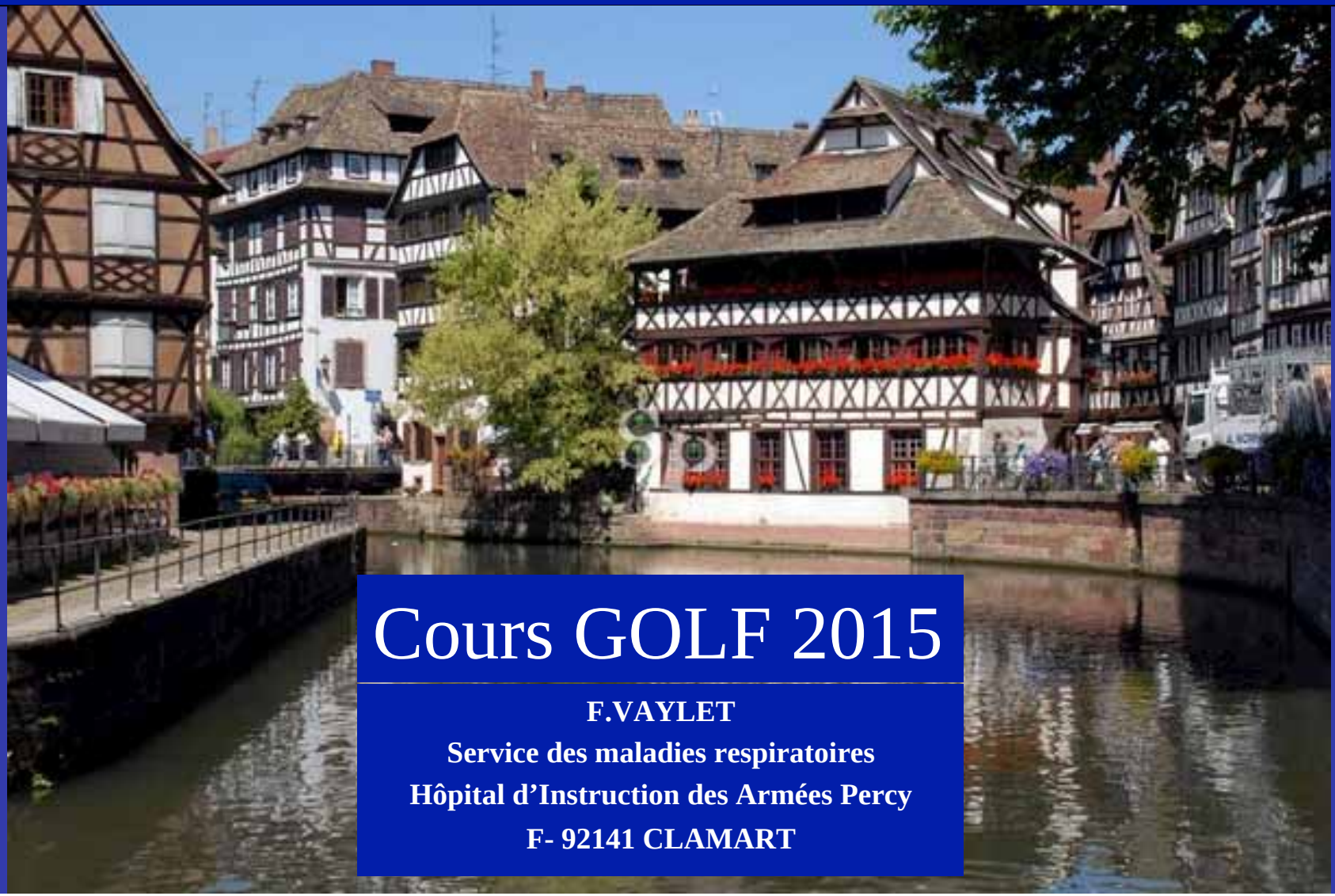
Optimiser le bilan d'extension à distance
(cadre du cancer broncho-pulmonaire)



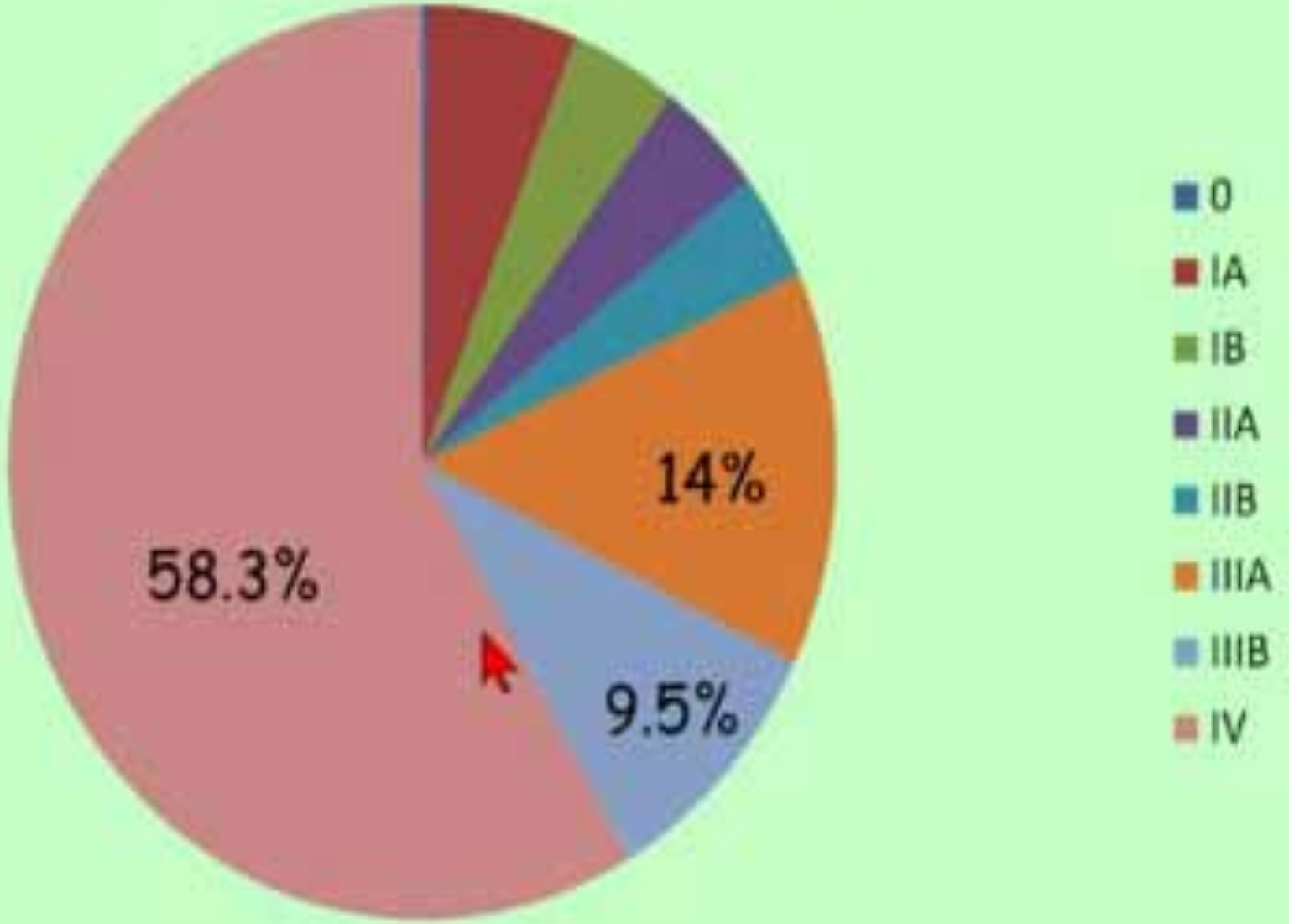
Cours GOLF 2015

F.VAYLET
Service des maladies respiratoires
Hôpital d'Instruction des Armées Percy
F- 92141 CLAMART

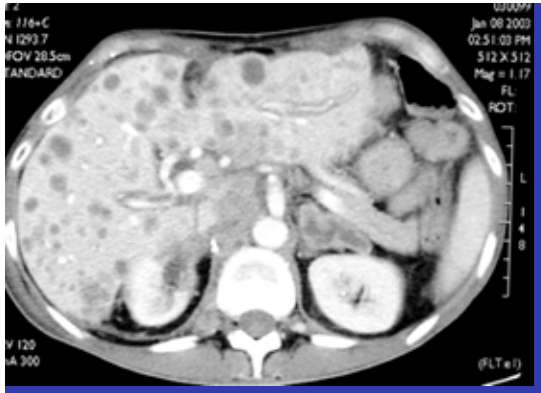
Un bilan oncologique à distance,

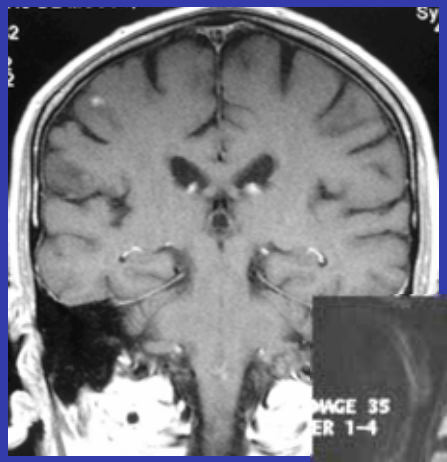
pourquoi?

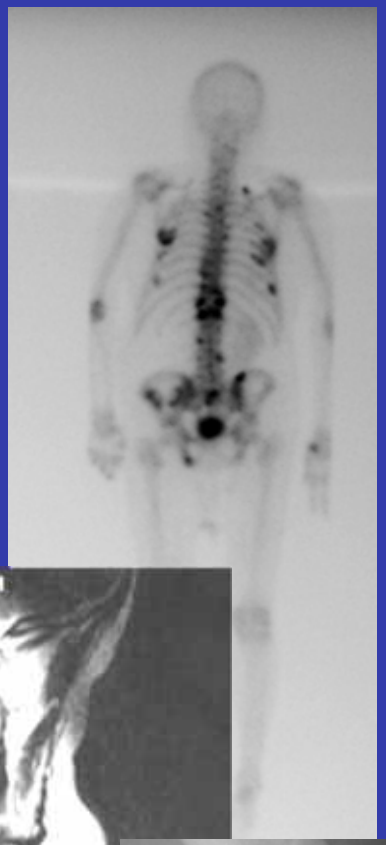
Répartition par stades (NSCLC seulement) en 2010:

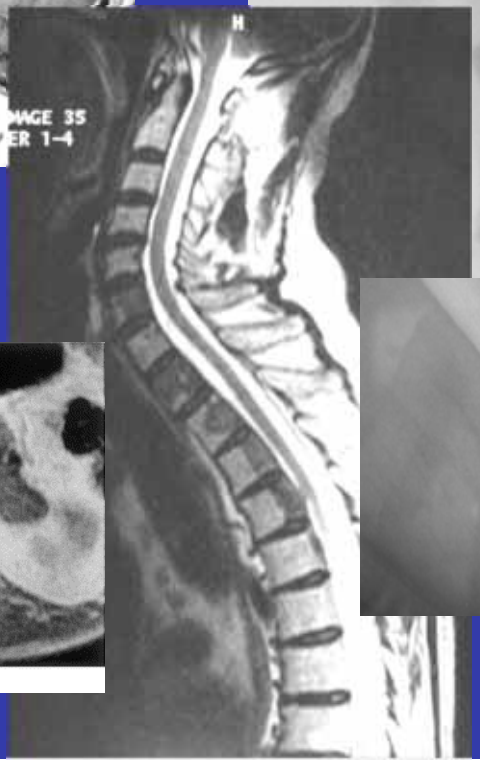


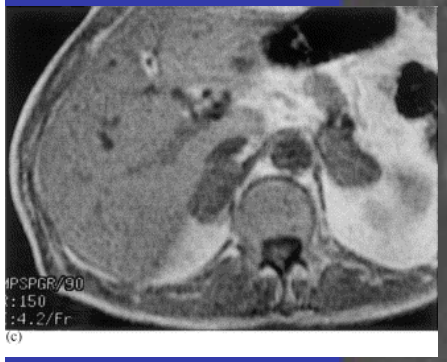
Extension métastatique

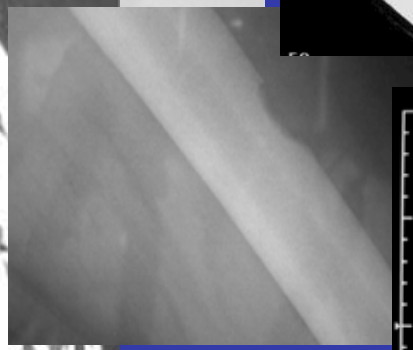


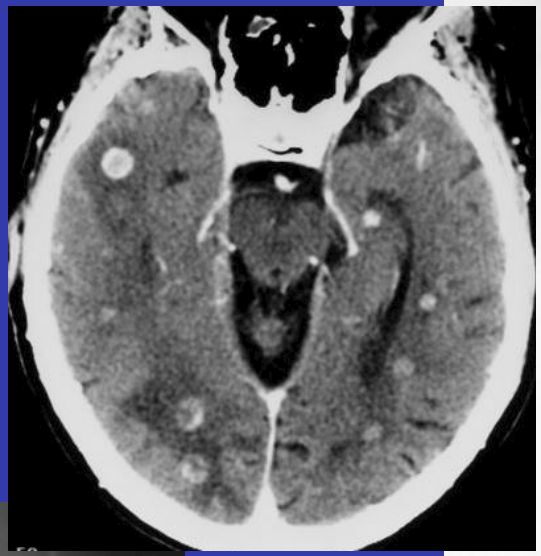


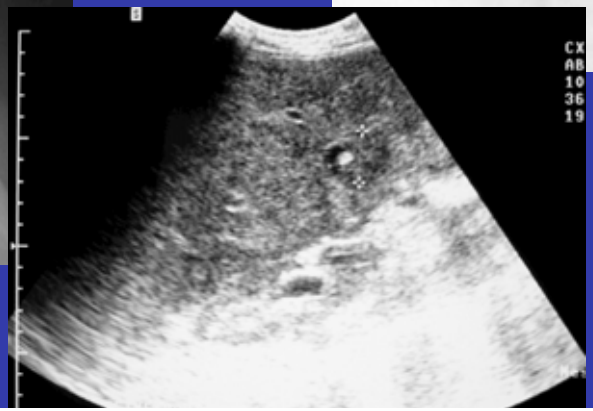


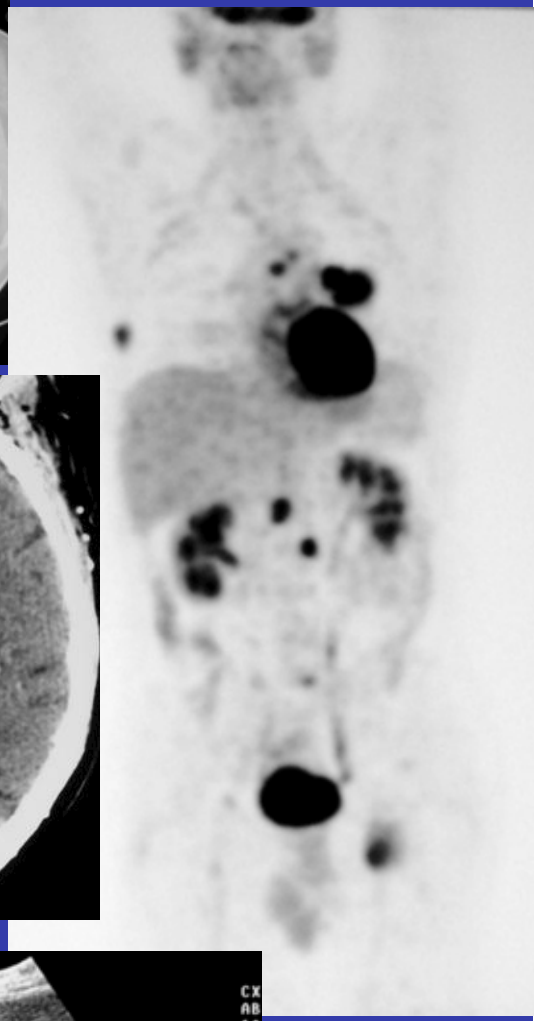


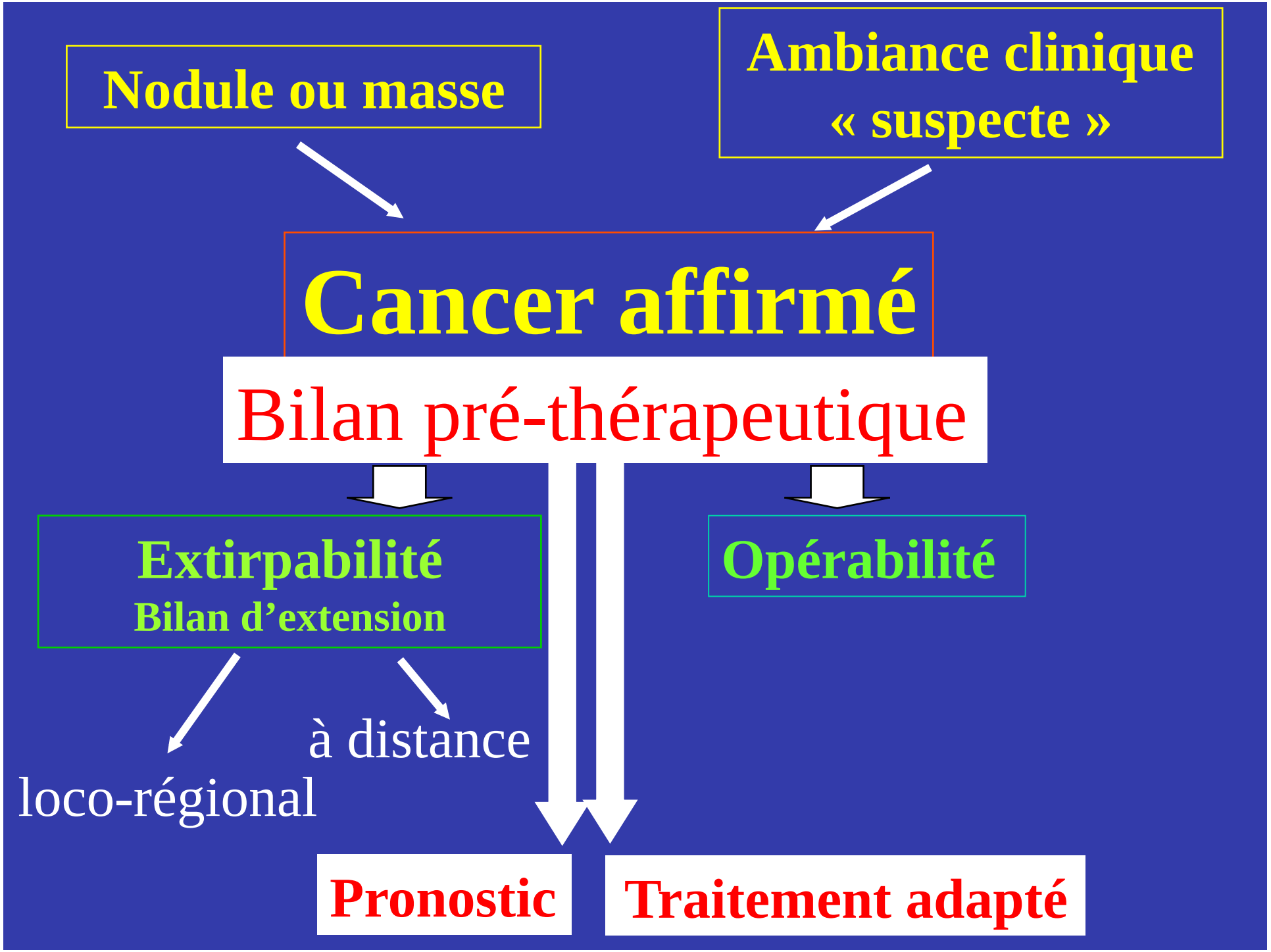




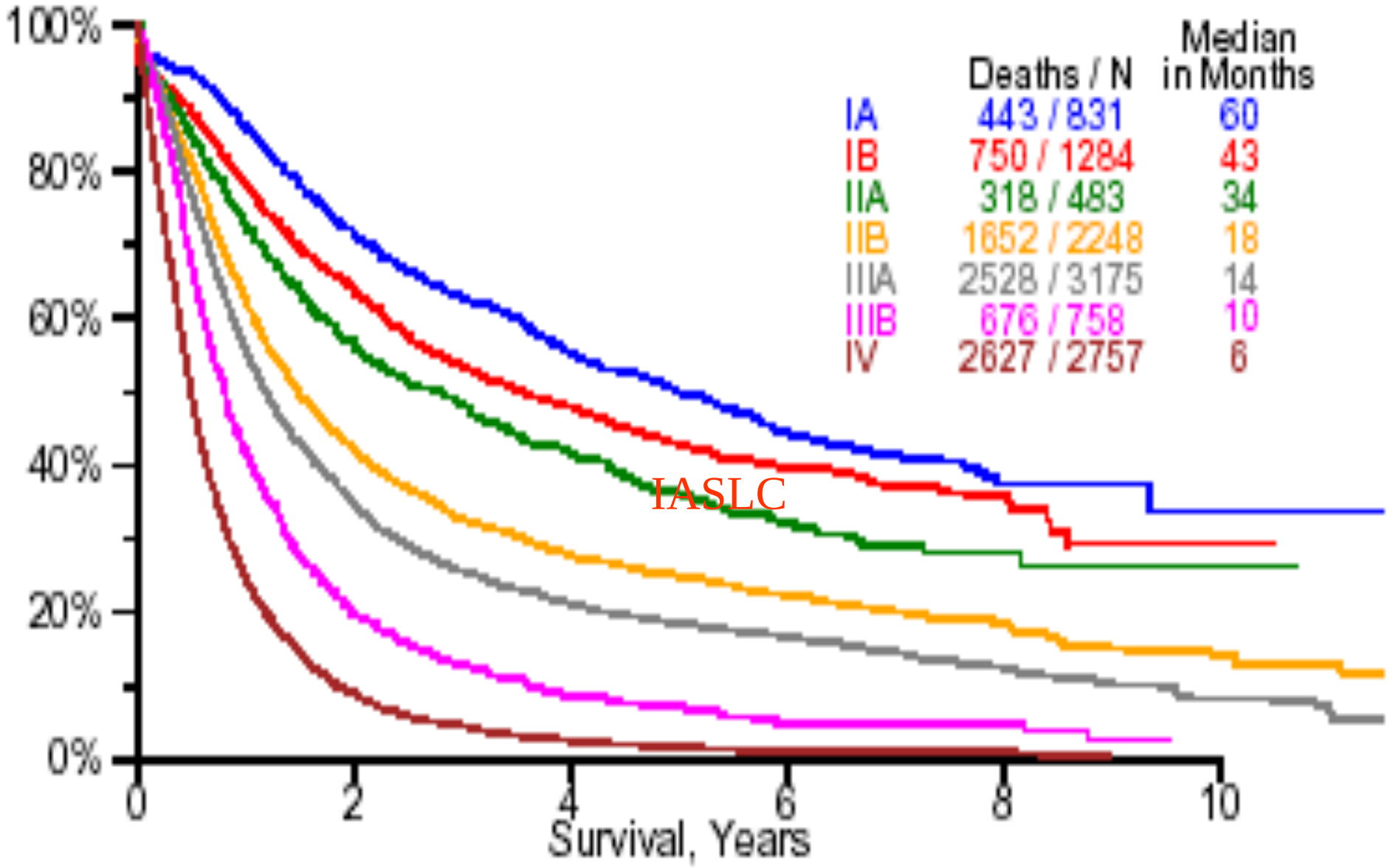







Nodule ou masse
Ambiance clinique « suspecte »
Cancer affirmé
Bilan pré-thérapeutique
Extirpabilité
Bilan d'extension
Opérabilité
loco-régional
à distance
Pronostic
Traitement adapté

Survie des Cancers non à petites cellules



Traitement du CBNPC

	Stade I	Stade II	Stade IIIA	Stade IIIB	Stade IV PS 0-1	Stade IV PS 2	Stade IV PS > 2
Chirurgie	xxxxxxxxx xxxxxxxxx						
Radiothérapie suivie de chirurgie							
Chirurgie suivie de radiothérapie							
Chimiothérapie préopératoire et chirurgie	EC	EC	EC				
Chirurgie suivie de chimiothérapie		xxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxx xxxxxxxxxxx				
Chirurgie puis chimiothérapie- et radiothérapie		EC	EC				
Radiothérapie radicale							
Chimio et Radiothérapie radicale			xxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxx xxxxxxxxxxx			
Chimiothérapie					xxxxxxxxxx xxxxxxxxxx	EC	
Traitement symptomat. y compris palliatif						xxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxx xxxxxxxxxxx

EC : essai clinique

Anatomie pathologique des cancers bronchopulmonaires

Cancers à petites cellules (15-20%)

Cancers non à petites cellules (80-85%)

- Épidermoïde
- Adénocarcinome
- Indifférencié ou à grandes cellules

2 groupes de tumeurs d'évolutions différentes

→ **Prise en charge différente**

Buts du bilan d'extension des cancers non à petites cellules

Effectuer une sélection rigoureuse des patients non candidats à une chirurgie

T4: Ostéolyse d'un corps vertébral

Envahissement cardiaque ou d'un gros tronc vasculaire

Envahissement trachéal inopérable ou oesophagien

Envahissement de la graisse médiastinale

Atteinte péricardique ou pleurale

N2: Bulky inextirpable

N3: Adénopathies controlatérales ou sus-claviculaires

M1: Présence de métastases

Buts du bilan d'extension des cancers à petites cellules

Effectuer une sélection rigoureuse des patients non candidats à une radiothérapie

T4: Pleurésie maligne (M1a)

Atteinte péricardique

N3: Adénopathies controlatérales ou sus-claviculaires

M1: Présence de métastases

Optimiser ?

