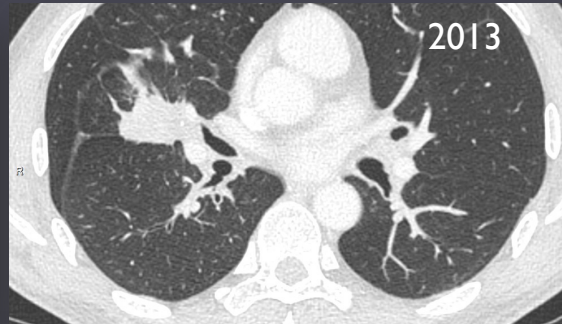
La morphologie est insuffisante pour cibler une biopsie

Fumeur. Tumeur homogène sans injection



Re-biopsie dans le cancer du poumon

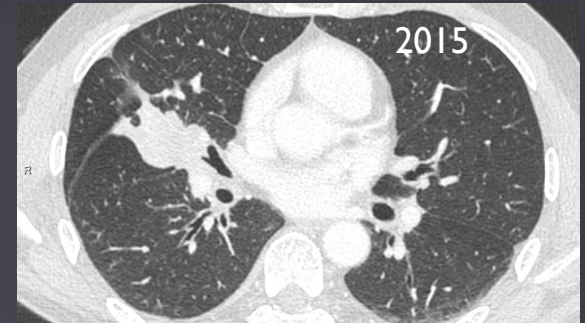
Adénocarcinome bronchique EGFR+ en 2012. Mise sous Gefitinib (Iressa®). Réponse initiale puis progression



Re-Biopsie :

- Adénocarcinome bronchique
- TTF1+, Alk-
- Mutation T790M

Mise sous Osimertinib

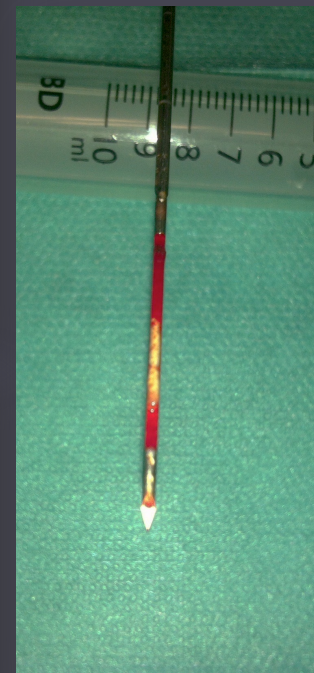
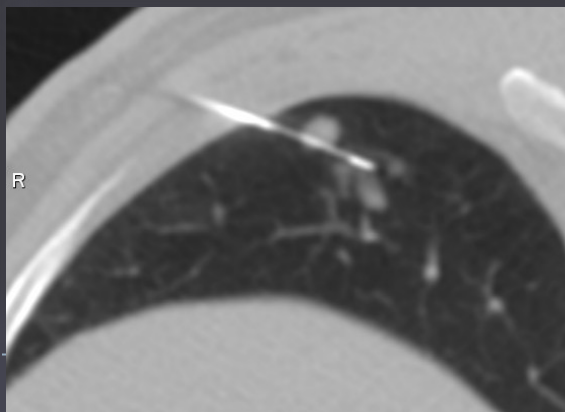
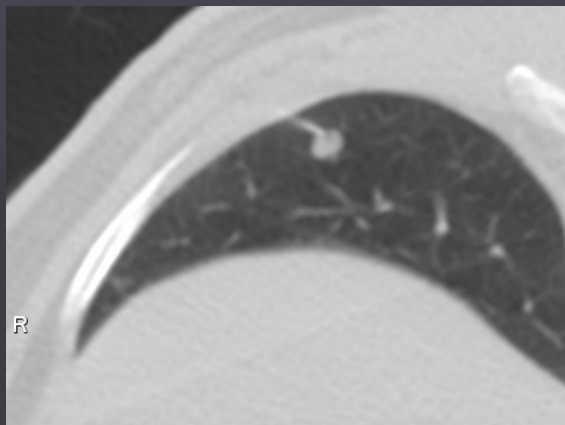
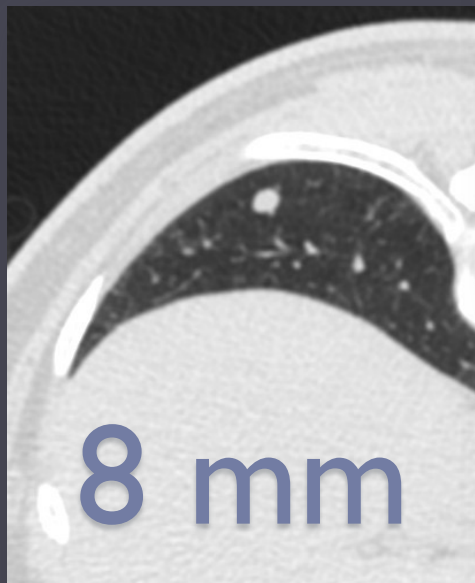


Performance des biopsies pulmonaires

	Sensitivity (%)	Accuracy (%)	No of Procedures	Ref.
Overall	82%	88%	61	Wallace MJ, Radiology 2002
	87%	77%	162	Ohno Y, AJR 2003
	91%	94%	346	Geraghty PR, Radiology 2003
Malignancy	89%	91%	10	Montaudon M, Eur Radiol 2004
- <10mm	88%	92%	7	Wallace MJ, Radiology 2002
- <10mm	67%	80%	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
Infection				
- Fungal	70.6%	76.4%	17	Nosari A, Haematologica 2003

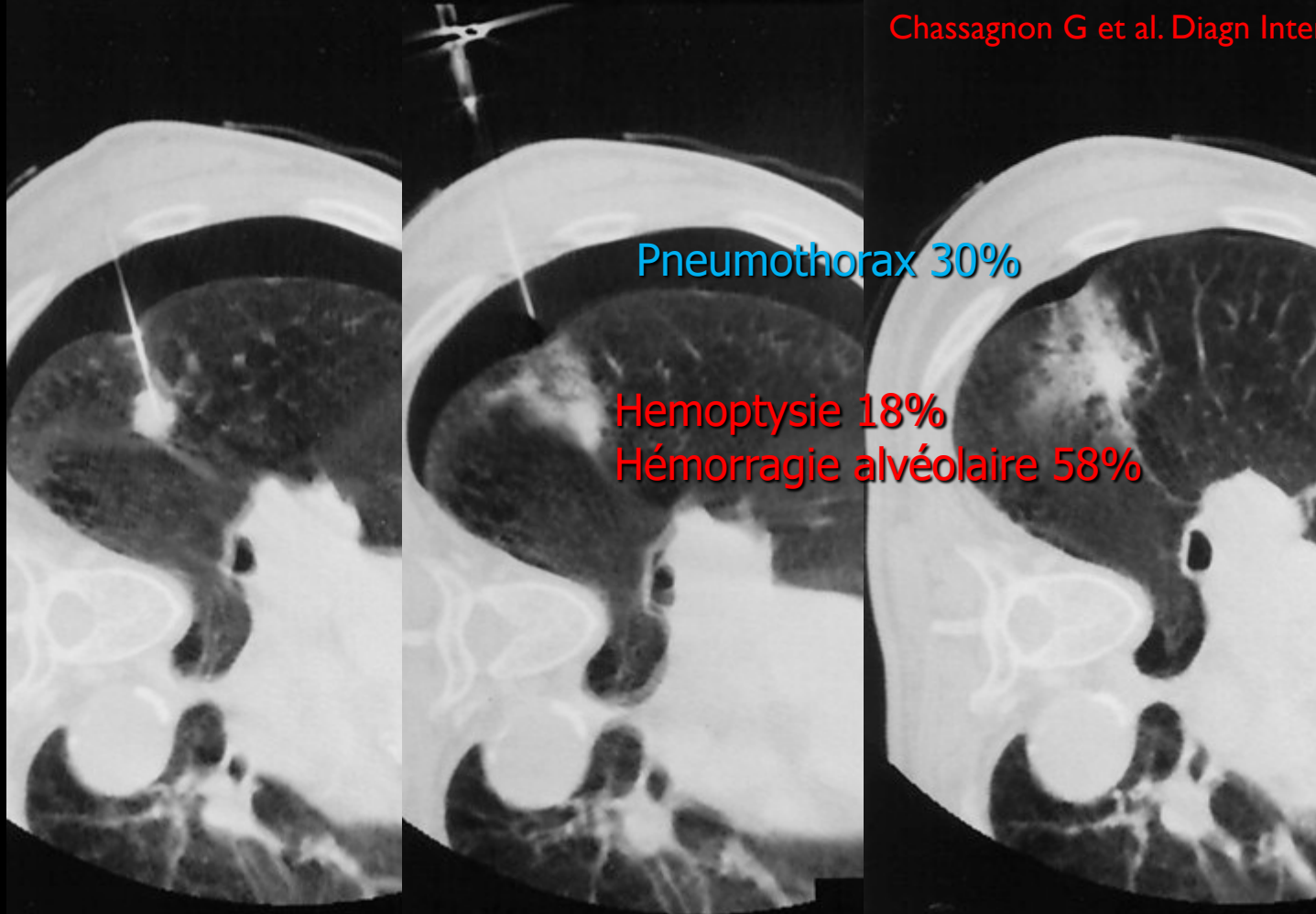
- *Wilson M et al. CT-guided percutaneous lung biopsy: Correlation between diagnostic yield, lung lesion size, and lobar distribution. Am J Interv Radiol 2021

