

Training Workshop
on Diagnosis and Classification of Pneumoconioses

Evaluation of Pneumoconioses by HRCT

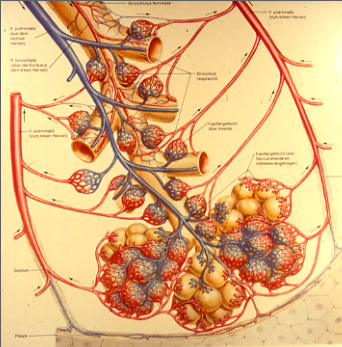
* IC OERD *

International Classification of HRCT for Occupational
and Environmental Respiratory Diseases

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K. Hofmann-Preiss; BDT MVZ Erlangen, Germany

Diagnostic Radiology of Occupational and Environmental Diseases



πνευμον = Lung
κονιζ = Dust



Zenker 1867 :

Changes in the Lung, caused by the
Retention of and the Reaction to inhaled Dust

- **organic** as well as **inorganic** -



Fibrosis of the Alveolae

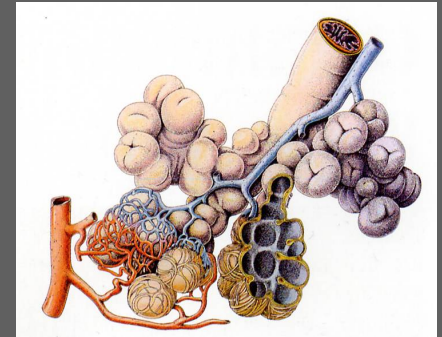


without Granuloma

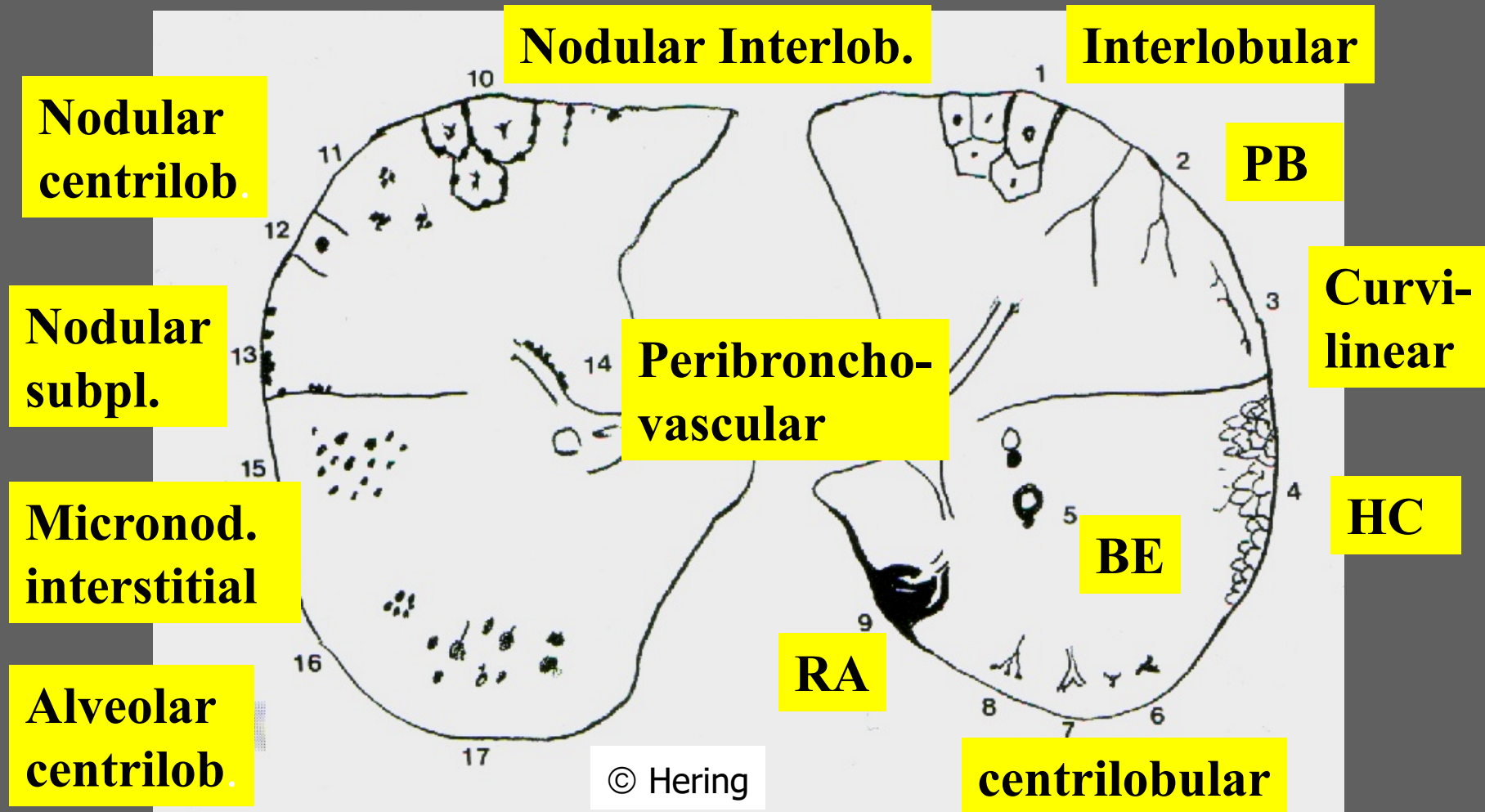
e.g. Asbestosis

with Granuloma

e.g. Silicosis



HRCT-Signs of Pneumoconioses

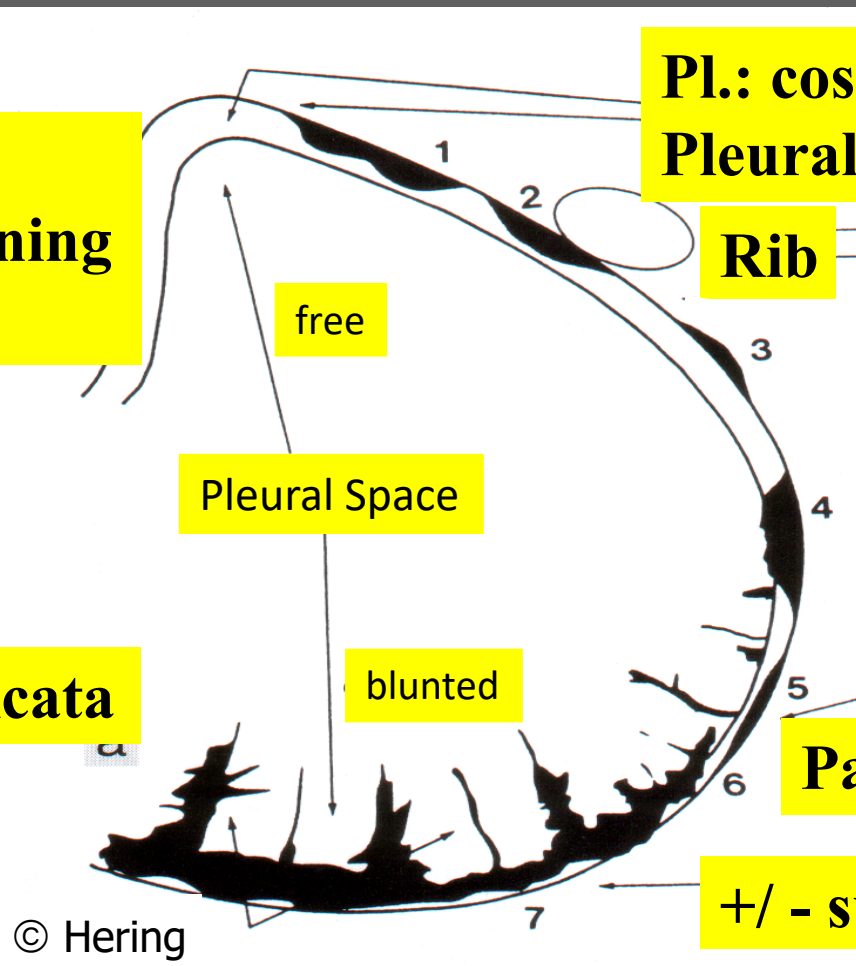


HRCT-Signs of Pneumoconioses

1 -3

„parietal“ Thickening
(Plaques)

Hyalinosis complicata



„Harmonization,, - HRCT-Findings

CT-Classification

Basic Datas:
Name/Insurance-Nr.
CT- Technical Datas
Quality/Positioning

Parenchymal Abnormalities:
Rounded Opacities - well-defined
Irregular- or linear Op. (inter- or intralob.)
"Ground glass"*, Emphysema, Fibrosis

Pleural Abnormalities:
Parietal or Visceral Type*
Mediastinum/Diaphragm
Calcification?

Additional:

Symbols; Comments
and final Judgement

CT-Classification of Occupational and Environmental Respiratory Diseases (OERD)



Nagata Tokuhou 1512-1630
by Yostifugii 19th century

Japan:

Akira M., Arakawa H., Hiraga Y.,
Hosoda Y., Itoh H., Kusaka Y.,
Nakajima Y., Shida H., Suganuma N.

Belgium: Gevenois P.

Finland: Kivisaari L., Vehmas T.

France: Letourneux M.

Germany: Hering K.G., Kraus Th.,
Tuengerthal S.

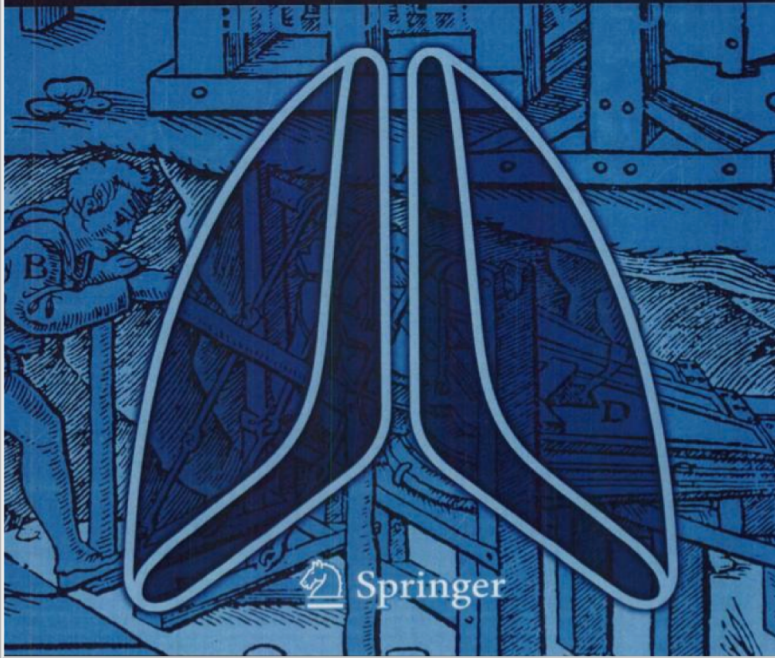
Great Britain: Crane M.

USA: Parker J.E.

Diagnostic Radiology of Occupational and Environmental Diseases

Y. Kusaka • K.G. Hering • J.E. Parker (Eds.)

International Classification of **HRCT** for Occupational and Environmental Respiratory Diseases



| CT-Classification | | CT-No. / Date | | Quality | | Position | |
|-------------------|--|-----------------|--|--------------------|--|----------|---|
| Name/No. | | No. slices | | Sequential | | kV | 1 |
| | | Slice thickness | | Single slice spir. | | mA | 2 |
| | | Window settings | | Multi slice spiral | | sec | 3 |
| | | | | | | | 4 |

CT-FINDING 2001

Is the film completely negative? ☐ No ☐ Yes

Well defined rounded opacities
☐ No ☐ Yes

Irregular and/or linear opacities
☐ No ☐ Yes

Inhomogeneous attenuation
☐ No ☐ Yes

Honeycombing grade
☐ No ☐ Yes

Large opacities
☐ No ☐ Yes

| | No | Yes |
|-----------------|----|-----|
| P = < 1.5 mm | | |
| Q = 1.5 - 3 mm | | |
| R = > 3 - 10 mm | | |

| Predominant Size | |
|------------------|--|
| | |

| Predominant Type | |
|------------------|--|
| Intralobular | |
| Interlobular | |

| Ground glass opacity grade | |
|----------------------------|--|
| | |

| Emphysema grade | |
|-----------------|--|
| | |

| Zones/Profusion | | |
|-----------------|---------|---------|
| | R | L |
| U | 0 1 2 3 | 0 1 2 3 |
| M | 0 1 2 3 | 0 1 2 3 |
| L | 0 1 2 3 | 0 1 2 3 |

| Grade | |
|-------|--|
| | |

| Sum Grade | |
|-----------|--|
| | |

| Sum Grade | |
|-----------|--|
| | |

| Sum Grade | |
|-----------|--|
| | |

| Sum Grade | |
|-----------|--|
| | |

| Predominant Parenchymal | |
|-------------------------|----|
| RO | IR |
| GGO | HC |
| EM | LO |

| Pleural abnormalities | |
|-----------------------|---------------|
| W | parietal type |
| M | visceral type |
| D | |

| Pleural calcifications | |
|------------------------|--|
| | |

| Extent / Width | | |
|----------------|-------|---------|
| | R | L |
| 0 | 1 2 3 | 0 1 2 3 |
| 0 | a b c | 0 a b c |

| Localisation | |
|--------------|---|
| W | M |
| D | |

Comments / Summary

Date / Signature

Signature

ICOERD-2014-Germany

- Classificationsheet (semiquantitative)
- Set of Reference Films

Update: Standardisierte CT-/HRCT-Klassifikation der Bundesrepublik Deutschland für arbeits- und umweltbedingte Thoraxerkrankungen

Diagnostic Radiology of Occupational and Environmental Diseases

ICOERD and HR CT and Classification

How do you work with the system?