La situation actuelle ne serait-elle pas satisfaisante?

LES REFERENTIELS

4 exemples

NICE National Institute for Health and Care Excellence

Lung cancer: diagnosis and management

NICE guidelines [CG121] Published date: April 2011

1.3.2 Patients with known or suspected lung cancer should be offered a contrast-enhanced chest CT scan to further the diagnosis and stage the disease. The scan should also include the liver and adrenals[2]. **[2005]**

1.3.4 Ensure all patients potentially suitable for treatment with curative intent are offered PET-CT before treatment. **[new 2011]**

1.3.12 Choose investigations that give the most information about diagnosis and staging with least risk to the patient. Think carefully before performing a test that gives only diagnostic pathology when information on staging is also needed to guide treatment. **[new 2011]**

NICE National Institute for Health and Care Excellence

Lung cancer: diagnosis and management

NICE guidelines [CG121] Published date: April 2011

Stage M1b

1.3.25 Confirm the presence of isolated distant metastases/synchronous tumours by biopsy or further imaging (for example, MRI or PET-CT) in patients being considered for treatment with curative intent. **[new 2011]**

1.3.26 Consider MRI or CT of the head in patients selected for treatment with curative intent, especially in stage III disease. **[new 2011]**

1.3.27 Offer patients with features suggestive of intracranial pathology, CT of the head followed by MRI if normal, or MRI as an initial test. **[new 2011]**

1.3.28 An X-ray should be performed in the first instance for patients with localised signs or symptoms of bone metastasis. If the results are negative or inconclusive, either a bone scan or an MRI scan should be offered. **[2005]**

1.3.29 Avoid bone scintigraphy when PET-CT has not shown bone metastases. **[new 2011]**

Extrathoracic Staging

3.1.1. In patients with a normal clinical evaluation and no suspicious extrathoracic abnormalities on chest CT being considered for curative-intent treatment, PET imaging (where available) is recommended to evaluate for metastases (except the brain) (Grade 1B)**.**

Remark: Ground glass opacities and an otherwise normal chest CT do not require a PET scan for staging.

Remark: In patients with peripheral stage cIA tumors a PET scan is not required.

Remark: If PET is unavailable, bone scan and abdominal CT are reasonable alternatives to evaluate for extrathoracic disease.

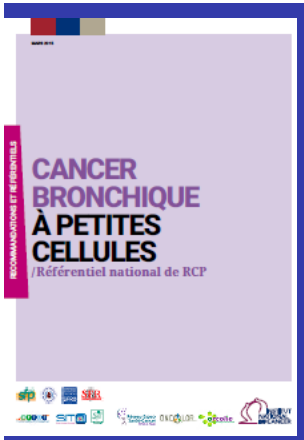
3.1.2. In patients with an imaging finding (eg, by PET) suggestive of a metastasis, further evaluation of the abnormality with tissue sampling to pathologically confirm the clinical stage is recommended prior to choosing treatment (Grade 1B).

Remark: Tissue sampling of the abnormal site is imperative so that the patient is not excluded from potentially curative treatment.

Remark: Tissue sampling of a distant metastatic site is not necessary if there is overwhelming radiographic evidence of metastatic disease in multiple sites.

Remark: Tissue sampling of the mediastinal lymph nodes does not necessarily need to be performed if there is overwhelming radiographic evidence of metastatic disease in multiple distant sites.

3.4.1. In patients with clinical stage III or IV non-small cell lung cancer (NSCLC) it is suggested that routine imaging of the brain with head MRI (or CT if MRI is not available) should be performed, even if they have a negative clinical evaluation (Grade 2C).



BILAN PRÉTHÉRAPEUTIQUE
D'UN CANCER BRONCHIQUE (ADAPTÉ DE INCa, 2011)

La tumeur est-elle accessible à un traitement locorégional après évaluation initiale (clinique, fibroscopie bronchique et TDM)?

NON

Examens discutés en fonction des signes d'appel cliniques

OUI

Évaluation de l'extension N

TEP-TDM

Existe-t-il un hypermétabolisme et un impact thérapeutique attendu?

NON*

Évaluation de l'extension N terminée

OUI

Prélèvements anatomopathologiques

Prélèvements réalisés en première intention par PTBA ou PTOA (éventuellement échoguidée) ou chirurgicale

Si PTBA ou PTOA négative, deuxième prélèvement chirurgical

Évaluation de l'extension M

TDM abdominopelvienne si non réalisée initialement (coupes hépatiques et surrénaliennes), lecture en fenêtres osseuses

TEP-TDM

Imagerie cérébrale systématique IRM ou TDM avec injection (l'IRM est à privilégier si disponible)**

Prélèvement anatomopathologique si image suspecte unique facilement accessible

National

- Pathology review[a]
- H&P (include performance status + weight loss)[b]
- CT chest and upper abdomen, including adrenals
- CBC, platelets
- Chemistry profile
- Smoking cessation advice, counseling, and pharmacotherapy
  - Use the 5 A's Framework: Ask, Advise, Assess, Assist, Arrange http://www.ahrq.gov/clinic/tobacco/5steps.htm
- Integrate palliative care[c] (See NCCN Guidelines for Palliative Care)

metastatic non-small cell lung cancer. N Engl J Med 2010;363:733-742.

ersion 1.2016
g Cancer

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CLINICAL STAGE

Stage IA, peripheral[d] (T1ab, N0)	See Pretreatment Evaluation (NSCL-2)
Stage I, peripheral[d] (T2a, N0); central[d] (T1ab-T2a, N0); Stage II (T1ab-T2ab, N1; T2b, N0); stage IIB (T3, N0)[e] Stage IIIA (T3, N1)	See Pretreatment Evaluation (NSCL-2)
Stage IIB[f] (T3 invasion, N0); Stage IIIA[f] (T4 extension, N0-1; T3, N1)	See Pretreatment Evaluation (NSCL-4)
Stage IIIA[f] (T1-3, N2)	See Pretreatment Evaluation (NSCL-7)
Separate pulmonary nodule(s) (Stage IIB, IIIA, IV)	See Pretreatment Evaluation (NSCL-7)
Multiple lung cancers	See Treatment (NSCL-9)
Stage IIIB[f] (T1-3, N3) mediastinal CT positive Contralateral (lymph nodes ≥1 cm) or palpable supraclavicular lymph nodes	See Pretreatment Evaluation (NSCL-11)
Stage IIIB[f] (T4, N2-3) on CT	See Pretreatment Evaluation (NSCL-12)
Stage IV (M1a)[c] (pleural or pericardial effusion)	See Pretreatment Evaluation (NSCL-12)
Stage IV (M1b)[c] Limited sites with resectable lung lesion	See Pretreatment Evaluation (NSCL-13)
Stage IV (M1b)[c] disseminated metastases	See Systemic Therapy (NSCL-16)

er
sessment
with

[d]Based on the CT of the chest: Peripheral = outer third of lung. Central = inner two thirds of lung.
[e]T3, N0 related to size or satellite nodules.
[f]For patients considered to have stage IIB and stage III tumors, where more than one treatment modality (surgery, radiation therapy, or chemotherapy) is usually considered, a multidisciplinary evaluation should be performed.

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NCCN Guidelines Version 1.2016
Non-Small Cell Lung Cancer

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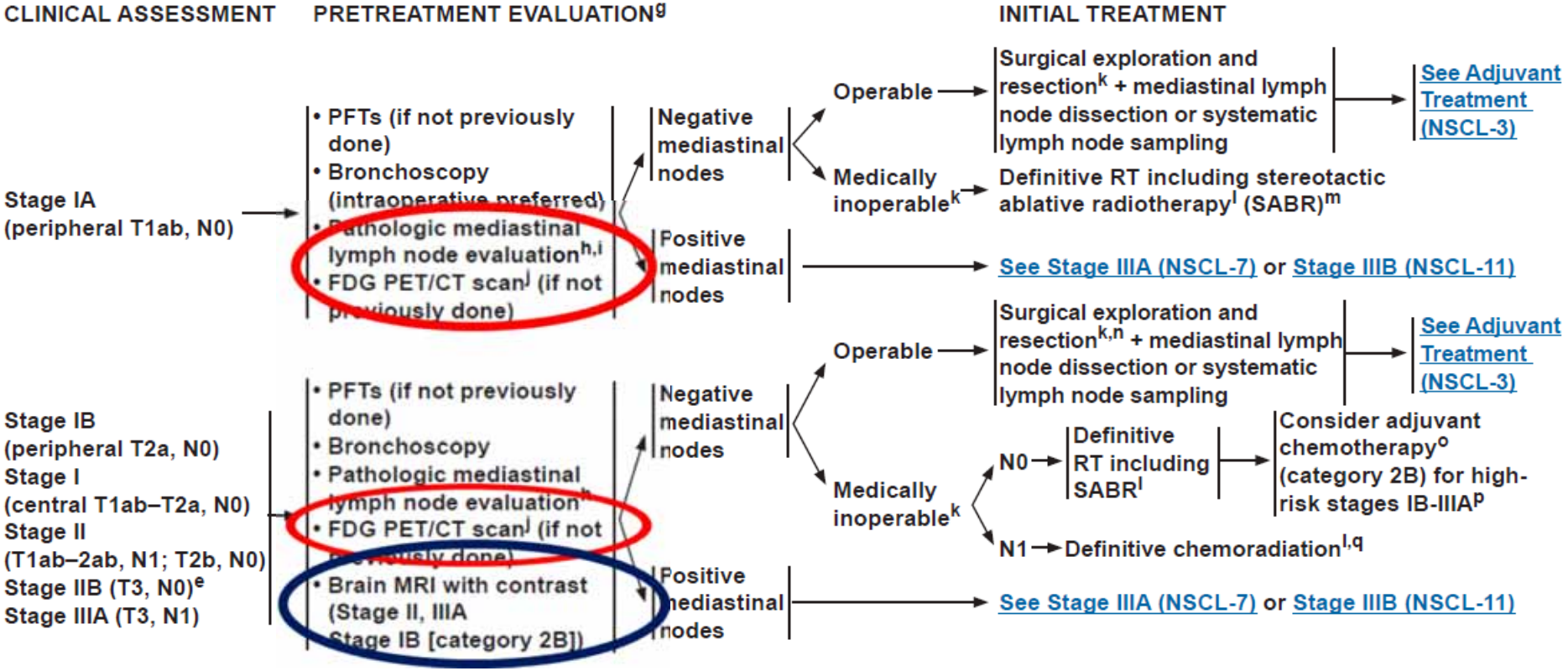
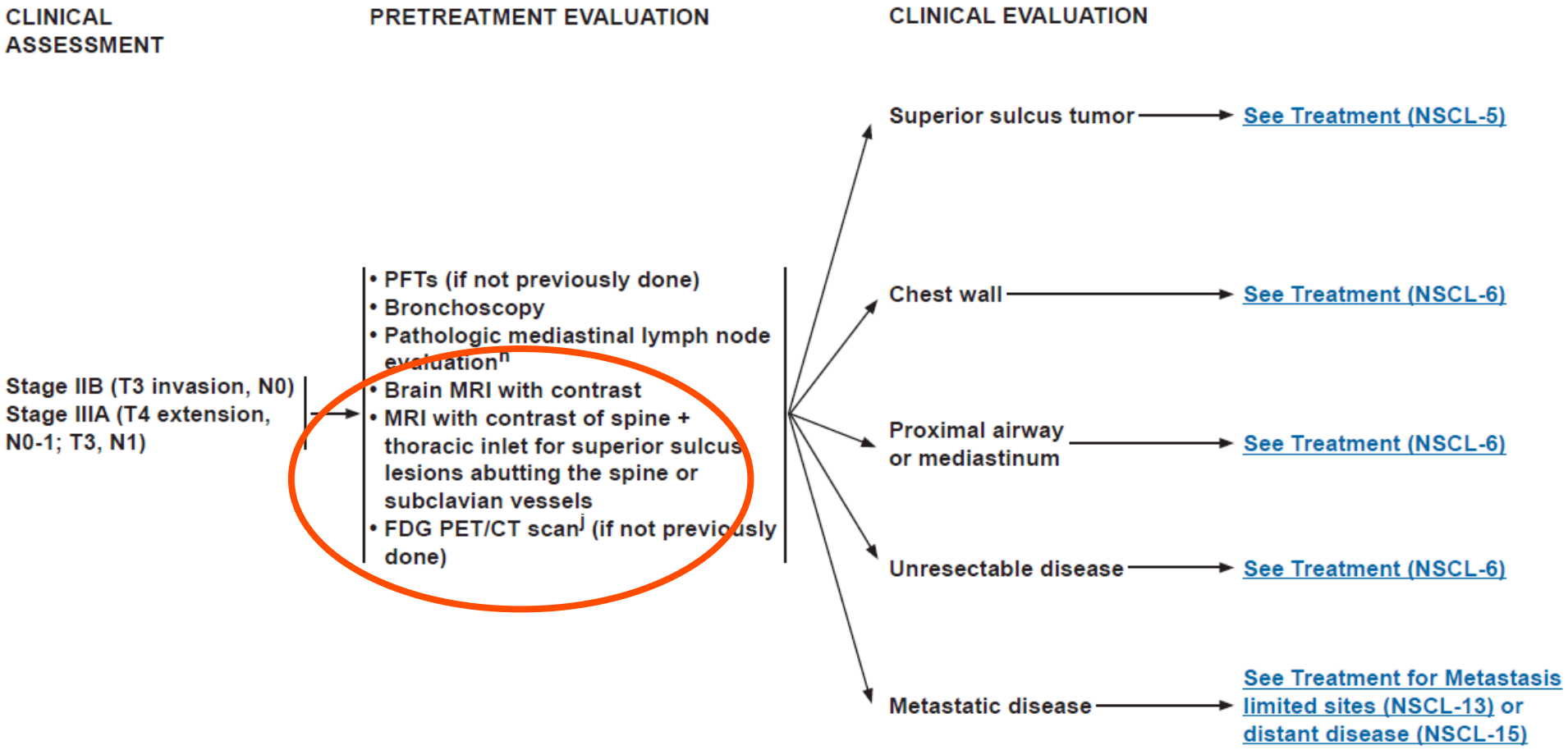


[e]T3, N0 related to size or satellite nodules.
[g]Testing is not listed in order of priority and is dependent upon clinical circumstances, institutional processes, and judicious use of resources.
[h]Methods for evaluation include mediastinoscopy, mediastinotomy, EBUS, EUS, and CT-guided biopsy.
[i]Solid tumors <1 cm and purely non-solid tumors <3 cm that are CT and PET negative have a low likelihood of positive mediastinal lymph nodes and pre-resection pathologic mediastinal evaluation is optional.
[j]Positive PET/CT scan findings for distant disease need pathologic or other radiologic confirmation. If PET/CT scan is positive in the mediastinum, lymph node status needs pathologic confirmation.
[k]See Principles of Surgical Therapy (NSCL-B).
[l]See Principles of Radiation Therapy (NSCL-C).
[m]Interventional radiology ablation is an option for selected patients.
[n]After surgical evaluation, patients likely to receive adjuvant chemotherapy may be treated with induction chemotherapy as an alternative.
[o]See Chemotherapy Regimens for Neoadjuvant and Adjuvant Therapy (NSCL-D).
[p]Examples of high-risk factors may include poorly differentiated tumors (including lung neuroendocrine tumors [excluding well-differentiated neuroendocrine tumors]), vascular invasion, wedge resection, tumors >4 cm, visceral pleural involvement, and incomplete lymph node sampling (Nx). These factors independently may not be an indication and may be considered when determining treatment with adjuvant chemotherapy.
[q]See Chemotherapy Regimens Used with Radiation Therapy (NSCL-E).



[h]Methods for evaluation include mediastinoscopy, mediastinotomy, EBUS, EUS, and CT-guided biopsy.
[j]Positive PET/CT scan findings for distant disease need pathologic or other radiologic confirmation. If PET/CT scan is positive in the mediastinum, lymph node status needs pathologic confirmation.

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Non-Small Cell Lung Cancer

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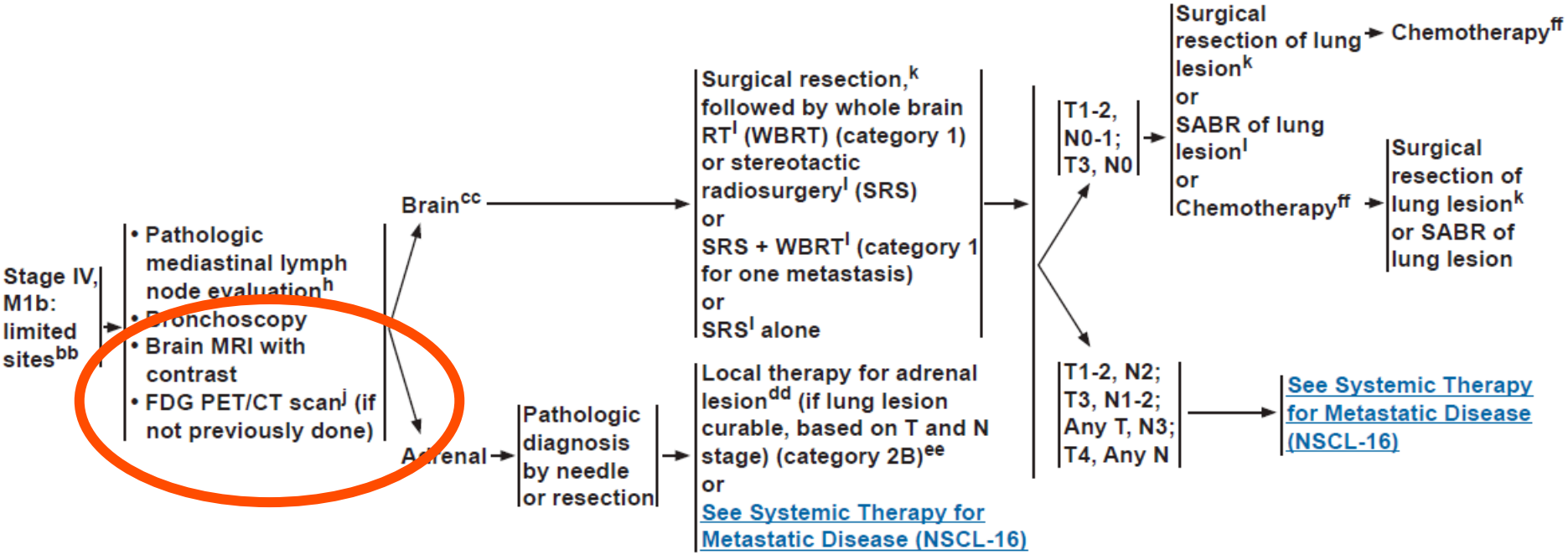
CLINICAL ASSESSMENT | **PRETREATMENT EVALUATION** | **INITIAL TREATMENT**



[h]Methods for evaluation include mediastinoscopy, mediastinotomy, EBUS, EUS, and CT-guided biopsy.
[j]Positive PET/CT scan findings for distant disease need pathologic or other radiologic confirmation. If PET/CT scan is positive in the mediastinum, lymph node status needs pathologic confirmation.
[k]See Principles of Surgical Therapy (NSCL-B).
[l]See Principles of Radiation Therapy (NSCL-C).
[bb]Aggressive local therapy may be appropriate for selected patients with limited-site oligometastatic disease.
[cc]See NCCN Guidelines for Central Nervous System Cancers.
[dd]May include adrenalectomy or RT (including SABR).
[ee]Patients with N2 disease have a poor prognosis and systemic therapy should be considered.
[ff]See Systemic Therapy for Advanced or Metastatic Disease (NSCL-F).