ATCD de K urothélial. Nodule unique de 8 mm



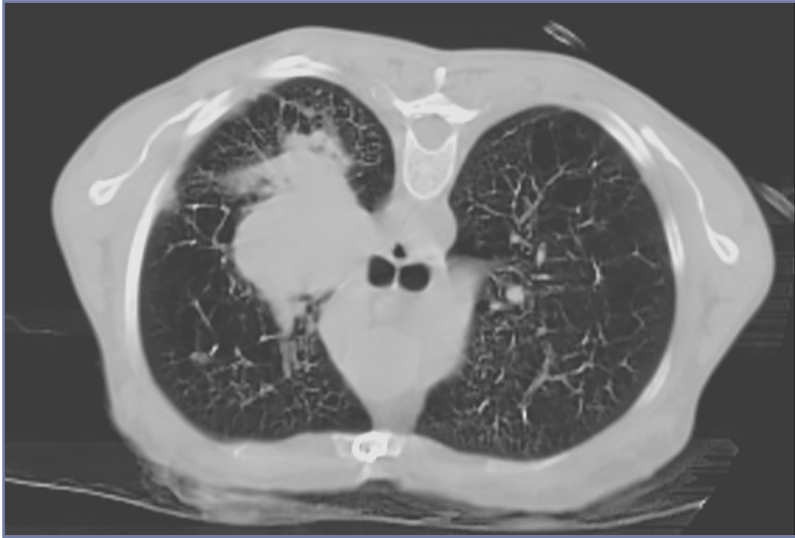
Complications

	Risk	No of Procedures	Needle	Ref.
Pneumothorax (total/chest tube)	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
Bleeding (total/hemoptysis)	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
Vasovagal response	0.3%	846	19G PNAB	Geraghty PR, Radiology 2003
Air embolism	0.061%	9783		Tomiyama N. Eur J Radiol 2006
Dissémination tumorale	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

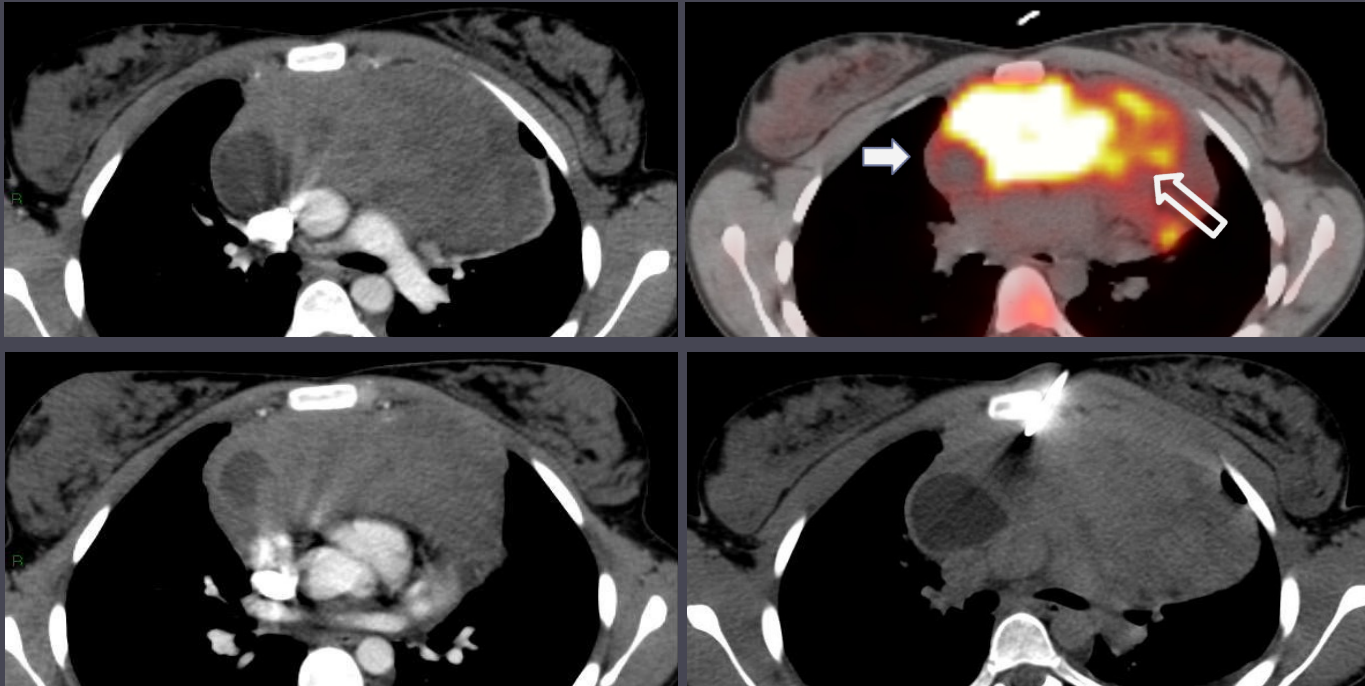
Constance de Margerie-Mellon, MD, Cédric de Bazelaire, PhD, MD,*
Sandy Amorim, MD,† Pauline Brice, MD,† Abdellatif Tazi, PhD, MD,‡
Josette Brière, MD,§ Jacques Frijja, MD,* and Eric de Kerviler, MD**

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

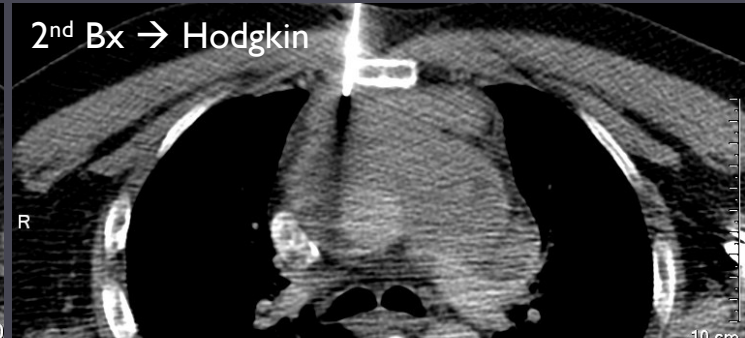
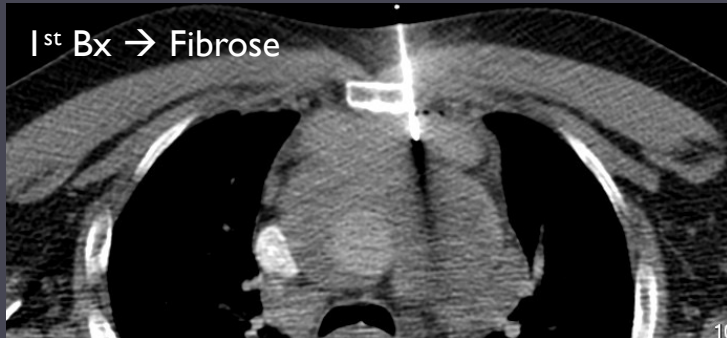
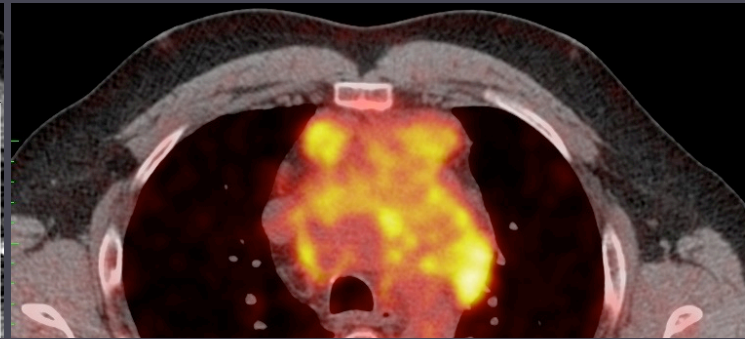
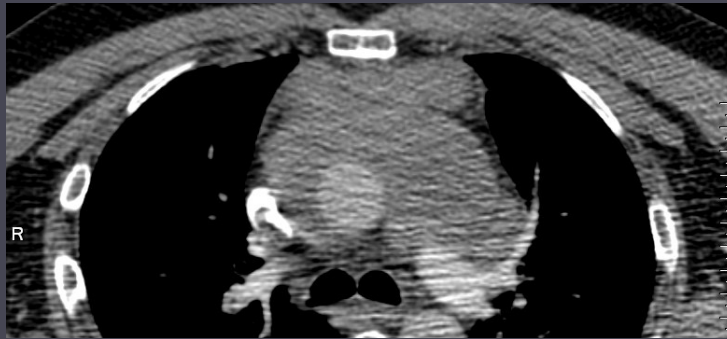
S'aider d'autres modalités d'imagerie pour mieux cibler

Confirmation de récidence de Hodgkin



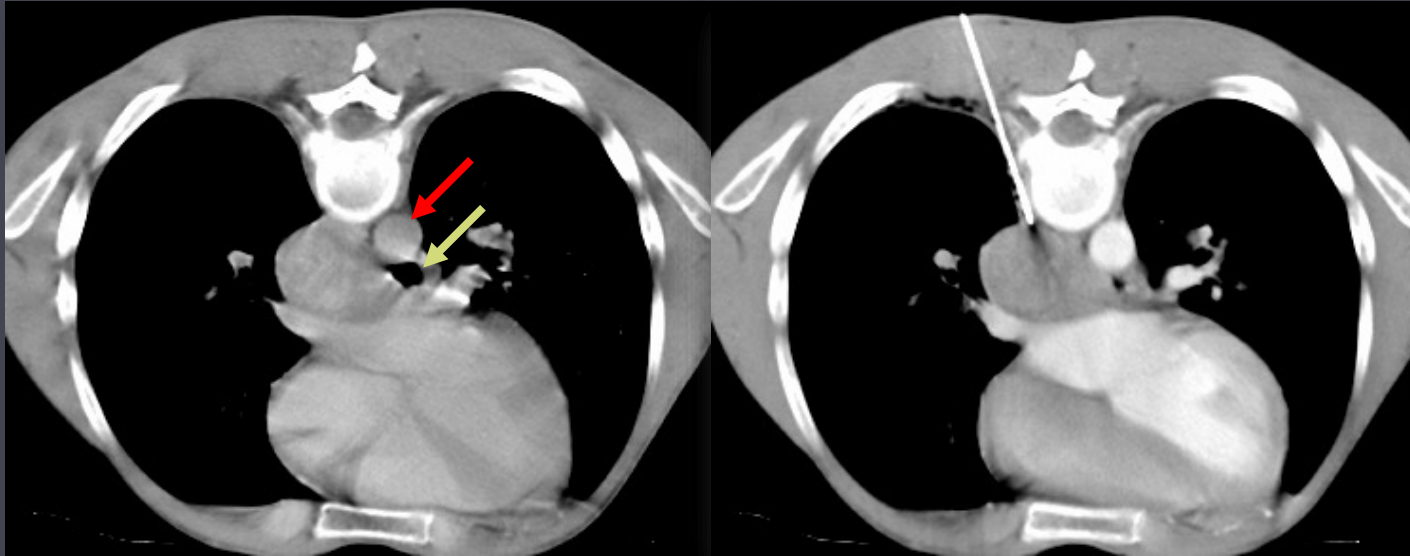
S'aider d'autres modalités d'imagerie pour mieux cibler