- Name, date and technical aspects
- Pattern detection
- Localisation
- Quantification
- Differential diagnosis
- Final assessment

print reset header reset (completely)

CT-Classification (ICOERD - International Classification for Occupational and Environmental Respiratory Diseases)

ID-No.: CT-No. / Date

Name: No. slices Sequential: ☐ KV Position Quality

First name: Slice thickness ☐ mA SUP 1

Date of birth: Window settings ☐ sec CM 2

DLP: BMI: 3

Technique

Is the film completely negative? No ☐ Yes ☐ reset symbols

reset subarea

Well defined rounded opacities P = < 1,5 mm no ☐ yes ☐ Q = 1,5 - 3 mm no ☐ yes ☐ R = > 3 - 10 mm no ☐ yes ☐

Predominant Size

Zones / Profusion / Grade

U M L

Sum Grade

reset subarea

Irregular and/or linear opacities Intralobular no ☐ yes ☐ Interlobular no ☐ yes ☐

Predominant Type

Zones / Profusion / Grade

U M L

Sum Grade

Lung

reset subarea

Inhomogeneous attenuation no ☐ yes ☐

Ground glass opacity no ☐ yes ☐

U M L

Sum Grade

Honey-combing no ☐ yes ☐

U M L

Sum Grade

Emphysema no ☐ yes ☐

U M L

Sum Grade

reset subarea

reset subarea

Predominant Parenchymal

RS IR GGO HCC EM LD

Lung

reset subarea

Pleural abnorm. W parietal type no ☐ yes ☐ visceral type no ☐ yes ☐

Predominant Type

U M L

Sum Grade

CPA blunted no ☐ yes ☐

U M L

Sum Grade

Pleura

Extent / Width

U M L

Sum Grade

Pleural calcifications no ☐ yes ☐ Localisation W M D

reset subarea

Comments / Summary

Assessment

Date Signature

VA CT - G 1 (english)

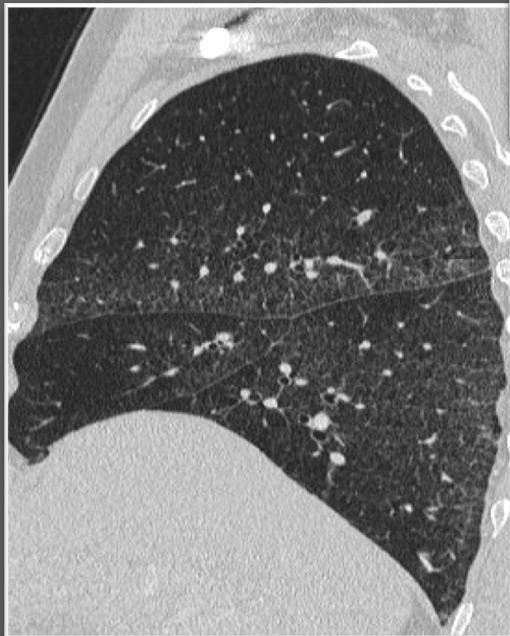
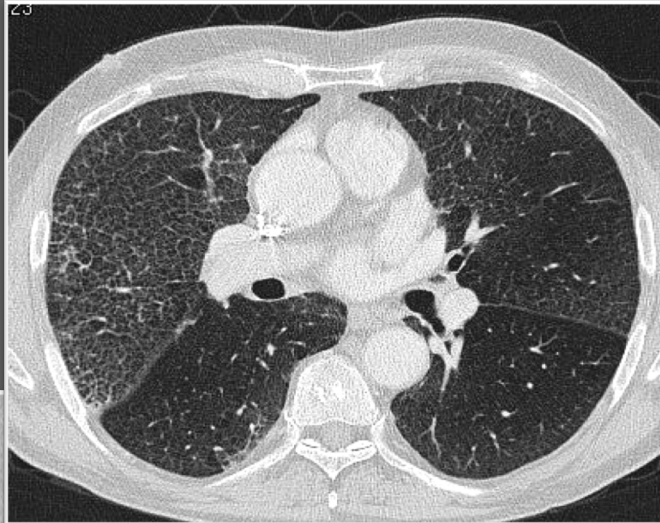
CT-Classification (ICOERD - International Classification for Occupational and Environmental Respiratory Diseases)

- Name
- Date of Birth
- Date of Examination

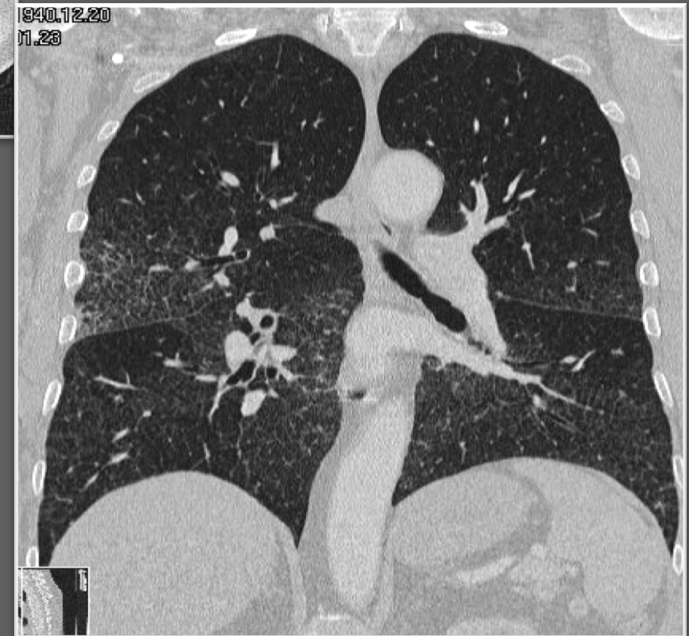
- No. Slices, Slice-Thickness, Window-setting
- CTDI vol
- DLP
- BMI
- Patient Position - Supine – Prone
- Quality: 1 = good ++++
4 = unsuitable for classification

Diagnostic Radiology of Occupational and Environmental Diseases

Why MPR ? (Multiplanar Reconstruction)

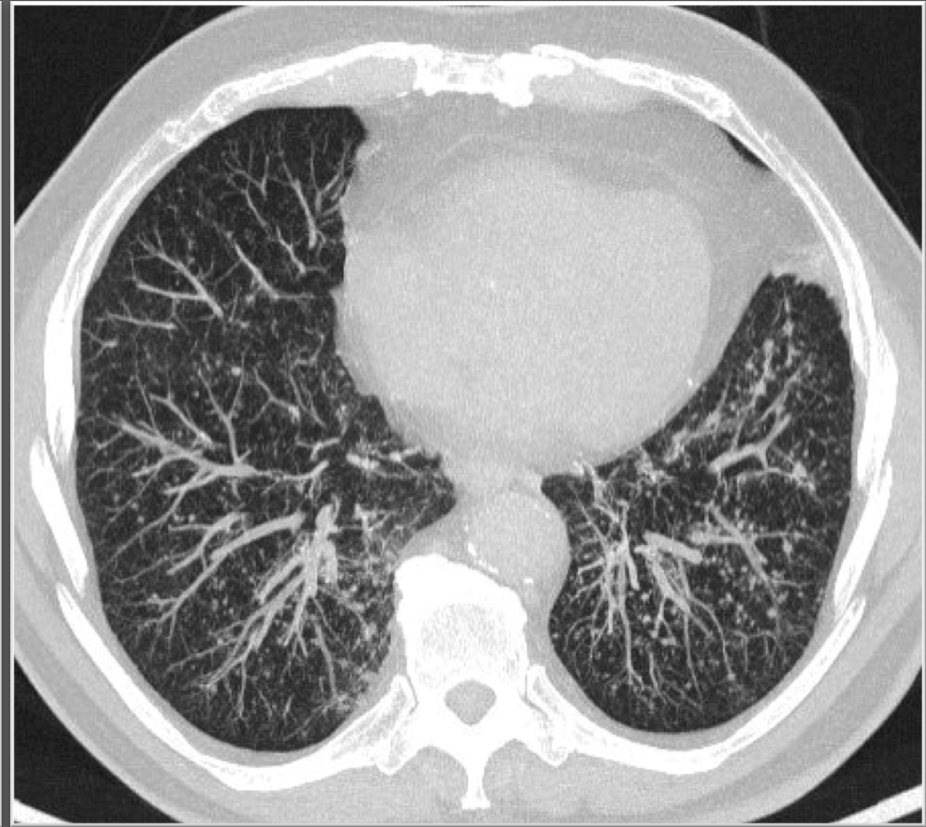


Localisation !



Diagnostic Radiology of Occupational and Environmental Diseases

Why MIP ? (Maximum Intensity Projection)



Additional Information e.g. on nodular findings

Diagnostic Radiology of Occupational and Environmental Diseases

Parenchymal - Pattern

- Rounded opacities
- irregular / linear
- inhomogenous
- Ground Glass
- Honeycombing
- Emphysema
- Large Opacities

| reset subarea | | Predominant Size | | Zones / Profusion / Grade | | | | | | | | | | | | Sum Grade | |
|--------------------------------------------------------------------------------------------|--|------------------|----------------------------------------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--|--|--|--|-----------|--|
| | | P = < 1,5 mm | no <input type="checkbox"/> yes <input type="checkbox"/> | R | | | | L | | | | | | | | | |
| | | Q = 1,5 - 3 mm | no <input type="checkbox"/> yes <input type="checkbox"/> | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | | | | | | |
| Well defined rounded opacities no <input type="checkbox"/> yes <input type="checkbox"/> | | R = > 3 - 10 mm | no <input type="checkbox"/> yes <input type="checkbox"/> | U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |
| | | | | M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |
| | | | | L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |

| reset subarea | | Predominant Type | | Zones / Profusion / Grade | | | | | | | | | | | | Sum Grade | |
|-----------------------------------------------------------------------------------------------|--|------------------|----------------------------------------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--|--|--|--|-----------|--|
| | | Intralobular | no <input type="checkbox"/> yes <input type="checkbox"/> | R | | | | L | | | | | | | | | |
| | | Interlobular | no <input type="checkbox"/> yes <input type="checkbox"/> | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | | | | | | |
| Irregular and/or linear opacities no <input type="checkbox"/> yes <input type="checkbox"/> | | | | U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |
| | | | | M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |
| | | | | L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |

| reset subarea | | Ground glass opacity | | Zones / Profusion / Grade | | | | | | | | | | | | Sum Grade | |
|---------------------------------------------------------------------------------------|--|----------------------------------------------------------|--|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--|--|--|--|-----------|--|
| | | no <input type="checkbox"/> yes <input type="checkbox"/> | | R | | | | L | | | | | | | | | |
| | | | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | | | | | | |
| Inhomogeneous attenuation no <input type="checkbox"/> yes <input type="checkbox"/> | | | | U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |
| | | | | M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |
| | | | | L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |

| reset subarea | | Honeycombing | | Zones / Profusion / Grade | | | | | | | | | | | | Sum Grade | |
|---------------|--|----------------------------------------------------------|--|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--|--|--|--|-----------|--|
| | | no <input type="checkbox"/> yes <input type="checkbox"/> | | R | | | | L | | | | | | | | | |
| | | | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | | | | | | |
| | | | | O | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |
| | | | | M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |
| | | | | U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |

| reset subarea | | Emphysema | | Zones / Profusion / Grade | | | | | | | | | | | | Sum Grade | |
|---------------|--|----------------------------------------------------------|--|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--|--|--|--|-----------|--|
| | | no <input type="checkbox"/> yes <input type="checkbox"/> | | R | | | | L | | | | | | | | | |
| | | | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | | | | | | |
| | | | | U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |
| | | | | M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |
| | | | | L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | |

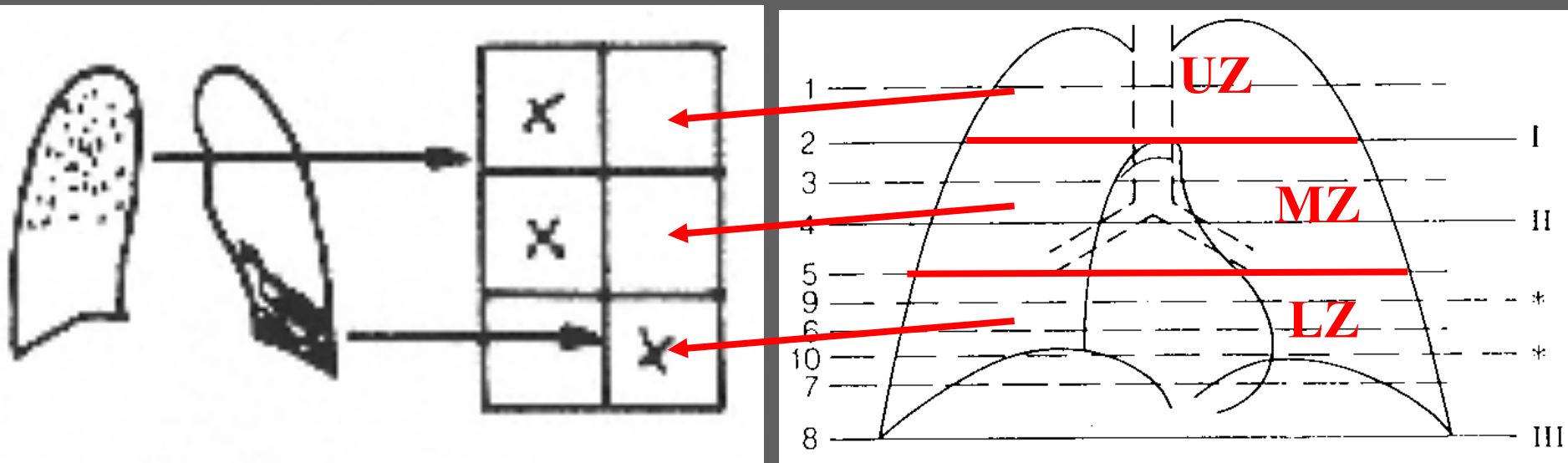
| reset subarea | | Large opacities | | R | | | | L | | | | Sum Grade | |
|---------------|--|----------------------------------------------------------|--|---|---|---|--|--------------------------|--------------------------|--------------------------|--------------------------|-----------|--|
| | | no <input type="checkbox"/> yes <input type="checkbox"/> | | A | B | C | | U | M | L | | | |
| | | | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| | | | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| | | | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |

| reset subarea | | Predominant Parenchymal | | | | | | | | | |
|---------------|--|-----------------------------|-----------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|--|--|--|--|
| | | RS <input type="checkbox"/> | IR <input type="checkbox"/> | GGO <input type="checkbox"/> | HC <input type="checkbox"/> | EM <input type="checkbox"/> | LO <input type="checkbox"/> | | | | |

Diagnostic Radiology of Occupational and Environmental Diseases

Distribution: ILO versus ICOERD

The overall distribution is recorded in a grading system, regardless of form and size, for each side right (R) or left (L) and each zone of the thorax: upper (U) – arch of the aorta and above, middle (M) – arch of the aorta down to the inferior pulmonary vein, lower (L) – inferior pulmonary vein and below including diaphragm. The precise definition of the borderline of the zone is not crucial for the application of the system.