Les bases de ces référentiels

Diffusion métastatique

EXTREMEMENT FREQUENTE: 11 - 36 % Quint LE *Ann Th S* 1996

au moment du diagnostic

Cerveau: 15 – 33 %

IRM > TDM > Clinique

Foie: 10 – 40 %

IRM > TDM > Echo > Bio > Clinique

Surrénales: 10- 38 %

IRM > TDM > Echo

Os: 19 - 33 %

Immunomarq. > B.O.M > IRM > Scinti > Bio > Clinique

Plus de 12 examens paracliniques

Métastases hépatiques

8 - 27 %.
30 % si CPC, 8 % si Epi

Echographie:

Disponible, pas chère
mais sensibilité faible 50-60 %, très opérateur dépendant

TDM:

Sensibilité 70 - 76 % sans iode
78 - 90 % avec iode
89 - 93 % porto-scan

Spécificité: 87 %

<u>Attention aux coupes hépatiques faites pendant ex thoracique:</u>
Risque de rater des métas iso-denses
et <u>n'explore pas tout le foie</u>

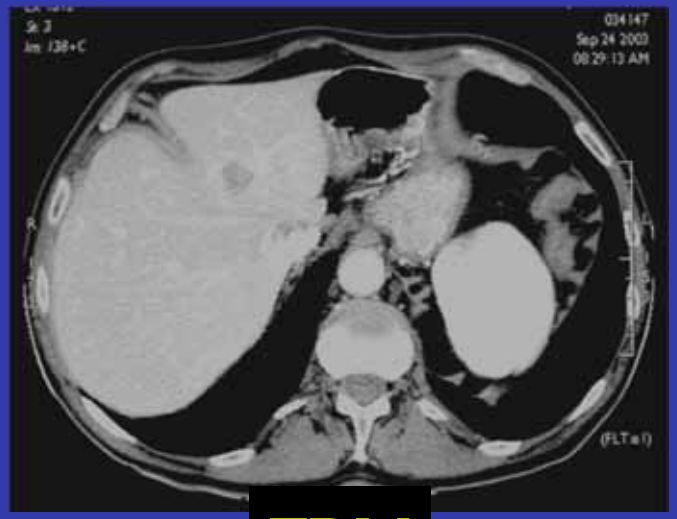
Faux positifs: 5 - 10%
angiomes, adénomes, hyperplasie

Métastases hépatiques

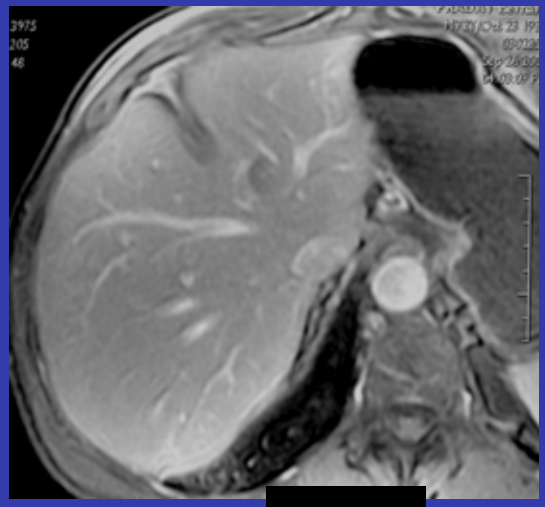
IRM

Examen de choix
Sensibilité: 50 - 98 % selon les séquences, l'injection de gadolinium
Différencie les tumeurs bénignes
Elimine l'angiome avec certitude
Spécificité: 92 %

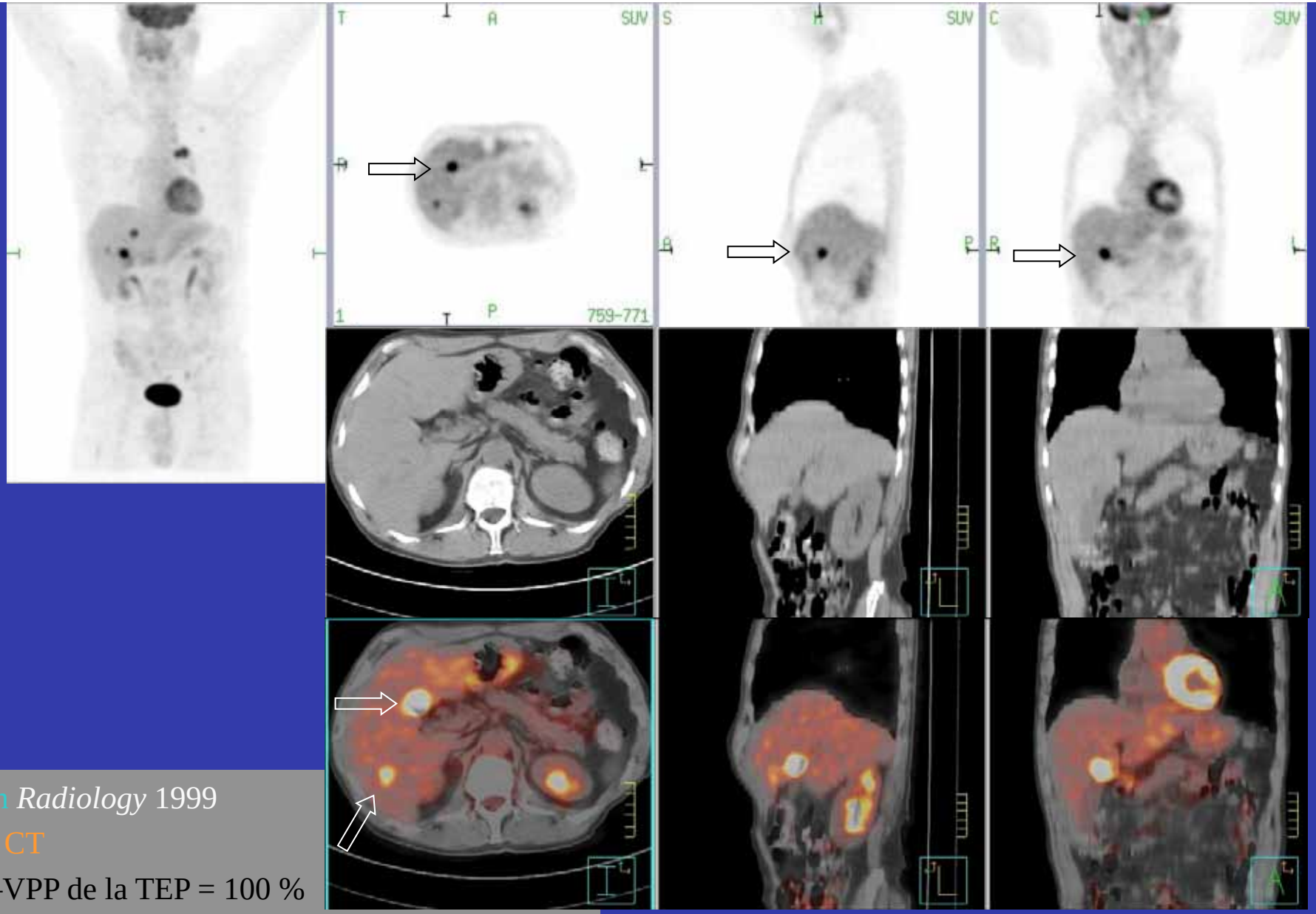
Coût ?
Accessibilité



TDM



IRM



Marom *Radiology* 1999

TEP > CT

–VPP de la TEP = 100 %

–VPP du CT = 55 % (faux positifs++)

–VPN de la TEP = 100 %

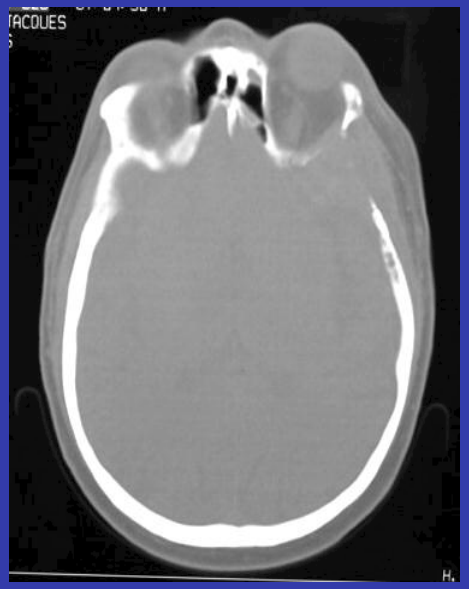
–VPN du CT = 100 %

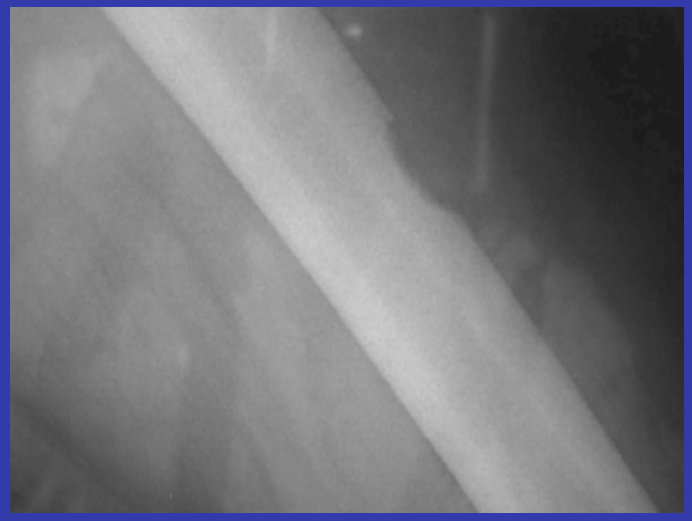
Métastases osseuses

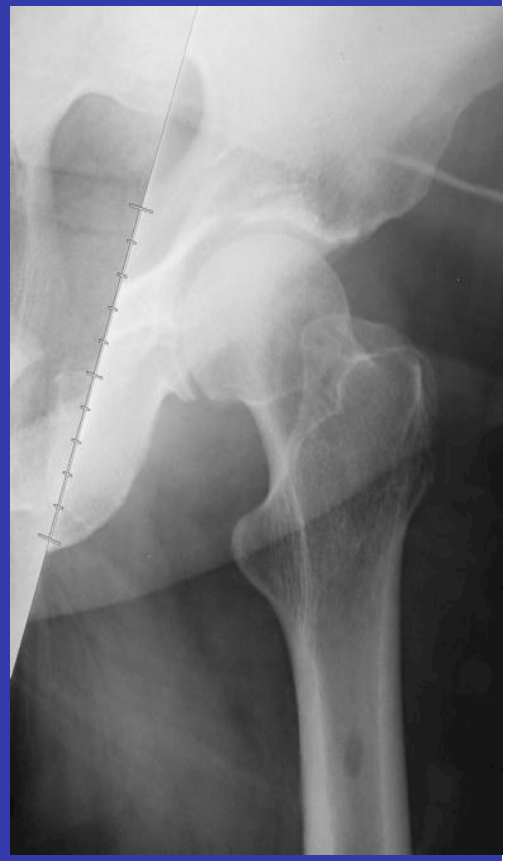
10 - 50 %.
50 % si CPC, 10 % si Epi
80 % axiales
esst ostéolytiques

RX

Sensibilité 36%
>50 % de destruction osseuse pour voir une lyse







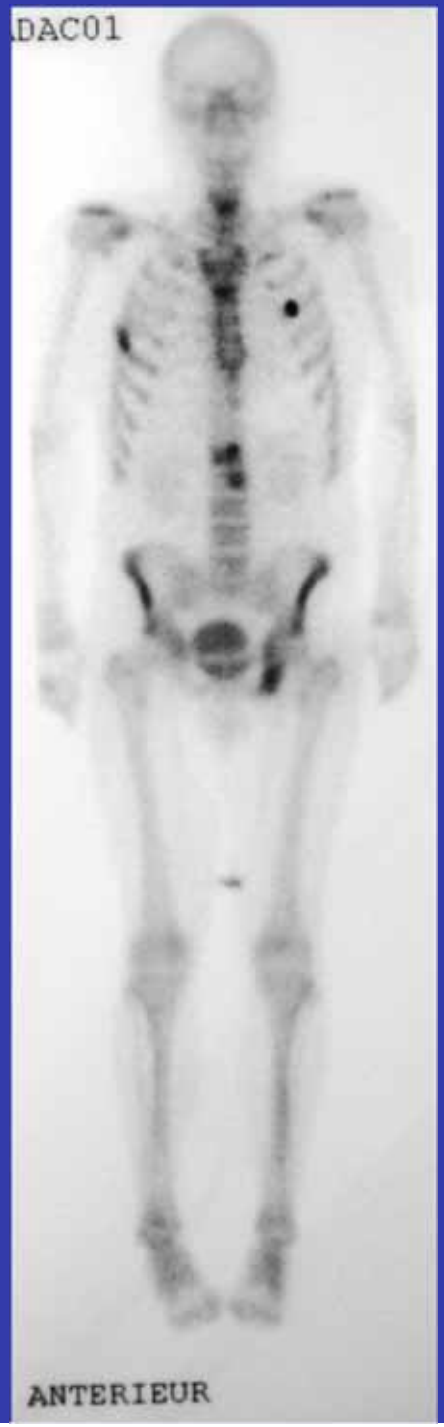
Métastases osseuses

Scintigraphie Te99

Examen corps entier
Trop bonne sensibilité 30 % de FP
Mauvaise spécificité

\+ ds 42 % si symptômes
\+ ds 4 - 7,5 % si pas de symptômes

=> Si lésion unique: faire RX ou TDM ou IRM



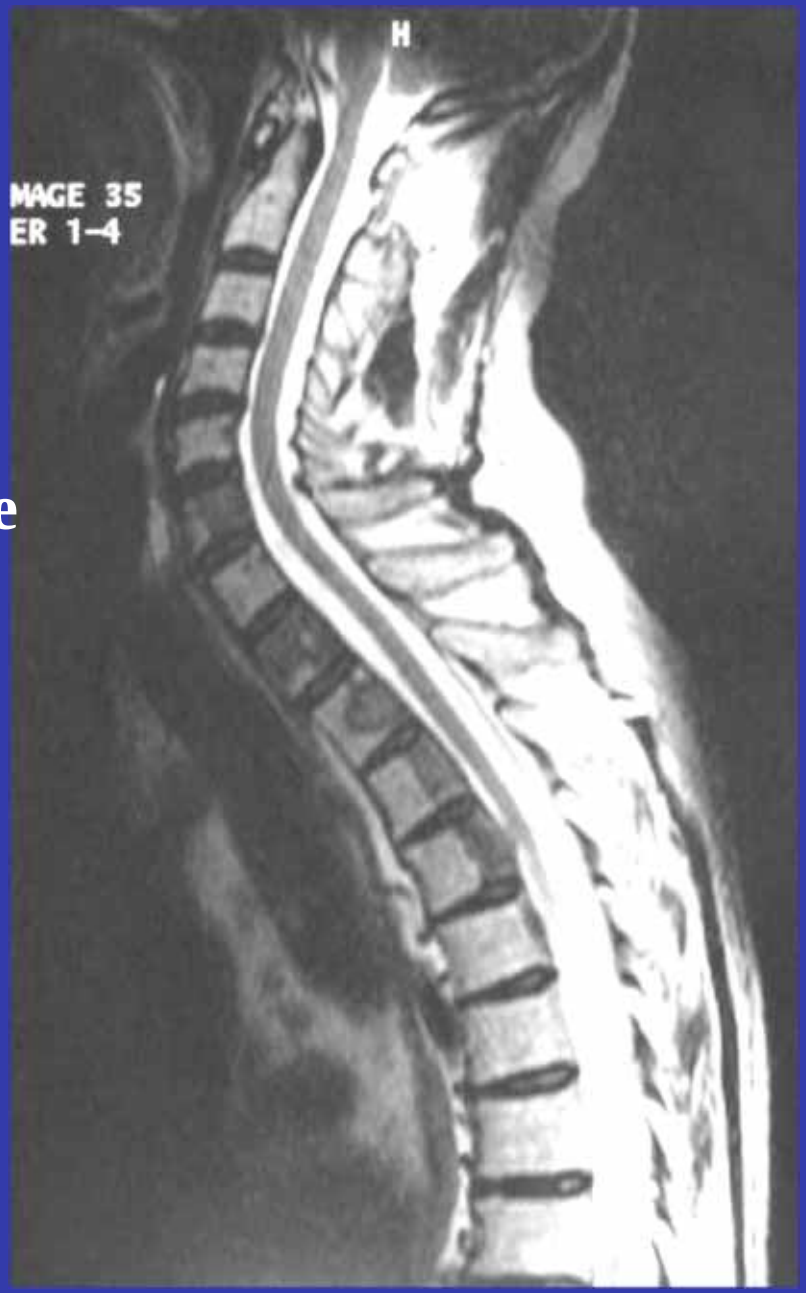
Métastases osseuses

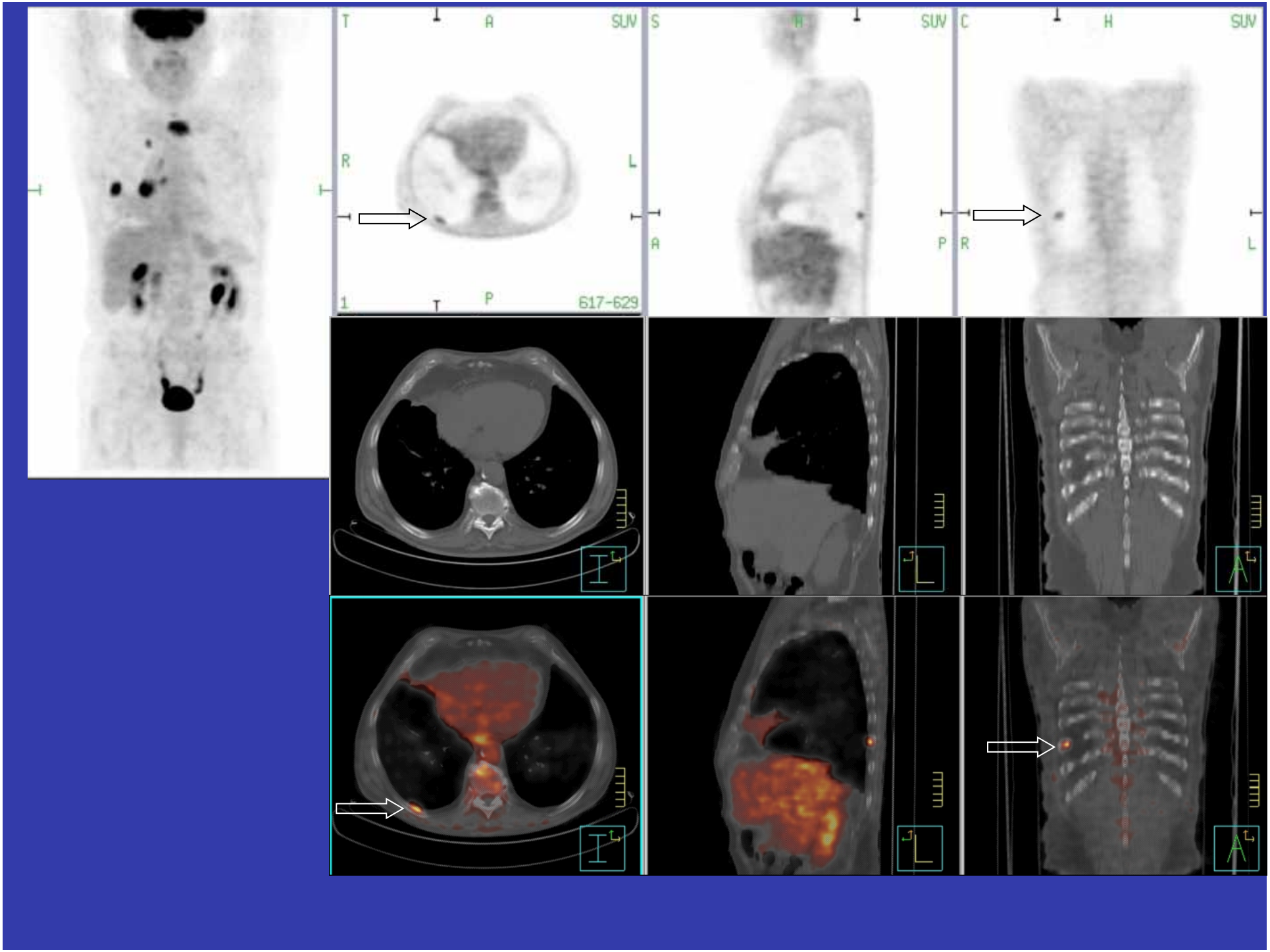
IRM

Plus précise car analyse de la corticale et de la médullaire

Meilleure sensibilité
Meilleure spécificité

Mais pas d'examen corps entier

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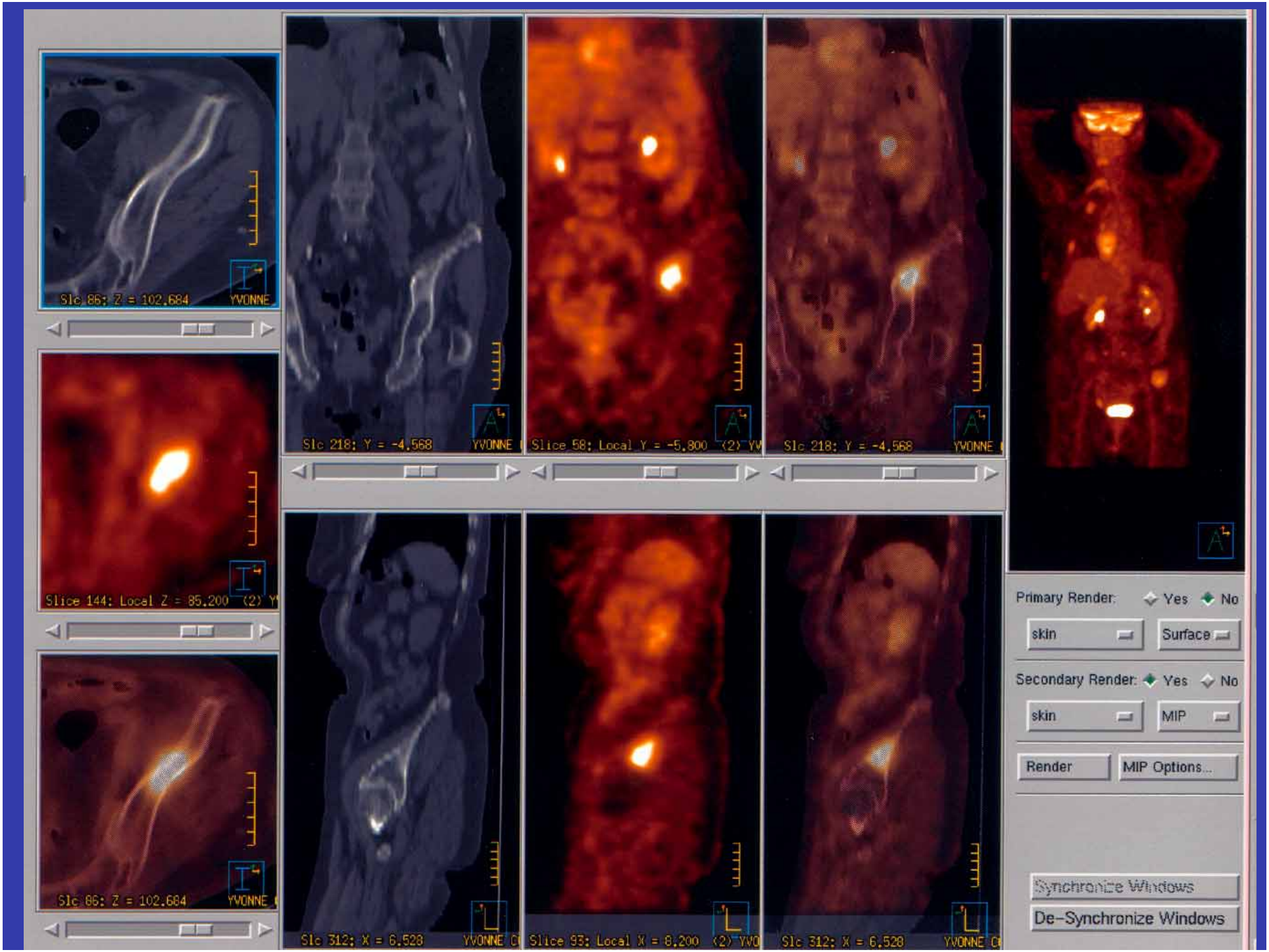
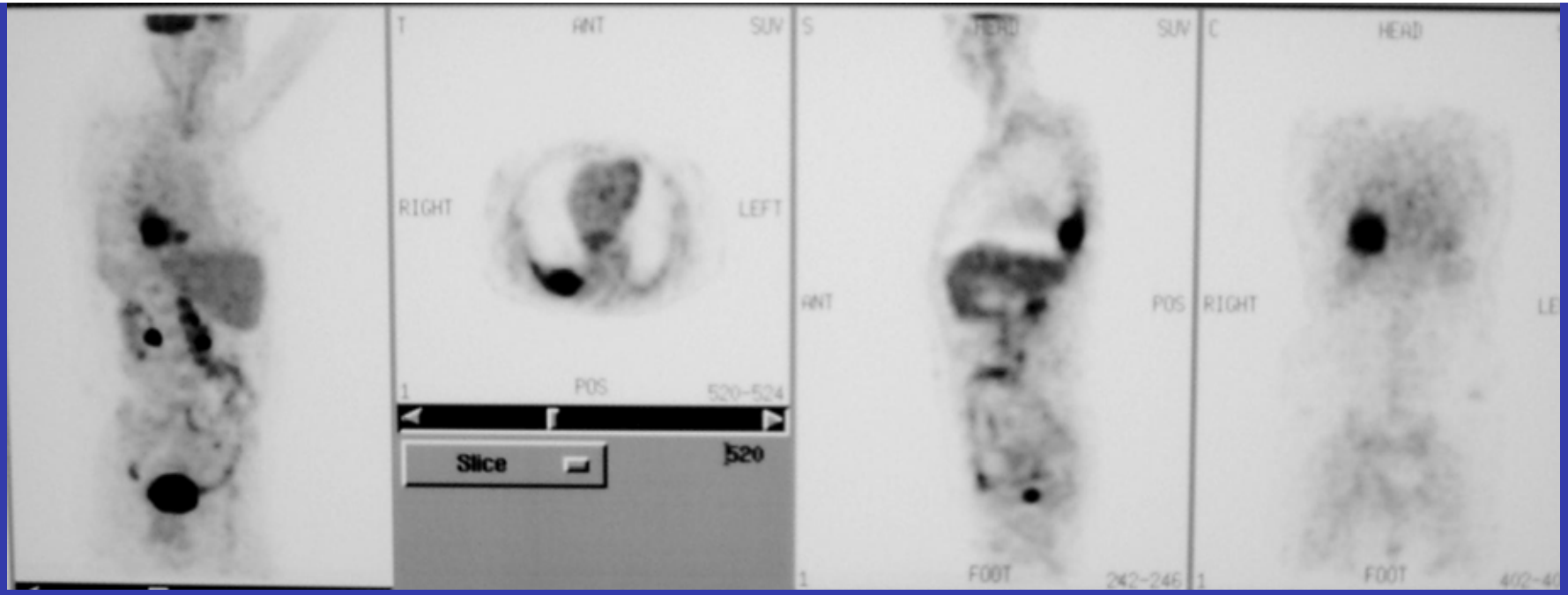
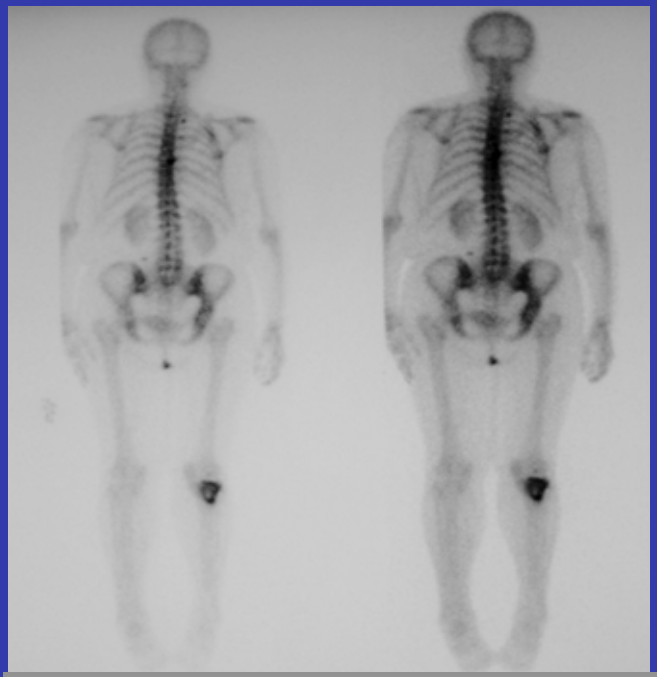