Patient adressé pour biopsie d'une masse médiastinale antérieure




Masse du médiastin postérieur

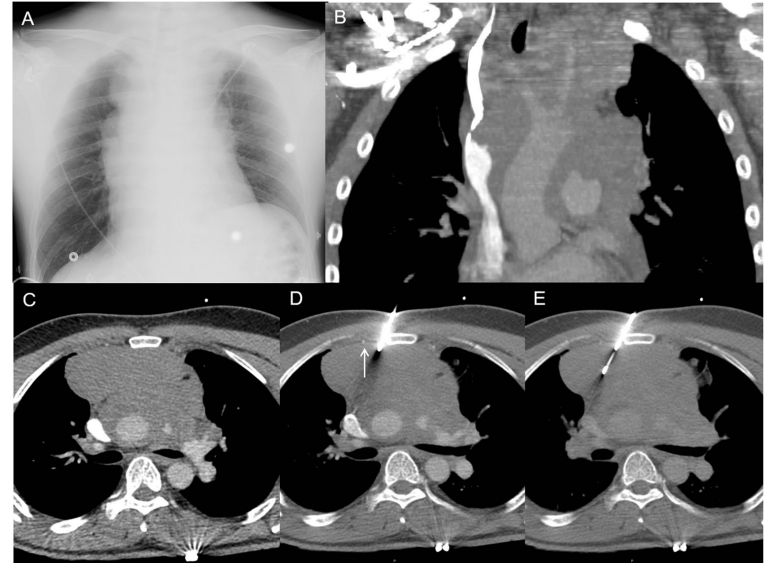
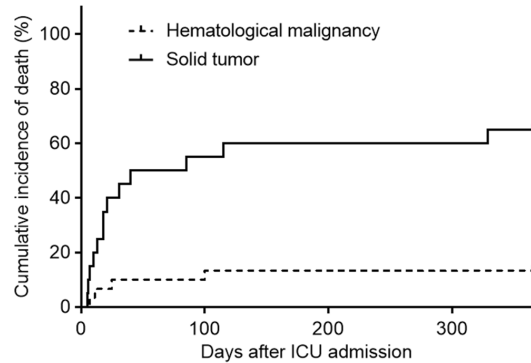
Injection de sérum physiologique



Management of superior vena cava syndrome in critically ill cancer patients

Sarah Morin¹ · Adeline Grateau¹ · Danielle Reuter¹ · Eric de Kerviler^{2,3} ·
Constance de Margerie-Mellon² · Cédric de Bazelaire^{2,3} · Lara Zafrani^{1,3} ·
Benoit Schlemmer^{1,3} · Elie Azoulay^{1,3} · Emmanuel Canet¹ 

- ▶ 50 patients
- ▶ 60% hematological malignancies



2

Les ablations

Indications en France

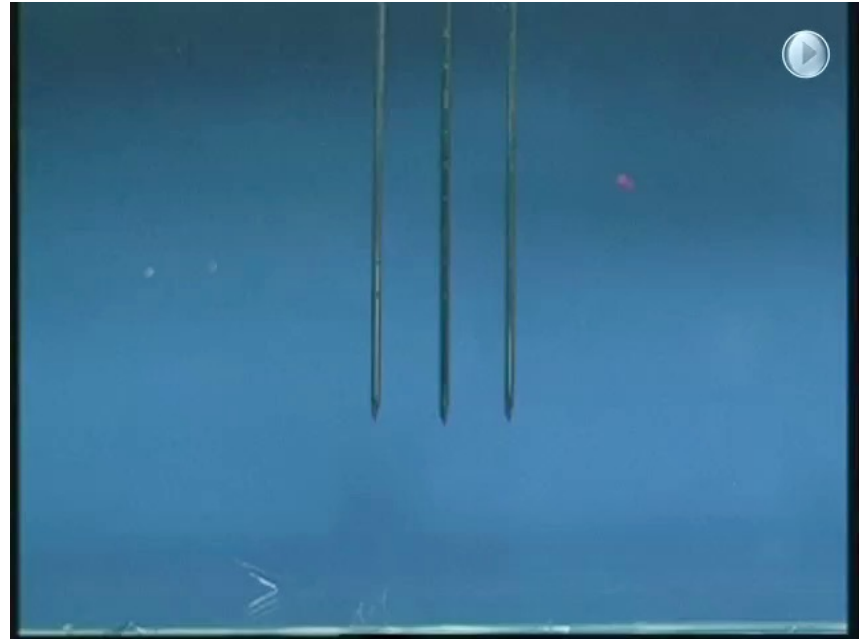
- ▶ **Maladie oligo-métastatique pulmonaire +++**
 - ▶ Mélanome
 - ▶ Rein-vessie
 - ▶ Colo-rectal
 - ▶ Sarcomes
- ▶ **Discuté**
 - ▶ K bronchique primitif non opérable

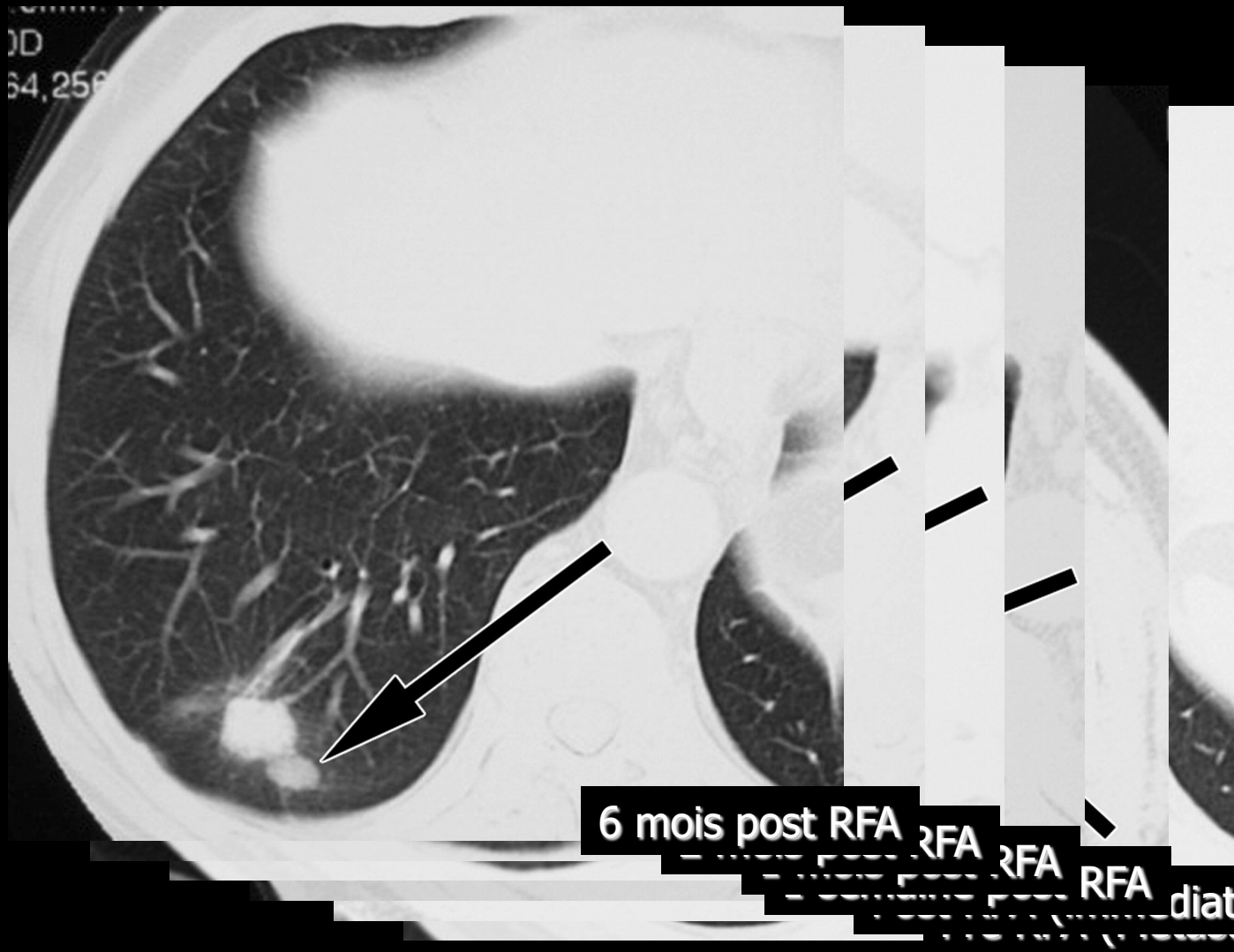
Ablations tumorales : Le chaud ou le froid ?

