

Rayon de miel
et
Fibrose Pulmonaire Idiopathique (FPI)

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Fibrose Pulmonaire Idiopathique

- Maladie rare, mais pas après 75 ans
- Prévalence 10-20/100000
- Incidence 6/100000, en augmentation
- La plus fréquente des pneumopathies interstitielles idiopathiques
- Prédominance masculine 2/3
60-70 ans
- Lié au tabac
- Pronostic globalement mauvais, hétérogène, imprévisible
- Substratum histopathologique PIC

PIC = Pneumopathie Interstitielle Commune = Usual Interstitial Pneumonia = UIP

Pneumopathies interstitielles idiopathiques majeures

Entités cliniques

Patterns histologiques

Chroniques fibrosantes

FPI

PINS

PIC

PINS

Liées au tabac

Bronchiolite respiratoire-PI
respiratoire

Bronchiolite

DIP

DIP

Aigües / subaigües

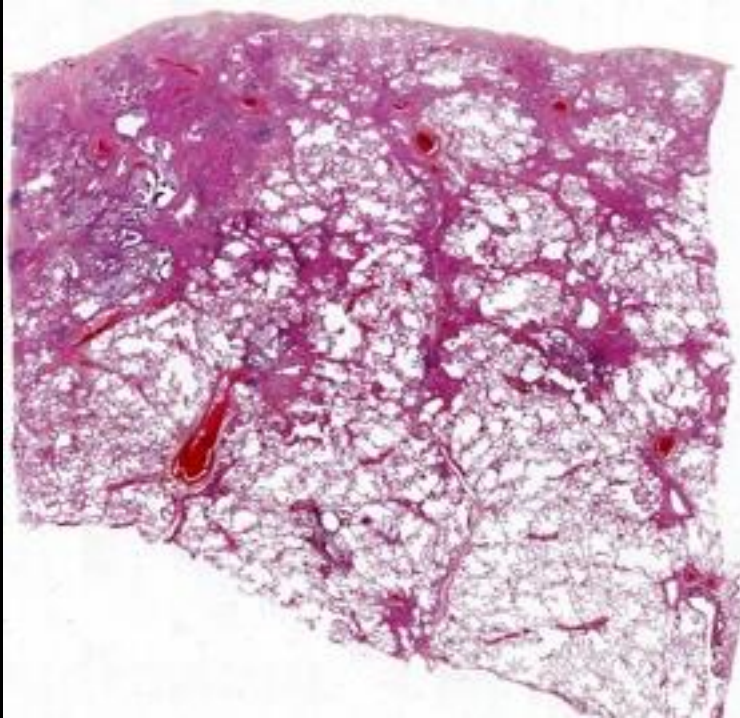
POC

Pneumopathie organisée

PIA

ATS/ERS update Pneumopathies Interstitielles Idiopathiques AJRCCM 2013
Domage alveolaire diffus

Pneumopathie interstitielle commune : pattern histologique

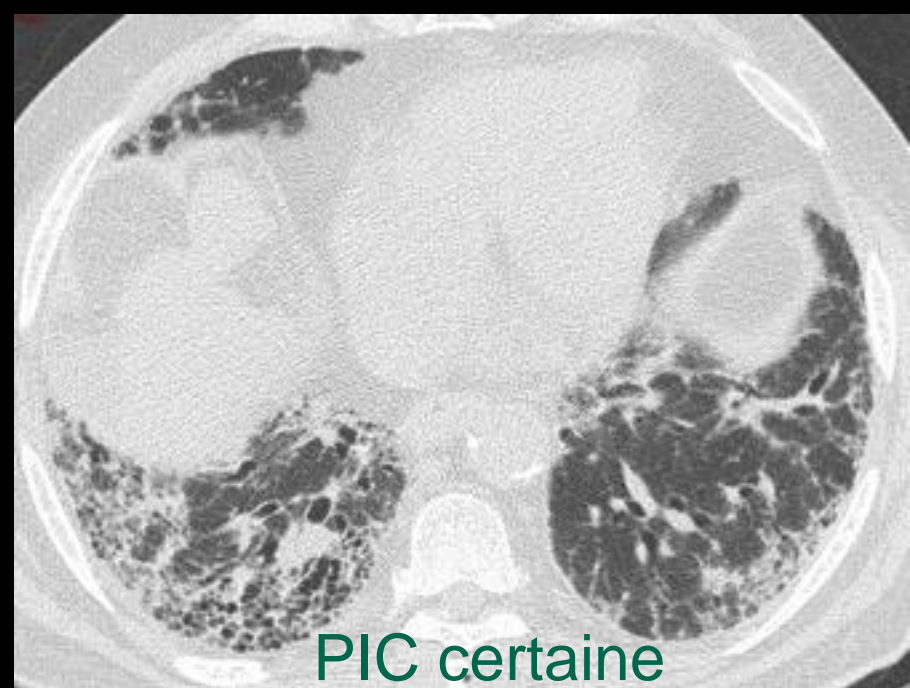
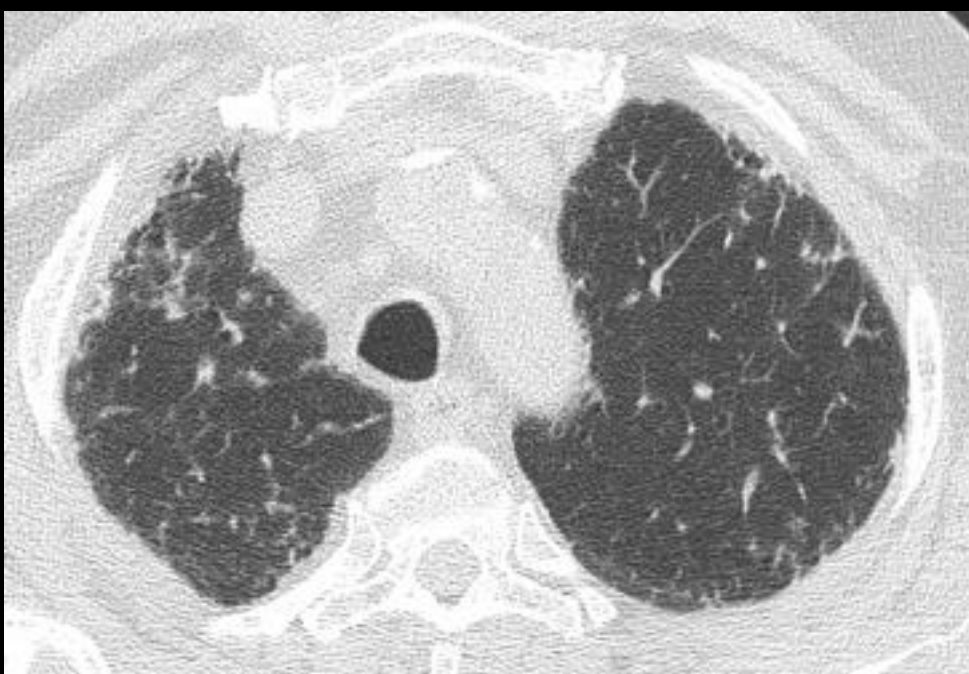