Slc 86; Z = 102.684
YVONNE
Slc 218; Y = -4.568
YVONNE
Slice 58; Local Y = -5.800
Slc 218; Y = -4.568
YVONNE
Slice 144; Local Z = 85.200
Slc 86; Z = 102.684
YVONNE
Slc 312; X = 6.528
YVONNE
Slice 93; Local X = 8.200
Slc 312; X = 6.528
YVONNE
Primary Render:
Yes
No
skin
Surface
Secondary Render:
Yes
No
skin
MIP
Render
MIP Options...
Synchronize Windows
De-Synchronize Windows





Métastases osseuses

TEP > Scinti Te 99

Se:93,9 % vs 74,1 %
Sp: 93,2 % vs 68 %

Sheen SS ATS 2005: 179 pts

TEP > Scinti Te 99

Se:91 % vs 75 %
Sp: 94 % vs 85 %
VPP 98%

Taira *Radiology* 2007

Min JW. JTO 2007 PD122. 182 pts

FDG-TEP supérieure à Te99 scintigraphie osseuse et dosage PAL

	Se	Sp	Exact	VPP	VPN
FDG-TEP	**93**	**94**	**93**	**76**	**99**
99Te	**93**	**44**	**52**	**25**	**97**
PAL	**27**	**94**	**83**	**47**	**87**
PAL + 99Te	**27**	**97**	**86**	**67**	**87**

Métastases surrénales

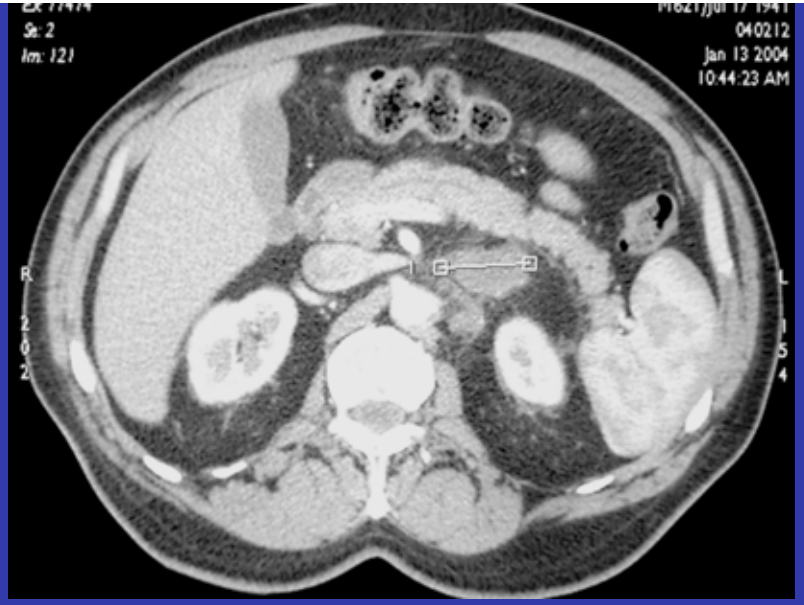
5 - 40 %.
70 % si GC, 10 % si Epi

1-9 % de tumeurs bénignes
dans la population générale

Echographie

Peu sensible pour détection et caractérisation

Métastases surrénales



TDM

4 critères: uni/bilatéralité, taille, densité spontanée, densité à 10 mn,

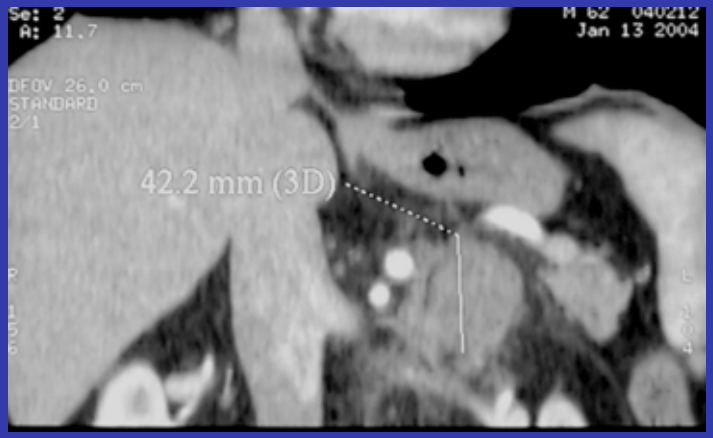
Bénin si <10 uH : Se 71 - 85 %, Sp 98 - 100 %

diff densité > 50% à 60 sec et 10 mn : Se-Sp = 100%

Taille: < 3 cm: 2 / 3 bénin

> 3 cm: 2 / 3 malin

Unilatéralité = 0

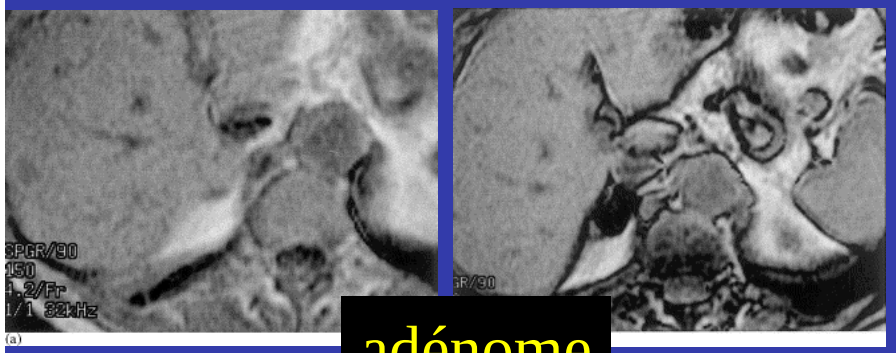


Métastases surrénales

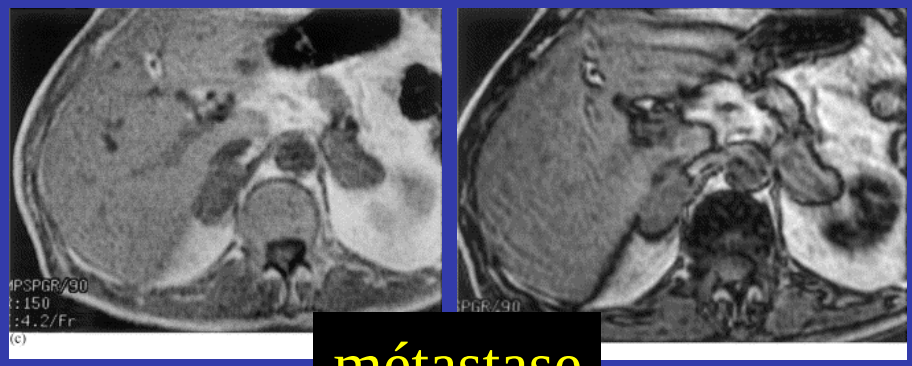
IRM

+ gadolinium: Se 81 - 100 % Sp 80 – 100 %

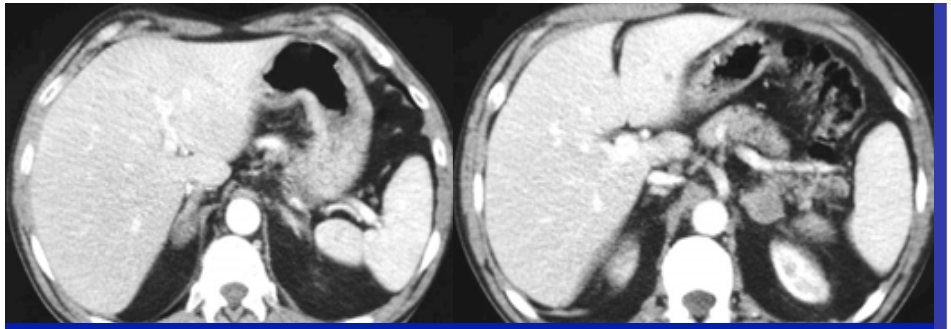
+ déplacement chimique en opposition de phase: Se – Sp 100%



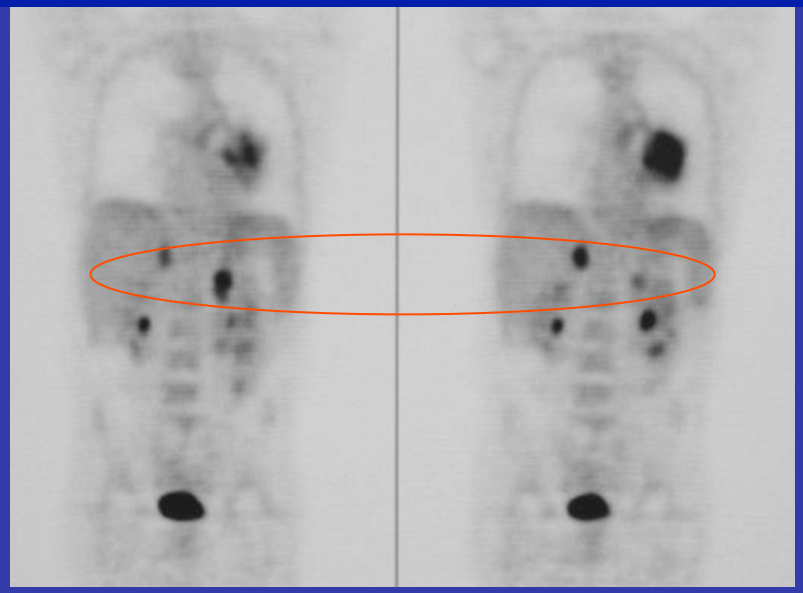
adénome



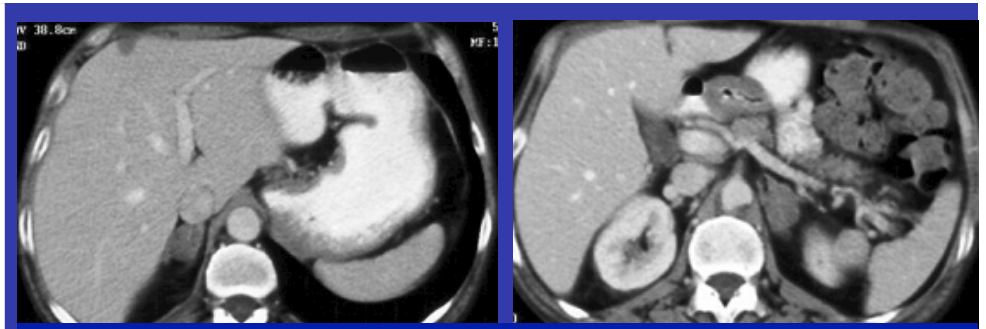
métastase



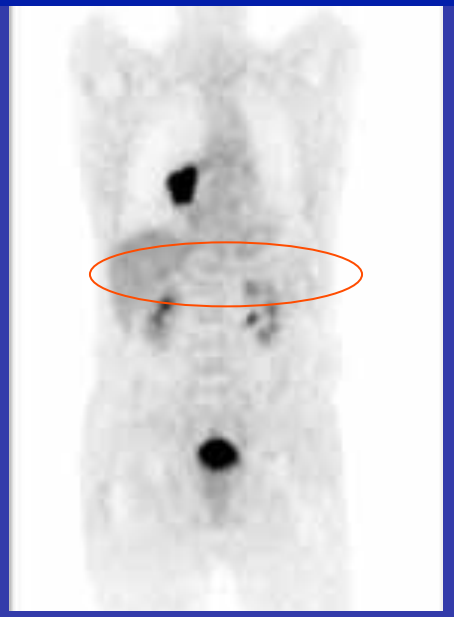
Métastases surrénaliennes bilatérales



Marom Radiology 1999
TEP VPP 100% VPN 100%
TDM VPP 46% VPN 100%

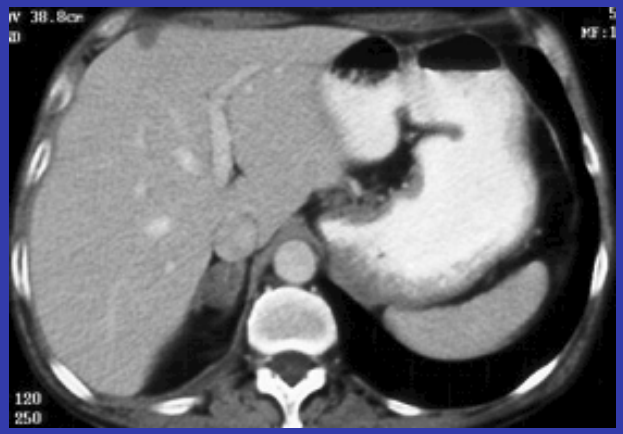


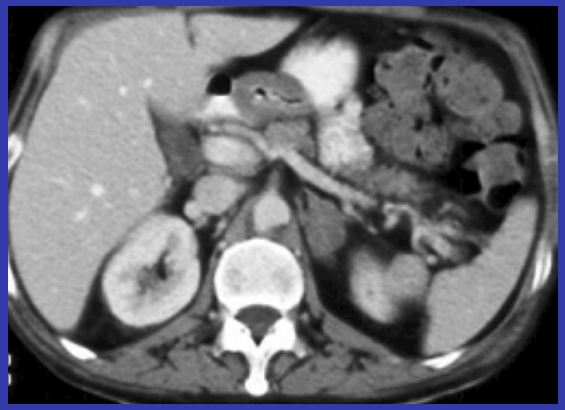
Adénomes surrénaliens bilatéraux

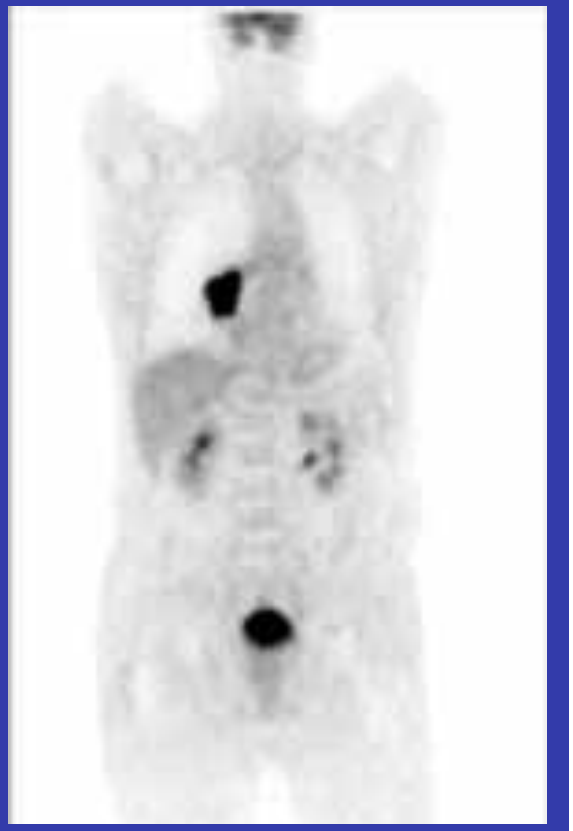


Perrotin RMR 2006
TEP Se: 88%, Sp:100%,
VPP:96%, VPN:96%,
Exact:97%

TEP Se: 80-93%, Sp: 95-100%,
VPP: 96%, VPN: 96%,
Exact: 97-99 %

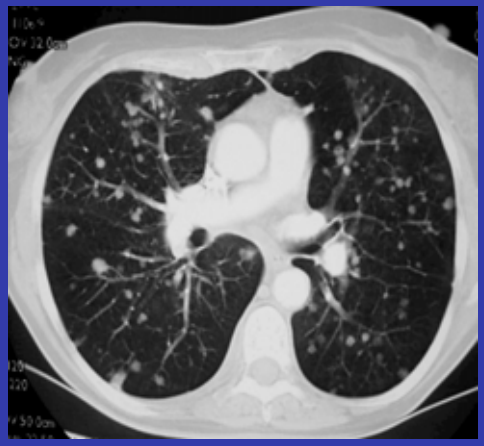


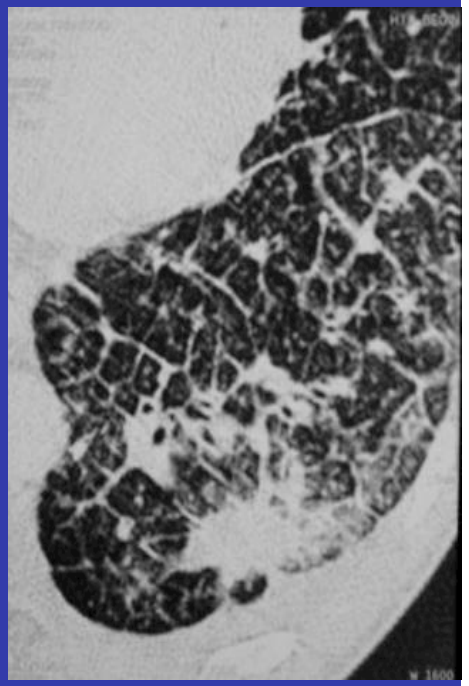




Notion nouvelle: Rapport SUV Surrénale /SUV foie
Si > 1.45 = Malin 100% fiabilité

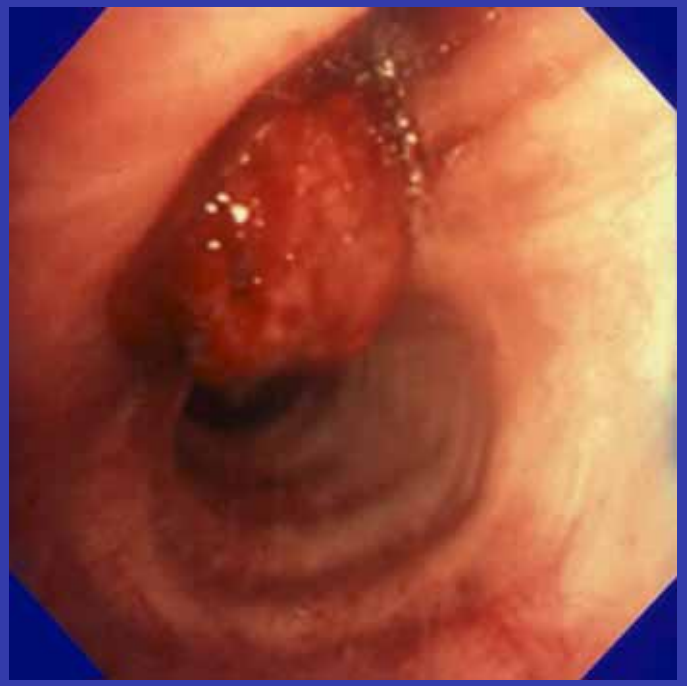
Métastases pulmonaires





Nodulaire
Lymphangitique
Endobronchique

RX
TDM
ENDOSCOPIE



Métastases pulmonaires

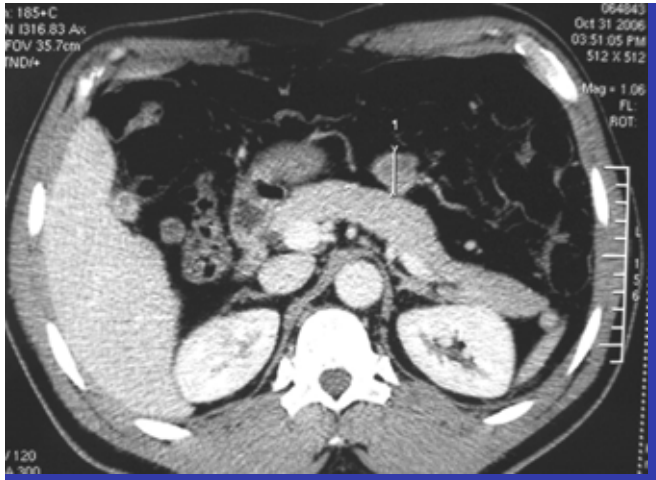
Marom ***Radiology*** **1999**

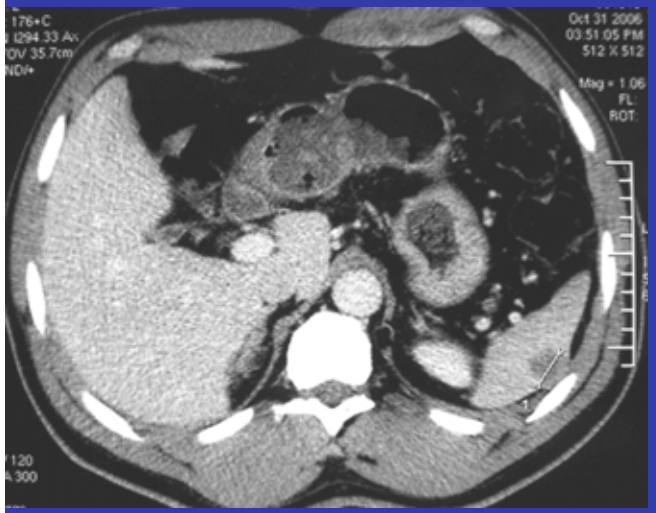
18 patients avec une métastase pulmonaire / 100 patients

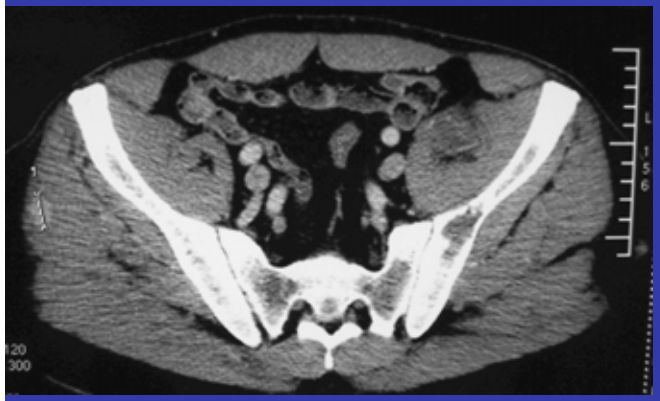
- **17 / 18 identifiés par TEP**
- **14 / 18 identifiés en CT**
- **1 faux positif en TEP (inflammation)**
- **5 faux positifs en CT**

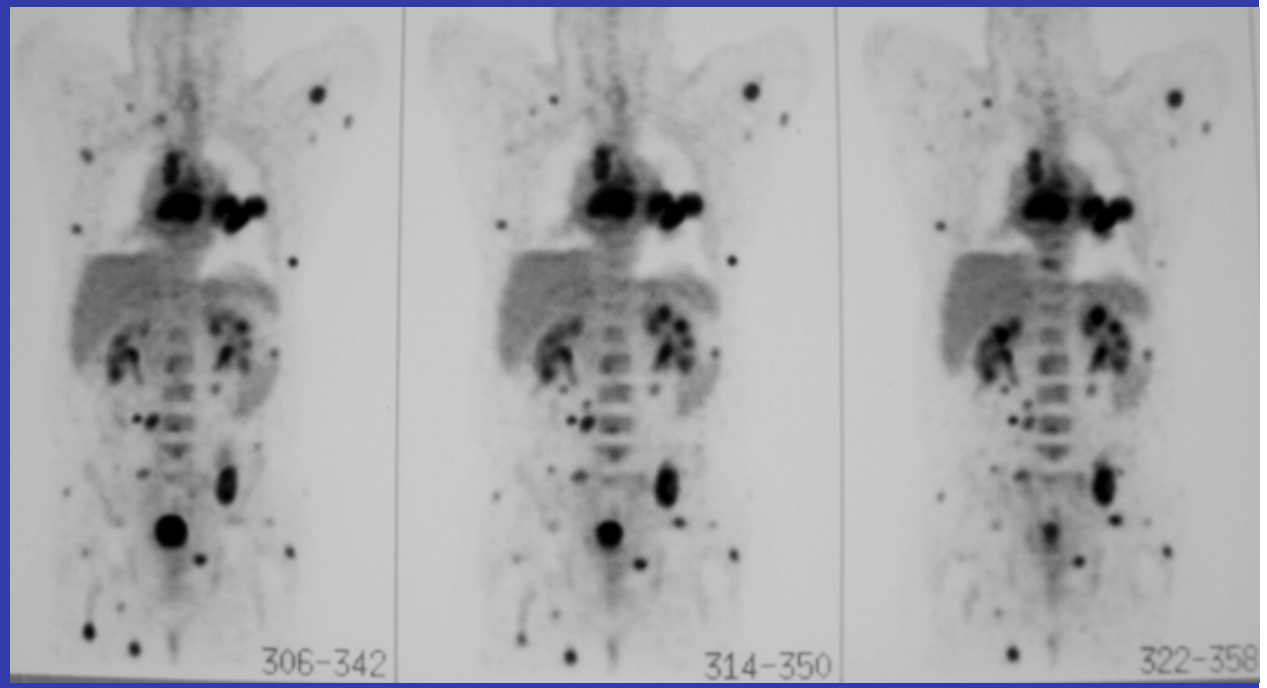
→ **Sensibilité CT < sensibilité TEP (78% / 94%)**