Radiofréquence

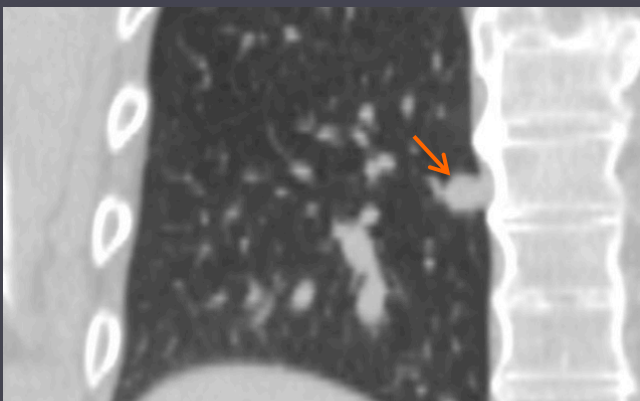
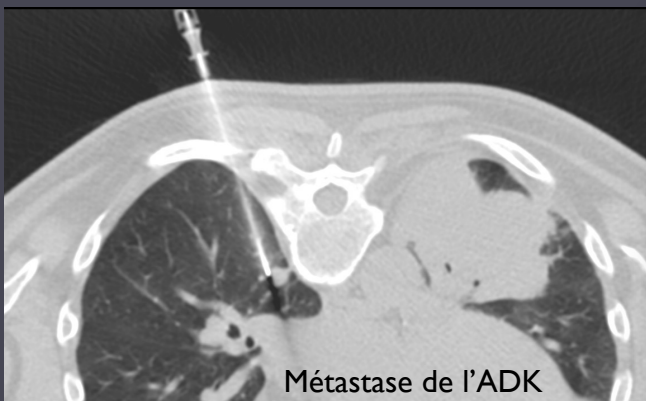
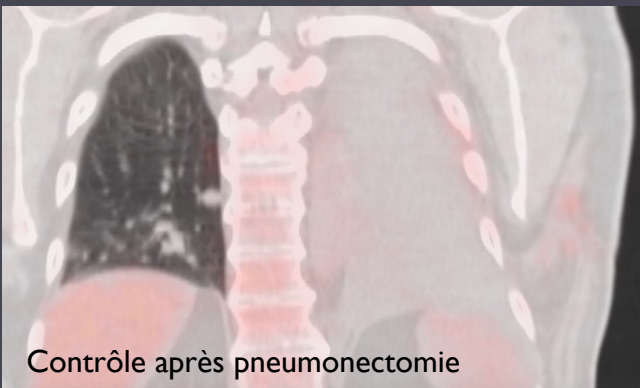


Cryoablation



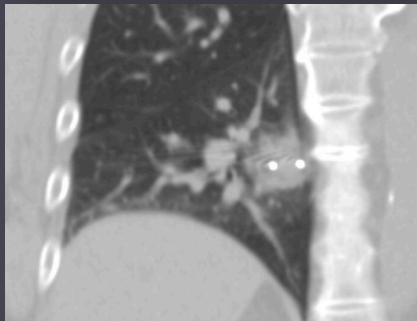
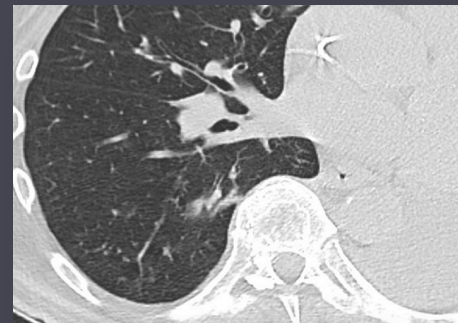
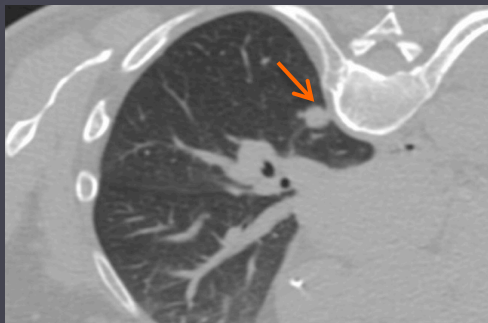


Cryoablation du poumon

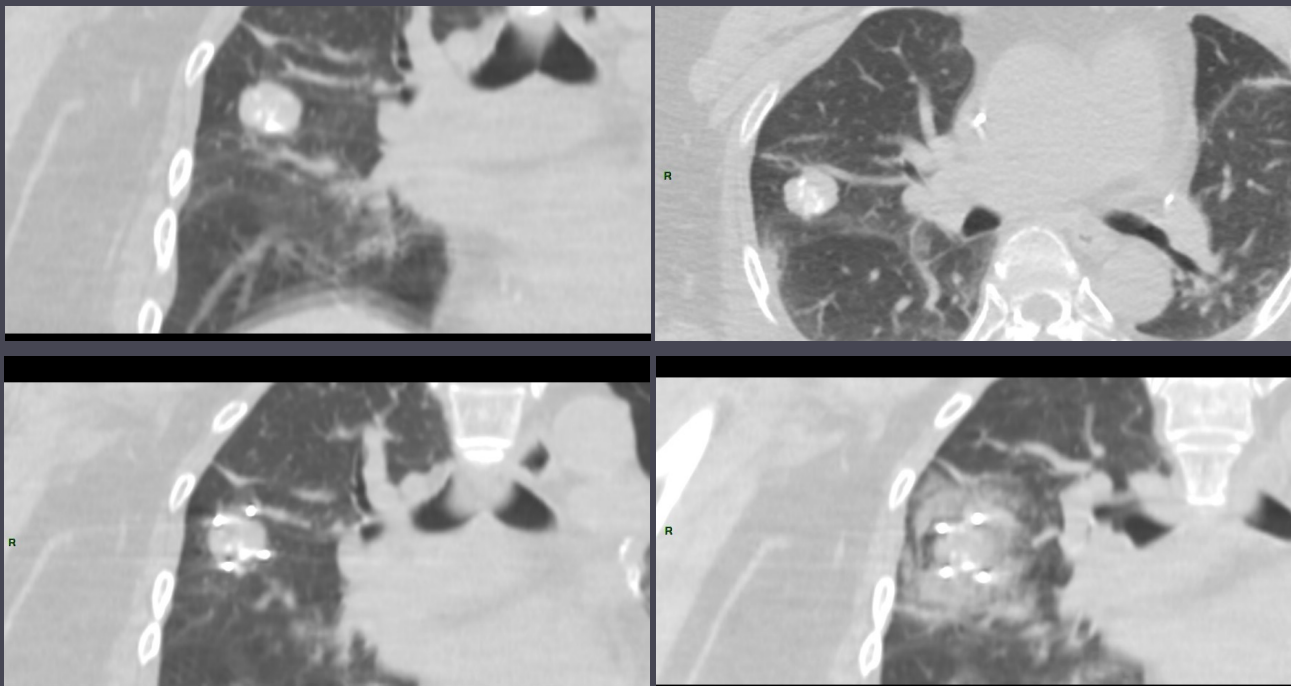


Cryoablation du poumon

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



Chondrosarcome métastatique. 3 résections, 4 cryothérapies



CRC metastasis



original article

Annals of Oncology 00: 1–5, 2015
doi:10.1093/annonc/mdv037**Radiofrequency ablation is a valid treatment option for lung metastases: experience in 566 patients with 1037 metastases**T. de Baère^{1*}, A. Aupérin², F. Deschamps¹, P. Chevallier³, Y. Gaubert⁴, V. Boige⁵, M. Fonck⁶, B. Escudier⁵ & J. Palussière⁷¹Departments of ¹Image Guided Therapy; ²Biostatistics, Gustave Roussy Cancer Campus, Villejuif; ³Department of Imaging, Hôpital Archet 2, Nice; ⁴Department of Imaging, Hôpital de la Timone, Marseille; ⁵Department of Medical Oncology, Gustave Roussy Cancer Campus, Villejuif; ⁶Departments of ⁶Medical Oncology; ⁷Imaging, Institut Bergonié, 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	76.1% (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

Eclipse

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

Thierry de Baère, MD,^{a,*} David Woodrum, MD, PhD,^b Lambros Tselikas, MD,^a Fereidoun Abtin, MD,^c Peter Littrup, MD,^d Frederic Deschamps, MD,^a Robert Suh, MD,^c Hussein D. Aoun, MD,^d Matthew Callstrom, MD^b

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)



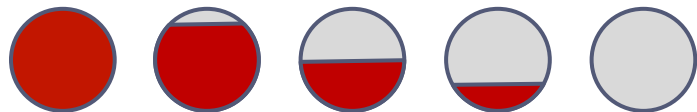
Matthew R. Callstrom, MD, PhD,^{a,*} David A. Woodrum, MD, PhD,^a
Francis C. Nichols, MD,^b Jean Palussiere, MD,^c Xavier Buy, MD,^c Robert D. Suh, MD,^d
Fereidoun G. Abtin, MD,^d Bradley B. Pua, MD,^e David C. Madoff, MD,^e
Sandeep L. Bagla, MD,^f Dimitrios C. Papadouris, MD,^f Hiran C. Fernando, MD,^g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

- ▶ 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 !