Diagnostic Radiology of Occupational and Environmental Diseases

Well defined rounded opacities

reset subarea

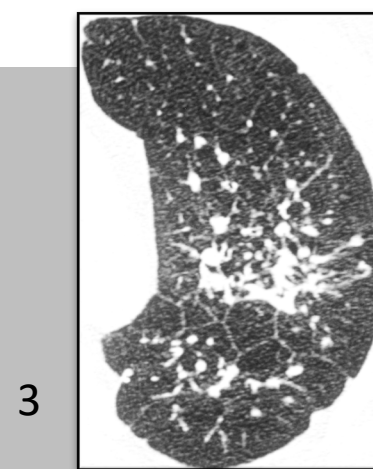
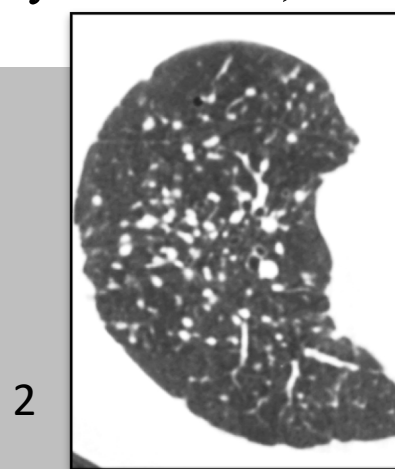
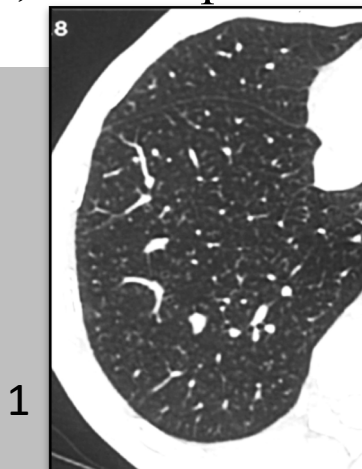
| | | | | Predominant Size | Zones / Profusion / Grade | | | | | | | | Sum Grade | | |
|--------------------------------------------------------------------------------------------|-----------------|----|--------------------------|------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--|--|
| | | | | | R | | | | L | | | | | | |
| | | | | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | | | |
| Well defined rounded opacities no <input type="checkbox"/> yes <input type="checkbox"/> | P = < 1,5 mm | no | <input type="checkbox"/> | yes | <input type="checkbox"/> | | | | | | | | | | |
| | Q = 1,5 - 3 mm | no | <input type="checkbox"/> | yes | <input type="checkbox"/> | | | | | | | | | | |
| | R = > 3 - 10 mm | no | <input type="checkbox"/> | yes | <input type="checkbox"/> | | | | | | | | | | |
| | | | | | U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| | | | | | M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| | | | | | L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |

0 = no definitive opacities

1 = mild, small opacities definitely present but few in number

2 = moderate, numerous small opacities

3 = severe, small opacities very numerous, normal anatomical lung structures poorly visible



Diagnostic Radiology of Occupational and Environmental Diseases

Well defined rounded opacities

reset subarea

Well defined rounded opacities

no ☐ yes ☐

P = < 1,5 mm

no ☐ yes ☐

Predominant Size

☐

Q = 1,5 - 3 mm

no ☐ yes ☐

☐

R = > 3 - 10 mm

no ☐ yes ☐

☐

Zones / Profusion / Grade

| | R | | | | L | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sum Grade <div></div> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

How to do??

reset subarea

Well defined rounded opacities

no ☐ yes ☒

P = < 1,5 mm

no ☐ yes ☒

☐

Predominant Size

☒

Q = 1,5 - 3 mm

no ☐ yes ☒

☒

R = > 3 - 10 mm

no ☐ yes ☐

☐

Zones / Profusion / Grade

| | R | | | | L | | | | |
|---|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|----------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Sum Grade <div>09</div> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| L | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Diagnostic Radiology of Occupational and Environmental Diseases

Irregular and / or linear opacities

| reset subarea | | | | | | Zones / Profusion / Grade | | | | | | | | | |
|--------------------------------------|------------------------------|-----------------------------|------------------------------|---------------------|--|---------------------------|---|---|---|---|---|---|---|--------------|----------------------|
| | | | | | | R | | | | L | | | | | |
| | | | | | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | | |
| Irregular and/or linear opacities | Intralobular | no <input type="checkbox"/> | yes <input type="checkbox"/> | Predominant Type | | | | | | | | | | Sum Grade | <input type="text"/> |
| | Interlobular | no <input type="checkbox"/> | yes <input type="checkbox"/> | | | | | | | | | | | | |
| no <input type="checkbox"/> | yes <input type="checkbox"/> | | | | | | | | | | | | | | |

1. Irregular and/or linear opacities

- 1.1. Absence (No) or Presence (Yes) has to be reported.
- 1.2. Morphologic abnormalities of parenchymal disease:
 - 1.2.1. Intralobular opacities
 - 1.2.2. Interlobular opacities

Diagnostic Radiology of Occupational and Environmental Diseases

Irregular and / or linear opacities

reset subarea

Irregular and/or
linear opacities

no ☐ yes ☐

Intralobular

no ☐ yes ☐

Interlobular

no ☐ yes ☐

Predominant
Type

☐

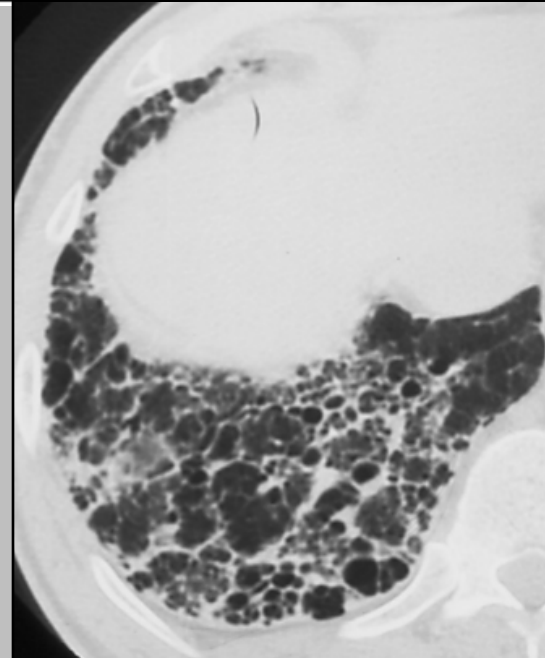
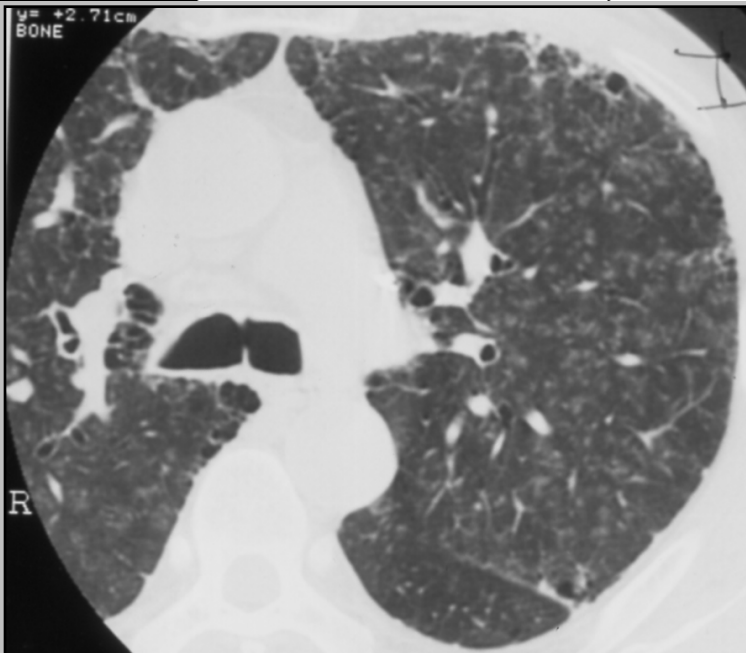
☐

Zones / Profusion / Grade

| | R | | | | L | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Sum
Grade

| | |
|--|--|
| | |
|--|--|



Diagnostic Radiology of Occupational and Environmental Diseases

Inhomogeneous attenuation

Ground glass opacity

reset subarea

Inhomogeneous
attenuation

no ☐ yes ☐

Ground glass
opacity

no ☐ yes ☐

| | R | | | | L | | | | Sum Grade |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="text"/> <input type="text"/> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Inhomogeneity is possibly due to mosaic perfusion (MP) or ground glass opacity (GGO). In cases where GGO is present grading has to be done for each side and each zone by judging the extent of the finding:

1 = focal

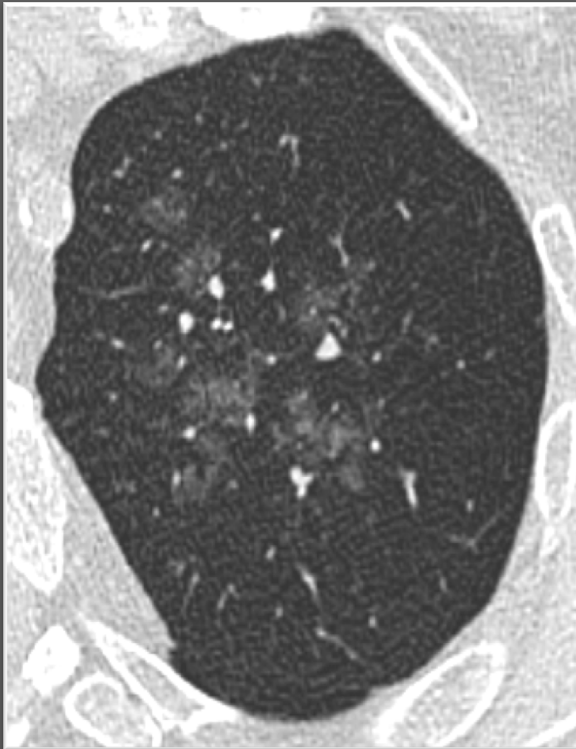
2 = patchy

3 = diffuse

In a case of mosaic perfusion related to air trapping or vessel obstruction use only the symbol “MP”.

Diagnostic Radiology of Occupational and Environmental Diseases

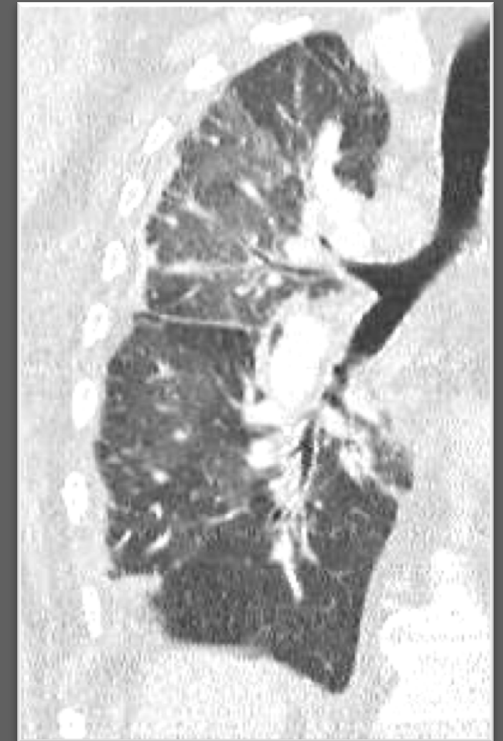
Inhomogeneous Lung Density



Ground Glass
Vessel-Size identical



Mosaic Pattern due to Air Trapping
Look at Expiration



Mosaic Perfusion
Vessel-Size different

Diagnostic Radiology of Occupational and Environmental Diseases

Honeycombing

Honey-combing

no ☐

yes ☐

| | R | | | | L | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| O | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Sum
Grade

| | |
|--|--|
| | |
|--|--|

Emphysema

Emphysema

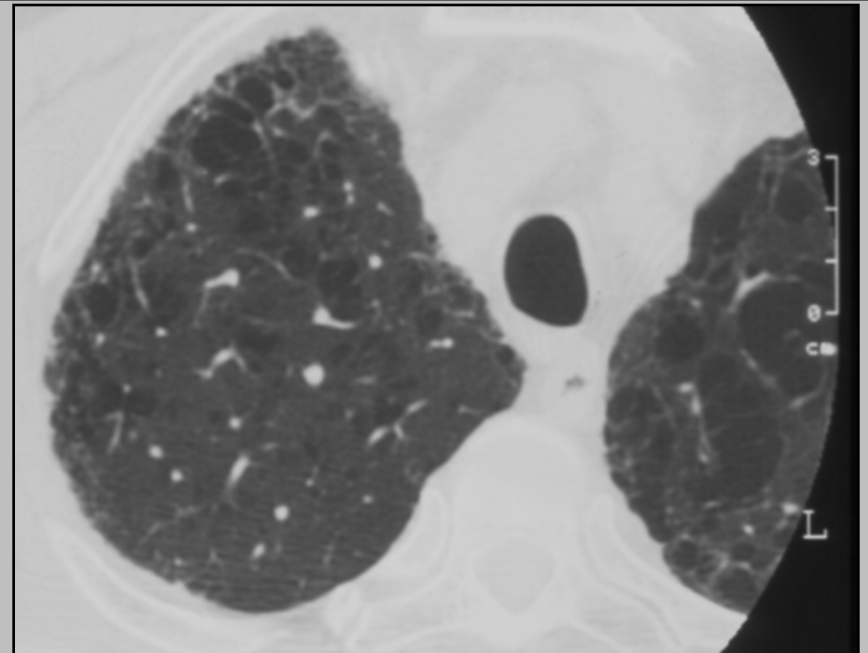
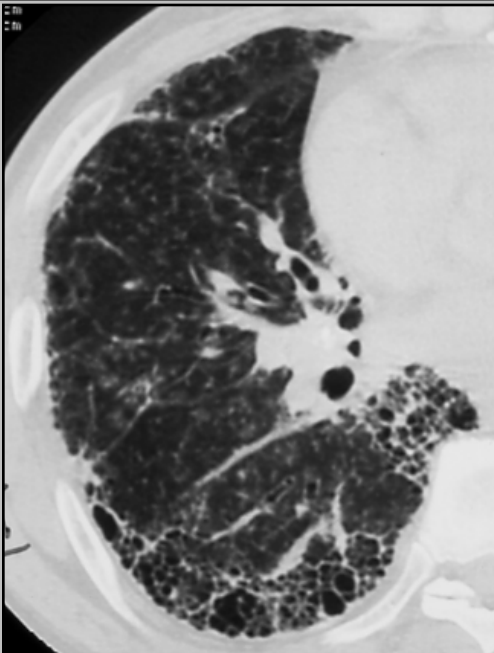
no ☐

yes ☐

| | R | | | | L | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Sum
Grade

| | |
|--|--|
| | |
|--|--|



Diagnostic Radiology of Occupational and Environmental Diseases

Honeycombing

| Honey-combing | | R | | | | L | | | | Sum Grade |
|------------------------------|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------------|
| | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| no <input type="checkbox"/> | O | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="text"/> |
| | M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| yes <input type="checkbox"/> | U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Emphysema

| Emphysema | | R | | | | L | | | | Sum Grade |
|------------------------------|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------------|
| | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| no <input type="checkbox"/> | U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="text"/> |
| | M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| yes <input type="checkbox"/> | L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Honeycombing can occur with and without GGO. Absence (No) or Presence (Yes) has to be reported. Irregular opacities within the HC-area are not classified separately.