→ **VPP CT < VPP TEP (74% / 94%)**

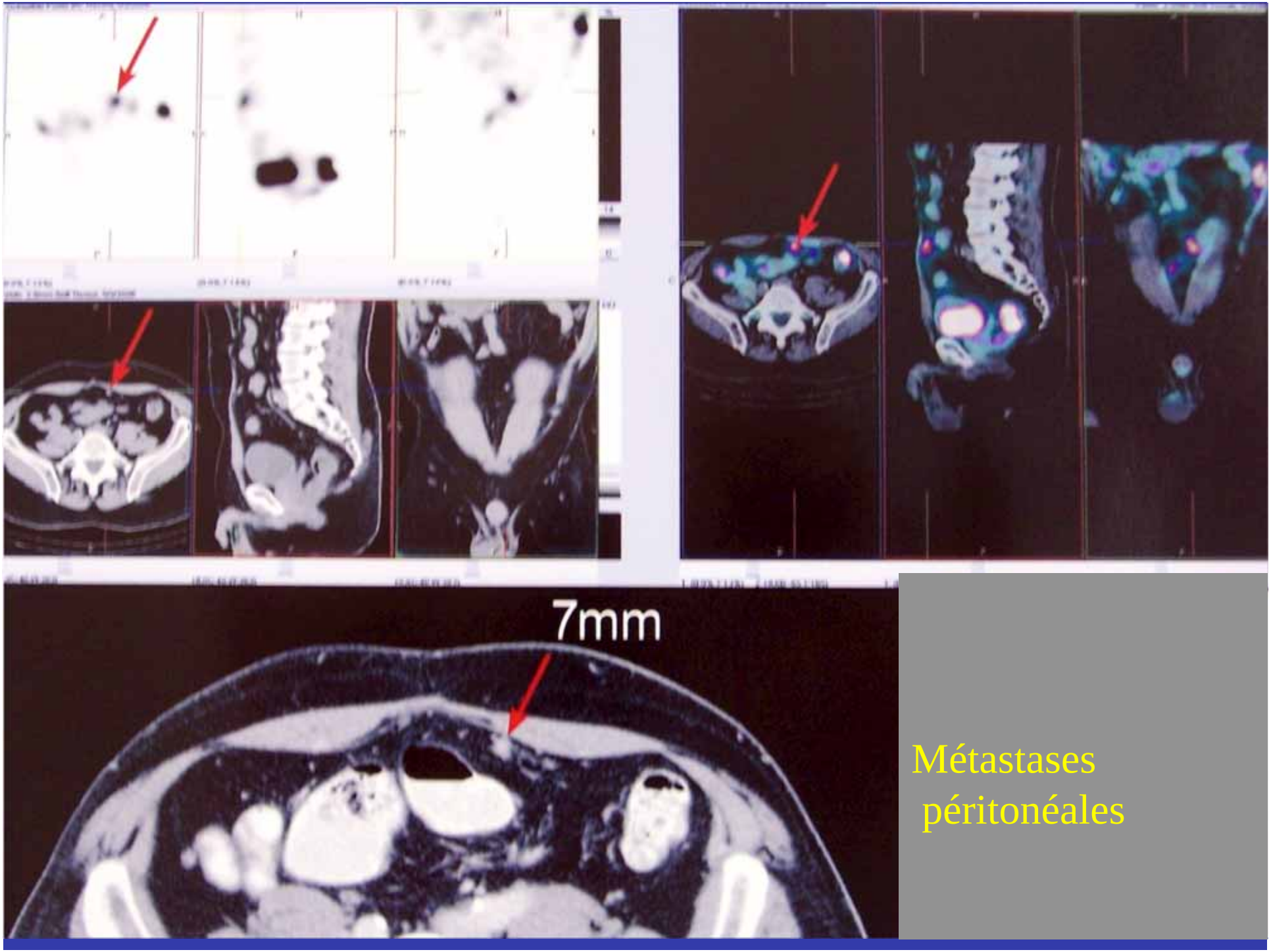




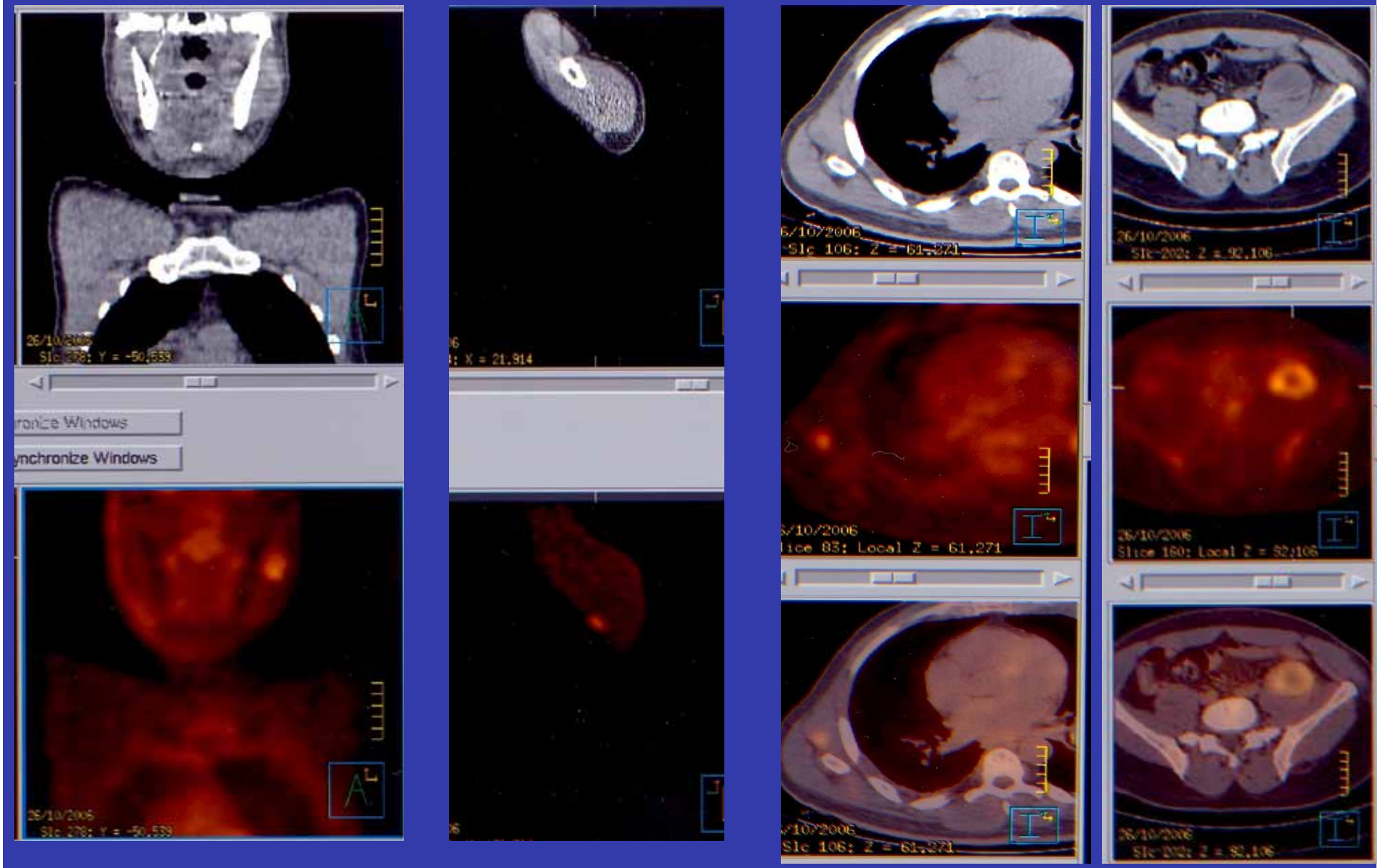




Métastase splénique



Métastases
péritonéales



Métastases musculaires

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journal homepage: www.elsevier.com/locate/suronc

Review

Meta-analysis: Accuracy of ^{18}FDG PET-CT for distant metastasis staging in lung cancer patients

Junkai Li, Wen Xu, Fanjun Kong, Xueling Sun, Xiaoyan Zuo*

Table 1
The clinical characteristics and study quality of the selected studies.

Study	Origin	Design	Type of pathology	No. of patients	Male (%)	Age (range or mean, y)	Analysis method	Follow-up time (m)	Prevalence (%)	QUADAS[b]
Antoch [4], 2003	Germany	Prosp	NSCLC	20	80	39 70	QL + QN	4.7[a]	25.0	12
Gerfolio [5], 2004	USA	Prosp	NSCLC	129	60	24 87	QL + QN	NR	14.7	11
Fischer [6], 2007	Denmark	Prosp	SCLC	29	38	47 77	QL	16.8[a]	70.0	12
De Wever [7], 2007	Belgium	Retro	All	50	88	26 83	QL + QN	NR	6.0	11
Ohno [12], 2008	Japan	Prosp	NSCLC	203	54	72	QL	>12	19.7	12
Yi [13], 2008	Korea	Prosp	NSCLC	165	76	61	QL	19.7[a]	20.1	12
Plathow [14], 2008	Germany	Prosp	NSCLC	52	69	49 71	QL + QN	2.7[a]	7.7	11
El-Hariri [15], 2012	Egypt	Prosp	All	33	85	34 76	QL + QN	5 7	21.2	12
Opolka [16], 2013	Poland	Prosp	NSCLC	99	71	41 88	QL + QN	NR	18.2	11

Prosp = prospective; Retro = retrospective; QL = qualitative; QN = quantitative; NA = not acquired; NR = not reported.
[a] Mean of follow-up time.
[b] The number of items assessed as "yes" in the QUADAS tool.

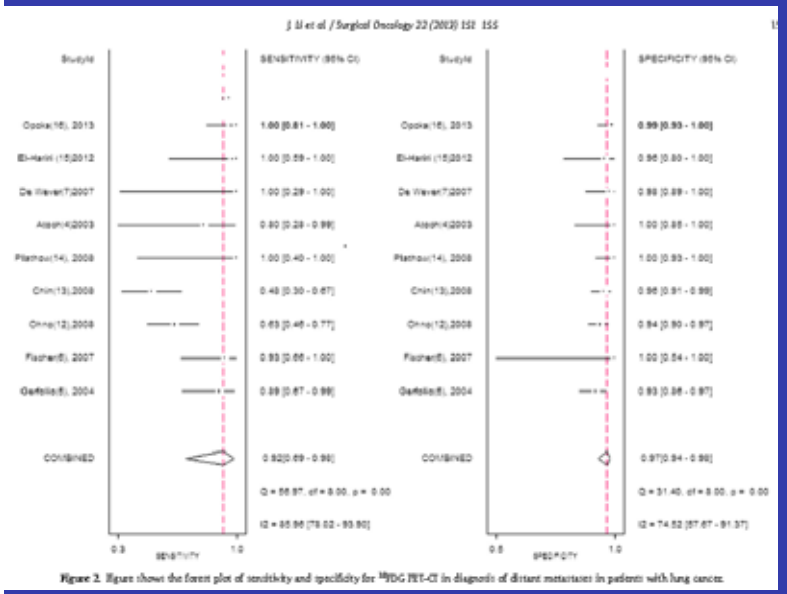


Figure 2. Figure shows the forest plot of sensitivity and specificity for ^{18}FDG PET-CT in diagnosis of distant metastases in patients with lung cancer.

Sensibilité = 0,92
Spécificité = 0,97

DOR diagnosis odd ratio = 336
Tx Vraisemblance positive = 29,4
Tx Vraisemblance négative = 0,08

Performances de la 18FDG-TEP

Cancer non à petites cellules

Se T 93-95% Sp T 73-92%
Se N 83-85% Sp N 89-92% Standard A
Se M 92% Sp M 97%

Cancer à petites cellules

Nucl Med Commun. 2014 Jul;35(7):697-703. doi: 10.1097/MNM.0000000000000122.

18F-FDG PET or PET/CT for detecting extensive disease in small-cell lung cancer: a systematic review and meta-analysis.

Lu YY[1], Chen JH, Liang JA, Chu S, Lin WY, Kao CH.

Author information

Abstract

The purpose of this study was to conduct a systematic review and meta-analysis of the published literature to evaluate the diagnostic accuracy of fluorine-18 2-fluoro-2-deoxy-D-glucose (F-FDG) PET or PET/computed tomography (CT) in the pretherapeutic staging of patients with small-cell lung cancer (SCLC). The authors conducted a systematic MEDLINE search of published articles. Two reviewers independently assessed the methodological quality of each study. We estimated the pooled sensitivity, specificity, positive and negative likelihood ratios (LR+ and LR-), and summary receiver operating characteristic curves in the detection of extensive disease (ED) in patients with SCLC. Twelve studies with a total of 369 patients met the inclusion criteria. The pooled estimates of sensitivity, specificity, LR+, and LR- of F-FDG PET or PET/CT for the detection of ED in SCLC were 97.5% [95% confidence interval (CI), 94.2-99.2%], 98.2% (95% CI, 94.9-99.6%), 19.86 (95% CI, 9.79-40.30), and 0.06 (95% CI, 0.03-0.10), respectively. Whole-body F-FDG PET or PET/CT is a valuable imaging tool for the pretherapeutic assessment of ED in patients with SCLC.

Table 5 Evaluation the Information of Staging Benefit of PET and PET-CT of M1 Disease/Management Changes

Author (y)	N	PET Accuracy	Management Changes—PET Scan Either Upstaged or Downstaged Patient*
Cerfolio (2003)[25]	400	—	13% (6% upstaged, 7% downstaged)†
Reed (2003)[31]	303	sens 83%, spec 90%	
Gupta (2000)[61]	97	96%	59%
Schiepers (2000)[62]	129	86%	38% (23% upstaged, 15% downstaged)
Seltzer (2000)[63]	273	—	44%
Baum (2000)[64]	63	90%	52%
Saunders (1999)[65]	97	—	37%
Marom (1999)[66]	100	83%	23% (12% upstaged, 11% downstaged)
Steinert (1998)[67]	100	—	21%

*Upstage = resectable to nonresectable; downstage = nonresectable to resectable (N or M stage).
†Limited to patients upstaged or downstaged with regard to M1 disease/staging only.

Cerfolio RJ
Th Cardiovascul Surgery 2007

Métastases cérébrales

3 - 40 %.
47 % si GrC, 14 % si Epi

TDM

Coupes fines 2-5 mm non jointives
Double dose, ex retardé 30-60 minutes
Faux négatifs = 10 %: fosse postérieure,
petites lésions proches des structures osseuses
métastases lepto-méningées

IRM: ex de référence

CI iode

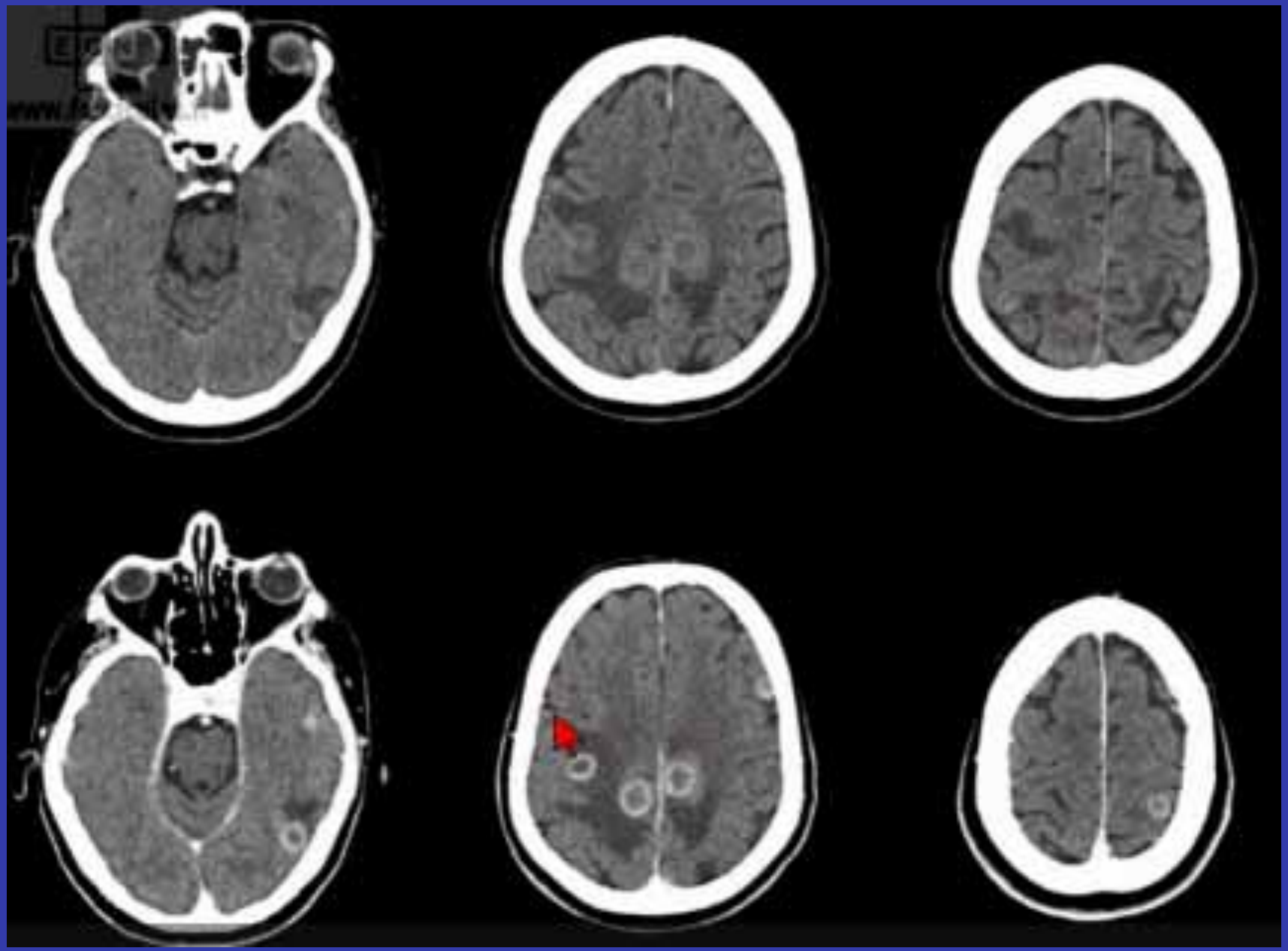
Caractérisation lésion

Gadolinium augmente la sensibilité mais également les faux positifs

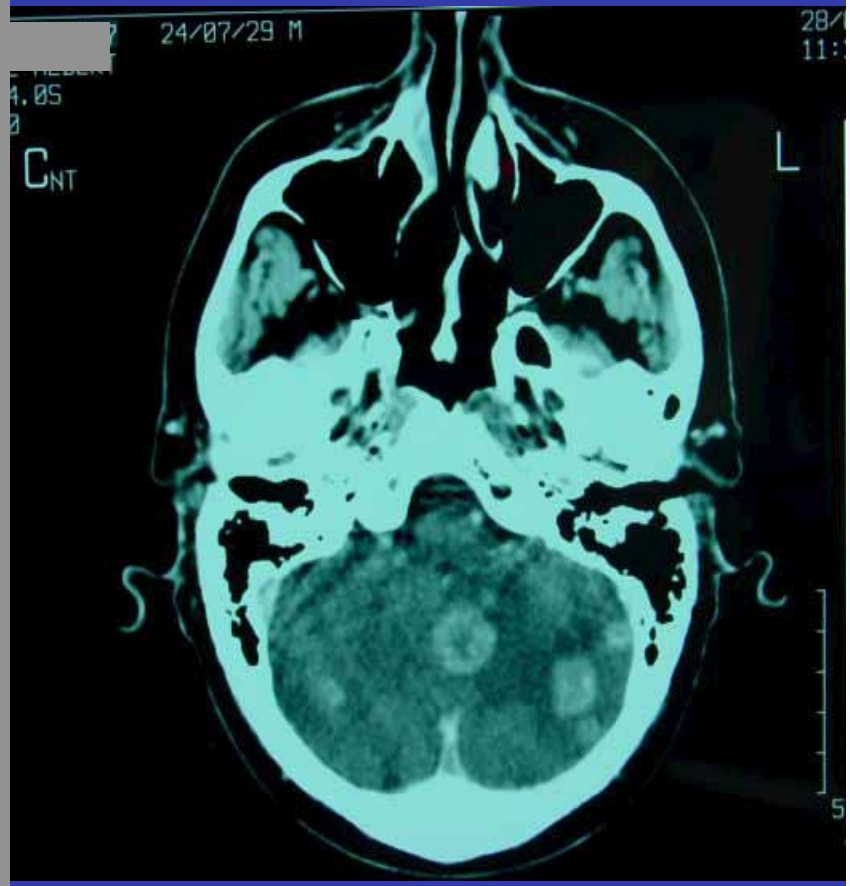
TDM normal malgré signes cliniques

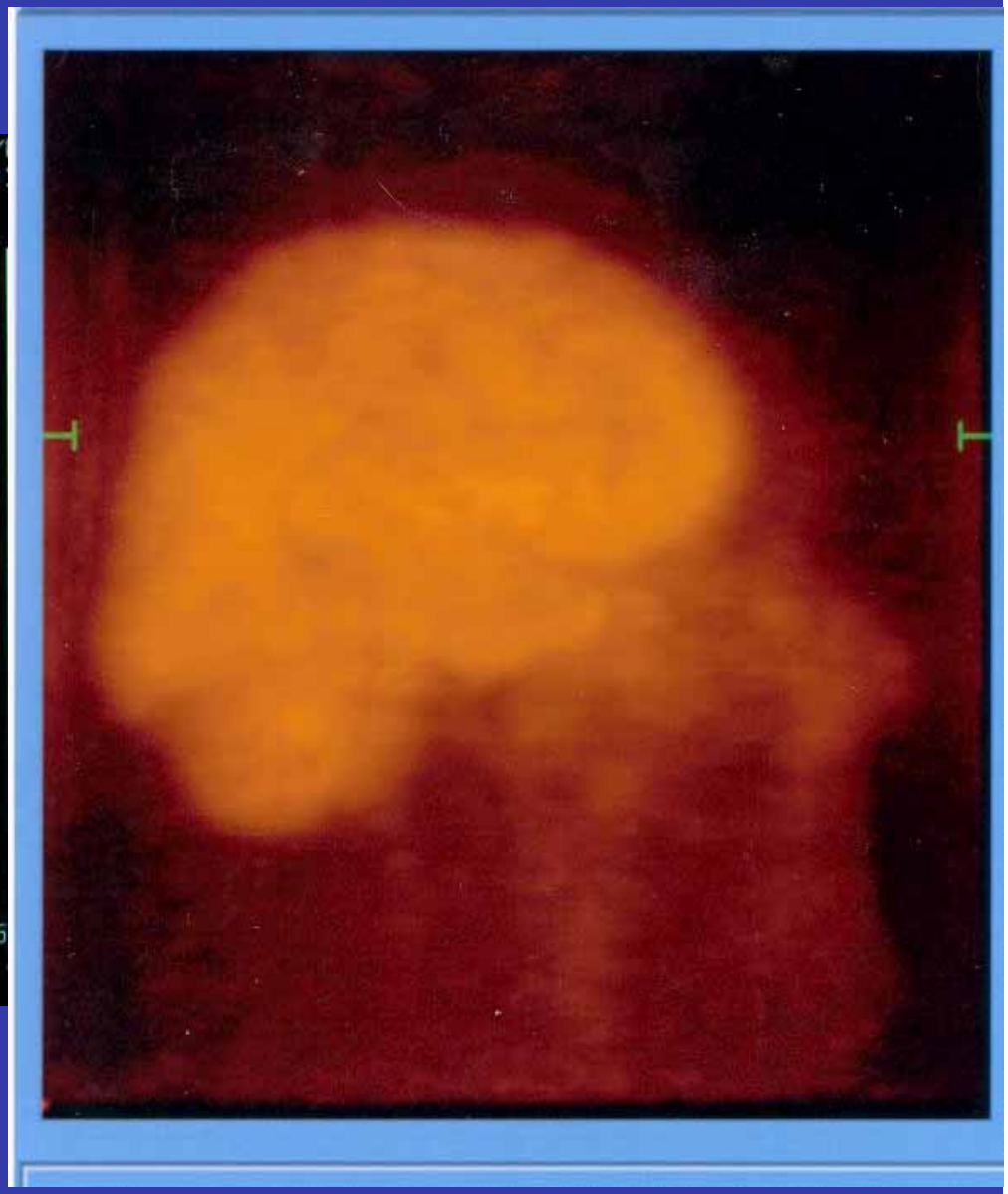
Tumeurs de la fosse postérieure

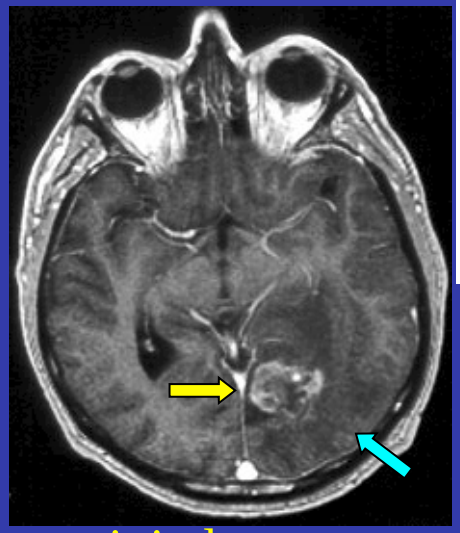
Méta « unique » en TDM et indication neurochirurgicale