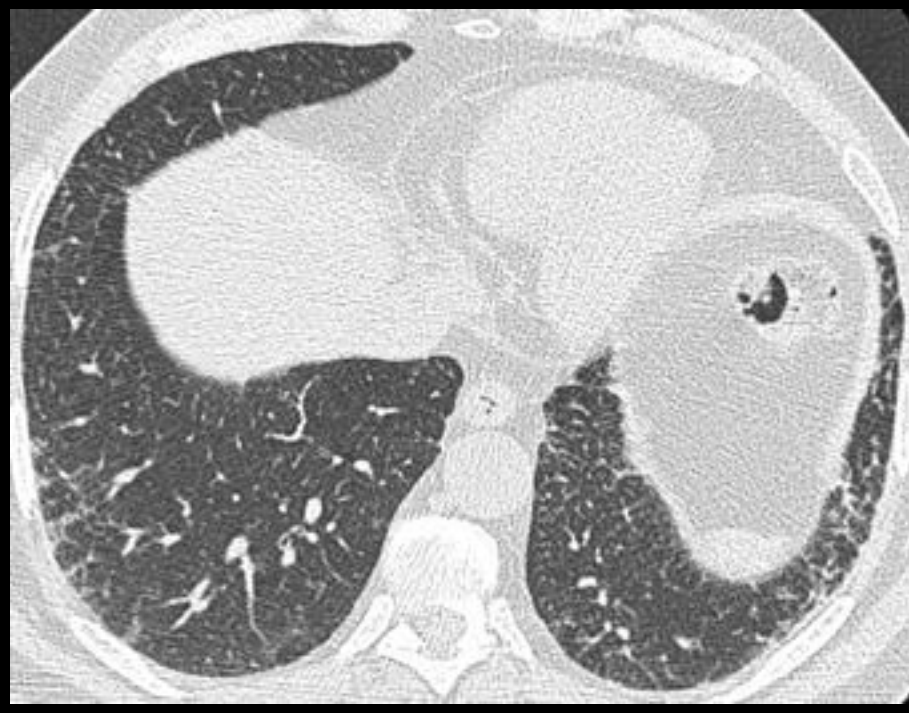
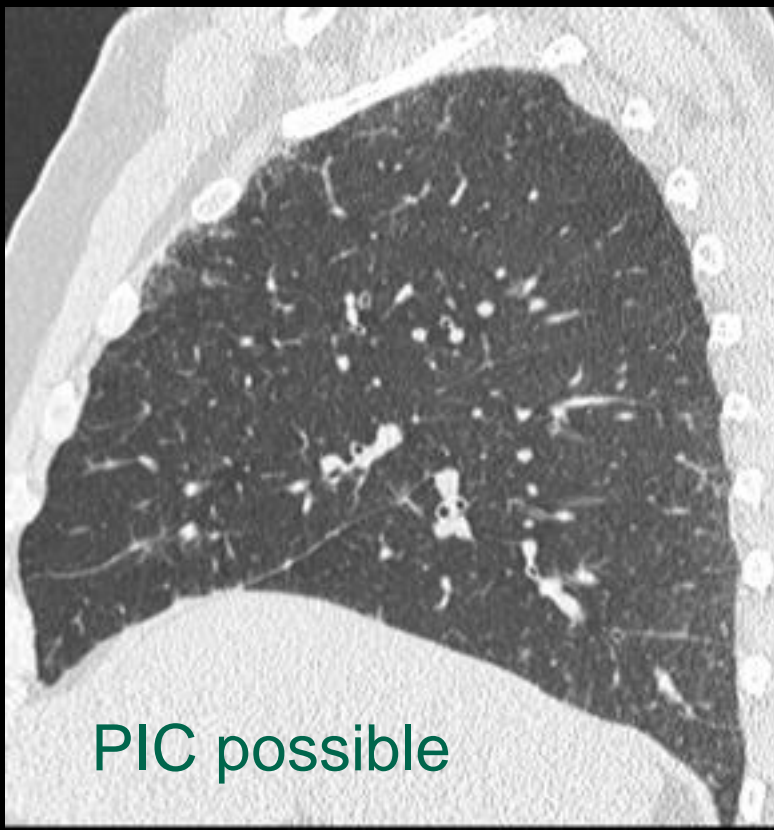
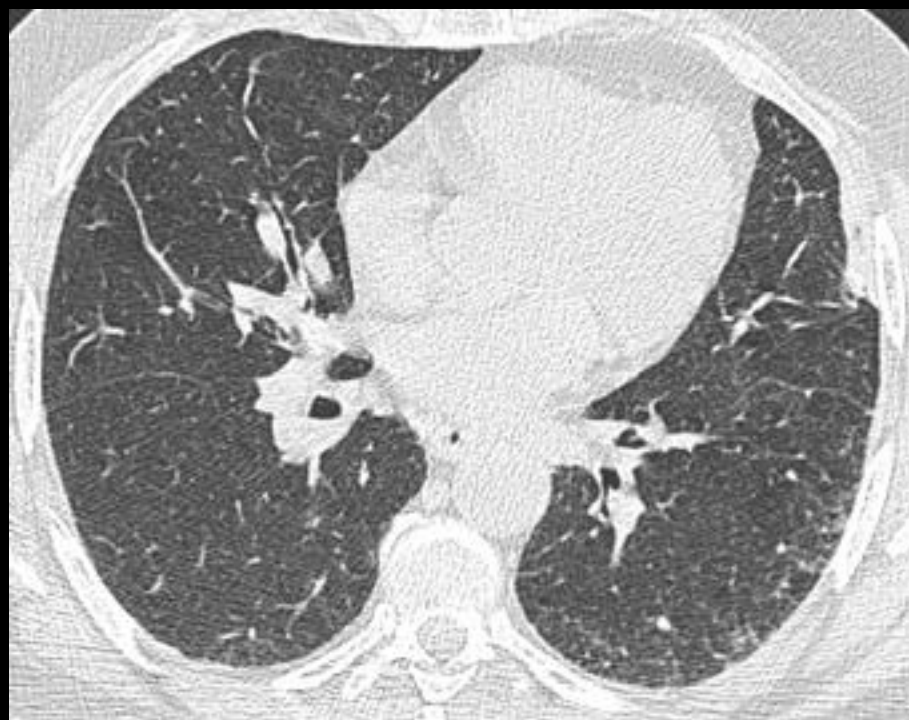
- Hétérogénéité temporelle
Foyers fibroblastiques +/- rayon de miel
- Hétérogénéité spatiale, atteinte « patchy »
- Distribution sous-pleurale / paraseptale

Rôle du scanner : reconnaître un pattern de PIC

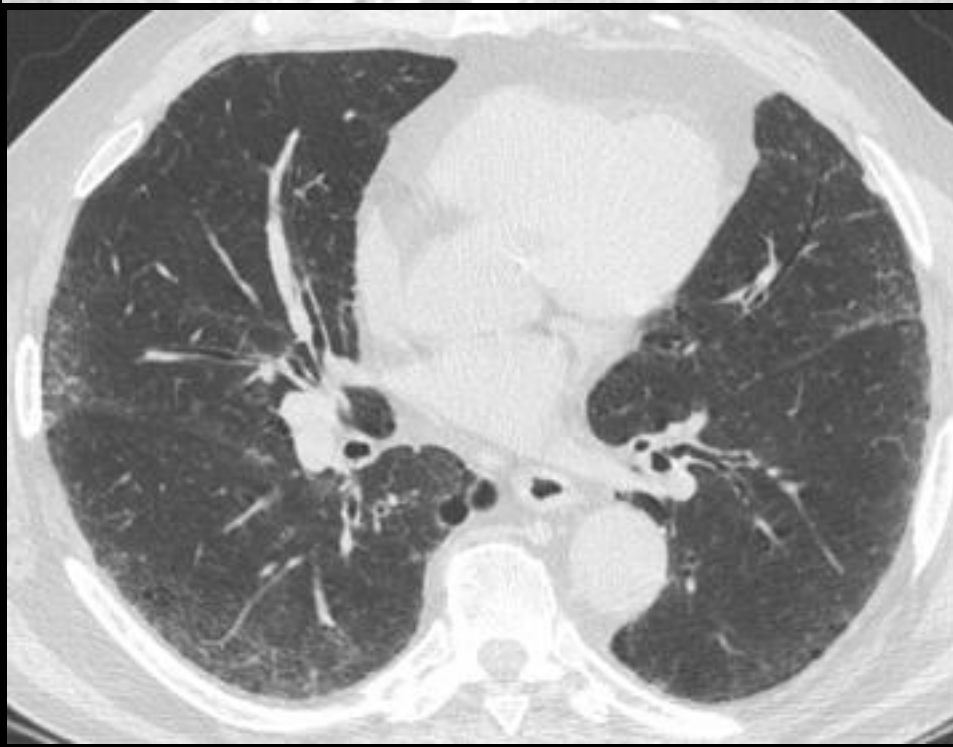
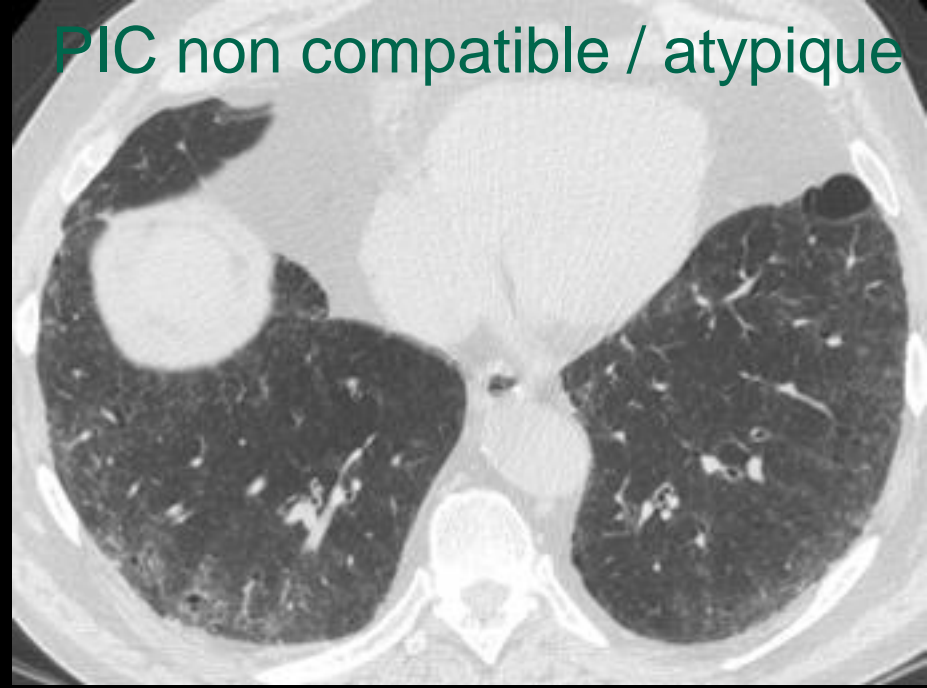
Valeur du scanner pour le diagnostic de PIC