Grading has to be done for each side and each zone:

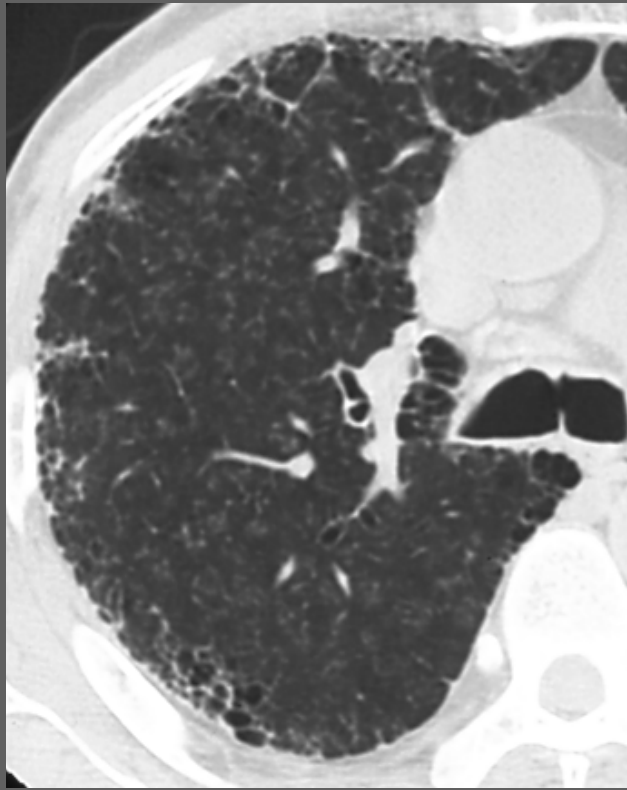
1 = mild, up to 10 mm in the subpleural parenchyma

2 = moderate; >10 to 30 mm in the subpleural parenchyma

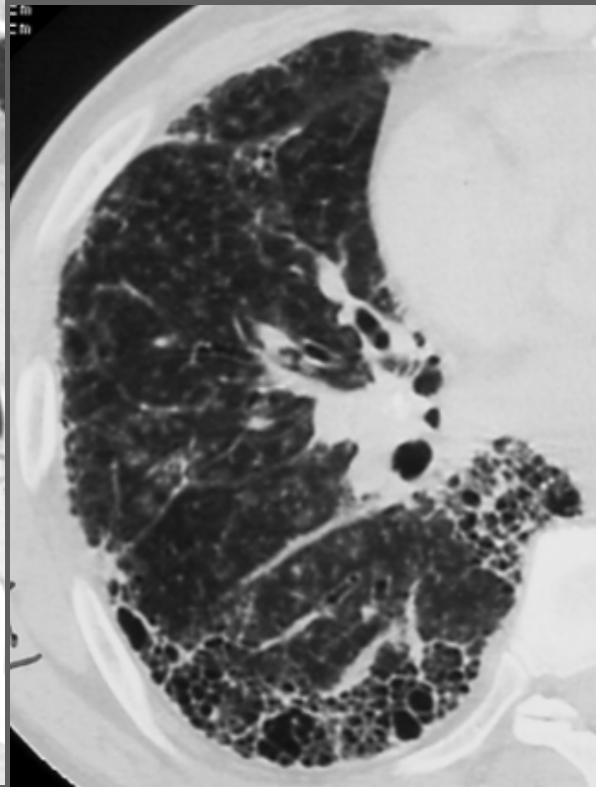
3 = severe; >30 mm up to whole area

Diagnostic Radiology of Occupational and Environmental Diseases

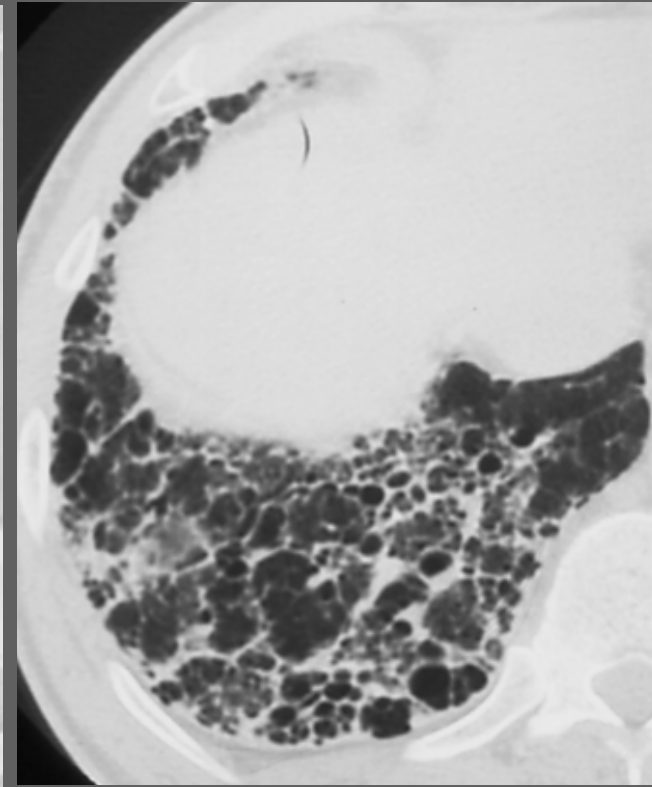
ICOERD: HC 1-3



HC Grade 1



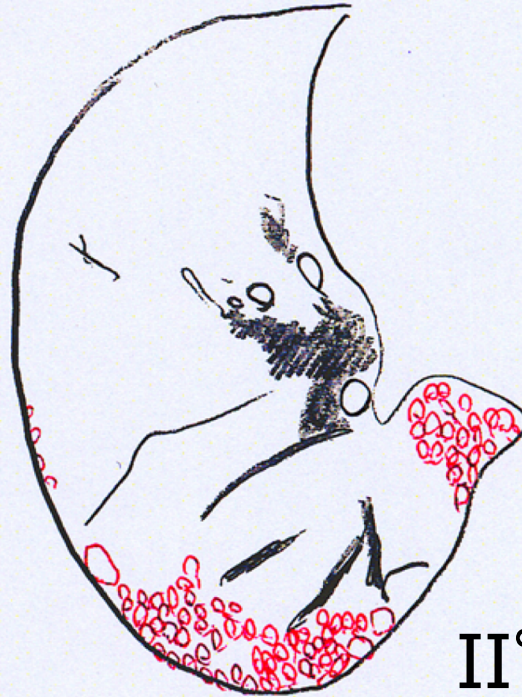
HC Grade 2



HC Grade 3



I°

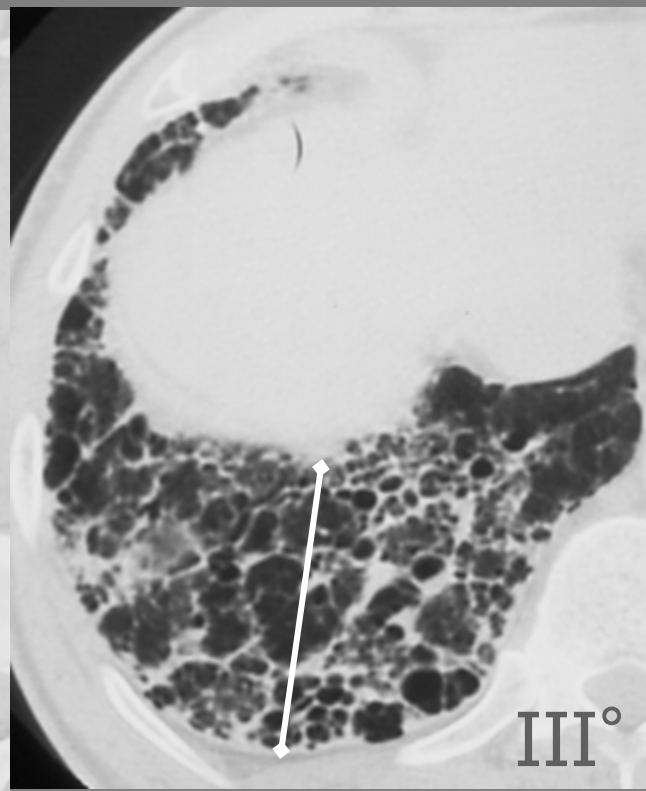
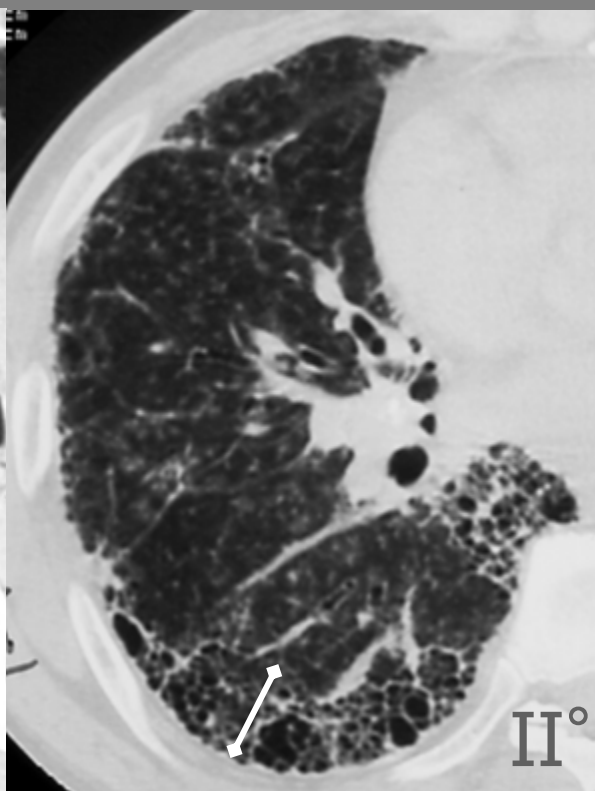


II°



III°

| | | | |
|---|---------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 1 | HC Gr 1 | Honeycombing Grade 1= mild = up to 10 mm in the subpleural region | Intralobular, dotlike opacities, mild subpleural emphysema |
| 2 | HC Gr 2 | Honeycombing Grade 2 = moderate = >10 up to 30 mm in the subpleural space | Intralobular, dotlike opacities, focal distribution of Ground Glass Opacity (GGO), pleural thickening due to fibrosis |
| 3 | HC Gr 3 | Honeycombing Grade 3 = severe = >30 mm up to whole area | focal distribution of Ground Glass Opacity (GGO), pleural thickening due to fibrosis, |



| | | | |
|---|---------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 1 | HC Gr 1 | Honeycombing Grade 1= mild = up to 10 mm in the subpleural region | Intralobular, dotlike opacities, mild subpleural emphysema |
| 2 | HC Gr 2 | Honeycombing Grade 2 = moderate = >10 up to 30 mm in the subpleural space | Intralobular, dotlike opacities, focal distribution of Ground Glass Opacity (GGO), pleural thickening due to fibrosis |
| 3 | HC Gr 3 | Honeycombing Grade 3 = severe = >30 mm up to whole area | focal distribution of Ground Glass Opacity (GGO), pleural thickening due to fibrosis, |

Diagnostic Radiology of Occupational and Environmental Diseases

Honeycombing

Honey-combing

no ☐

yes ☐

| | R | | | | L | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| O | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sum Grade <input type="text"/> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Emphysema

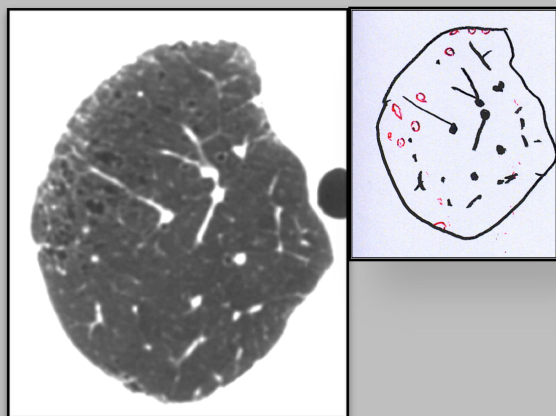
Emphysema

no ☐

yes ☐

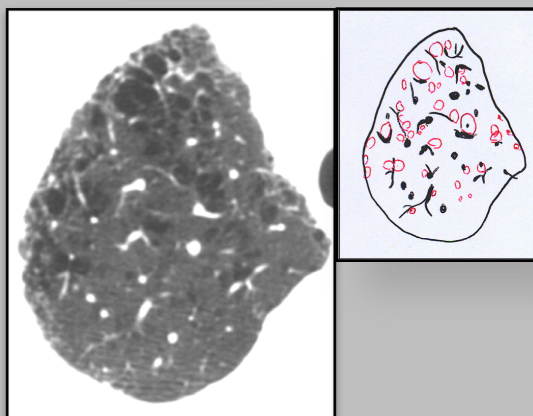
| | R | | | | L | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sum Grade <input type="text"/> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Grade 1



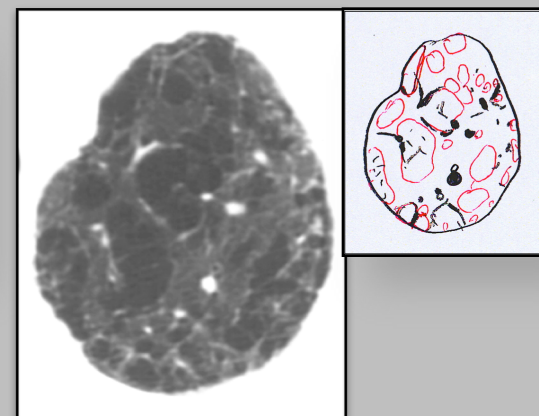
< 15 %

Grade 2



15 – 30 %

Grade 3



> 30 %

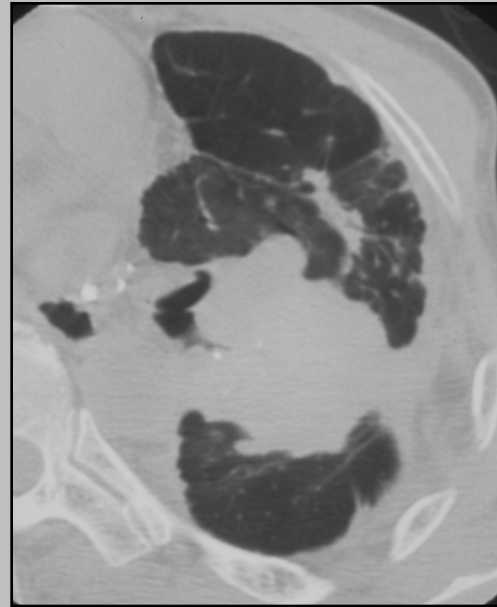
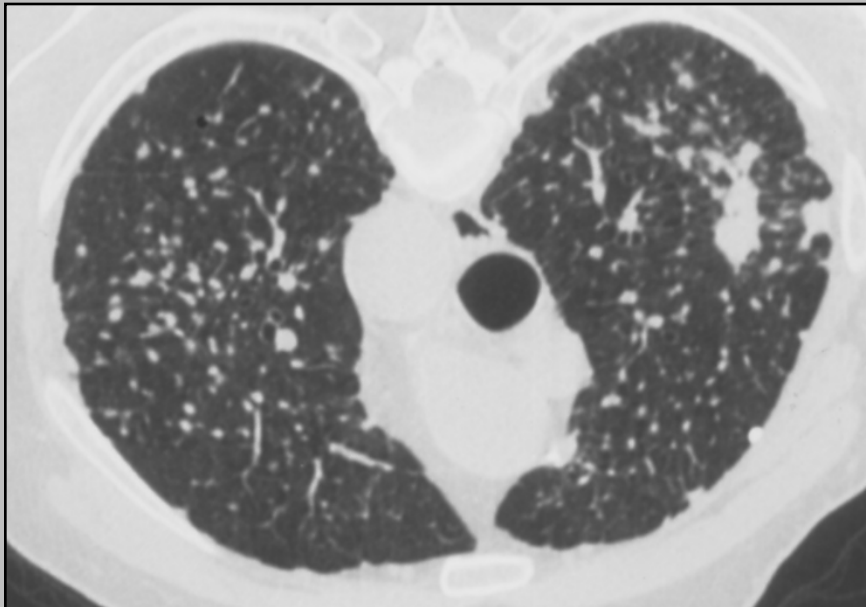
Diagnostic Radiology of Occupational and Environmental Diseases