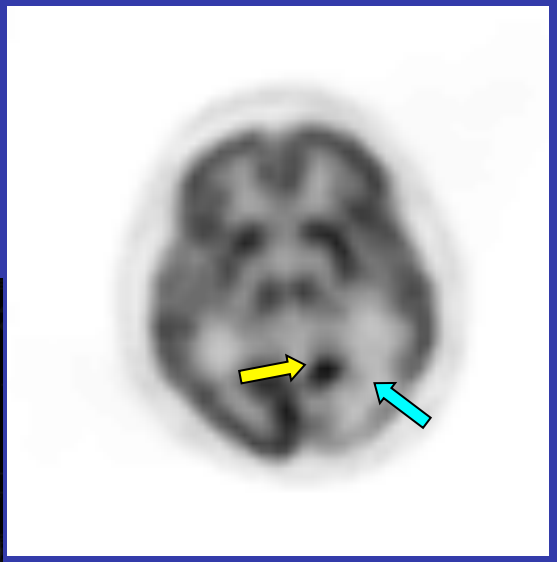
Métastases cérébrales



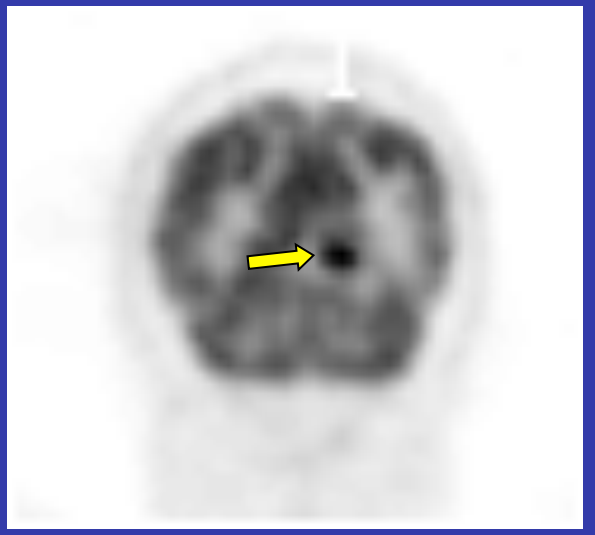




Lésion occipitale gauche



Oedème



Hypofixation corticale liée à l'oedème

La détection des métastases cérébrales est difficile

IRM = la référence

Méningite carcinomateuse

9 à 25% des KBP

Céphalées, troubles mentaux, atteinte nerfs crâniens, douleurs rachidiennes ou radiculaires, incontinence, faiblesse mb inf, anomalies sensorielles

Association atteinte cérébrale, nerfs crâniens et rachis

PL: cellules carcinomateuses dans 50% des cas

IRM: hydrocéphalie ou prise de contraste citernes basales

Cancers bronchiques

bilan d'extension métastatique

BILAN IDEAL en 2015-6:

Apres examen clinique, TDM Thorax avec coupes foie surrénales

18FDGTEP-TDM + IRM Cerveau

- Est-ce satisfaisant?

Cette stratégie est-elle fiable ?

Verboom P. *E.J.N.M.* 2003.30(11):Nov. 1444-9.

1ère étude - phase III randomisée (1/98-1/99)

188 pts KCBP nPç considérés opérables après bilan conventionnel

96 pts: B.conv -----> chir

92 pts: B.conv + TEP ----> chir (pas de diff: age,sexe, TNM- conv)

def: chirurgie «futile»: lésion bénigne
III A N2 (except mN2), III B, M 1,
chir exploratrice,
rechute < 1an

B.conv: 39 chir futile

B.conv +TEP: 19 chir futile ===> 51 % de moins (p = 0,0003)

	Conv.		Conv. + TEP	
	96 pts		92 pts	
non-opérés	**18 pts**		**32 pts**	
	10	N2-N3	**18**	
	1	M+	**7**	
	2	Bénin	3	
	2	Autres T	1	
	3	Refus	3	
Opérés	**78 pts**		**60 pts**	
chir futile	**39 pts**		**19 pts**	**(p=0,0003)**
	6	IIIA	4 (FN)	
	6	IIIB	2 (FN)	
	2	Bénin	2 (FP)	
	1	x	-	
19/78 = 24 %	**19 (9 dcd)**	rechute < 1an	11 (0 dcd)	11/60 = 18 %
coût	12400 USD		11400 USD	**(p=ns)**

TNM 2009: Survies KB BP nPc

Stade	T	N	M	Survie à 5 ans cTNM	Survie à 5 ans pTNM
IA	T1a, b	N0	M0	50 %	73 %
IB	T2a	N0	M0	43 %	58 %
IIA	T1a, b	N1	M0	36 %	46 %
	T2a	N1	M0		
	T2b	N0	M0		
IIB	T2b	N1	M0	25 %	36 %
	T3	N0	M0		
IIIA	T1, T2	N2	M0	19 %	24 %
	T3	N1, N2	M0		
	T4	N0, N1	M0		
IIIB	T4	N2	M	7 %	9 %
	Tout T	N3	M0	3 %	
IV	Tout T	Tout N	M1	2 %	

Répartition selon l'histologie: série autopsique

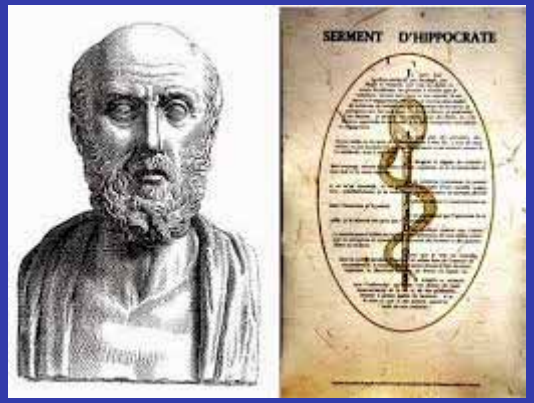
MJ Matthews *Lung Cancer* 1976

	Epi N = 126	ADK N = 100	Gdes C N = 80	Pttes C N = 102
Foie	20%	41%	60%	73%
Surrénale	18%	50%	74%	54%
Os	16%	36%	38%	36%
SNC	14%	37%	47%	28%
Rein	17%	23%	35%	22%
GI	10%	5%	25%	14%

Peut on faire mieux?

- Comment?
- Quels moyens ?
- Quelle rentabilité ?
- Pourquoi?
- Pourqui?

Finances publiques



Santé

Médecin

Malade

Organisateurs
des soins

Famille et aidants

Maladie métastatique: Impact des nouveaux outils diagnostiques

National Cancer Database (USA)

- 812.000 patients
- Diagnostic CBNPC 1998-2006
- M1 synchrones

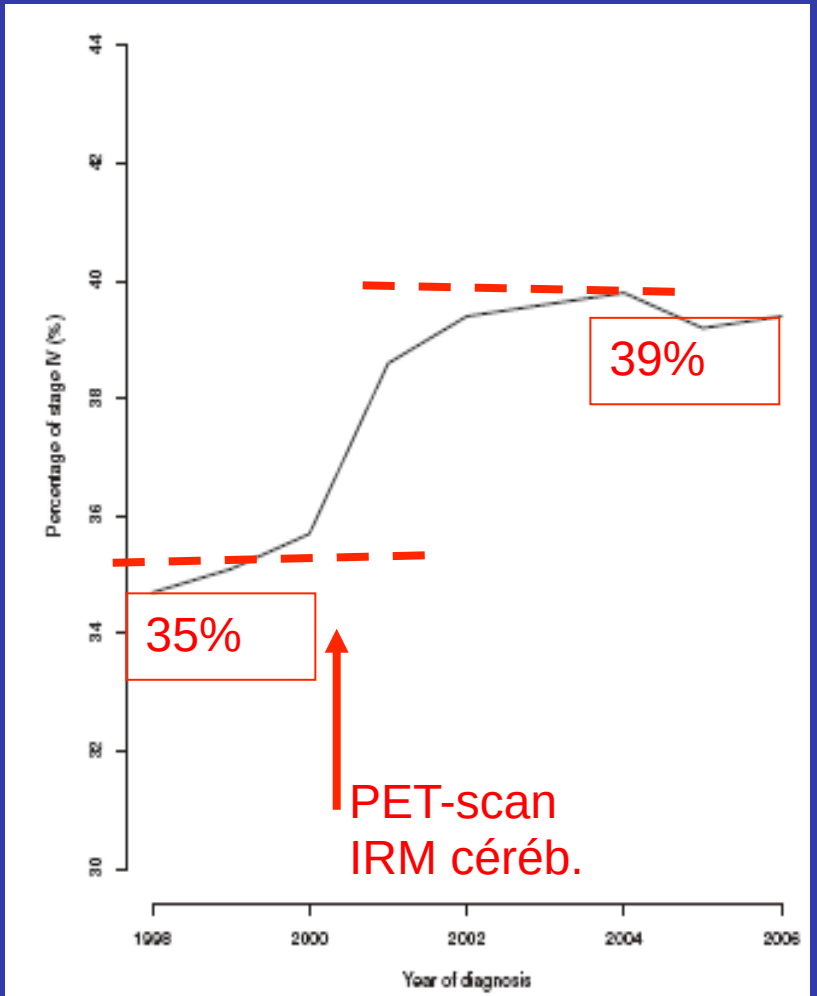


FIGURE 1. Percentage of stage IV non-small cell lung cancer (NSCLC) from 1998 to 2006.

Morgensztern, JTO 2010;5:29-33

CPLF
Lille 2008

La survie des cancers bronchiques s'améliore:
données comparatives de deux cohortes de patients suivis entre 1990-5 et 2000-5 à l'HIA Percy- Clamart

Vaylet F., Marotel C., Margery J., Bonnichon A., Le Floch H., Riviere F., Saint-Blancard P., Salles Y., Mairovitz A., Staub E., Pons F., Jancovici R., L'Her P.
Service des Maladies Respiratoires, de Chirurgie Thoracique et d'Anatomo-pathologie, Hôpital d'Instruction des Armées Percy - 92141 CLAMART.

Méthodologie: Depuis Janvier 1990, tous les patients pris en charge pour un cancer bronchique primitif dans le service sont enregistrés dans une base de données agrée par la CNIL. Une soixantaine d'items est colligée de manière prospective. Au 01 Mars 2007, au sein de cette base contenant 1180 patients, nous avons sélectionné tous ceux pris en charge du 01.01.1990 au 31.12.1995, puis tous ceux du 01.01.2000 au 31.12.2005.

Le but de cette étude est de comparer les deux populations et leur survie en fonction des caractéristiques cliniques, histologiques, de TNM, et des données thérapeutiques.

Population	Cohorte A 1990-5	Cohorte B 2000-5
Total	160	507
Homme	141 (88%)	381 (75%)
Femme	19 (12%)	126 (25%)
Age (années)	63.4	63.8
Non Fumeurs	5 (4%)	42 (9%)
Fumeurs et ex	125 (96%)	399 (91%)

La comparaison montre une augmentation du nombre global et de celui des femmes (p=0.04).

Présentation	Cohorte A 1990-5	Cohorte B 2000-5
Rx fortuite ou systématique	37 (26%)	115 (23%)
Signes thoraciques	79 (56%)	234 (47%)
Signes généraux	8 (6%)	88 (17 %)
Signes liés à une métastase	17 (12%)	60 (12%)

Dans les deux cohortes, le diagnostic est évoqué dans 77 % des cas devant des symptômes.

Présentation	Cohorte A 1990-5	Cohorte B 2000-5
PS 0-1	74 (58%)	357 (81%)
PS2-3-4	53 (42%)	83 (19%)

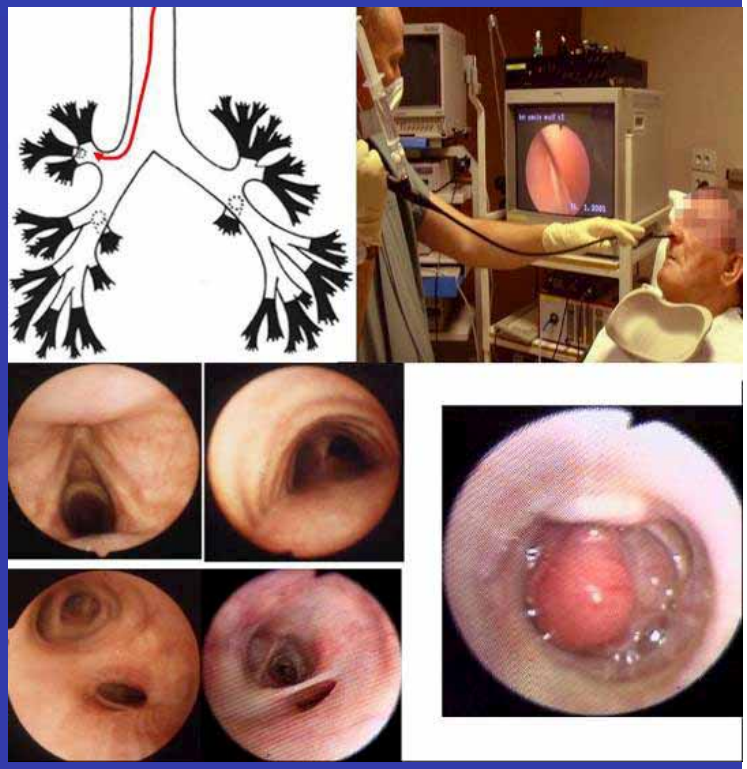
TNM	Cohorte A 1990-5	Cohorte B 2000-5
I	27 (17%)	102 (21%)
II	12 (8%)	30 (6%)
IIIA	30 (19%)	70 (14%)
IIIB	36 (23%)	62 (13%)
IV	53 (34%)	224 (46%)

Extension endo-bronchique (T)

ENDOSCOPIE BRONCHIQUE

en lumière blanche

en auto-fluorescence



Limites de la tumeur

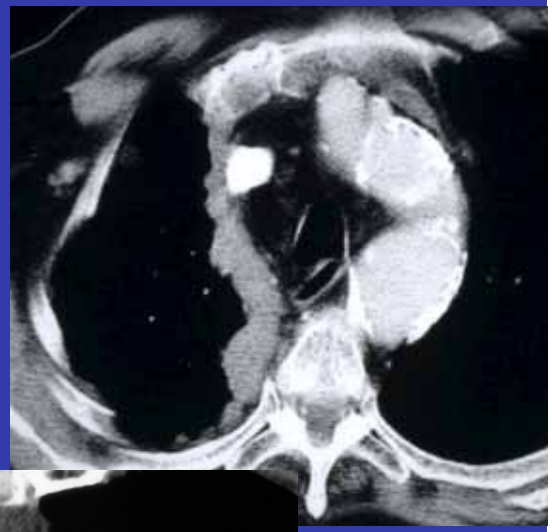
carène, trachée T4

2° localisation endobronchique M+

Extension pleurale (T / M1A)

CLINIQUE: Toux, Matité silencieuse

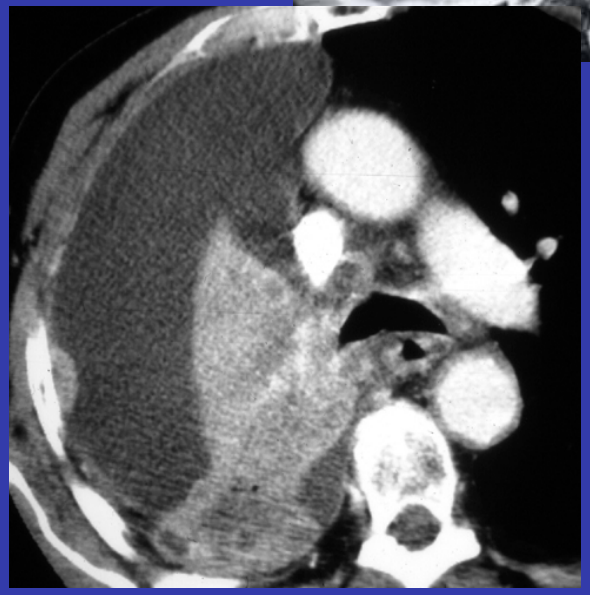
RX ThoraxTDM / IRM : Opacité pleurale



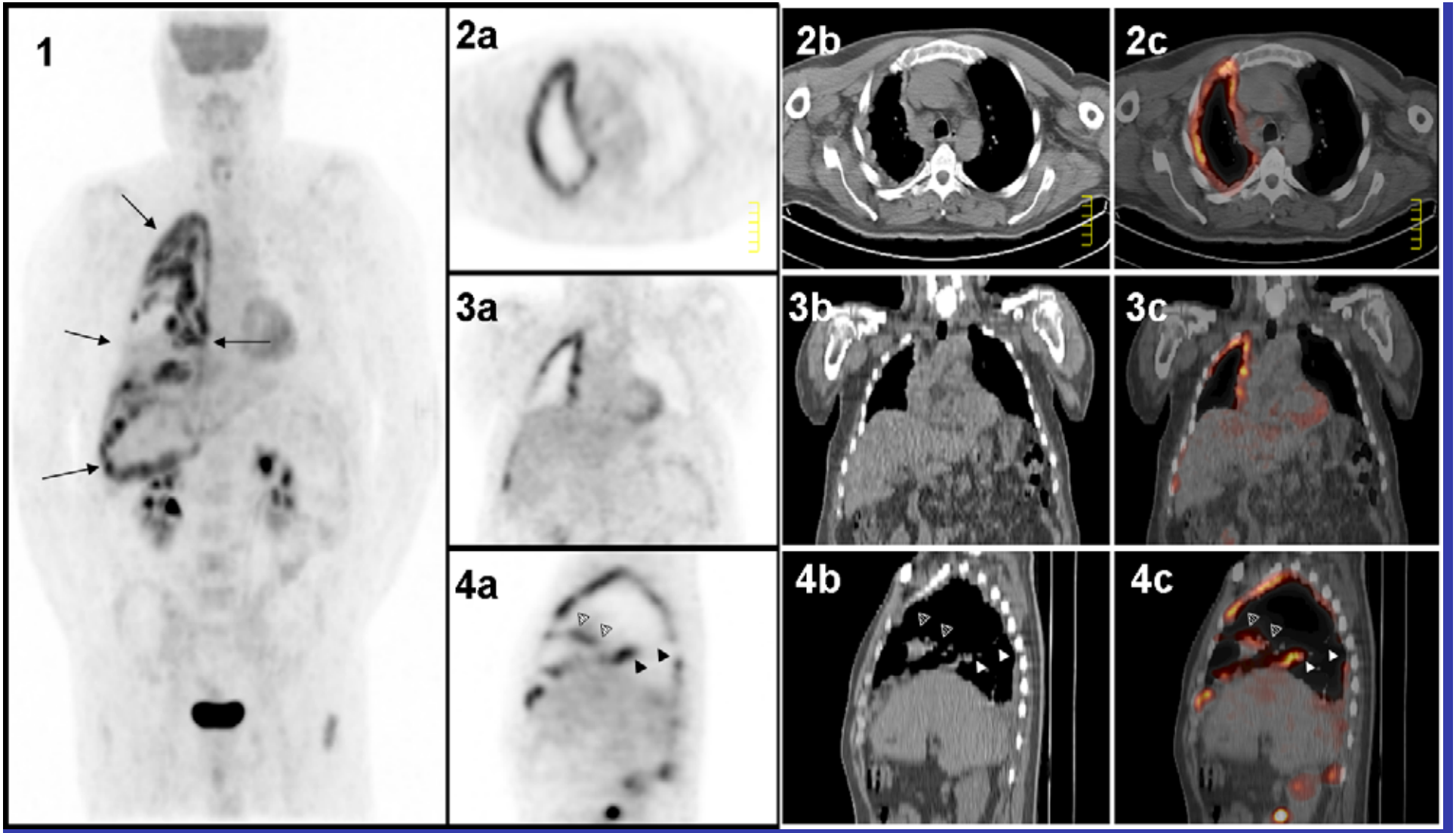
Diagnostic de certitude:

Ponction pleurale: Cytologie +

Biopsie à l'Abrams / Thoracoscopie +



- Épanchement pleural: ponction pleurale
- Si tumeur opérable et cytologie négative sur deux ponctions exploratrices: thoracoscopie première



Carcinome bronchique et métastatisation pleurale NC Gupta, JS Rogers, GM Graeber, JL Gregory, U Waheed, D Mullet, M. Atkins Clinical role of F-18 fluorodeoxyglucose positron emission tomography imaging in patients with lung cancer and suspected malignant pleural effusion. Chest 2002 ; 122 : 1918-24

En résumé, la sensibilité du PET scan pour détecter une atteinte pleurale métastatique serait de 89 % (IC 95 % : 67 à 97) et sa spécificité de 94 % (IC 95 % : 73 à 99). Avec une prévalence de 50 % environ d'atteinte pleurale néoplasique dans la population étudiée, la valeur prédictive positive serait de 94 % et la valeur prédictive négative de 89 %.

TEP et extension pleurale M1 A

Benard 1998 *Chest*
Caretta 2000 Eur *J Cardiothorac Surg*
Erasmus 2000 *AJR*
Duysinx 2004 *Chest*
Gupta 2002 *Chest*
Kramer 2004 *JNM*
Schaeffer 2004 *Radiology*
Toaff 2005 *Inv Radiol*

Se 89 - 100 %
Sp 67- 100 %

VPN 67 – 100 %
Exactitude diagnostique 80 %

Duysinx 2006 Nucl Med Comm

si SUV > 2.2

Se 86%
Sp 75 %
Exact 82 %

TEP –IRM

J Nucl Med. 2015 Oct 15. pii: jnumed.115.162040. [Epub ahead of print]

TNM staging of NSCLC: Comparison of PET/MR and PET/CT.

Huellner MW[1], Barbosa FG[1], Husmann L[1], Pietsch CM[1], Mader CE[1], Burger IA[1], Stolzmann P[1], Delso G[1], Frauenfelder T[1], von Schulthess GK[1], Veit-Haibach P[1].

Author information

Abstract

RATIONALE: To compare the diagnostic accuracy of whole-body non-contrast-enhanced PET/MR with that of PET/CT in determining the stage of non-small-cell lung cancer.

METHODS: This study was approved by the institutional review board and by national government authorities. Forty-two consecutive patients referred for the initial staging of non-small-cell lung cancer underwent whole-body imaging with a sequential trimodality PET/CT-MR system. PET/MR and PET/CT datasets were evaluated separately, and a tumor-node-metastasis (TNM) stage was assigned based on the image analysis. Nodal stations in the chest were identified according to the mapping system of the American Thoracic Society. The standard of reference was histopathology for the tumor stage in 20 subjects, for the nodal stage in 22 patients and for extrathoracic metastases in 5 subjects. All other lesions were confirmed by at least one different imaging method. Wilcoxon signed-ranks test was used for comparing PET/MR with PET/CT.