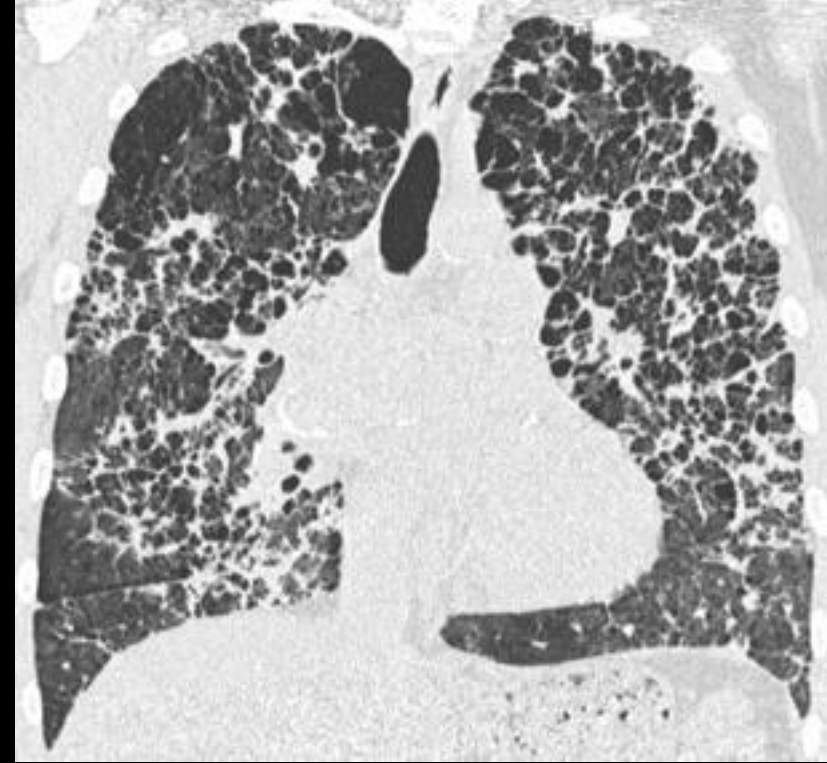
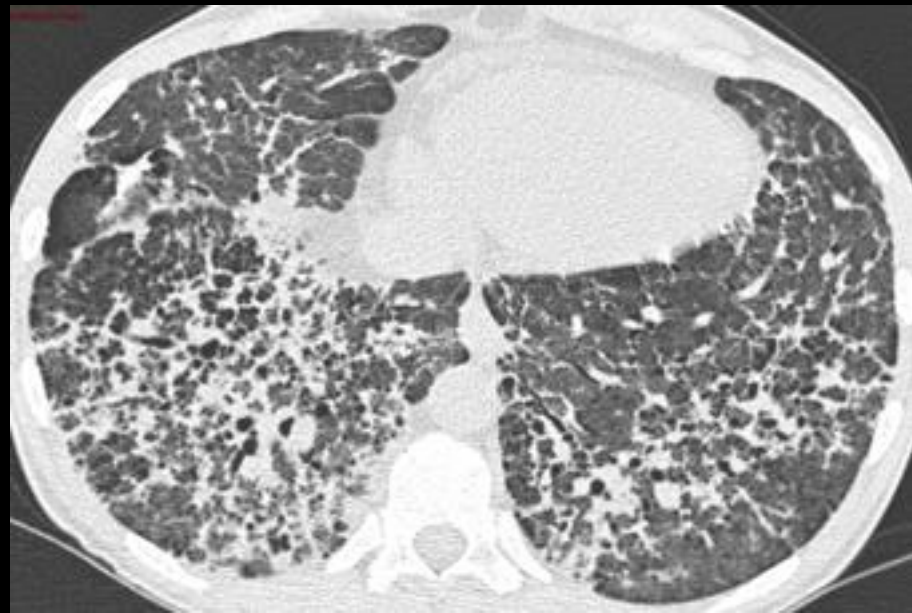
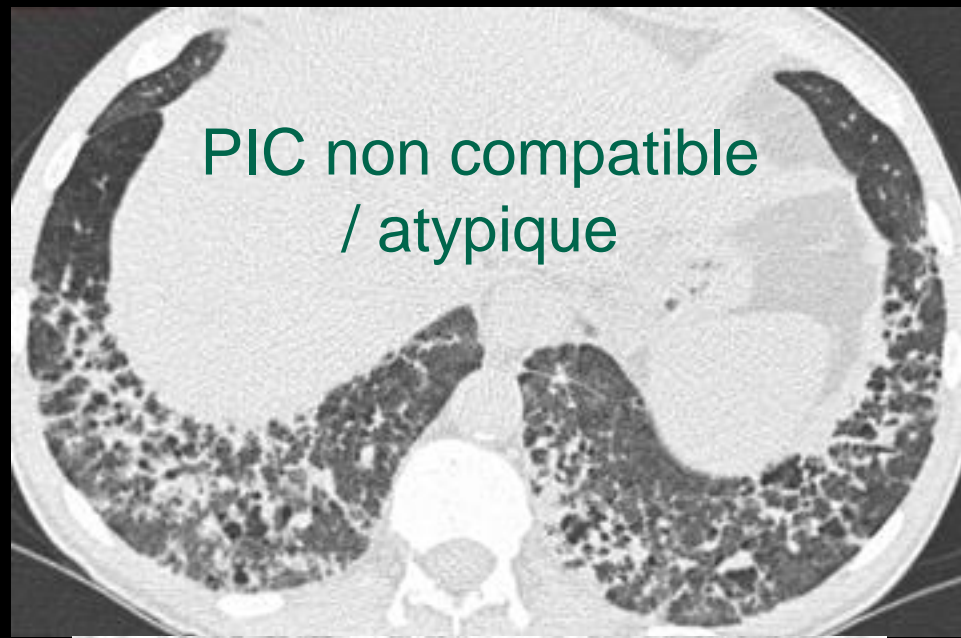
- PIC TDM certaine histologique > 95% → PIC
- PIC TDM possible → PIC histologique 50-75% dépend du contexte
- TDM incompatible avec PIC → N'exclue pas la PIC histo