Large opacities

| reset subarea | | | R | L |
|----------------------------------------------------------|----------------------------|---|--------------------------|--------------------------|
| Large opacities | A <input type="checkbox"/> | U | <input type="checkbox"/> | <input type="checkbox"/> |
| | B <input type="checkbox"/> | M | <input type="checkbox"/> | <input type="checkbox"/> |
| | C <input type="checkbox"/> | L | <input type="checkbox"/> | <input type="checkbox"/> |
| no <input type="checkbox"/> yes <input type="checkbox"/> | | | | |

Predominant parenchymal findings

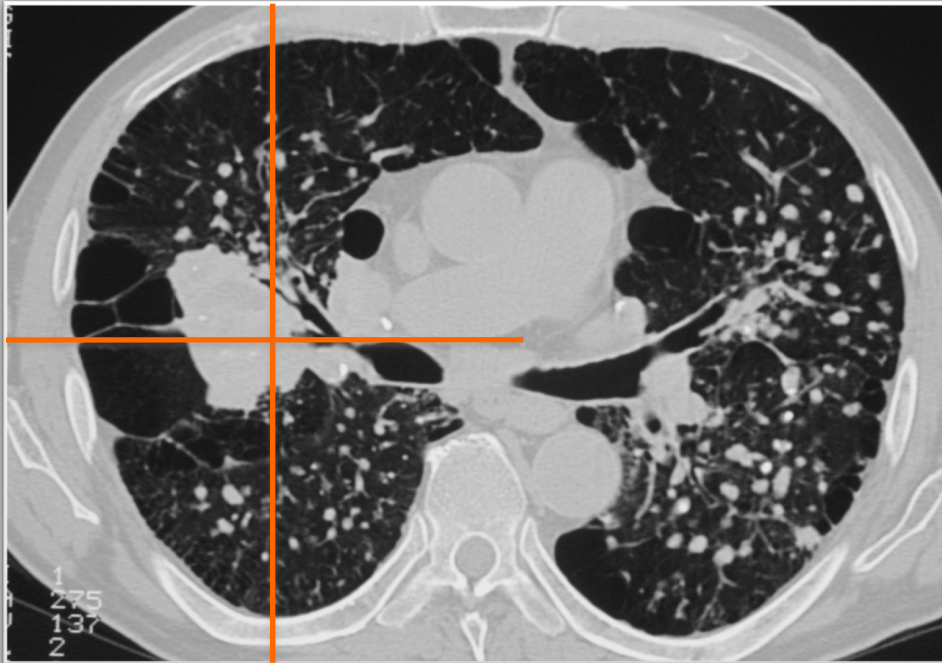
| reset subarea | | | | | |
|-----------------------------|-----------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|
| Predominant Parenchymal | | | | | |
| RS <input type="checkbox"/> | IR <input type="checkbox"/> | GGO <input type="checkbox"/> | HC <input type="checkbox"/> | EM <input type="checkbox"/> | LO <input type="checkbox"/> |



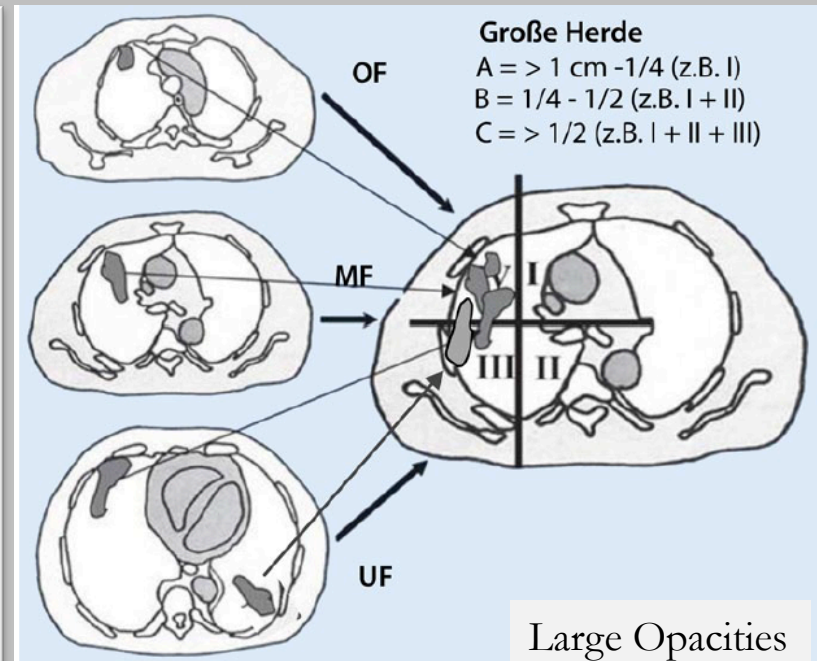
Pneumoconiotic
as well as
non-pneumoconiotic
conglomeration

Diagnostic Radiology of Occupational and Environmental Diseases

Coding Large Opacities



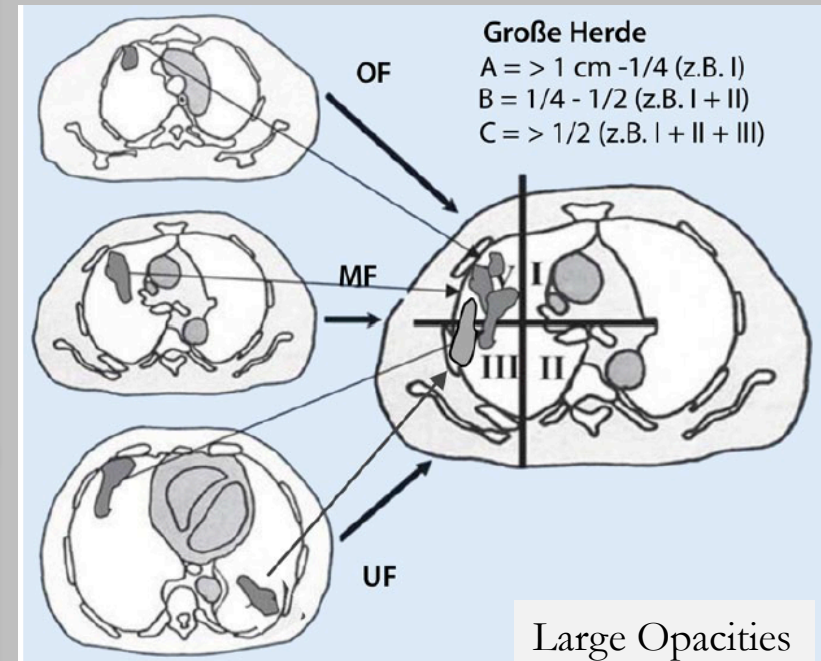
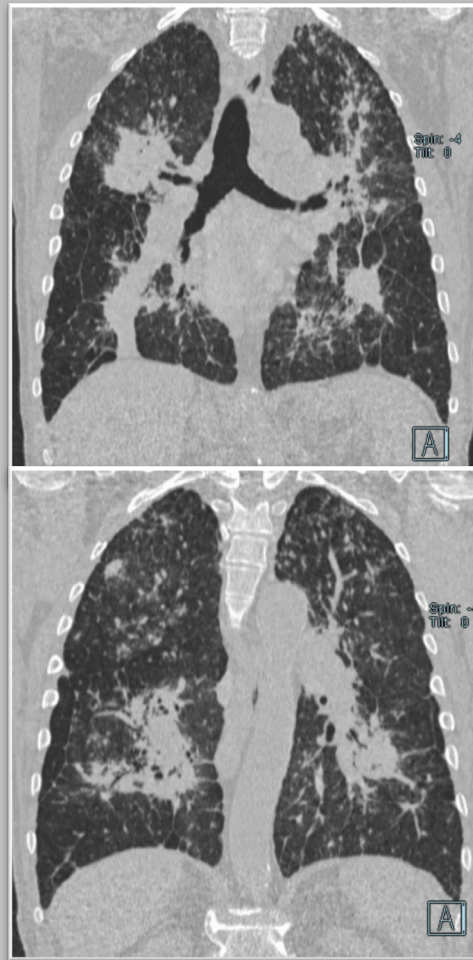
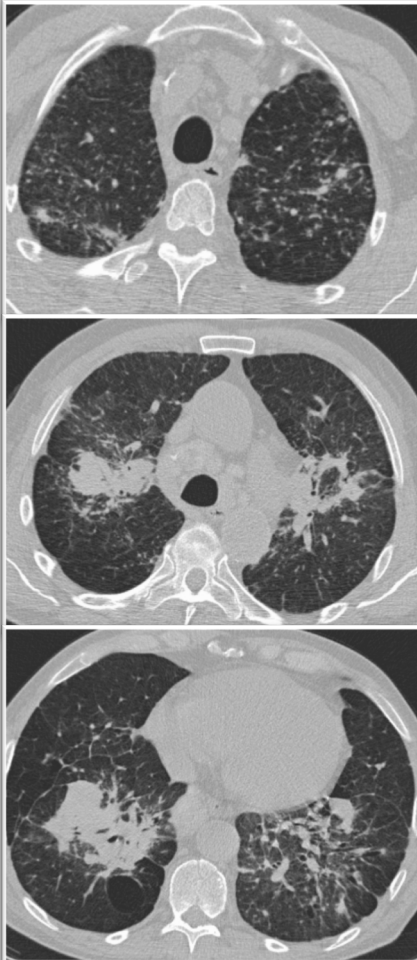
Referenz: Carina Trachealis



| | | | |
|-----------------------------|------------------------------|----------------------------|--------------------------|
| | | R | L |
| Large opacities | A <input type="checkbox"/> | U <input type="checkbox"/> | <input type="checkbox"/> |
| | B <input type="checkbox"/> | M <input type="checkbox"/> | <input type="checkbox"/> |
| | C <input type="checkbox"/> | L <input type="checkbox"/> | <input type="checkbox"/> |
| no <input type="checkbox"/> | yes <input type="checkbox"/> | | |

Diagnostic Radiology of Occupational and Environmental Diseases

Coding Large Opacities



| | | R | | L |
|---------------------------------------------------------------------|---|-------------------------------------|-------------------------------------|-------------------------------------|
| Large opacities | A | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | B | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| | C | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| no <input type="checkbox"/> yes <input checked="" type="checkbox"/> | | U | <input type="checkbox"/> | <input type="checkbox"/> |
| | | M | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| | | L | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Diagnostic Radiology of Occupational and Environmental Diseases

Large opacities

Predominant parenchymal findings

| reset subarea | | | R | L |
|----------------------------------------------------------|----------------------------|---|--------------------------|--------------------------|
| Large opacities | A <input type="checkbox"/> | U | <input type="checkbox"/> | <input type="checkbox"/> |
| | B <input type="checkbox"/> | M | <input type="checkbox"/> | <input type="checkbox"/> |
| | C <input type="checkbox"/> | L | <input type="checkbox"/> | <input type="checkbox"/> |
| no <input type="checkbox"/> yes <input type="checkbox"/> | | | | |

| reset subarea | |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Predominant Parenchymal | |
| RS <input type="checkbox"/> | IR <input type="checkbox"/> GGO <input type="checkbox"/> HC <input type="checkbox"/> EM <input type="checkbox"/> LO <input type="checkbox"/> |

Predominant Parenchymal

RS ☐ IR ☐ GGO ☐ HC ☐ EM ☐ LO ☐

Rounded well defined

Ground glass opacity

Emphysema

Irregular
intra- or interlobular

Honeycombing

Large Opacities

Diagnostic Radiology of Occupational and Environmental Diseases

Coding well defined rounded opacities



reset subarea

**Well defined
rounded opacities**

no ☐ yes ☐

P = < 1,5 mm

no ☐ yes ☐

**Predominant
Size**

Q = 1,5 - 3 mm

no ☐ yes ☐

R = > 3 - 10 mm

no ☐ yes ☐

Zones / Profusion / Grade

| | R | | | | L | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Sum
Grade**

| | |
|--|--|
| | |
|--|--|

Diagnostic Radiology of Occupational and Environmental Diseases

Coding well defined rounded opacities



reset subarea

**Well defined
rounded opacities**

no ☐ yes ☒

P = < 1,5 mm

no ☐ yes ☒

Q = 1,5 - 3 mm

no ☐ yes ☒

R = > 3 - 10 mm

no ☐ yes ☒

**Predominant
Size**

☐

☐

☒

Zones / Profusion / Grade

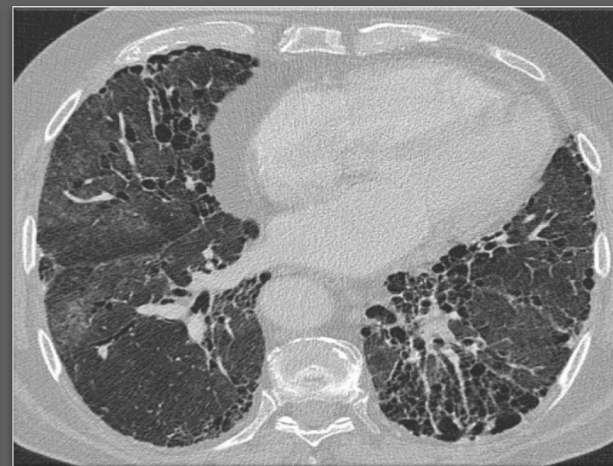
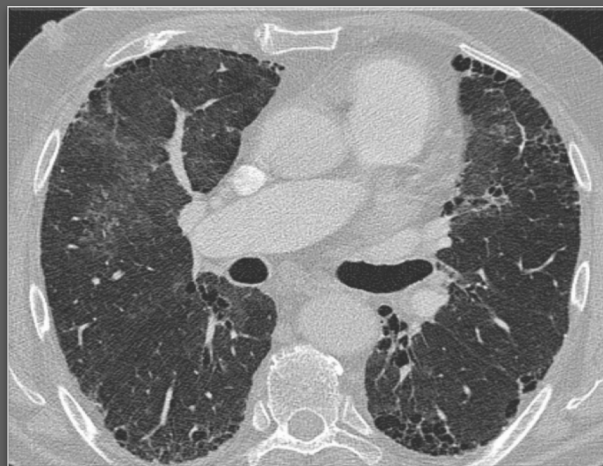
| | R | | | | L | | | |
|---|--------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| L | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Sum
Grade**