RESULTS: PET/MR did not provide additional information compared with PET/CT. The diagnostic accuracy of both imaging modalities was equal (T staging: P = 0.177, N staging: P = 0.114, M staging: P = 0.465), however with advantages for PET/CT by trend. In the subgroup with histopathological confirmation of T stage and N stage, the situation was similar (T staging: P = 0.705, N staging: P = 0.334).

CONCLUSION: This study indicates that PET/MR using a fast MR protocol does not improve the diagnostic accuracy of the staging of non-small-cell lung cancer.

Moins cher?

Recherche de l'extension métastatique

Intérêt de la biologie

Anémie, hyperleucocytose, thrombocytémie
Hypoalbuminémie

NSE, ACE, Cyfra 21-1

Augmentation des gamma-GT, des phosphatases alcalines, des LDH

Hypercalcémie

Cellules circulantes?

Panel de gènes

- **108 exons choisis à partir de 38 gènes analysés par la méthode de séquençage de Sanger**
  EGFR, KRAS, HER2,4, BRAF, PI3CA, PIK3R1, TP53, CDK4, CDKN2A, cKIT, PDGFRA, MET, FGFR2-4, FCGR2A,3A, FLT3, CTNNB1, GNAS, HRAS, NRAS, KDR, PDPK1, TOP1,2A, ERCC1, FBXW7, TSC2, PTEN, AKT1-3, MAP2K1-2, STK11, ALK
- **Début en 2012 : panel de 74 gènes analysés par NGS**

Gene	RefSeq	Exons	Panel
ABL1	NM_007313.	4 à 7	OP1
AKT1	NM_005163.	3&6	SAP32+OP1
AKT2	NM_001626.	3	SAP32
AKT3	NM_005465.	3	SAP32
ALK	NM_004304.	20 to 26	SAP32+OP1
APC	NM_000038.	16 (partiel)	OP1
ATM	NM_00005.3	-34&36-39-5	OP1
BRAF	NM_004333.	11&15	SAP32+OP1
BRCA1	NM_007294.	2 to 23	SAP32
BRCA2	NM_000059.	2 to 27	SAP32
CDH1	NM_004360.	3-8-9	OP1
CDKN2A	NM_00077.4	2	OP1
CSF1R	NM_005211.	7&22	OP1
CTNNB1	NM_NM	3	SAP32+OP1
DDR2	NM_0010147	4 to 13	SAP32
EGFR	NM_005228.	7-12-15-18 to	SAP32+OP1
ERBB2	NM_004448.	8-17 to 21	SAP32+OP1
ERBB3	NM_001982.	1 to 28	SAP32
ERBB4	NM_005235.	3 to 5-15&23	SAP32+OP1
EZH2	NM_004456.	16	OP1
FBXW7	NM_033632.	2 to 12	SAP32
FGFR1	NM_023110.	4-7-12-14&15	SAP32+OP1
FGFR2	NM_000141.	7-9-12&14	SAP32+OP1
FGFR3	NM_000142.	7-9-14-15&19	SAP32+OP1

Gene	RefSeq	Exons	Panel
FGFR4	NM_002011.	2 to 18	SAP32
FLT1	NM_002019.	1 to 30	SAP32
FLT3	NM_004119.	11-14-15-20	OP1
GNA11	NM_002067.	5	OP1
GNAQ	NM_002072.	5&8	OP1
GNAS	NM_000516.	8&9	OP1
HNF1A	NM_000545.	3&4	OP1
HRAS	NM_005343.	2 to 4	SAP32+OP1
IDH1	NM_005896.	4	OP1
IDH2	NM_002168.	4	OP1
INPP4B	NM_003866.	5 to 27	SAP32
JAK2	NM_004972.	14	OP1
JAK3	NM_000215.	4-13-15	OP1
KDR	NM_002253.	1 to 30	SAP32+OP1
KEAP1	NM_203500.	2 to 6	SAP32
KIT	NM_000222.	9-11-13-15-17	SAP32+OP1
KRAS	NM_033360.	2 to 4	SAP32+OP1
MAP2K1	NM_002755.	2&3	SAP32
MAP2K4	NM_003010.	1 to 11	SAP32
MAP3K1	NM_005921.	1 to 20	SAP32
MET	NM_001127500.1	-11-14-1	SAP32+OP1
MLH1	NM_000249.	12	OP1
MLL3	NM_170606.	8-9&43	SAP32
MPL	NM_005373.	1	OP1
MTOR	NM_004958.	1 to 58	SAP32

Gene	RefSeq	Exons	Panel
NF1	NM_001042	1 to 58	SAP32
NFE2L2	NM_006164.	2	SAP32
NOTCH1	NM_017617.	24-27&34	SAP32+OP1
NOTCH2	NM_024408.	34	SAP32
NOTCH4	NM_004557.	1 to 30	SAP32
NPM1	NM_002520.	12	OP1
NRAS	NM_002524.	2 to 4	SAP32+OP1
PDGFRA	NM_006206.	12-14-15&18	SAP32+OP1
PIK3CA	NM_006218.	-7-8-10-14-15	SAP32+OP1
PIK3R1	NM_181523.	10-12-14&15	SAP32
PPP2R1A	NM_014225.	5&6	SAP32
PTEN	NM_000314.	1 to 9	SAP32+OP1
PTPN11	NM_002834.	3&13	SAP32+OP1
RB1	NM_000321.	-11-14-17-18-	OP1
RET	NM_020975.	0-11-13-15-1	SAP32+OP1
ROS1	NM_002944.	38	SAP32
SMAD4	NM_005359.	3a6-8a12	OP1
SMARCB1	NM_003073.	2-4-5-9	OP1
SMO	NM_005631.	3-5-6-9-11	OP1
SRC	NM_005417.	14	OP1
STK11	NM_000455.	1 to 9	SAP32+OP1
TP53	NM_000546.	2 to 11	SAP32+OP1
TSC1	NM_000368.	1 to 23	SAP32
TSC2	NM_000548.	2 to 42	SAP32
VHL	NM_000551.	1 to 3	SAP32+OP1

WCLC 2015 - D'après Planchard D et al., abstr. ORAL06.06 actualisé

Un bilan , à qui?

Recherche de l'extension métastatique: systématique ou adaptée?

Aux données cliniques

Au stade loco-régional

A l'histologie

Aux perspectives thérapeutiques

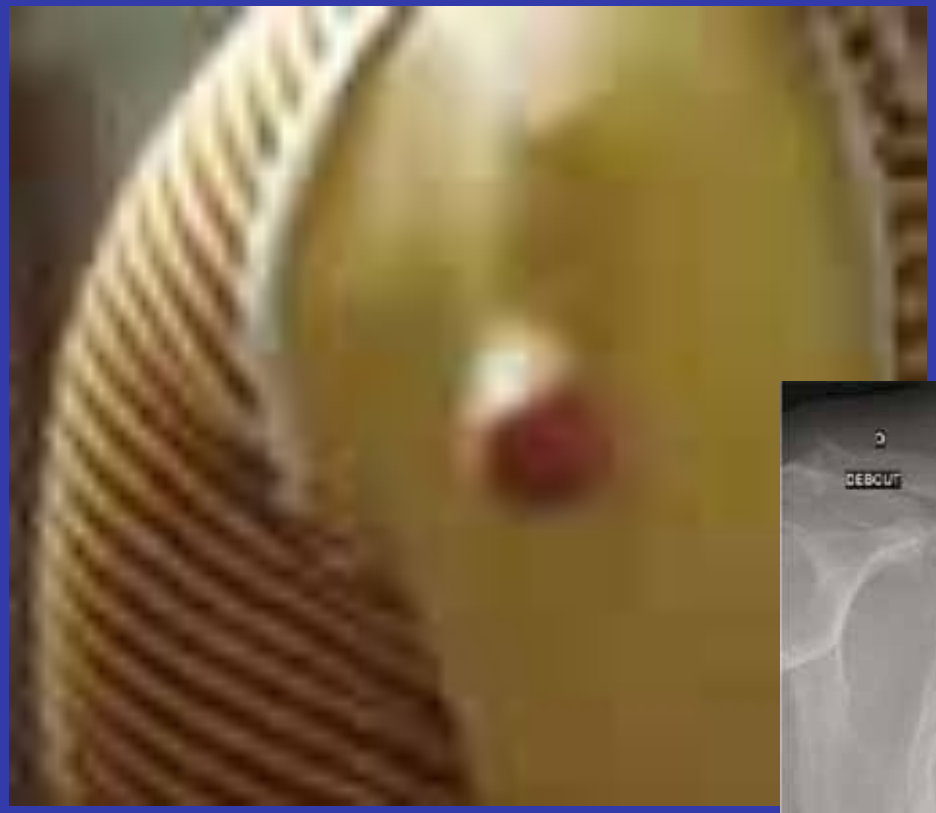
Recherche de l'extension métastatique: systématique ou adaptée?

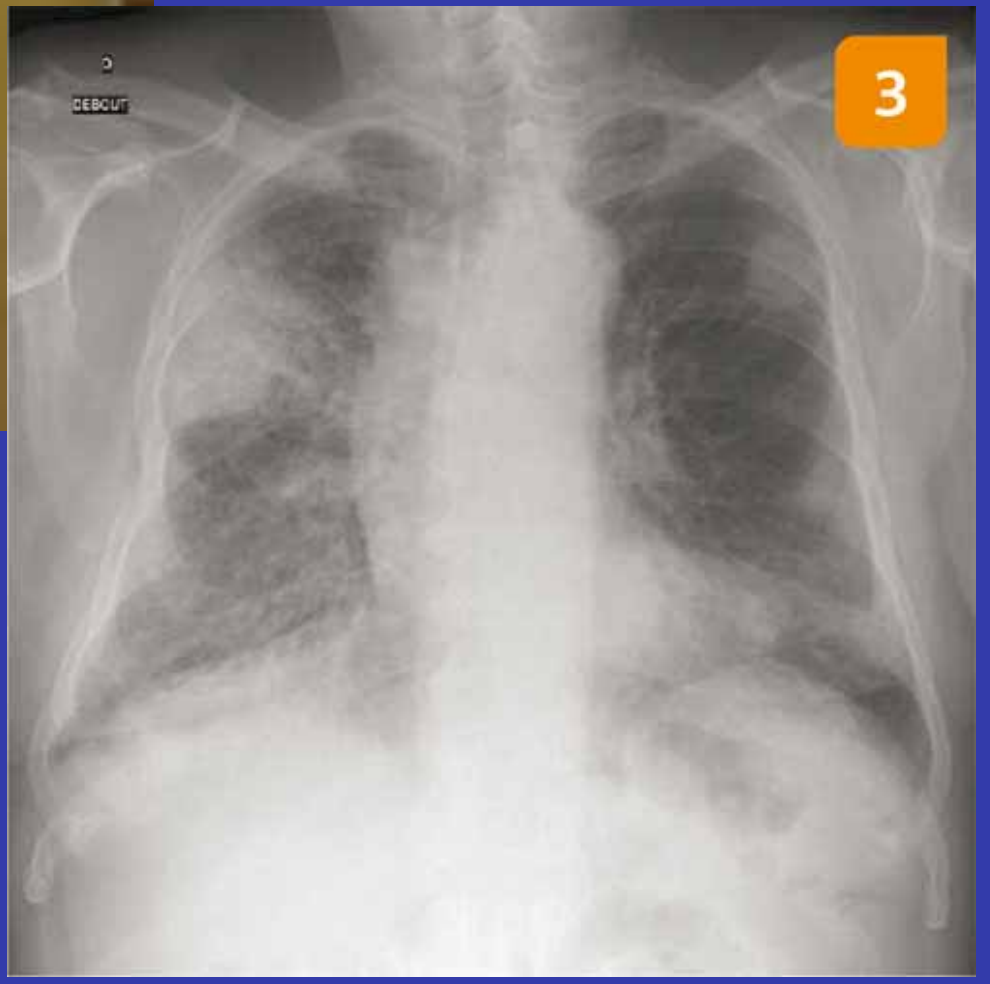
Aux données cliniques

Au stade loco-régional

A l'histologie

Aux perspectives thérapeutiques




DEBOUT
3

Recherche de l'extension métastatique: systématique ou adaptée aux données cliniques?

Si pas d'anomalies de l'examen clinique

Perte de poids > 10 kg, douleur osseuse focale, céphalées, syncopes, faiblesse, modif du comportement récent

Adénopathie périphérique > 1 cm, syndrome cave sup, masse palpable, douleur osseuse, hépatomégalie > 13 cm, anomalie de l'ex. neuro

Méta-analyse: Toloza EM. *Ches*t. 2003 Jan; 123(1 Suppl): 137S-146S.
(actualisation de **Silvestri** ***AJRCCM*** **1995; 152: 225-30.)**

Cerveau : VPN de l'examen clinique 0.94 (95% CI, 0.91-0.96)
Surrénales/foie: VPN 0.95 (95% CI, 0.93 - 0.96),
Os : VPN 0.90 (95% CI, 0.86 - 0.93).

Recherche de l'extension métastatique: systématique ou adaptée?

Aux données cliniques

Au stade loco-régional

A l'histologie

Aux perspectives thérapeutiques

Annals of Oncology 26: 1573–1588, 2015
doi:10.1093/annonc/mdv187
Published online 20 April 2015

2nd ESMO Consensus Conference in Lung Cancer: locally advanced stage III non-small-cell lung cancer

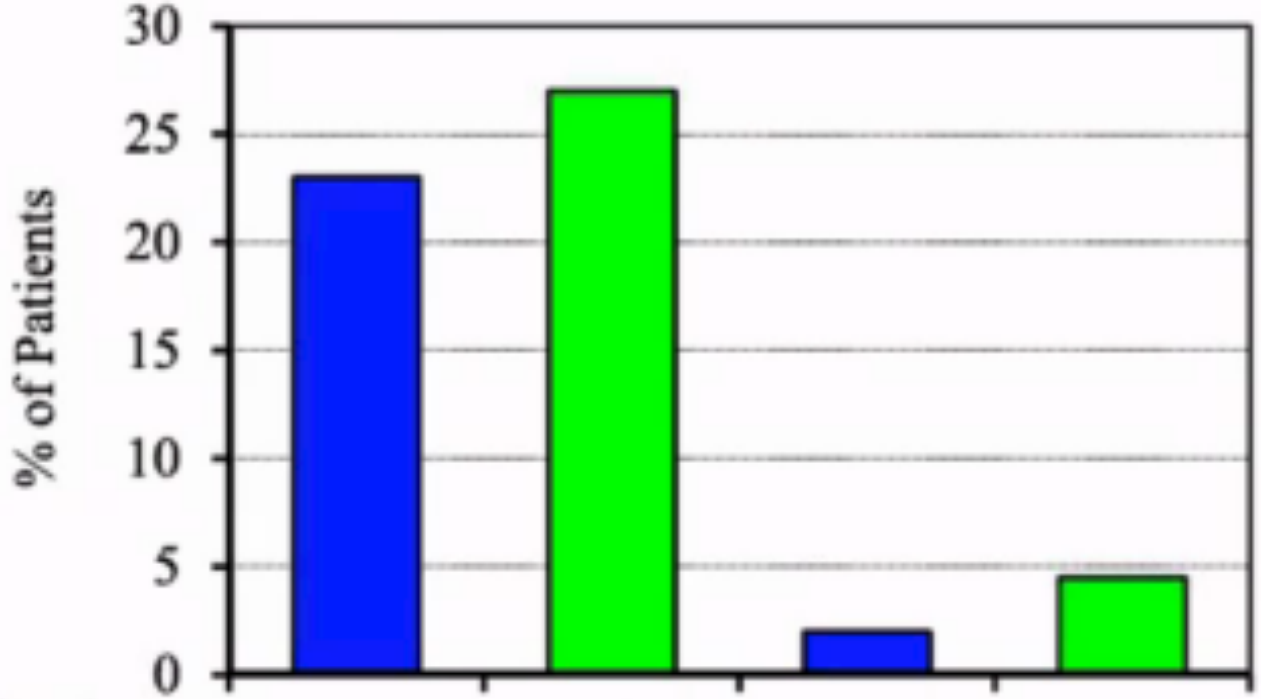
W. E. E. Eberhardt[1], D. De Ruysscher[2], W. Weder[3], C. Le Péchoux[4], P. De Leyn[5], H. Hoffmann[6], V. Westeel[7], R. Stahel[8], E. Felip[9], S. Peters[10] & Panel Members[†]

Recommendation 2.1: All patients planned for definitive stage III NSCLC treatment should undergo a diagnostic high-resolution CT followed by a PET or a combined positron emission tomography–computed tomography (PET-CT) with a CT technique with adequately high resolution for initial staging purposes [I, A] in order to rule out detectable extra-thoracic extra-cranial metastasis and to assess potential mediastinal lymph node involvement, ideally within 4 weeks before the start of treatment [III, B]. Single PET-positive distant lesions need pathological confirmation [V, B].

Recommendation 2.3: All patients planned for curative stage III NSCLC treatment should receive brain imaging for initial staging [III, B]. Contrast-enhanced brain MRI is the preferred method for staging of the brain in stage III disease [III, A]. Alternatively, dedicated contrast-enhanced brain CT can be carried out [III, B].

Recommendation 2.2: PET-positive mediastinal findings should be pathologically assessed [I, A]. Invasive mediastinal staging may still be indicated despite PET negativity in case of suspicious lesions (primary tumour of >3 cm large axis, central tumours, cN1, CT-enlarged lymph nodes with small axis >1 cm) [III, B].

False Negative Rate of Clinical Evaluation for Distant Metastases



Stage by Clinical Evaluation:

vs.

Further Imaging:

Conven-tional	PET	Conven-tional	PET

CHEST 2013; 143(5)(Suppl):e211S–e250S

Recherche de l'extension métastatique: systématique ou adaptée au stade loco-régional?

Plus le stade est élevé, plus le risque de métastases est grand

Cerveau: **5 % stade I**
9 % stade II
15 % stade III

Ferrigno *Chest* 1994
Salvatierra *Chest* 1990
Salbeck *Cancer* 1990
Milleron *Rev Pneumol Clin* 1992

Place de l'exploration cérébrale

Recherche de l'extension métastatique: systématique ou adaptée?

Aux données cliniques

Au stade loco-régional

A l'histologie

Aux perspectives thérapeutiques

Recherche de l'extension métastatique: systématique ou adaptée à l'histologie?

La nature adénocarcinomateuse
est plus pourvoyeuse de métastases, quelque soit le stade

Cerveau:

Ferrigno *Chest* 1994
Salvatierra *Chest* 1990
Salbeck *Cancer*1990
Milleron *Rev Pneumol Clin* 1992

Foie:

Salvatierra *Chest* 1990
Milleron *Rev Pneumol Clin* 1992

Recherche de l'extension métastatique: systématique ou adaptée?

Aux données cliniques

Au stade loco-régional

A l'histologie

Aux perspectives thérapeutiques

Recherche de l'extension métastatique: systématique ou adaptée aux perspectives de traitement?

Si l'abstention est prévue: peu d'intérêt

Sinon , il semble préférable de faire un bilan exhaustif pour suivre les différentes cibles

Mais attention aux faux positifs:

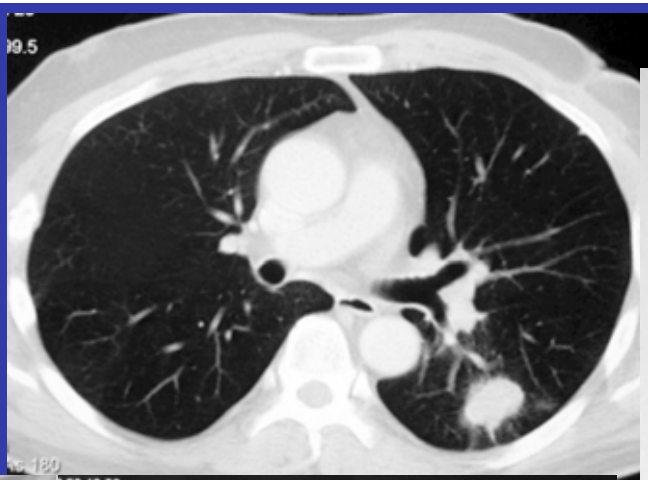
angiomes, kystes, adénomes, cals osseux, an. cérébrales dégénératives,….