PIC possible

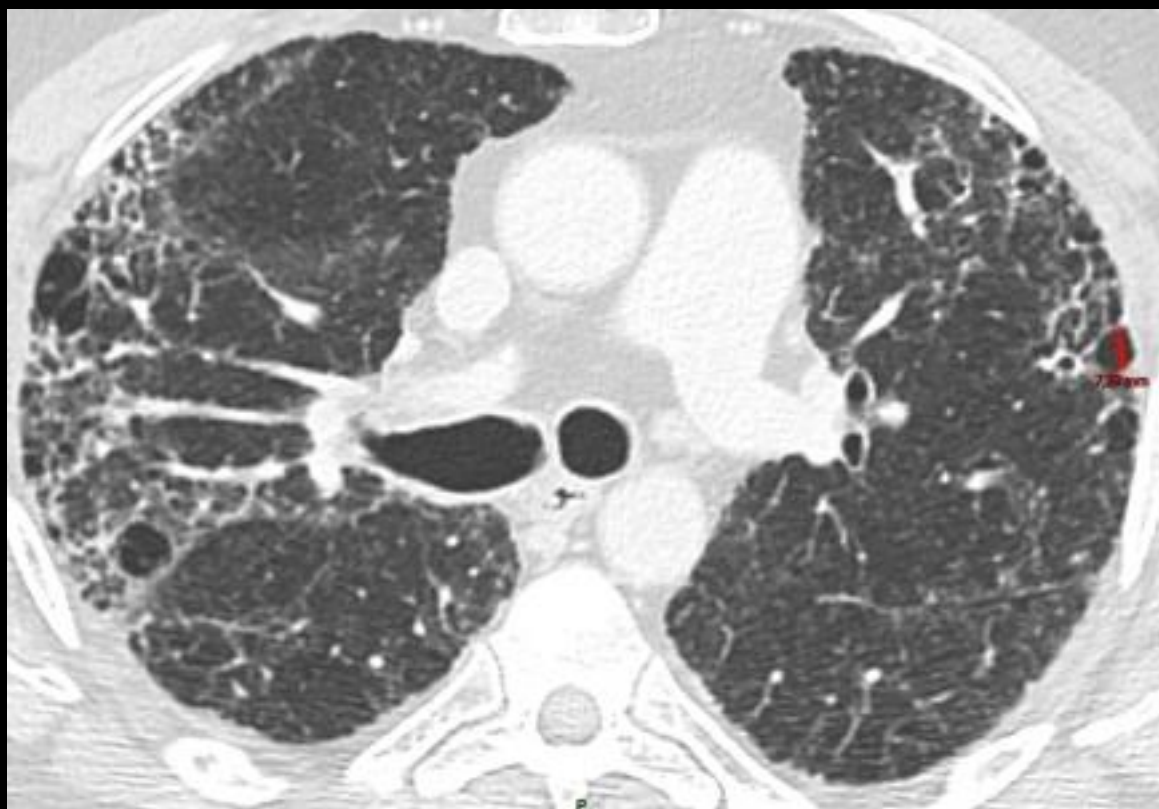




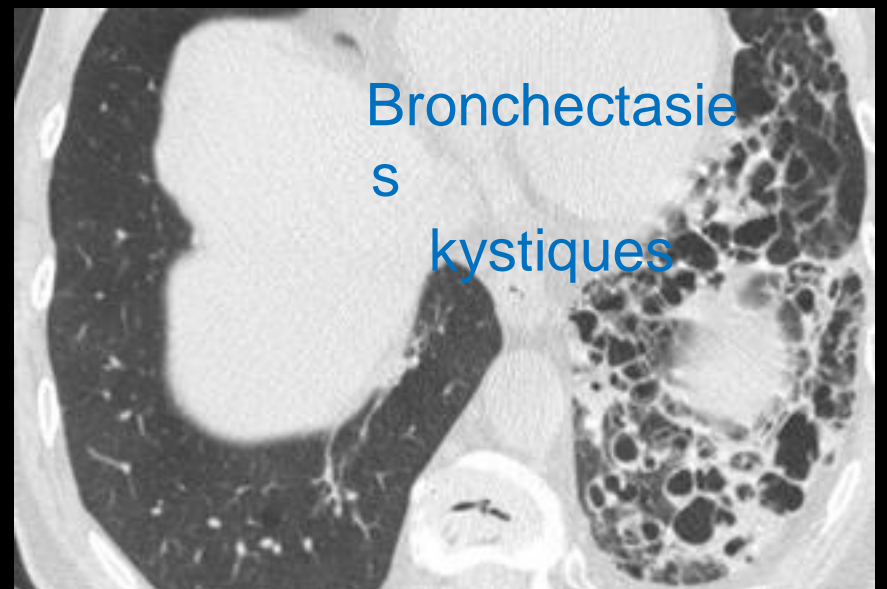
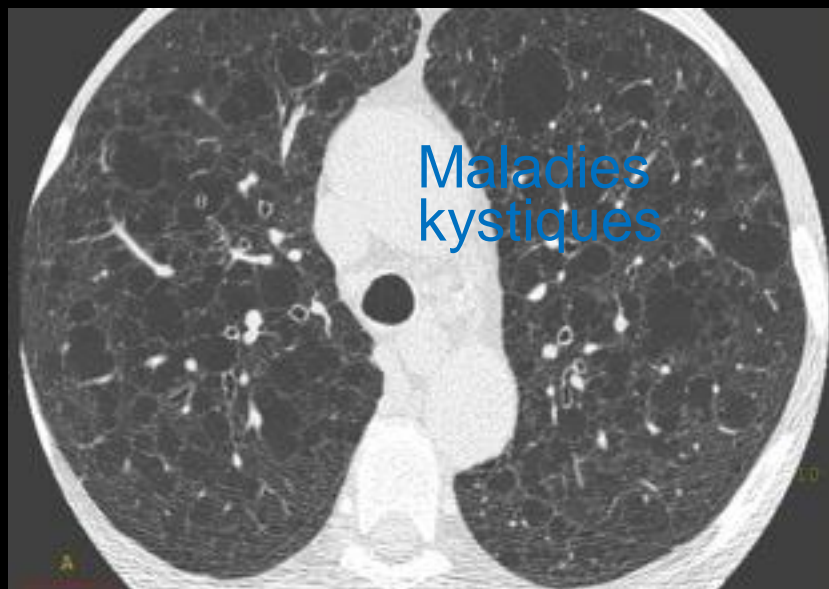
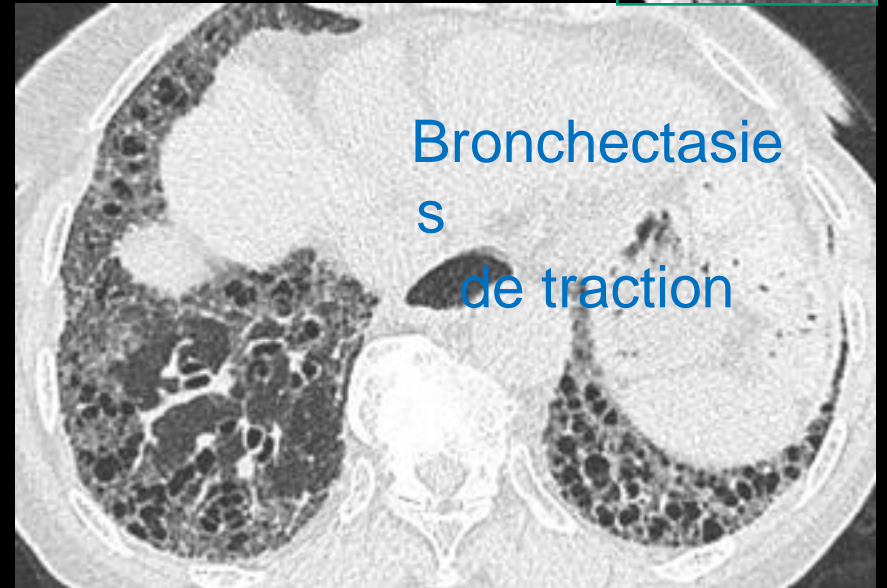
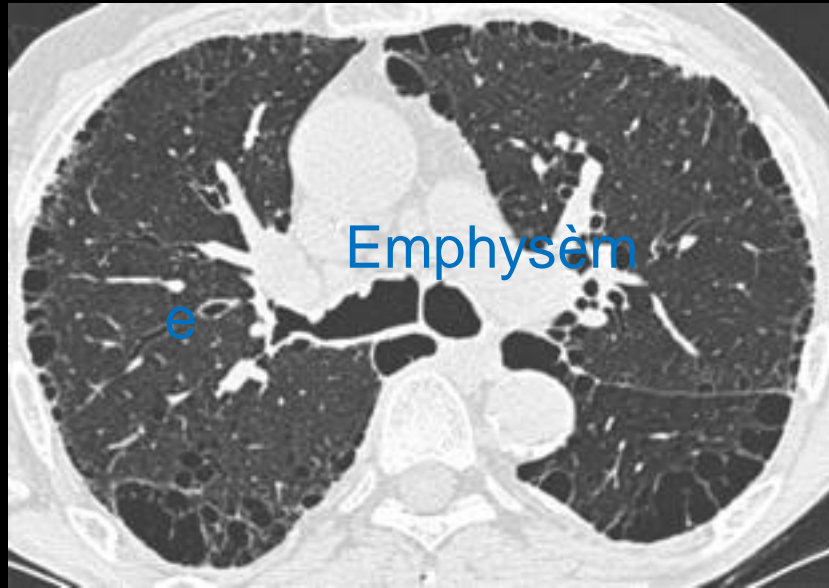
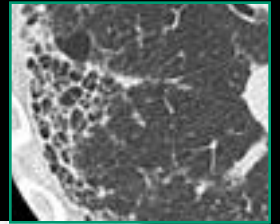
Rayon de miel au scanner