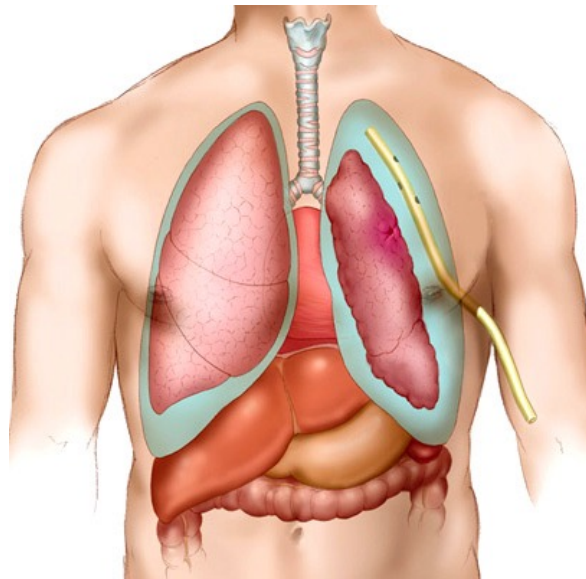


Postéro-inférieur

Liquide

Antéro-supérieur

Air



Attention au point d'entrée et au trajet

Eviter les muscles

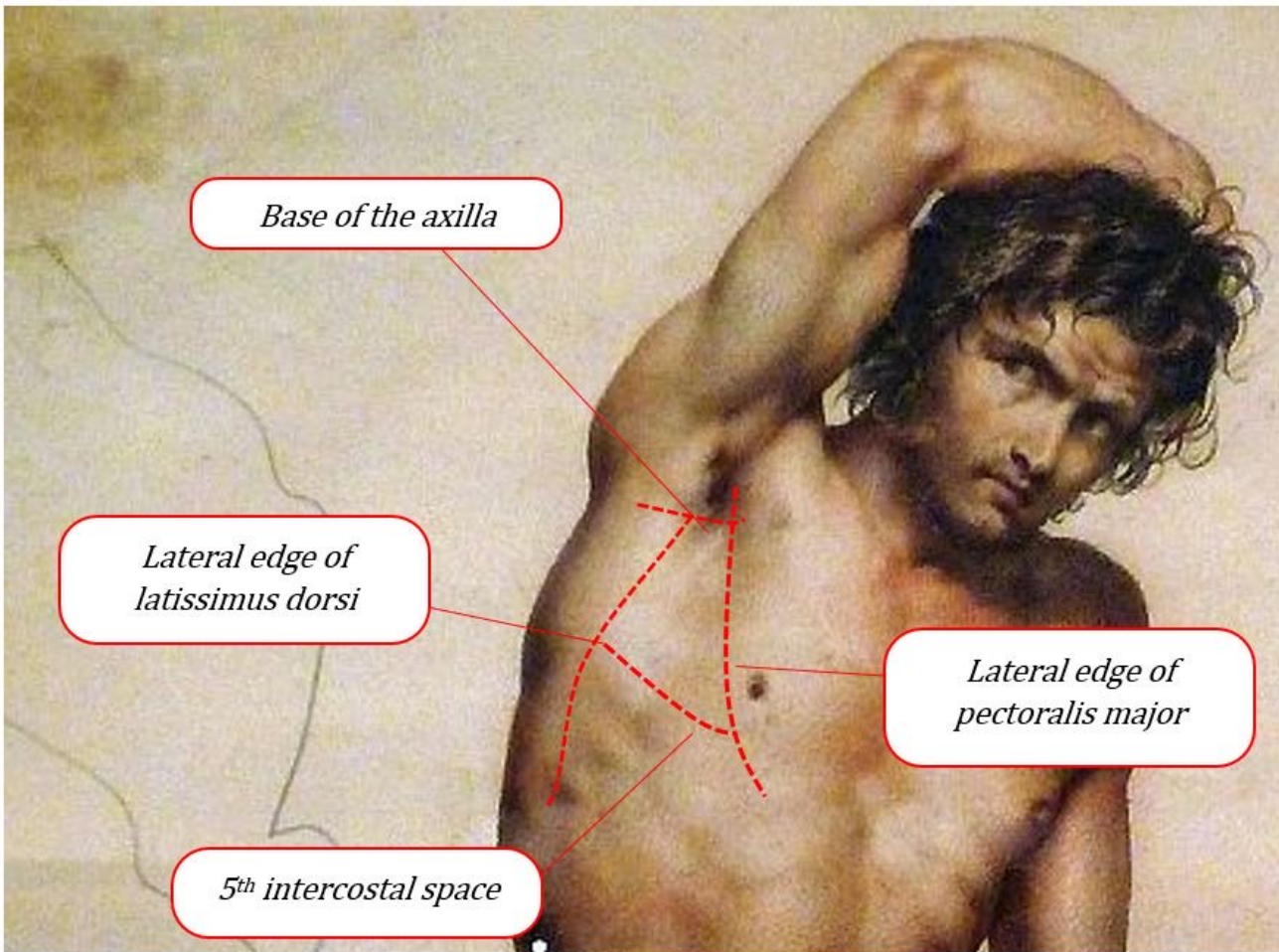
Eviter le dos

Base of the axilla

*Lateral edge of
latissimus dorsi*

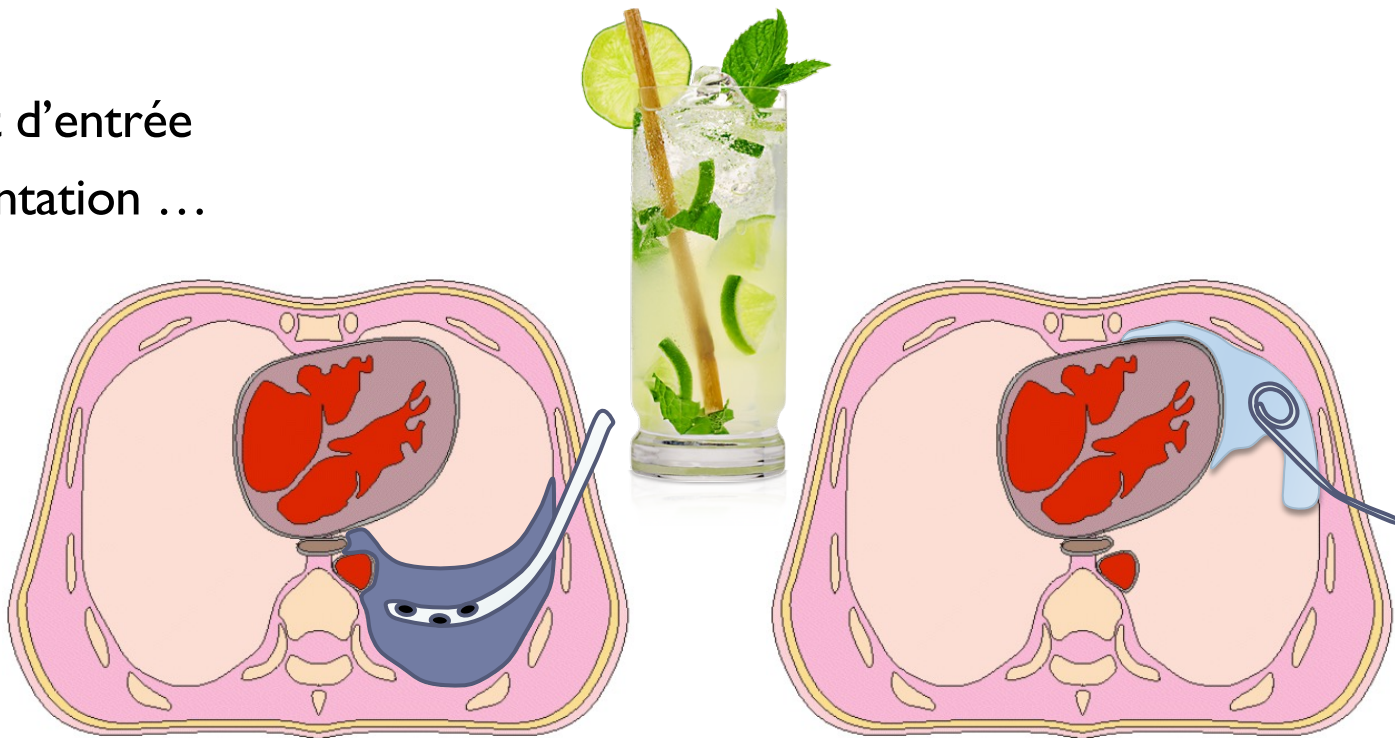
*Lateral edge of
pectoralis major*

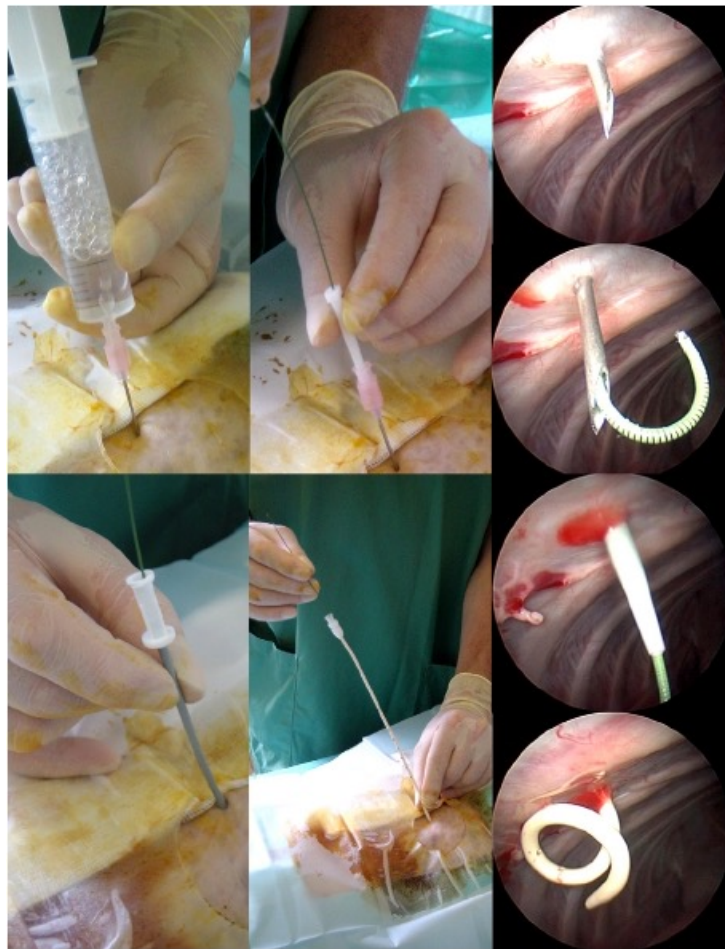
5th intercostal space



Les drains

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