1 1

Diagnostic Radiology of Occupational and Environmental Diseases

Coding irregular (rounded) and/or linear opacities



reset subarea

**Irregular and/or
linear opacities**

no ☐ yes ☐

Intralobular

Interlobular

no ☐ yes ☐

no ☐ yes ☐

**Predominant
Type**

☐

☐

Zones / Profusion / Grade

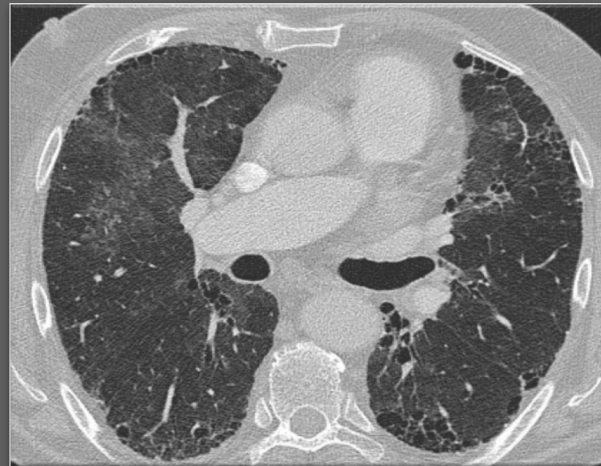
| | R | | | | L | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Sum
Grade**

| | |
|--|--|
| | |
|--|--|

Diagnostic Radiology of Occupational and Environmental Diseases

Coding irregular (rounded) and/or linear opacities



reset subarea

Irregular and/or
linear opacities

no ☐ yes ☒

Intralobular

Interlobular

no ☐ yes ☒

no ☐ yes ☒

Predominant
Type

☒

☐

Zones / Profusion / Grade

| | R | | | | L | | | |
|---|--------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| U | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| L | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Sum
Grade

1 1

Diagnostic Radiology of Occupational and Environmental Diseases

Coding ground glass opacities



reset subarea

**Inhomogeneous
attenuation**

no ☐ yes ☐

**Ground glass
opacity**

no ☐ yes ☐

| | R | | | | L | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Sum
Grade**

| | |
|--|--|
| | |
|--|--|

Diagnostic Radiology of Occupational and Environmental Diseases

Coding ground glass opacities



reset subarea

Inhomogeneous
attenuation

no ☐ yes ☒

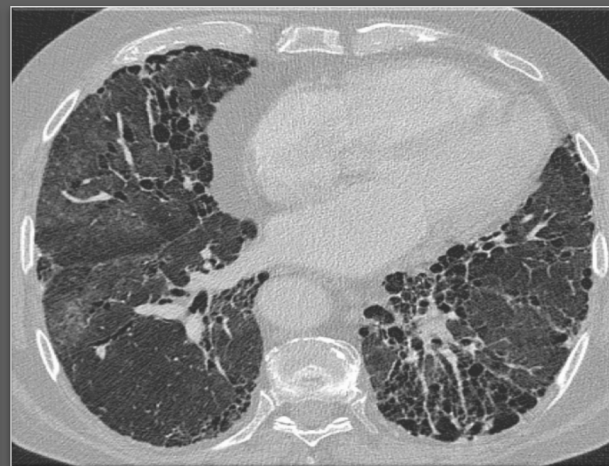
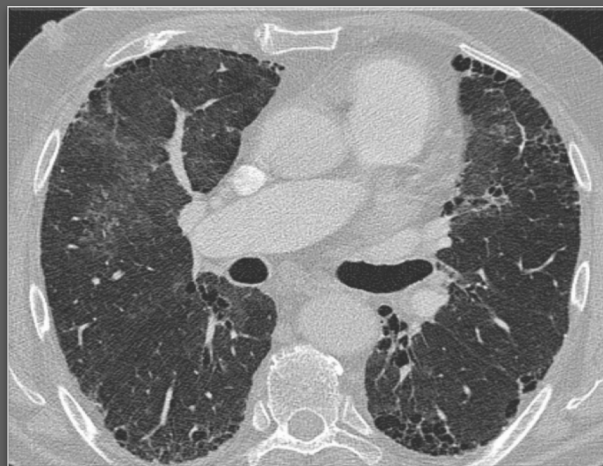
Ground glass
opacity

no ☐ yes ☒

| | R | | | | L | | | | Sum Grade |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------|
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 16 |
| M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

Diagnostic Radiology of Occupational and Environmental Diseases

Coding honeycombing

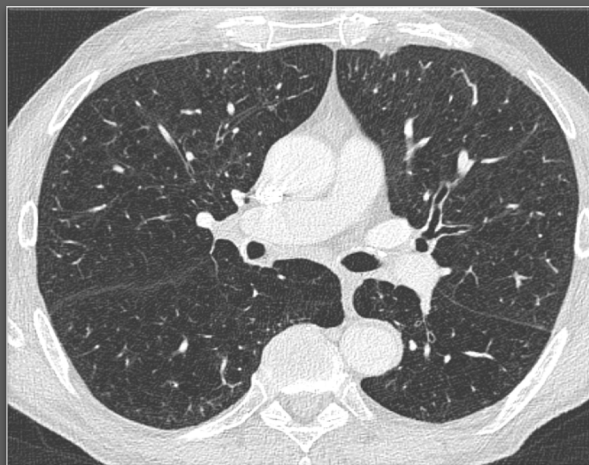


| Honey-combing | | R | | | | L | | | | Sum Grade |
|------------------------------|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------------|
| | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| no <input type="checkbox"/> | O | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="text"/> |
| | M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| yes <input type="checkbox"/> | U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

| Honey-combing | | R | | | | L | | | | Sum Grade |
|------------------------------|---|--------------------------|-------------------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-----------|
| | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| no <input type="checkbox"/> | O | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 05 |
| | M | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| yes <input type="checkbox"/> | U | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Diagnostic Radiology of Occupational and Environmental Diseases

Coding emphysema

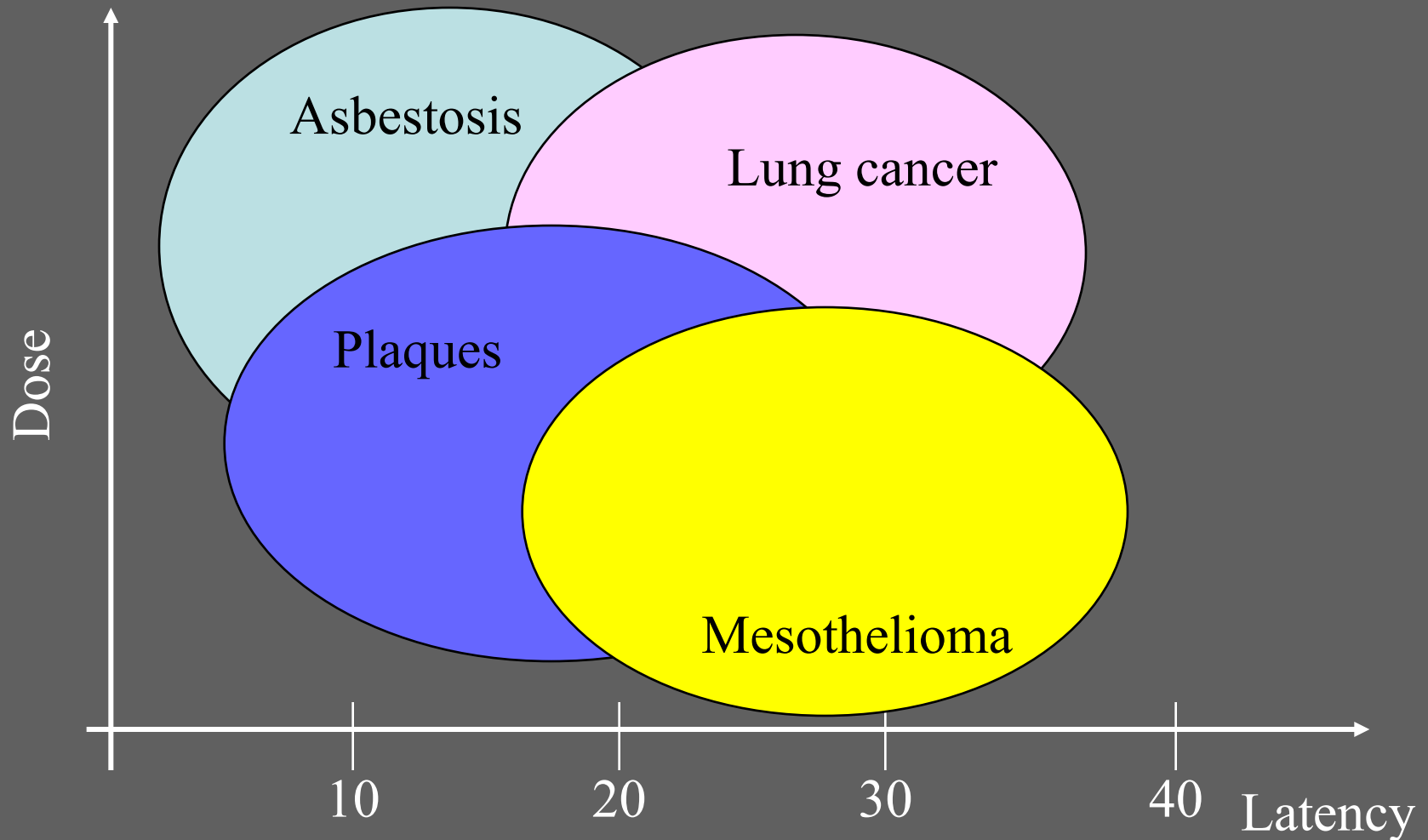


| Emphysema | | | R | | | | L | | | | Sum Grade |
|-----------|--------------------------|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------------|
| | | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| no | <input type="checkbox"/> | U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="text"/> <input type="text"/> |
| | | M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| yes | <input type="checkbox"/> | L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

| Emphysema | | | R | | | | L | | | | Sum Grade |
|-----------|-------------------------------------|---|--------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------|
| | | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| no | <input type="checkbox"/> | U | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 3 |
| | | M | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| yes | <input checked="" type="checkbox"/> | L | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Diagnostic Radiology of Occupational and Environmental Diseases

Asbestos related diseases with relation to dose and latency



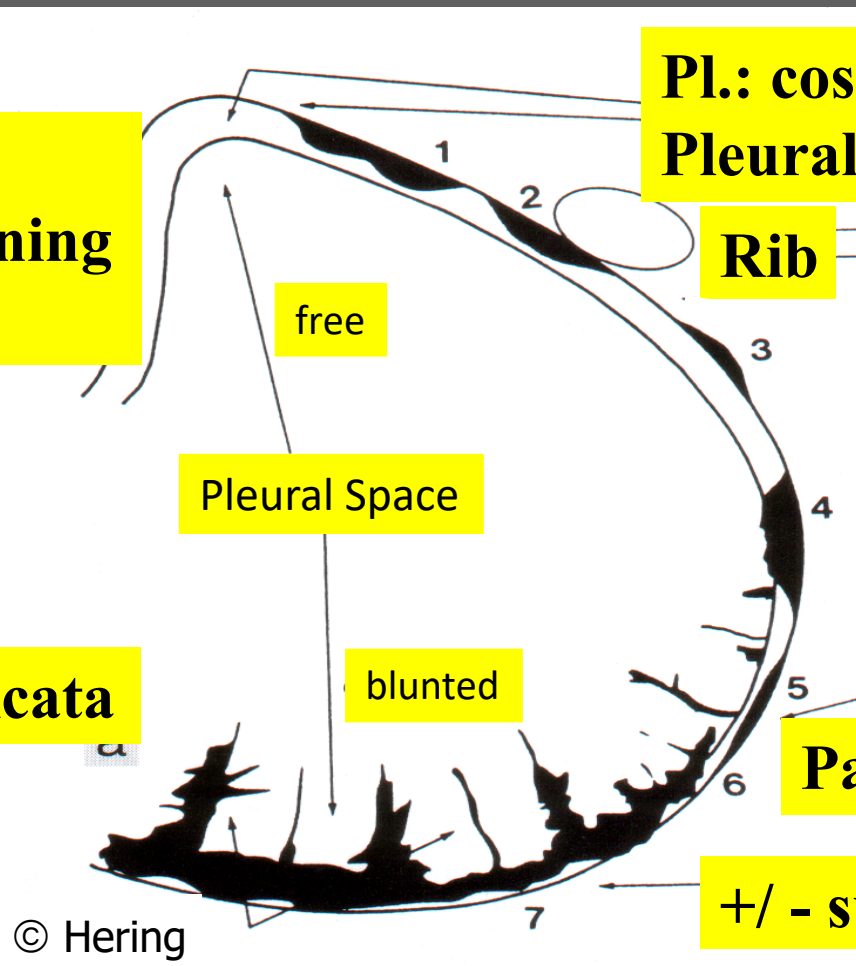
Bohlig und Otto 1975

HRCT-Signs of Pneumoconioses

1 -3

„parietal“ Thickening
(Plaques)

Hyalinosis complicata



Pl.: costal a. pulmonal
Pleural & Extrapl. Fat

Rib

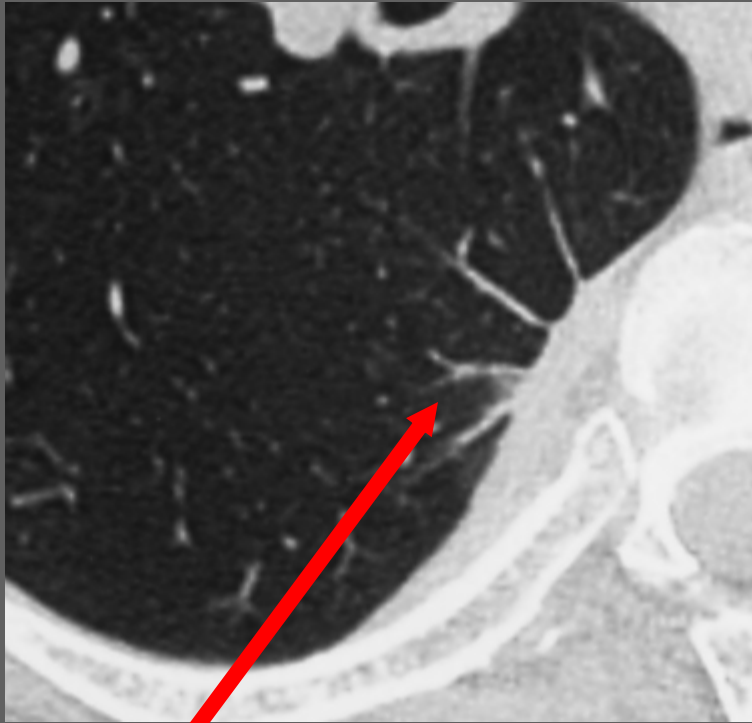
„visceral“ Thick.