- Cluster d'espaces aériens
- Diamètres typiquement similaires
3-10 mm □ 2,5 cm
- Parois bien définies
- Habituellement sous-pleural



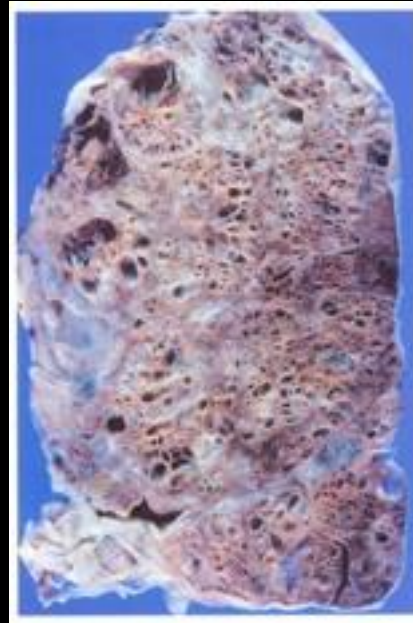


Ce qui n'est pas du rayon de miel

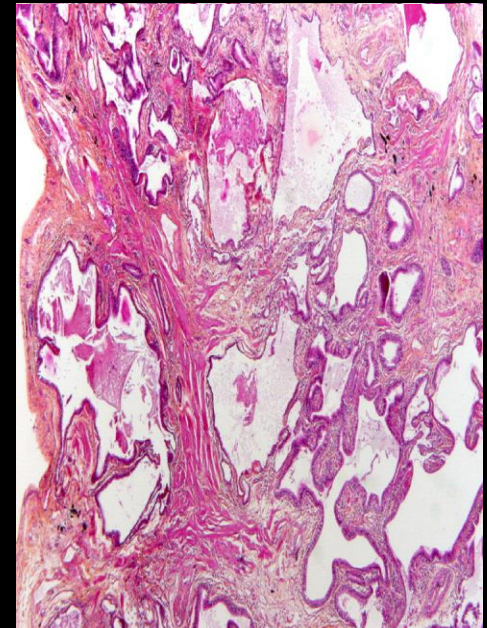


Rayon de miel en pathologie

- Aspect macroscopique
- Kystes de taille variable
- Fond fibrocicatriciel

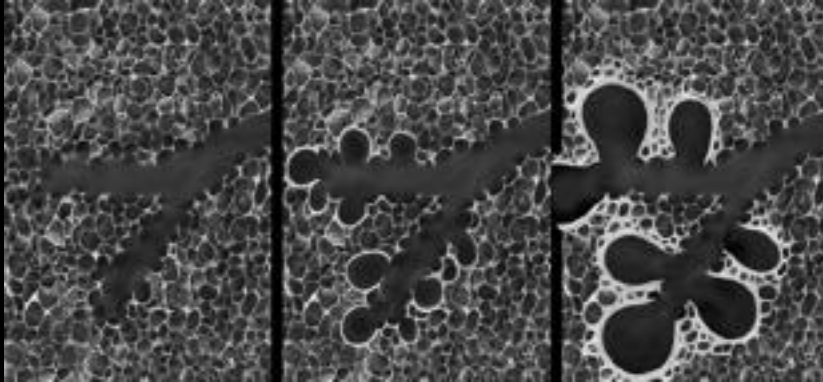


- Aspect microscopique
- Nombreuses cavités aériques 1 mm à X cm
- Epithélium de bordure
- Stase de mucus
- Collapsus alvéolaire au sein du tissu fibreux



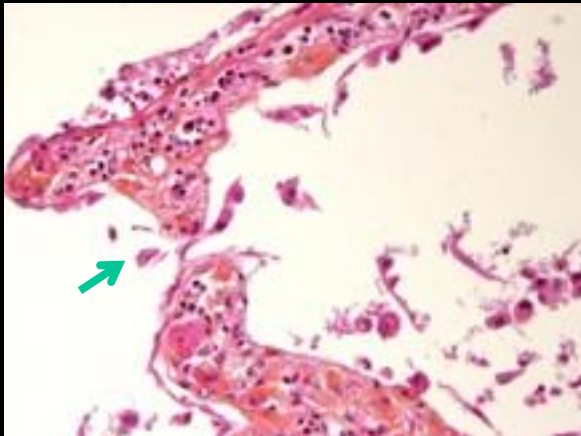
Rayon de miel : physiopathologie

- Collapsus alvéolaire → dilatation d'espaces aériens distaux



Galvin Radiology 2010

- Différentiation et migration d'une cellule souche → bronchiolisation d'espaces aériens distaux

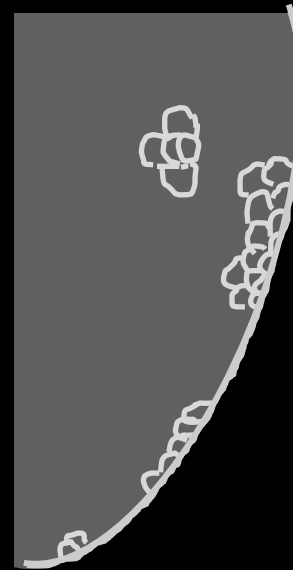


Seibold PLOS one 2013

Difficultés en scanner

Imprécisions de la définition

- Nombre d'espaces aériens dans le cluster
- Monocouche vs multicouches
- Topographie



Agrément inter-observateurs imparfait

Concordance Rate of Each Reader Group with Reference Standards

| Reader Group | No. of Specialists | κ Values* | 95% Confidence Interval |
|--|--------------------|------------------|-------------------------|
| Local (Japanese) expert chest radiologists specializing in diffuse lung disease | 9 | 0.56 \pm 0.12 | 0.46, 0.64 |
| Local (Japanese) chest radiologists with a specialty other than diffuse lung disease | 9 | 0.52 \pm 0.06 | 0.47, 0.57 |
| Local (Japanese) expert chest physicians | 11 | 0.51 \pm 0.08 | 0.46, 0.56 |
| Local (Japanese) non-chest expert board-certified radiologists | 5 | 0.40 \pm 0.18 | 0.18, 0.62 |
| North American expert chest radiologists | 3 | 0.51 \pm 0.08 | 0.31, 0.71 |
| Korean expert chest radiologists | 3 | 0.50 \pm 0.07 | 0.32, 0.68 |
| European expert chest radiologists | 3 | 0.58 \pm 0.05 | 0.45, 0.71 |