Le drainage pour le pneumothorax

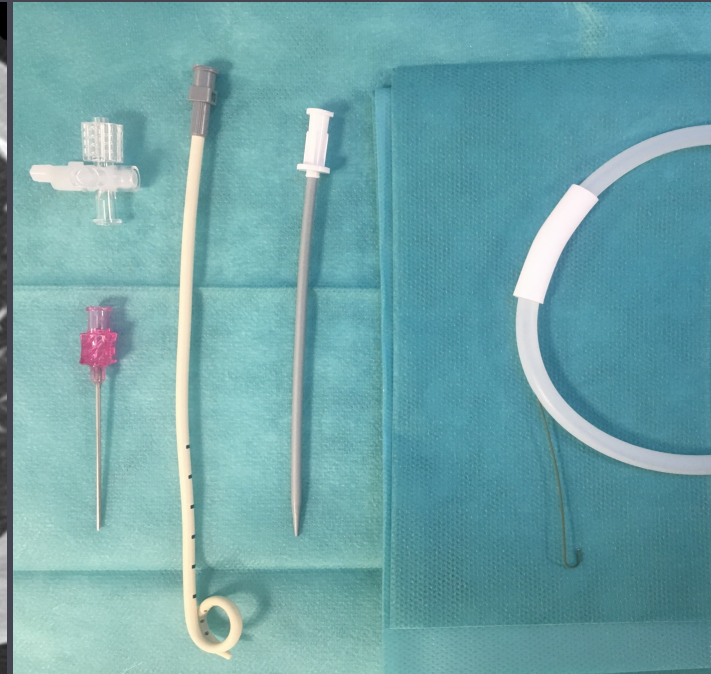
Abord antérieur

Technique de Seldinger

Dilatation

Petit drain 8F ou 10F

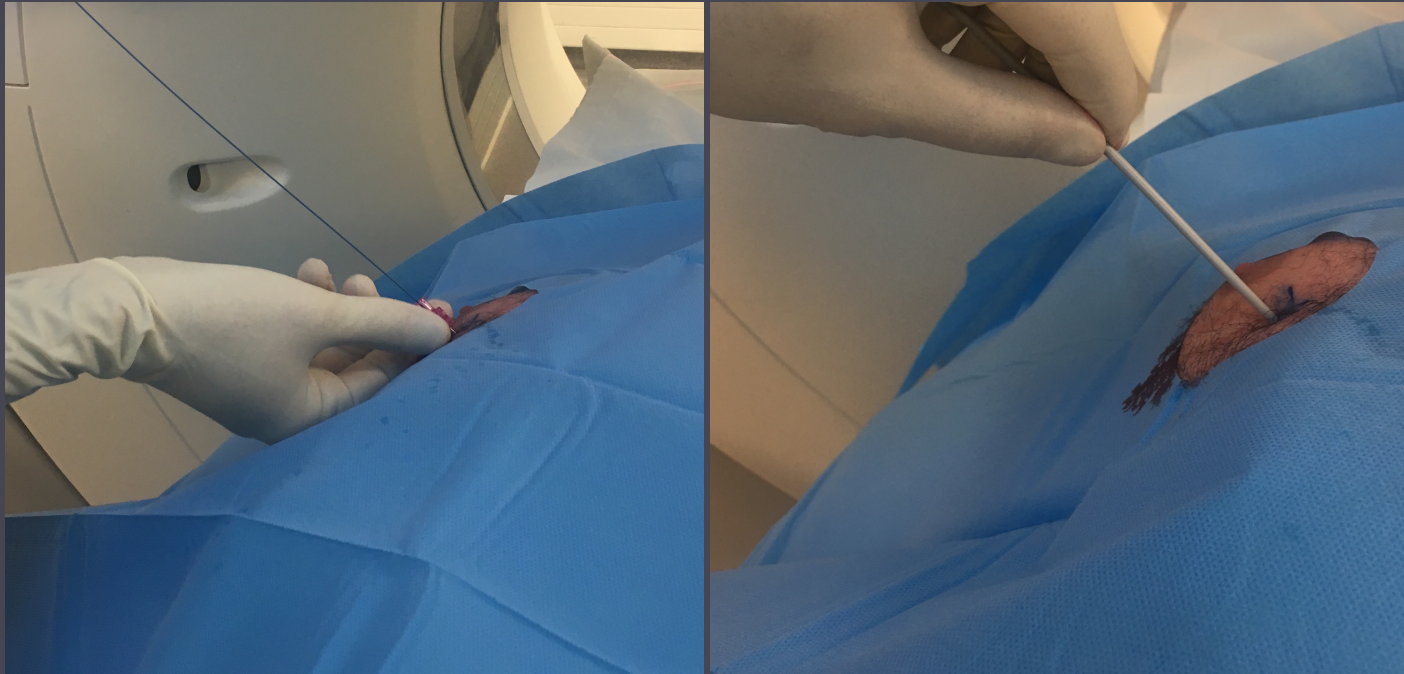
Drainage par technique de Seldinger : Pleurocath®



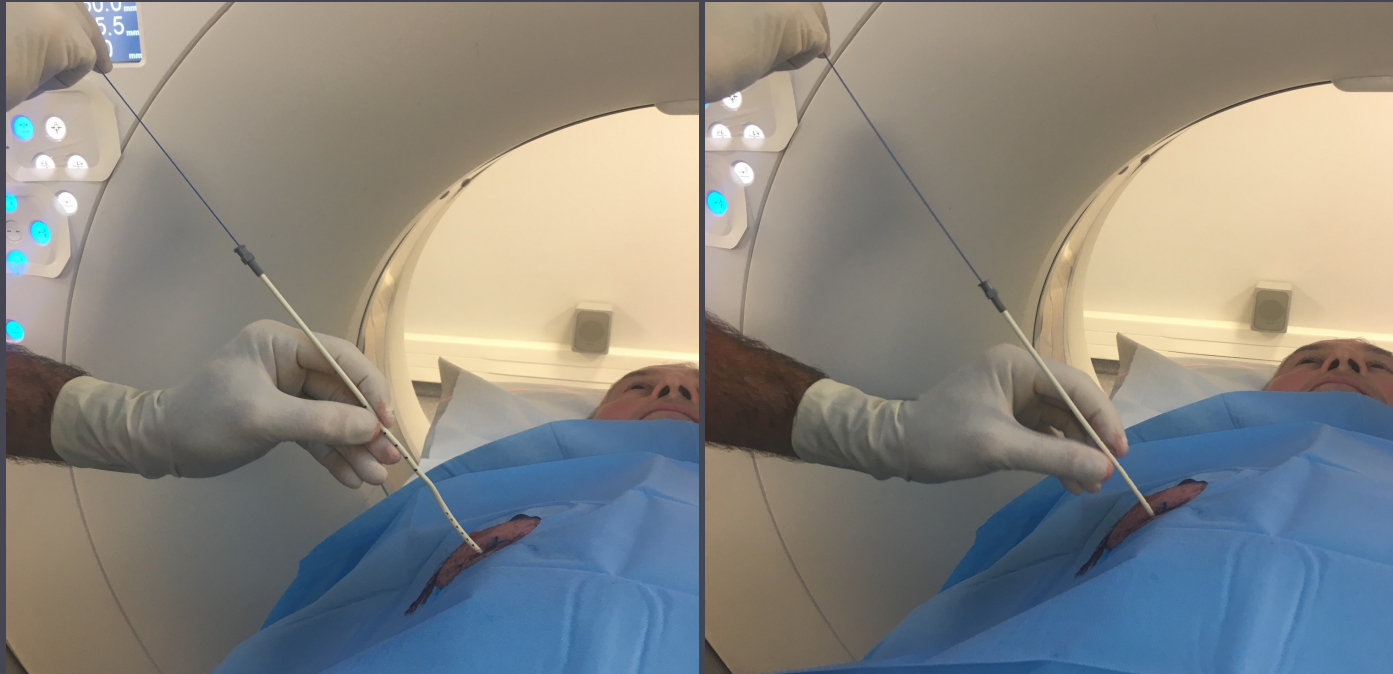
Drainage par technique de Seldinger : Pleurocath®



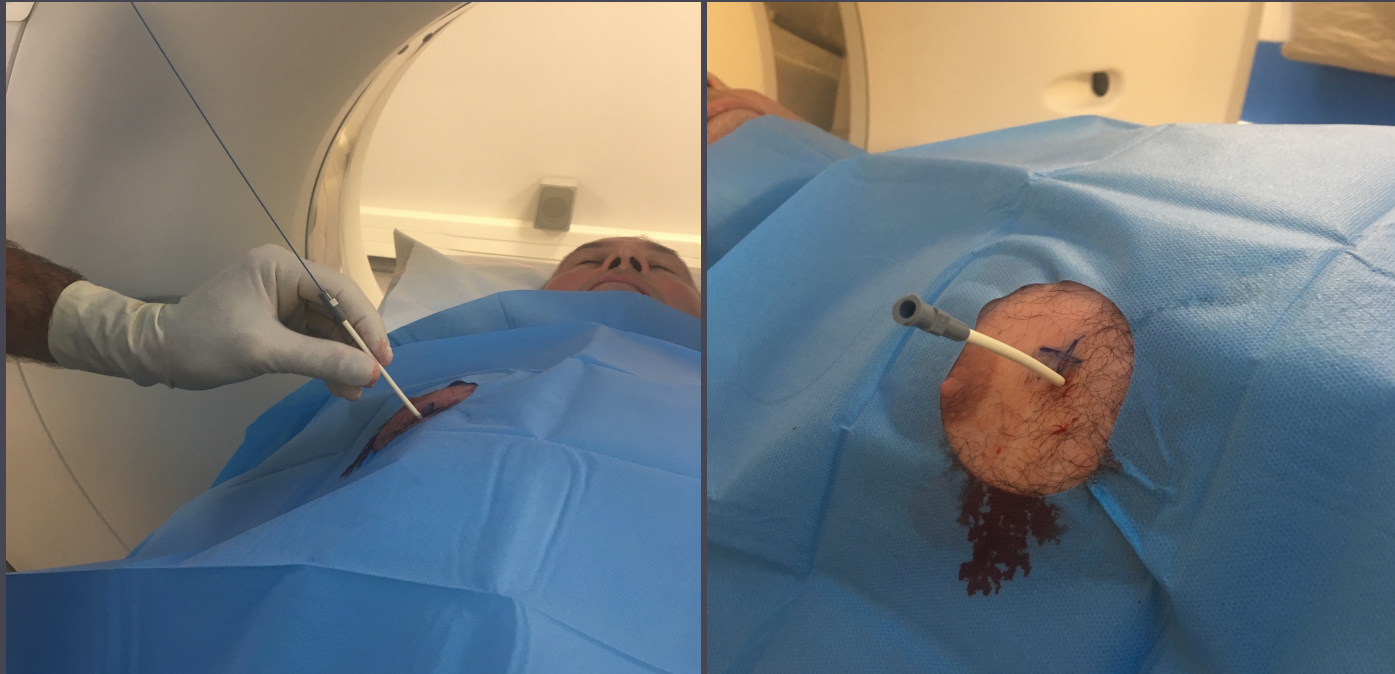
Drainage par technique de Seldinger : Pleurocath®