Parenchymal bands

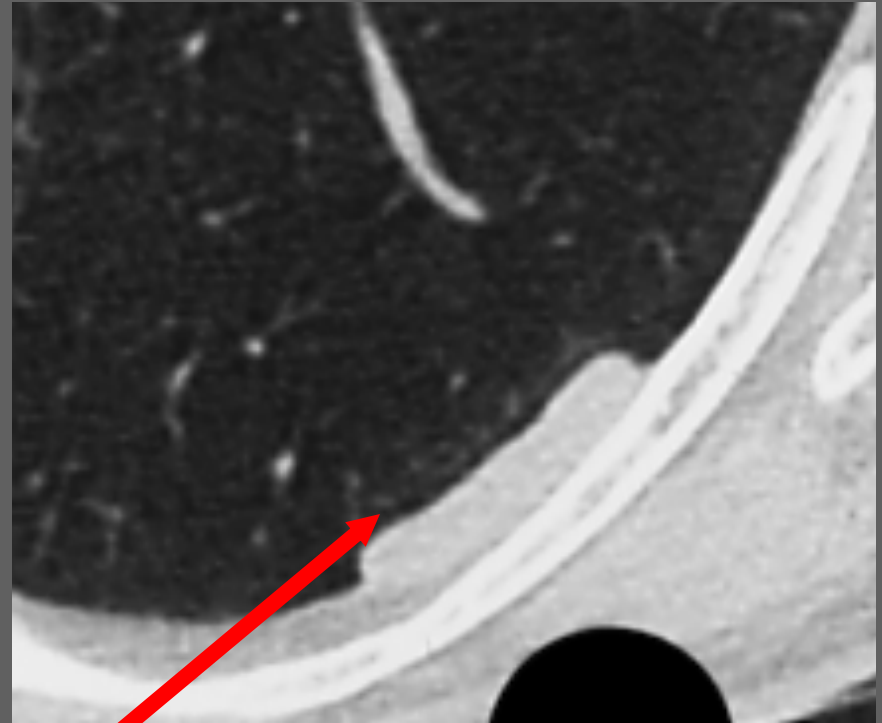
+/- subpl. Fibrosis

Diagnostic Radiology of Occupational and Environmental Diseases

Plaques - visceral and parietal Type



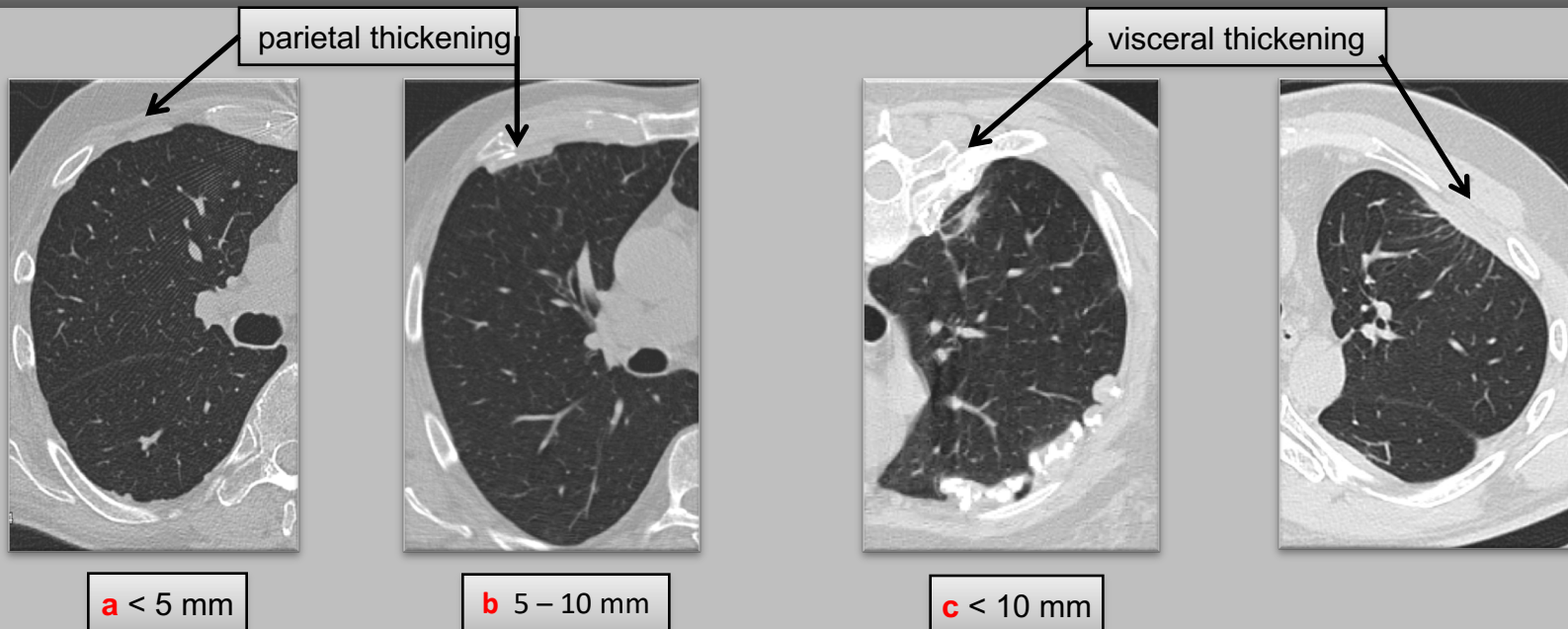
**Visceral Type with
parenchymal bands**



**Parietal Type, no definitive
subpleural reaction, but
centriacinar compression**

Diagnostic Radiology of Occupational and Environmental Diseases

Coding Plaques - visceral and parietal Type

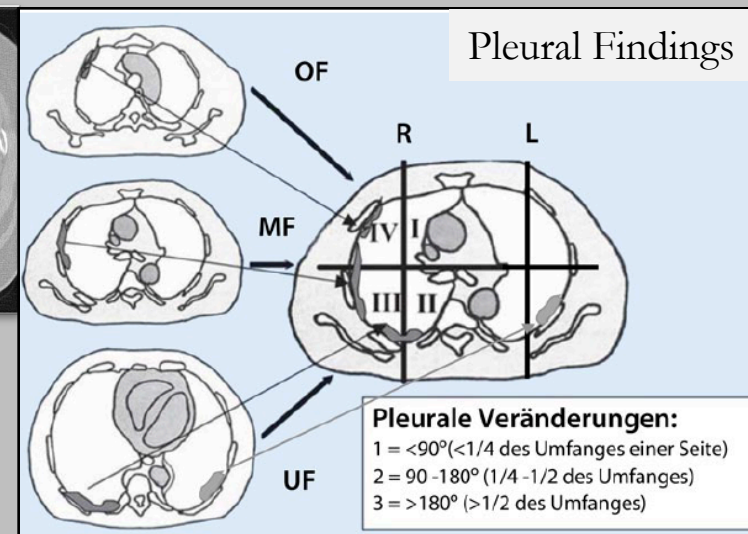
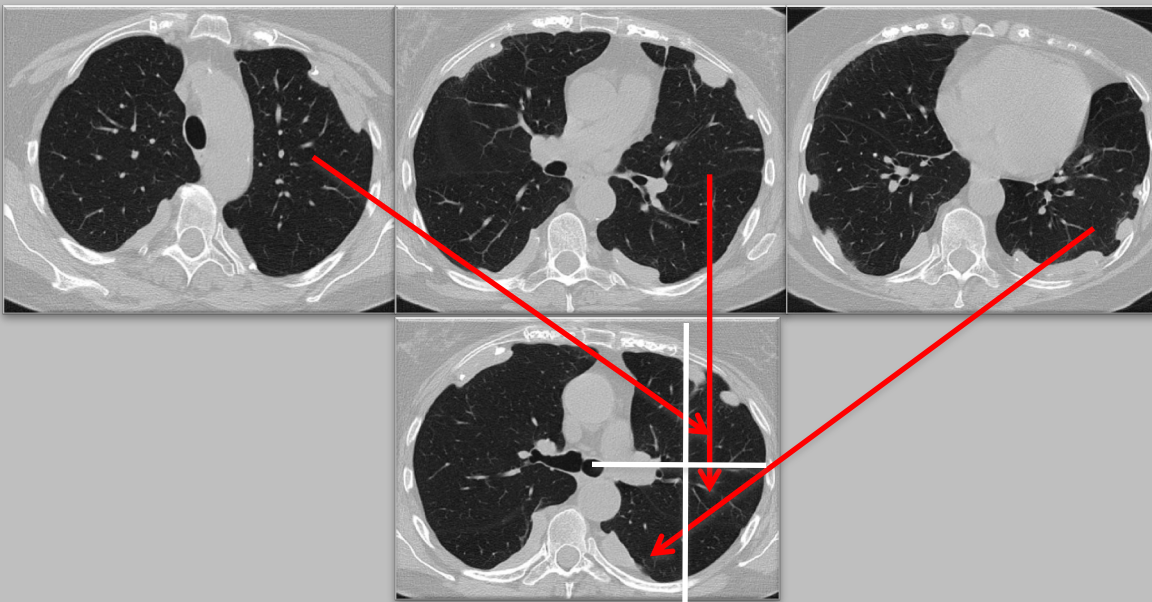


Pleura

| reset subarea | | | | Predominant Type | CPA blunted | | | | Extent / Width | | | | | | | | |
|------------------------------|--|--|--|-----------------------------|------------------------------|------------------------------|--|--|----------------|----------------------------|----------------------------|----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Pleural abnorm. | | | | | R | L | | | R | | | | L | | | | |
| | | | | | | | | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| no <input type="checkbox"/> | | | | parietal type | no <input type="checkbox"/> | yes <input type="checkbox"/> | | | U | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| yes <input type="checkbox"/> | | | | visceral type | no <input type="checkbox"/> | yes <input type="checkbox"/> | | | M | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | | | | | | | | | L | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | | | | | | | | | 0 | a | b | c | 0 | a | b | c | |
| Pleural calcifications | | | | no <input type="checkbox"/> | yes <input type="checkbox"/> | Localisation | | | | W <input type="checkbox"/> | M <input type="checkbox"/> | D <input type="checkbox"/> | reset subarea | | | | |

Diagnostic Radiology of Occupational and Environmental Diseases

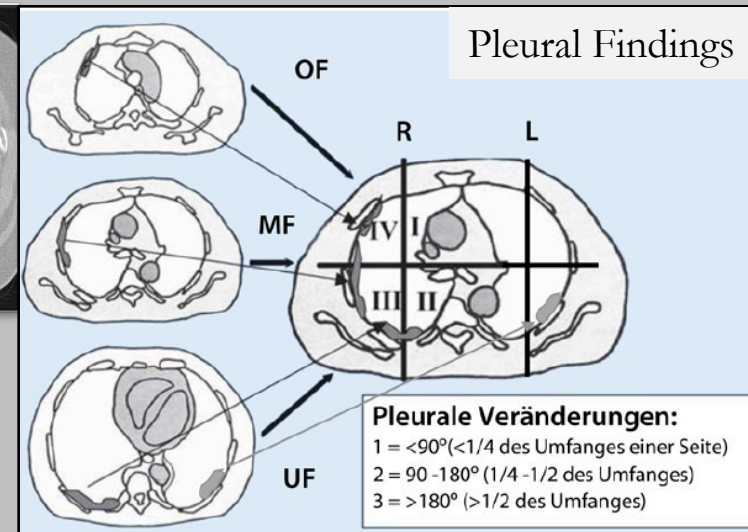
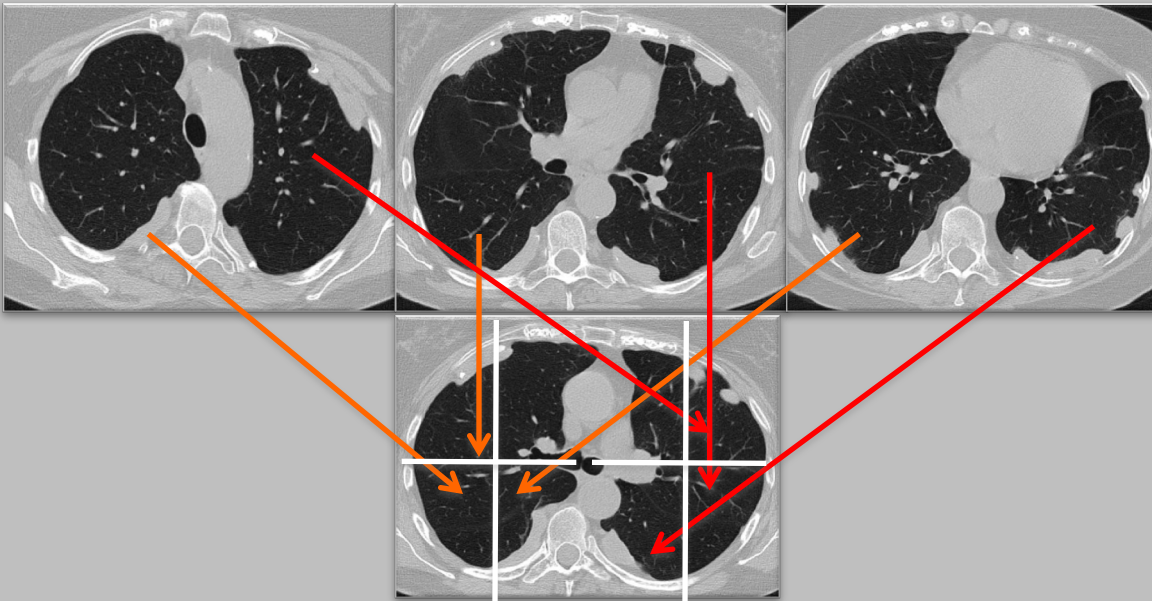
Coding Plaques - visceral and parietal Type



| reset subarea | | | | Predominant Type | CPA blunted | | Extent / Width | | | | | | | | | | |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---|---------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------|---|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Pleura | Pleural abnorm. no <input type="checkbox"/> yes <input checked="" type="checkbox"/> | W | parietal type | no <input type="checkbox"/> yes <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | R <input type="checkbox"/> L <input type="checkbox"/> | U | R | L | R | | | | L | | | |
| | | | visceral type | no <input checked="" type="checkbox"/> yes <input type="checkbox"/> | | | | | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| | | | M | no <input checked="" type="checkbox"/> yes <input type="checkbox"/> | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | D | no <input checked="" type="checkbox"/> yes <input type="checkbox"/> | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | ? | no <input checked="" type="checkbox"/> yes <input type="checkbox"/> | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Pleural calcifications no <input type="checkbox"/> yes <input checked="" type="checkbox"/> | | | | | Localisation W <input checked="" type="checkbox"/> M <input type="checkbox"/> D <input type="checkbox"/> | | | | | reset subarea | | | | | | | |