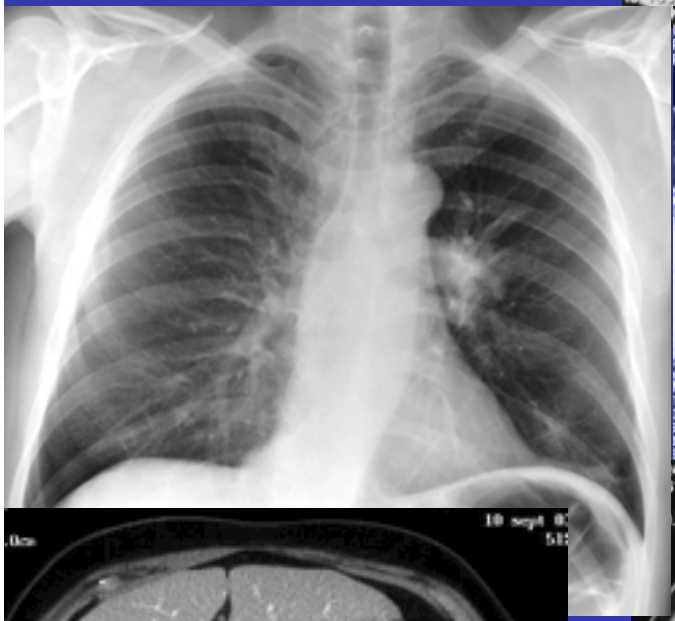
et aux faux négatifs

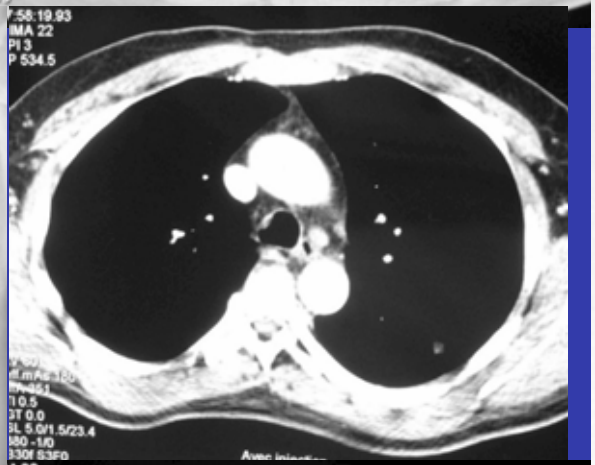
Homme 56 ans

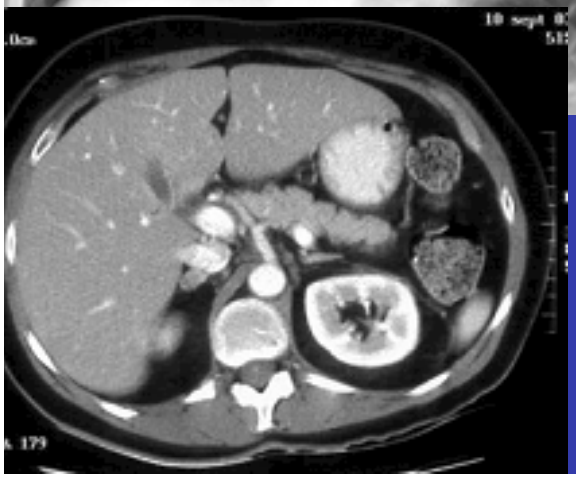
Délégué médical
Tabagisme 45 PA

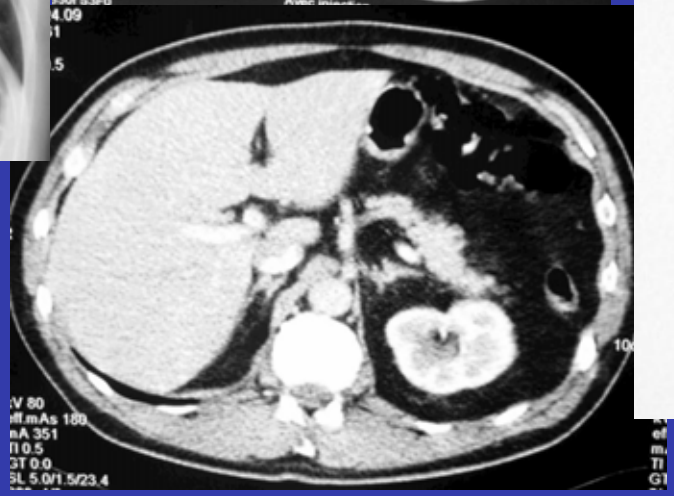
Rx de fin d’activité

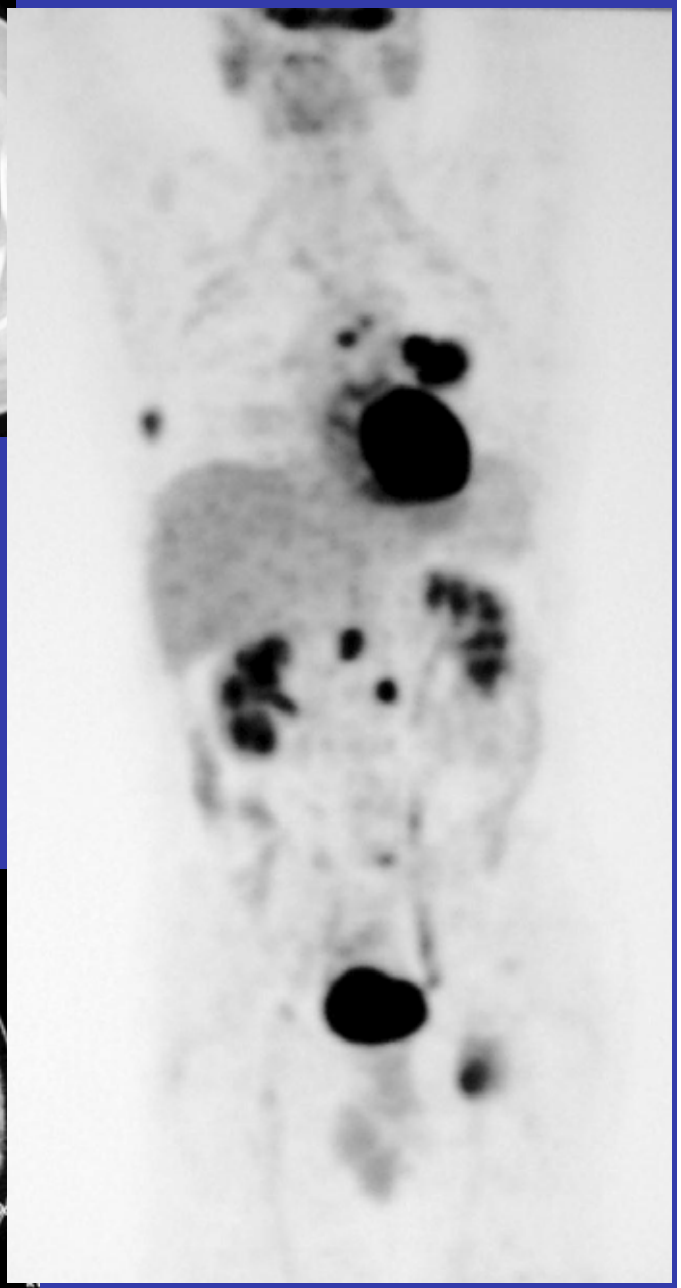




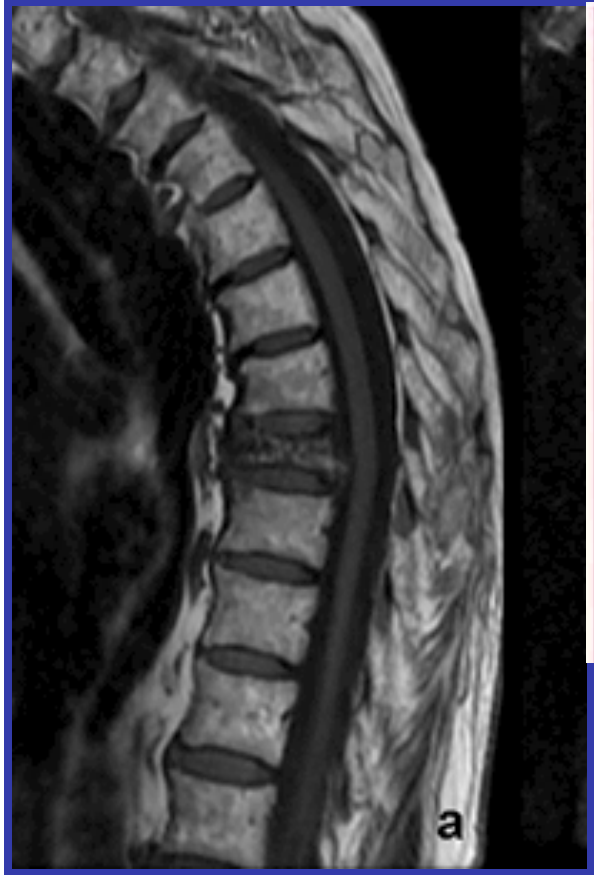


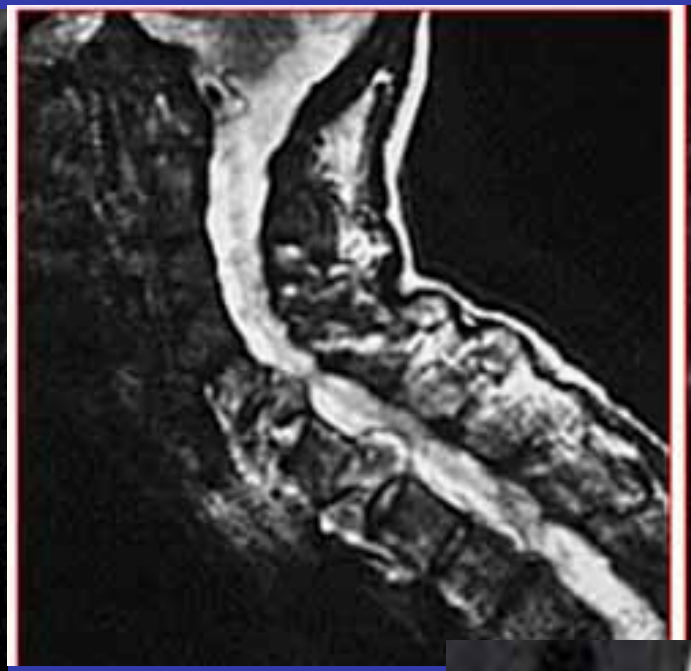


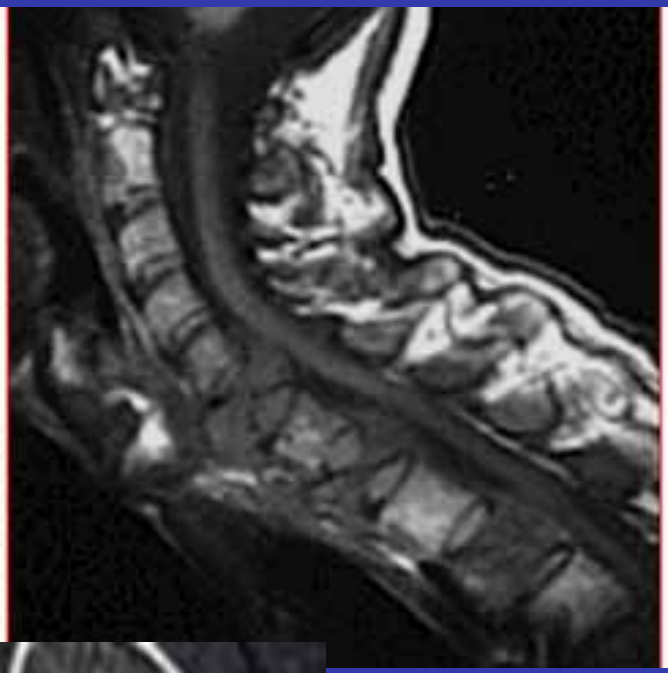


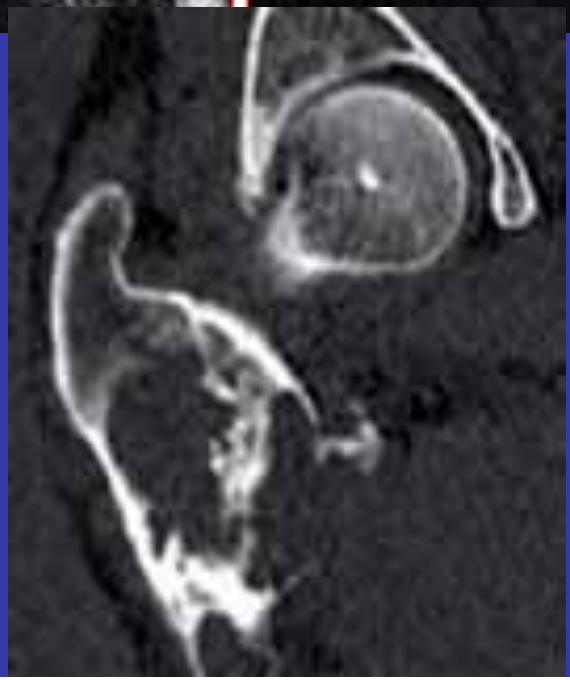


LESION OSSEUSE MENACANTE

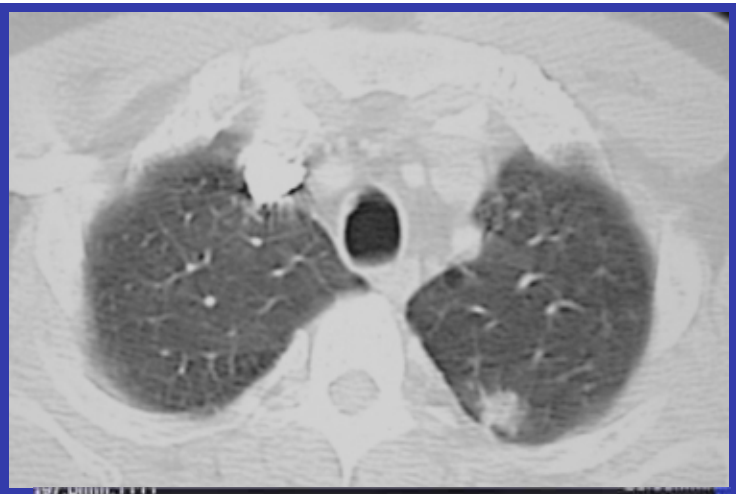


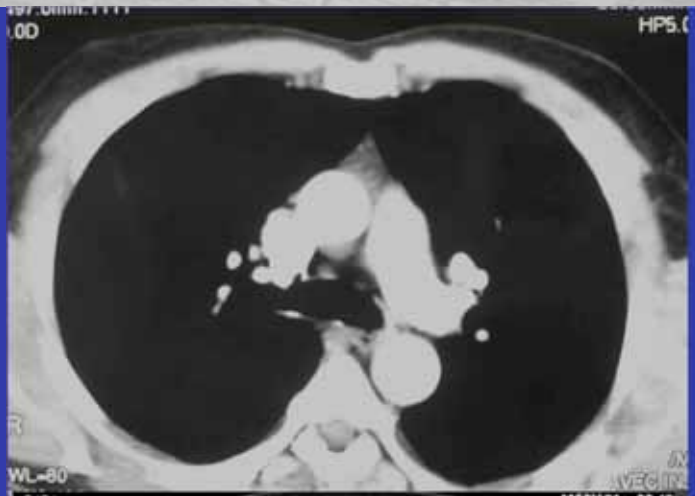


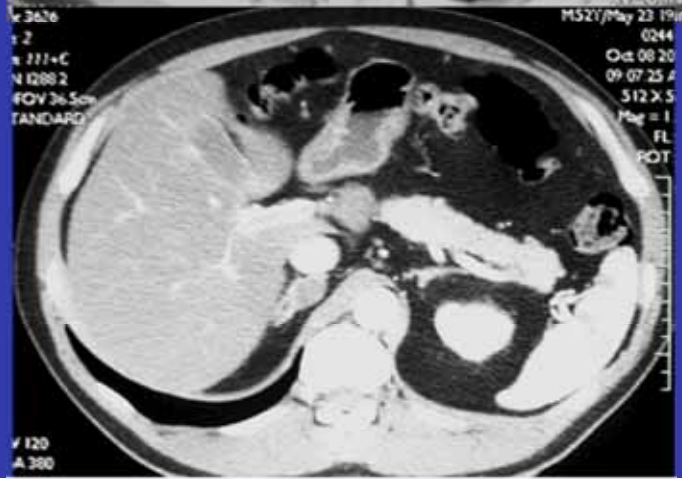


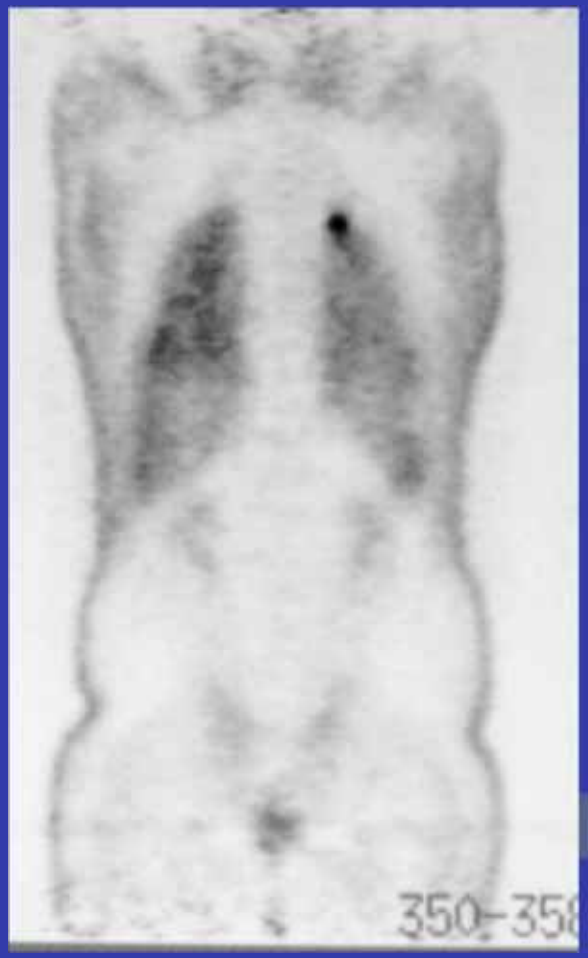


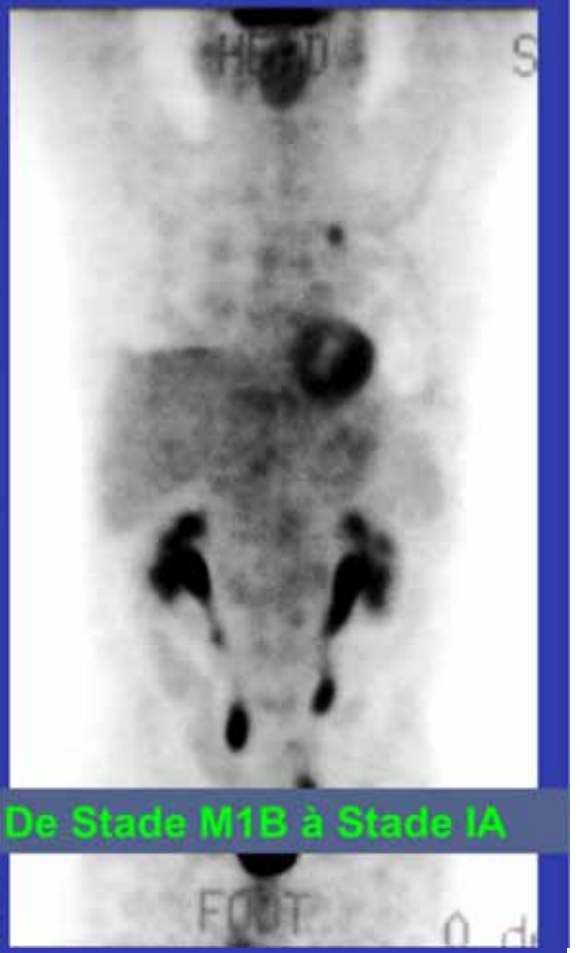
Protection du pronostic vital
ou fonctionnel











De Stade M1B à Stade IA

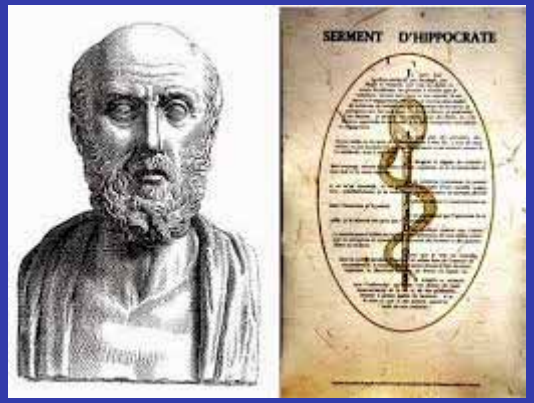
Est-ce satisfaisant? A qui? Quand?

- 18FDG-TEP et IRM Crane pour tous ?
- TDM Thorax injecté pour tous?
- Examens à adapter selon présentation clinique

- Tout d'emblée ou selon les résultats successifs
  mais en combien de temps?
- Délai d'obtention (IRM 22-50 j; TEP 2-30 j)

- Dans quel ordre TEP en premier ou en fin?
- IRM Crâne d'emblée ou en fin de bilan? (3%+ si reste -)

Finances publiques



Santé

Médecin

Malade

Organisateurs
des soins

Famille et aidants

M+ 23

Histo+ 25

Clinique et RX thora 21 M-

ACCES AUX SOINS

Délai de consultation
Zones de vulnérabilité sociale
Filière de soins
Accès aux médicaments innovants
Accès aux soins palliatifs

Enquête EDIFICE (JF Morère)
Etude TERRITOIRE (C Chouaid)

Lung cancer risks, beliefs and healthcare access among the underprivileged

Jean-François Morère[a], Jérôme Viguier[b], Chantal Touboul[c], Xavier Pivot[d], Jean-Yves Blay[e], Yvan Coscas[f], Christine Lhomel[g] and François Eisinger[h,i,j]

$P \leq 0.01$). Because access to healthcare and screening attendance show no signs of discrimination against vulnerable populations, efforts to reduce inequities in lung cancer control should focus on prevention. ***European Journal of Cancer Prevention*** **24:S82–S86 Copyright © 2015**

Table 2 Characteristics of respondents according to the vulnerable (EPICES score > 30) and nonvulnerable (EPICES score ≤ 30) status

	Vulnerable individuals	Nonvulnerable individuals	*P*
Do you believe your risk of cancer is lower than, higher than or equivalent to that of the average population?			
Higher (%)	21	14	≤0.01
For which cancer have you been or are you currently being treated? (of 119 individuals with a history of cancer)			
Lung cancer (%)	10	1	≤0.05
Risk factors for cancer			
BMI (average)	26.0	24.8	≤0.01
Fewer physical activities (%)	42	77	≤0.01
Current smoking (%)	38	23	≤0.01
History of smoking			
Sources of information (%)			
General practitioner	48	56	≤0.01
Lay press	28	37	≤0.05
Comorbidities (%)			
Anxiety	27	12	≤0.01
Lung disease	13	7	≤0.01
Bone and joint diseases	40	27	≤0.05
Visual disorders	14	8	≤0.01
Cardiovascular disease	13	9	≤0.05
Hypertension	24	19	≤0.05
At least one comorbidity	76	65	≤0.05
Average number of comorbidities [mean (SD)]	2.2 (1.3)	1.8 (1.0)	≤0.05
Access to healthcare			
Attendance to cancer screening (%)			
Colorectal	60	60	NS
Breast	94	97	NS
Prostate	46	52	NS
Average number of medical consultations in the last 12 months			
With a general practitioner (of 1233 individuals having consulted a general practitioner) [mean (SD)]	5.4 (4.7)	3.7 (3.1)	≤0.01
With an oncologist (of 71 individuals having consulted an oncologist) [mean (SD)]	6.5 (9.4)	2.5 (2.3)	≤0.01
Confidence in the national healthcare system (score	6.0	6.3	≤0.05

ACCESS TO INNOVATIVE DRUGS IN PATIENTS WITH METASTATIC LUNG CANCER IN FRENCH PUBLIC HOSPITALS (THE TERRITOIRE STUDY)

Scherpereel A[1], Fernandes J[2], Cotté F[3], Blein C[4], Debieuvre D[5], Durand-Zaleski I[6], Gaudin A[3], Ozan N[3], Saitta B[4], Souquet P[7], Vainchtock A[4], Westeel V[8], Chouaïd C[9]

[1]CHU Lille, Lille, France, [2]Oc Santé, Montpellier, France, [3]Bristol-Myers Squibb, Rueil-Malmaison, France, [4]HEVA, Lyon, France, [5]Mulhouse Hospital, Mulhouse, France, [6]URC Eco, Paris, France, [7]Hospices Civils de Lyon, Lyon, France, [8]Besançon Hospital, Besançon, France, [9]CHIC, Créteil, France

OBJECTIVES: Lung cancer survival is socioeconomically patterned, and socioeconomic inequalities in receipt of treatment have been demonstrated in several countries. In the hospitals, many innovative anticancer drugs are too expensive to be funded through a Diagnosis-Related Group (DRG) of chemotherapy administration. In France, such drugs are fully reimbursed up to national reimbursement tariffs (extra-DRG funding) to ensure equity of access. Our aim was to analyze the access of patients to innovative drugs according to social deprivation index. **METHODS:** A retrospective cohort study was constituted with all patients having a diagnosis of metastatic lung cancer in the French National hospitals databases (PMSI) during year 2011. Patients' data were linked to allow a two-year follow-up period. Because extra-DRG data were not available for private hospitals, our analysis was restricted to patients benefiting from chemotherapy in public hospitals only. In addition of demographic characteristics, comorbidities, and treatment, we assigned each patient to social deprivation index based on their postcode of residence. **RESULTS:**

We identified 11,602 patients receiving chemotherapy in public hospitals. During follow-up, 7,417 patients (63.9%) received expensive drugs at least once, including mostly pemetrexed (57.5%), bevacizumab (16.9%), or topotecan (7.2%); these patients were significantly more likely women and younger than the rest of the cohort ($p<0.0001$). Conversely, all selected comorbidities were associated with lower rates of administration i.e. chronic renal failure, diabetes, hypertension, COPD and other respiratory diseases ($p<0.0001$). Taking as reference patients from affluent areas, we observed lower rates of access in intermediary affluent, intermediary deprived and deprived areas. After multivariate adjustment, odd ratios were 0.85 [95%:0.75–0.95], 0.82 [95%:0.74–0.92] and 0.80 [95%:0.71–0.89], respectively. **CONCLUSIONS:** Even in a health care system organized to ensure a high degree of equity in medical care, we found indications of a socioeconomic gradient in innovative anticancer drugs access in lung cancer.

IRSN
INSTITUT DE RADIOPROTECTION ET DE SÛRETÉ NUCLÉAIRE

Limiter irradiation médicale

La dose au-delà de laquelle un excès significatif de cancers solides (tous types confondus) a pu être mis en évidence à ce jour est de l'ordre de 0,1 sievert (100 mSv) ; cette valeur de 100 mSv ne doit pas être considérée comme un seuil en dessous duquel tout risque dû aux rayonnements ionisants pourrait être écarté.

Doses	Types d'exposition
0,001 mSv	Exposition annuelle en France, liée à l'industrie nucléaire
0,05 mSv	Radiographie du thorax (un cliché postéro-antérieur)
0,034 mSv	Dose de rayonnements cosmiques reçue lors d'un vol en subsonique Paris/Dallas [2]
0,04 à 0,4 mSv	Expositions liées à l'accident de Tchernobyl, en France, en 1986, suivant les régions
0,5 mSv	Surcroît d'exposition dû à un séjour de trois mois dans une région granitique (Limousin, Bretagne ....) ou de six mois à 1500 m d'altitude
1 à 1,6 mSv	Irradiation médicale moyenne annuelle en France
1,3 mSv	Irradiation naturelle moyenne annuelle en France, liée au radon
2,4 mSv	Irradiation naturelle moyenne annuelle en France
12 mSv	Scanner abdomino-pelvien
50 mSv	Dose moyenne reçue en 1986 par un habitant vivant à 30 km de Tchernobyl
100 mSv	Dose moyenne reçue en quelques mois par un «liquidateur» de Tchernobyl
jusqu'à 10 Gy	Irradiations aiguës subies en quelques heures par les premiers intervenants après l'accident de Tchernobyl.

5 +5/10 m Sv TEP TDM