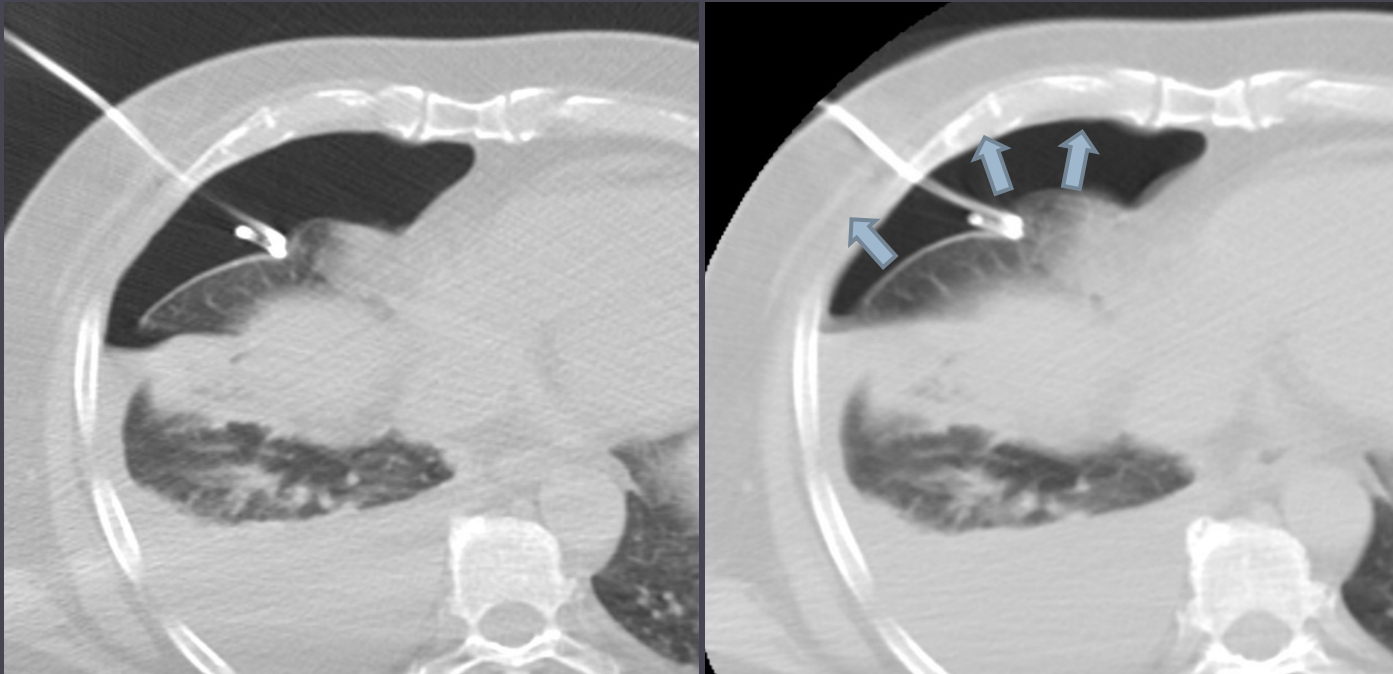
Drainage par technique de Seldinger : Pleurocath®



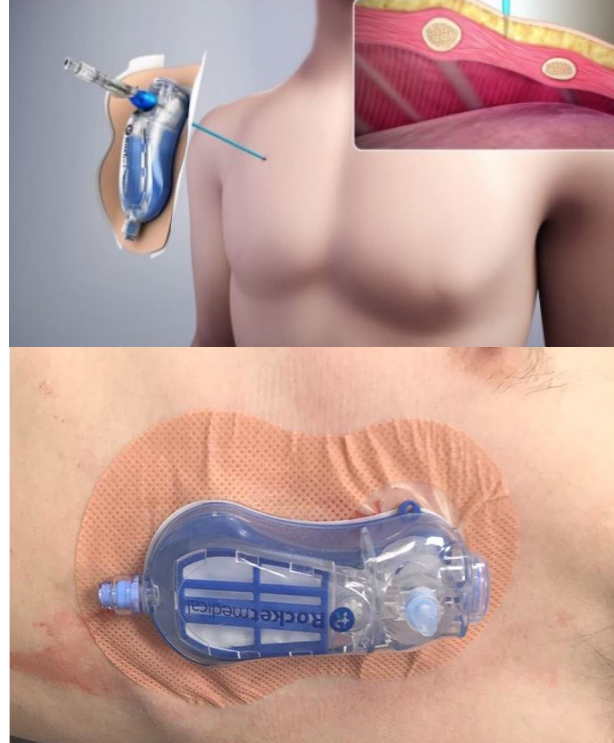
Drainage par technique de Seldinger : Pleurocath®