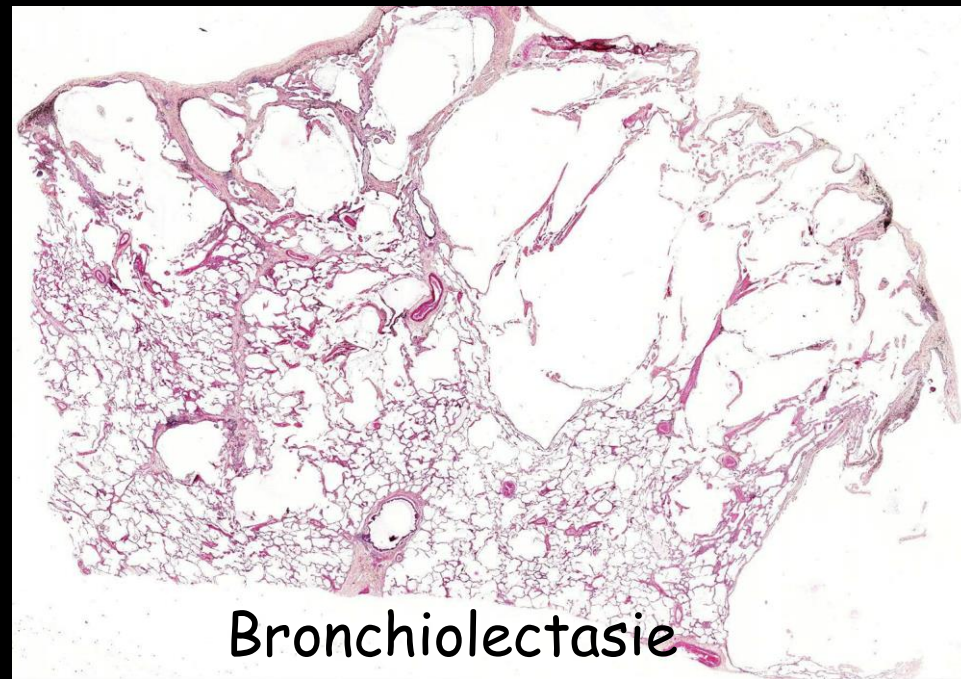
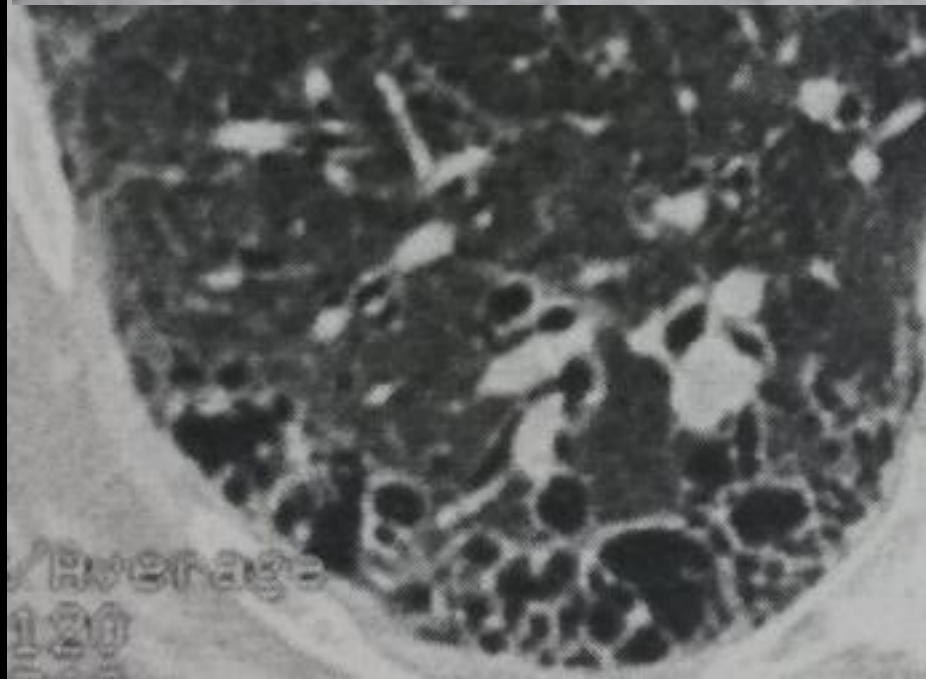
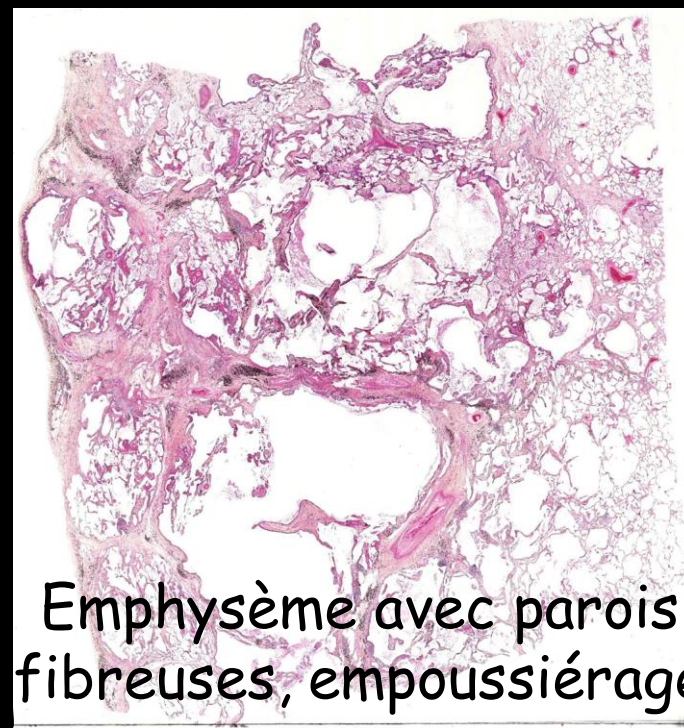
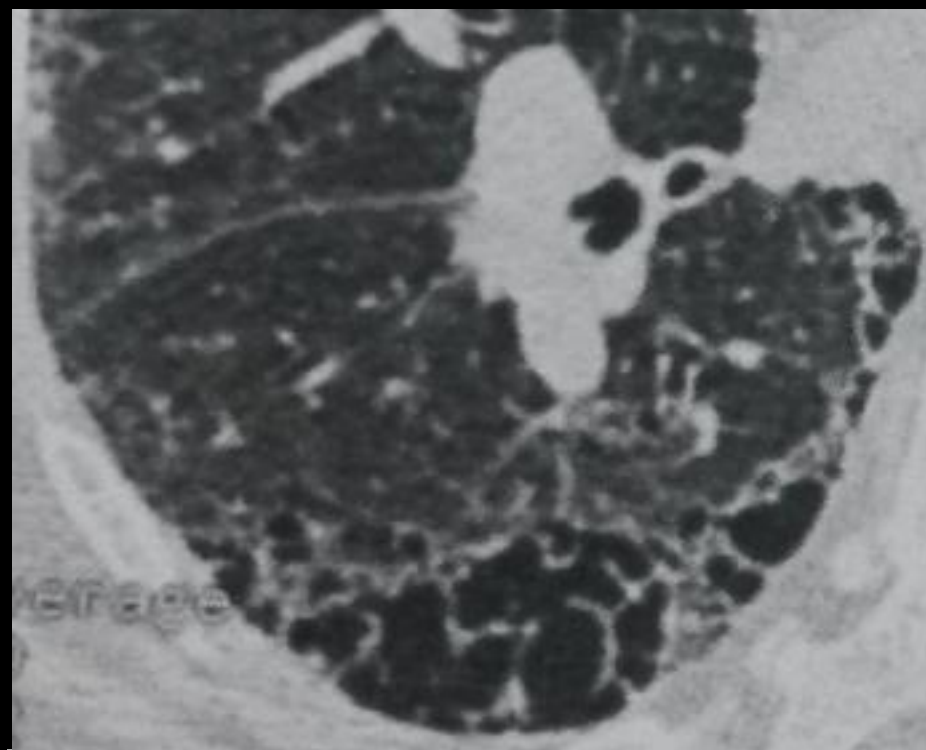
Note.—The κ values of the five core study members ranged from 0.45 to 0.67, with a mean κ value of 0.58 \pm 0.10 (95% confidence interval: 0.53, 0.62). The mean Cohen κ value of the non-chest expert board-certified radiologists was relatively low and insignificant. The Tukey-Kramer test demonstrated no significant differences in concordance rates among groups divided by subspecialty and geographic region; P values ranged from .38 to $>.99$.

43 observateurs, 80 cas, 1 image par cas, pas de corrélation histologique
Discordances dans 29% des cas

Principales causes de discordances inter-lecteurs pour la présence de rayon de miel

- Images kystiques + bronchectasies de traction
 - Emphysème sous-jacent
 - Kystes de grande taille

Watadani Radiology 2013



Airway enlargement with fibrosis (AEF)

HRCT comparison between MTWCs and honeycombing and emphysema.

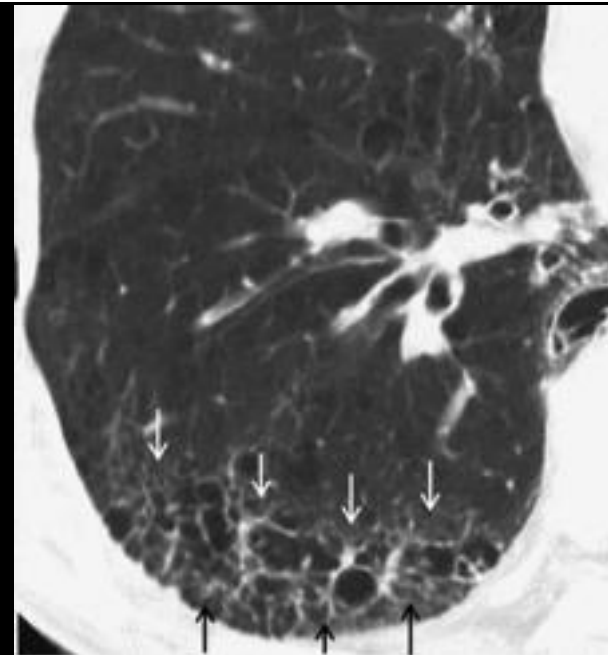
| | MTWCs | Honeycombing |
|-------------------------|---|--|
| Affected lobe | The upper lobe and upper and middle portion of the lower lobe | Mainly basal area of the lower lobe |
| Subpleural area | Slightly apart from pleura and involving deeper lung tissue | Subpleural |
| Thickness of cyst wall | Mostly less than 1 mm (mean 0.81 mm) | Thick wall (1–3 mm) in reticulation ^a |
| Volume of affected area | No volume loss | Volume loss ^a |