Drainage par technique de Seldinger : Pleurocath®



Rocket pleural vent



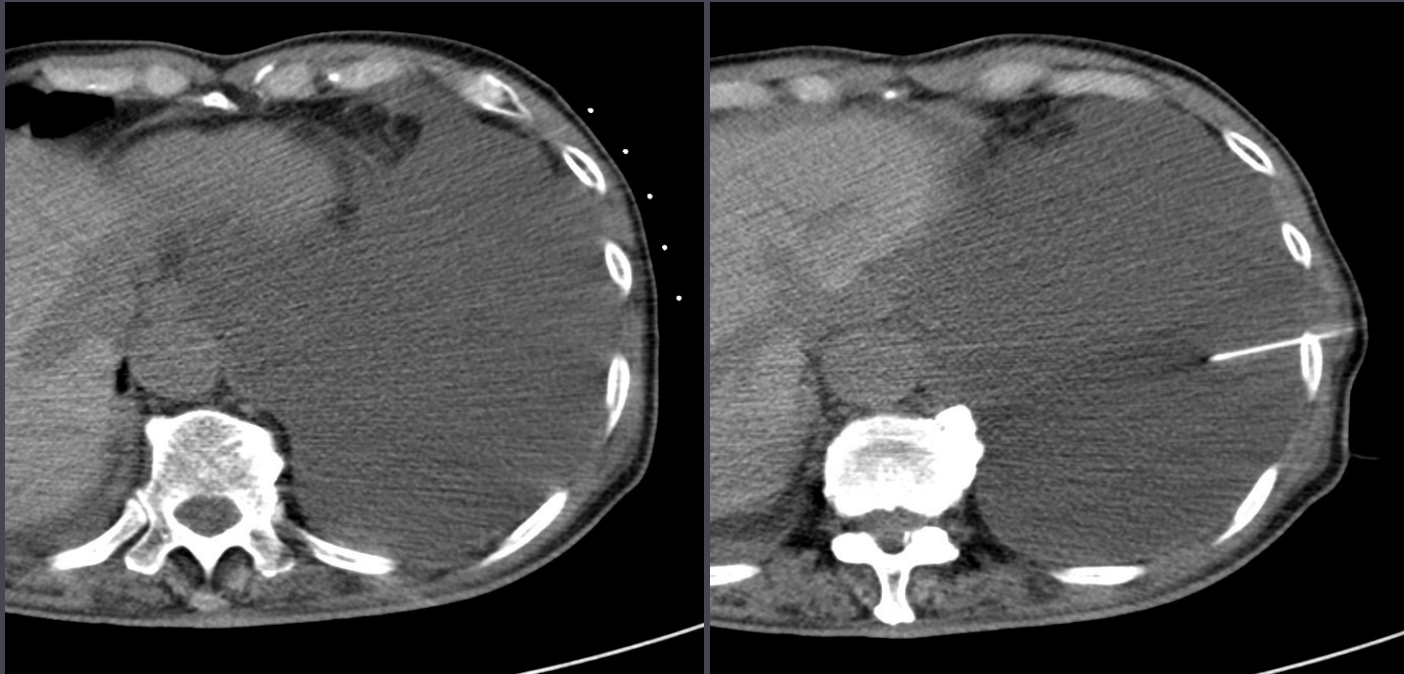
Le drainage d'un épanchement liquidien

- Gros drain à bout mousse monté sur un rigidificateur



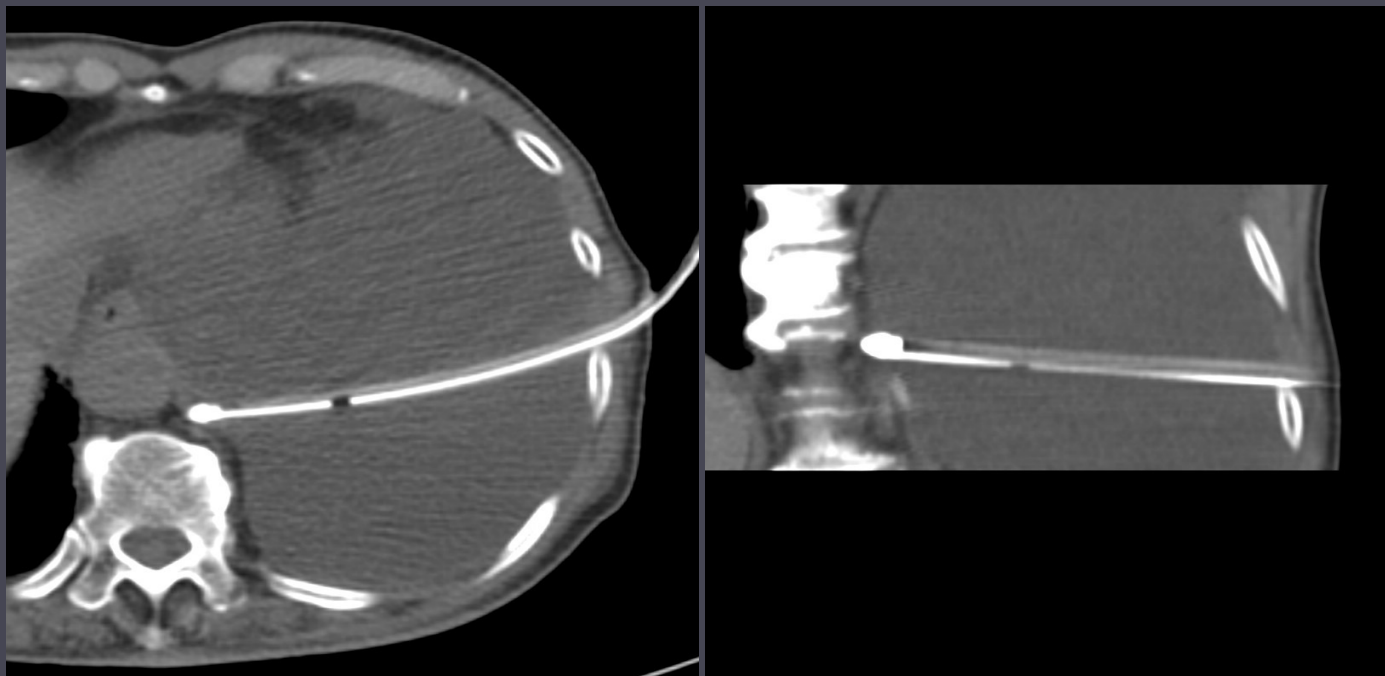
Drainage pleural

Patient mince, épanchement abondant → Ponction directe



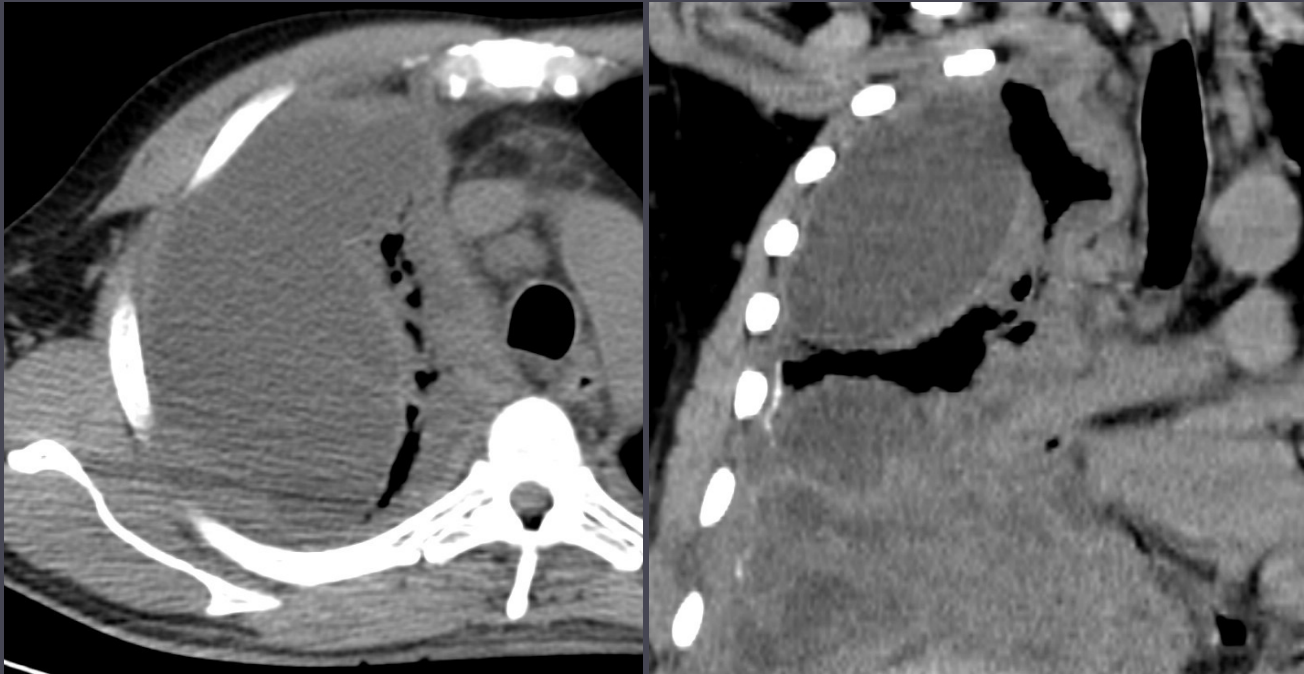
Drainage pleural

Patient mince, épanchement abondant → Ponction directe



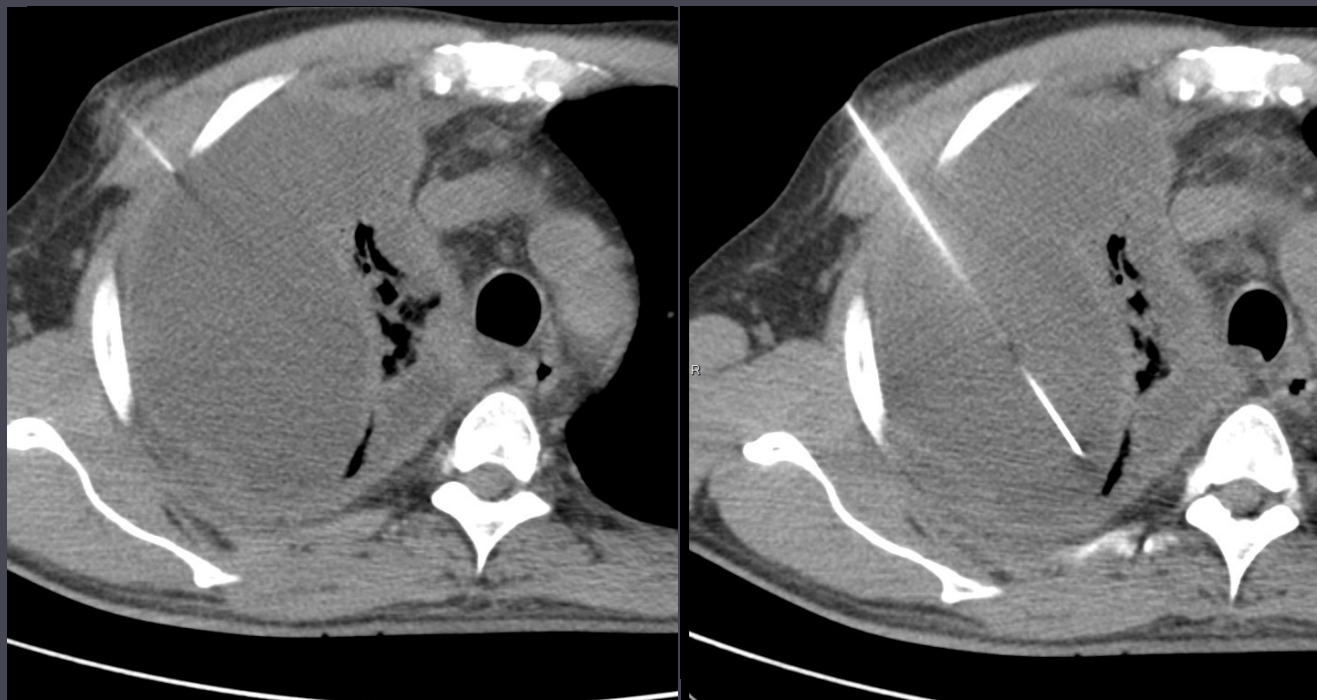
Epanchement pleural cloisonné

Epanchement apical



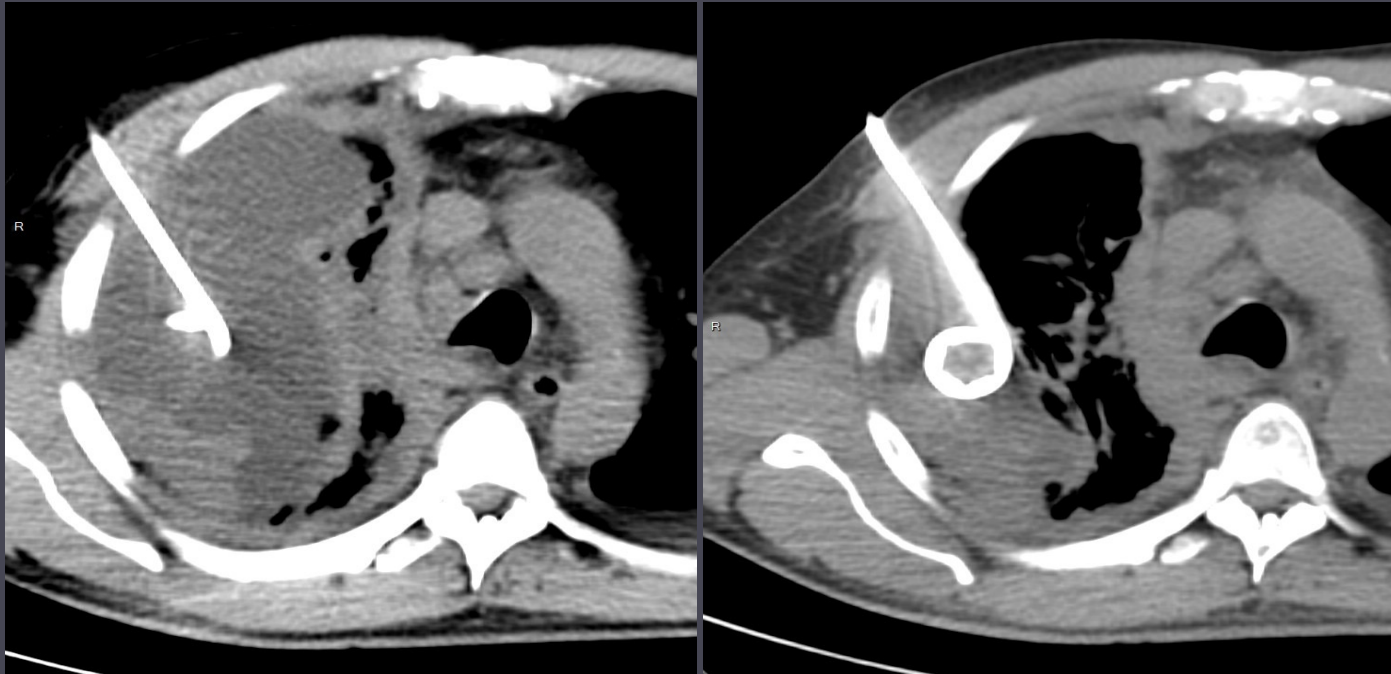
Epanchement pleural cloisonné

Epanchement apical



Epanchement pleural cloisonné

Epanchement apical



Conclusion

- ▶ 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