Watanabe Eur J Radiol 2015

Kystes multiples à parois fines

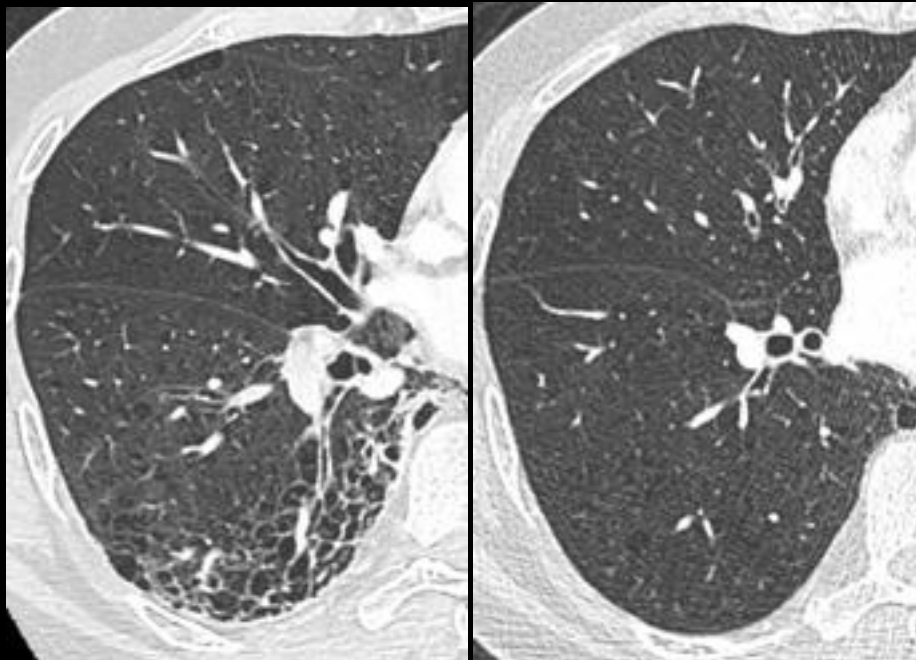
50% des cas d'AEF

- Pas de contact pleural
- Paroi fine
- Epargne bases

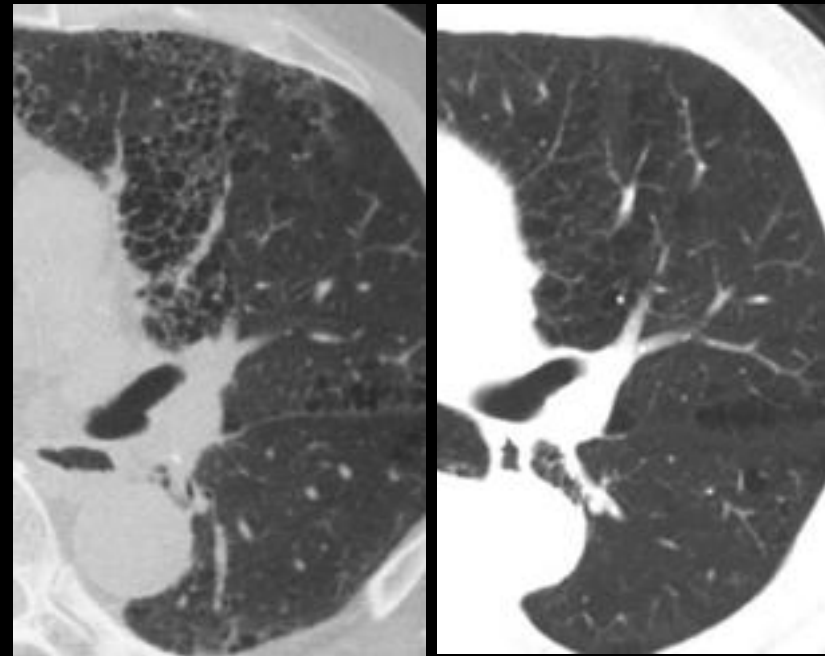


Emphysème et verre dépoli surajouté

→ fausses images de rayon de miel « transitoire »



Après antibiotiques



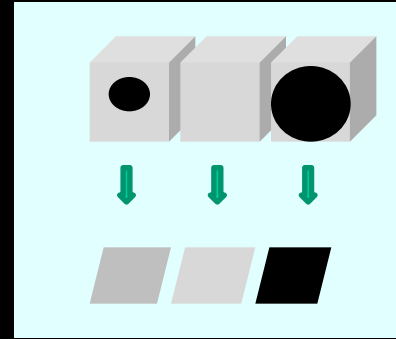
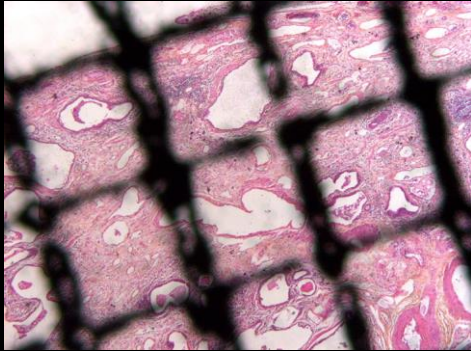
Après corticoïdes

Akira Radiology 2009

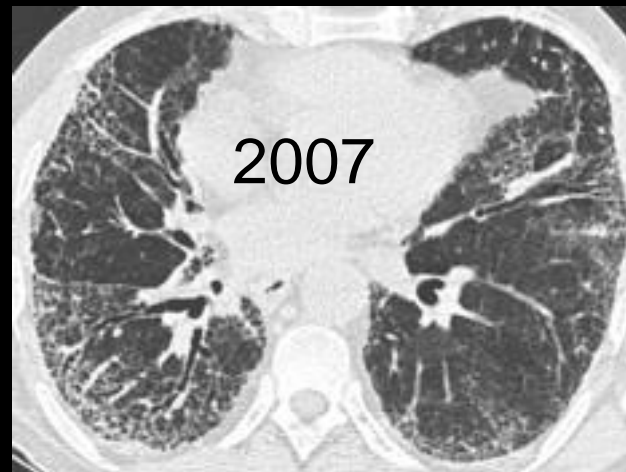
Thin-Section CT Diagnosis of UIP in All Patients, Patients with Concurrent Emphysema, and Patients without Concurrent Emphysema

| Observation | Sensitivity (%) | Specificity (%) | Accuracy (%) |
|--|-----------------|-----------------|--------------|
| All observations ($n = 84$) | 55 | 63 | 59 |
| Confident diagnosis ($n = 56$) | 52 | 83 | 68 |
| Possible diagnosis ($n = 28$) | 60 | 38 | 46 |
| Patients without concurrent emphysema ($n = 44$) | 59 | 73 | 68 |
| Confident diagnosis ($n = 32$) | 47 | 88 | 72 |
| Possible diagnosis ($n = 12$) | 86 | 50 | 61 |
| Patients with concurrent emphysema ($n = 40$) | 50 | 36 | 44 |
| Confident diagnosis ($n = 24$) | 58 | 67 | 61 |
| Possible diagnosis ($n = 16$) | 38 | 13 | 25 |

Rayon de miel microscopique non identifiable en scanner



Les « kystes » de rayon de miel augmentent de taille au cours du temps



Le rayon de miel seul ne fait pas la PIC

Thin-Section CT Features of Patients with Chronic HP, IPF, and NSIP

| Characteristic | Percentages | | |
|----------------|-----------------------------|----------------------|-----------------------|
| | Chronic HP (<i>n</i> = 18) | IPF (<i>n</i> = 23) | NSIP (<i>n</i> = 25) |
| Honeycombing | 64 (23/36) | 67 (31/46) | 8 (4/50) |

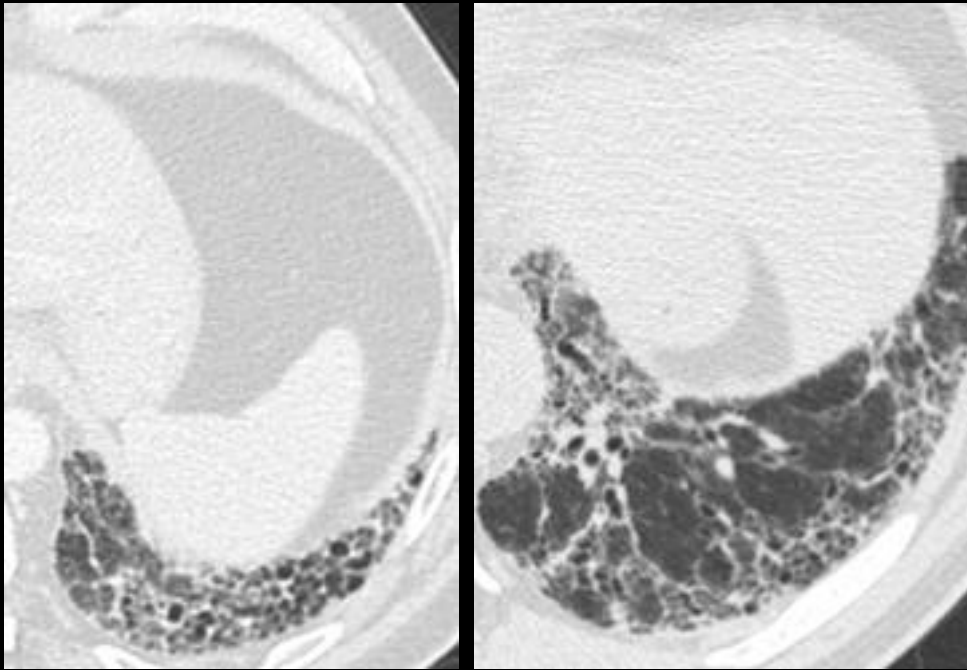
Silva Radiology 2008

- PIC
- PINS
- Sarcoïdose
- PHS chronique
- Pneumoconioses
- DIP
- SDRA
- Histiocytose à cellules de Langerhans
- Fibrose post-radique
- Séquelles tuberculeuses
- Pneumopathie médicamenteuse

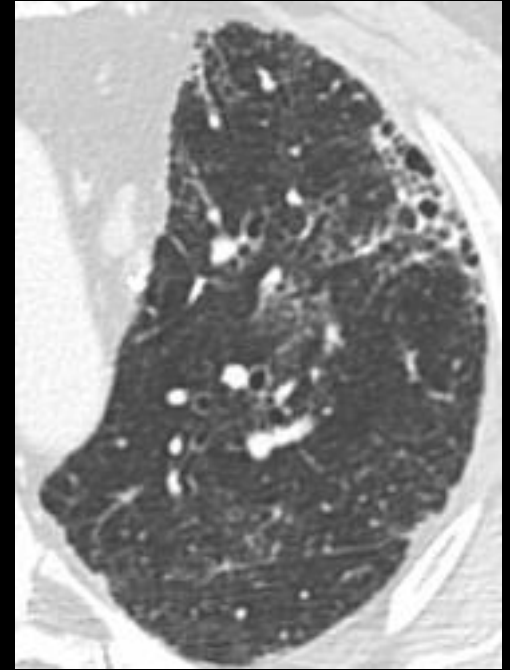
- L'étendue et la topographie du rayon de miel peuvent être de bons indicateurs de la PIC

Topographie habituelle sous-pleurale

Postérieur et basal

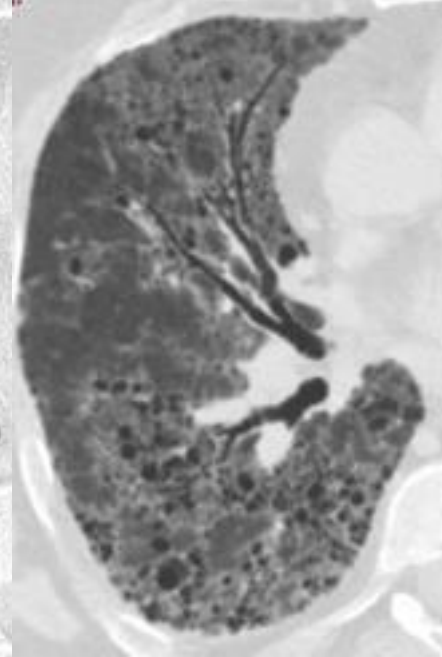
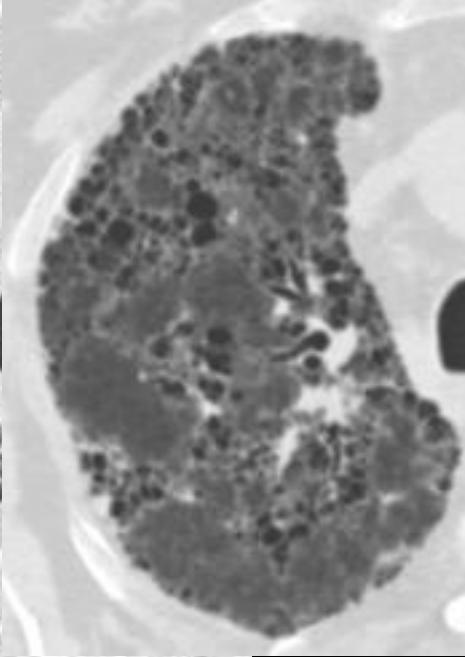
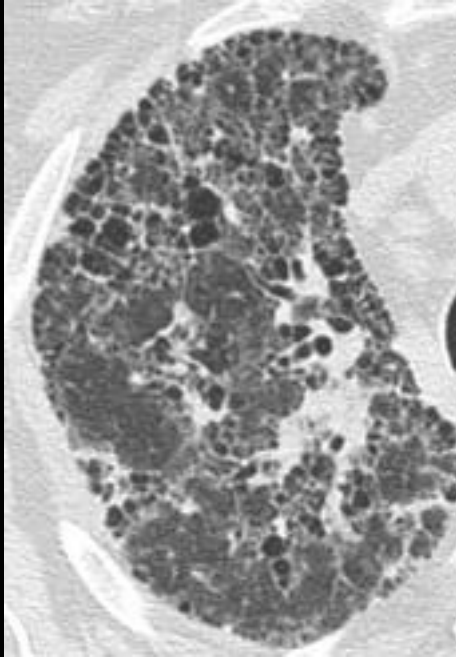


Antérolatéral et supérieur



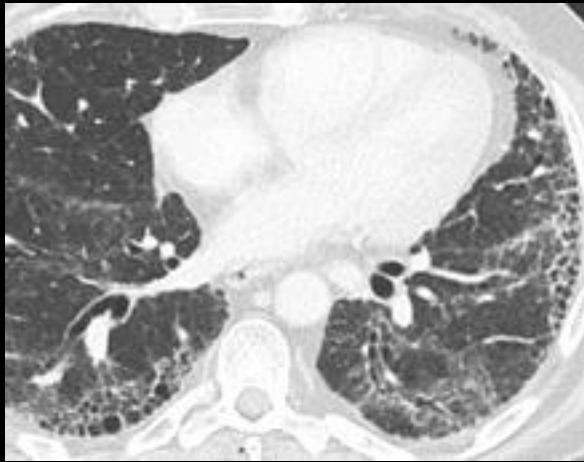
*McDonald Radiology 2001, Elliot JCAT 2005
Hunninghake Chest 2003, Akira Radiology 2009*

- Le rayon de miel est parfois péri-bronchovasculaire

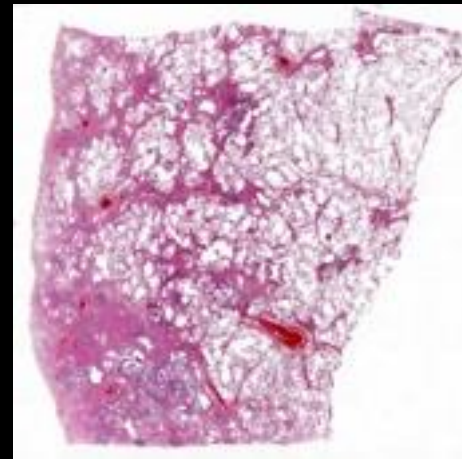


Conclusion

- Identification de rayon de miel indispensable au diagnostic de PIC certaine en scanner



> 95%



- Prudence en cas d'emphysème associé
- Savoir utiliser l'ensemble des images et des post-traitements

- Utiliser une technique TDM appropriée
 - Acquisition volumique → *reformattages multiplanaires, post-traitements*
 - Résolution spatiale (coupes mm, filtre spatial)
 - Inspiration profonde
 - Procubitus si verre dépoli en zones déclives