Diagnostic Radiology of Occupational and Environmental Diseases

Coding Plaques - visceral and parietal Type



| reset subarea | | | | Predominant Type | CPA blunted | | Extent / Width | | | | | | | | |
|---------------|------------------------|---------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|---|---|---|---|---|---|---|--|
| | | | | | R | L | R | | | | L | | | | |
| | | | | | | | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | |
| Pleura | Pleural abnorm. | no | <input type="checkbox"/> | yes | <input checked="" type="checkbox"/> | | | | | | | | | | |
| | W | parietal type | no | <input type="checkbox"/> | yes | <input checked="" type="checkbox"/> | | | | | | | | | |
| | | visceral type | no | <input checked="" type="checkbox"/> | yes | <input type="checkbox"/> | | | | | | | | | |
| | M | | no | <input checked="" type="checkbox"/> | yes | <input type="checkbox"/> | | | | | | | | | |
| | D | | ? | no | <input checked="" type="checkbox"/> | yes | <input type="checkbox"/> | | | | | | | | |
| | Pleural calcifications | no | <input type="checkbox"/> | yes | <input checked="" type="checkbox"/> | | | | | | | | | | |
| | Localisation | W | <input checked="" type="checkbox"/> | M | <input type="checkbox"/> | D | <input type="checkbox"/> | | | | | | | | |
| reset subarea | | | | | | | | | | | | | | | |

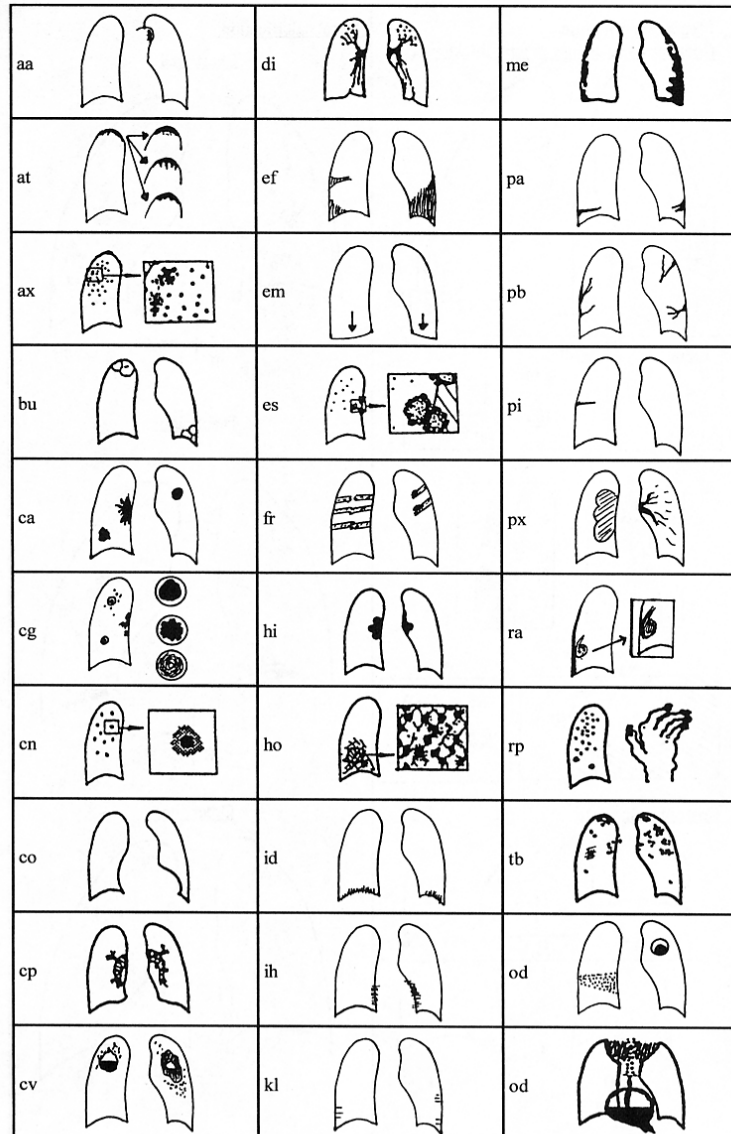
Diagnostic Radiology of Occupational and Environmental Diseases

Symbols: compatible with.....suspicious about

Symbols

- ☐ No
- ☐ AX
- ☐ BE
- ☐ BR
- ☐ BU
- ☐ CA
- ☐ CG
- ☐ CV
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- ☐ EF
- ☐ ES
- ☐ FP
- ☐ FR
- ☐ HI
- ☐ ME
- ☐ MP
- ☐ OD
- ☐ PB
- ☐ RA
- ☐ SC
- ☐ TB
- ☐ TD

Coalescence
 Bronchiectasis
 Bronchitis
 Bulla
 Carcinoma
 Calcified Granuloma
 Cavern
 Distorsion
 Dependent Opacity
 Effusion
 Eggshell
 Fat Pad
 Fracture
 Hilum
 Mesothelioma
 Mosaic Perfusion
 Other Disease
 Parenchymal Band
 Rounded Atelectasis
 Subpleural curvilinear lines
 Tuberculosis
 Tree in Bud



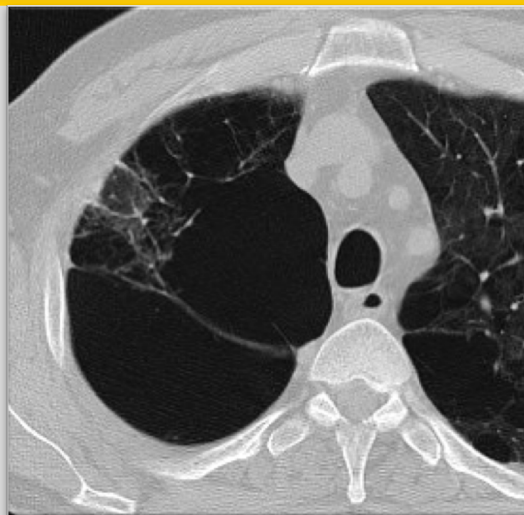
„An image says more
 than a 1000 words“
 Infographics that make
 complicated data
 easy to understand...

Diagnostic Radiology of Occupational and Environmental Diseases

Symbols: compatible with.....suspicious about

Symbols

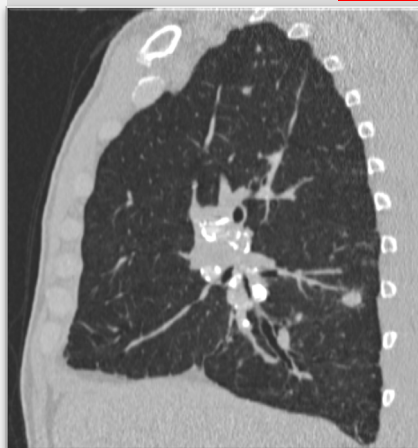
| | |
|----------------------------------------|------------------------------|
| <input type="checkbox"/> No | |
| <input type="checkbox"/> AX | Coalescence |
| <input type="checkbox"/> BE | Bronchiectasis |
| <input type="checkbox"/> BR | Bronchitis |
| <input checked="" type="checkbox"/> BU | Bulla |
| <input type="checkbox"/> CA | Carcinoma |
| <input checked="" type="checkbox"/> CG | Calcified Granuloma |
| <input type="checkbox"/> CV | Cavern |
| <input type="checkbox"/> DI | Distorsion |
| <input type="checkbox"/> DO | Dependent Opacity |
| <input type="checkbox"/> EF | Effusion |
| <input checked="" type="checkbox"/> ES | Eggshell |
| <input type="checkbox"/> FP | Fat Pad |
| <input type="checkbox"/> FR | Fracture |
| <input type="checkbox"/> HI | Hilum |
| <input type="checkbox"/> ME | Mesothelioma |
| <input type="checkbox"/> MP | Mosaic Perfusion |
| <input type="checkbox"/> OD | Other Disease |
| <input checked="" type="checkbox"/> PB | Parenchymal Band |
| <input checked="" type="checkbox"/> RA | Rounded Atelectasis |
| <input type="checkbox"/> SC | Subpleural curvilinear lines |
| <input type="checkbox"/> TB | Tuberculosis |
| <input type="checkbox"/> TD | Tree in Bud |



BU



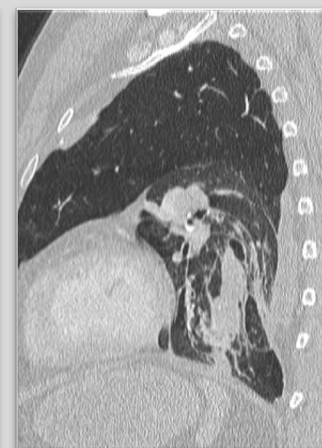
CG



ES



PB



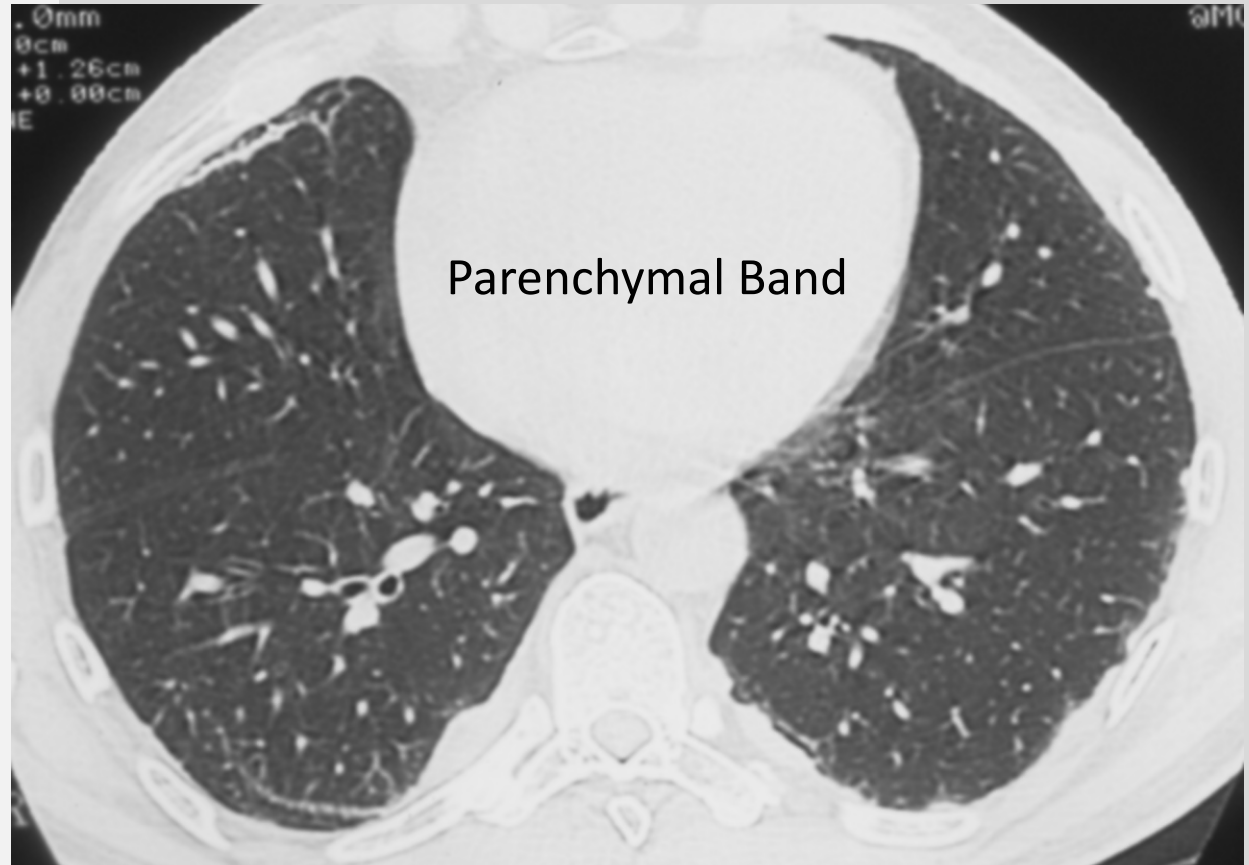
RA

Diagnostic Radiology of Occupational and Environmental Diseases

Symbols: compatible with.....suspicious about

Symbols

- | | |
|----------------------------------------|------------------------------|
| <input type="checkbox"/> No | |
| <input type="checkbox"/> AX | Coalescence |
| <input type="checkbox"/> BE | Bronchiectasis |
| <input type="checkbox"/> BR | Bronchitis |
| <input type="checkbox"/> BU | Bulla |
| <input type="checkbox"/> CA | Carcinoma |
| <input type="checkbox"/> CG | Calcified Granuloma |
| <input type="checkbox"/> CV | Cavern |
| <input type="checkbox"/> DI | Distorsion |
| <input type="checkbox"/> DO | Dependent Opacity |
| <input type="checkbox"/> EF | Effusion |
| <input type="checkbox"/> ES | Eggshell |
| <input type="checkbox"/> FP | Fat Pad |
| <input type="checkbox"/> FR | Fracture |
| <input type="checkbox"/> HI | Hilum |
| <input type="checkbox"/> ME | Mesothelioma |
| <input type="checkbox"/> MP | Mosaic Perfusion |
| <input type="checkbox"/> OD | Other Disease |
| <input checked="" type="checkbox"/> PB | Parenchymal Band |
| <input type="checkbox"/> RA | Rounded Atelectasis |
| <input checked="" type="checkbox"/> SC | Subpleural curvilinear lines |
| <input type="checkbox"/> TB | Tuberculosis |
| <input type="checkbox"/> TD | Tree in Bud |



PB

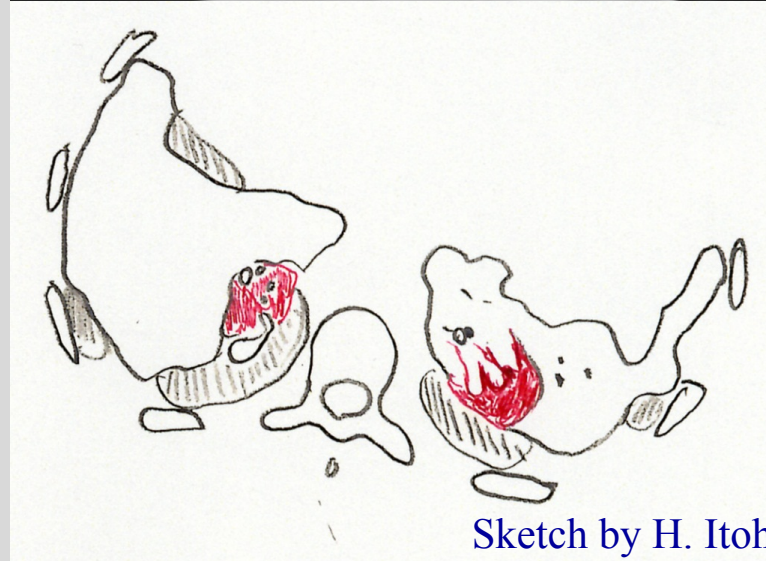
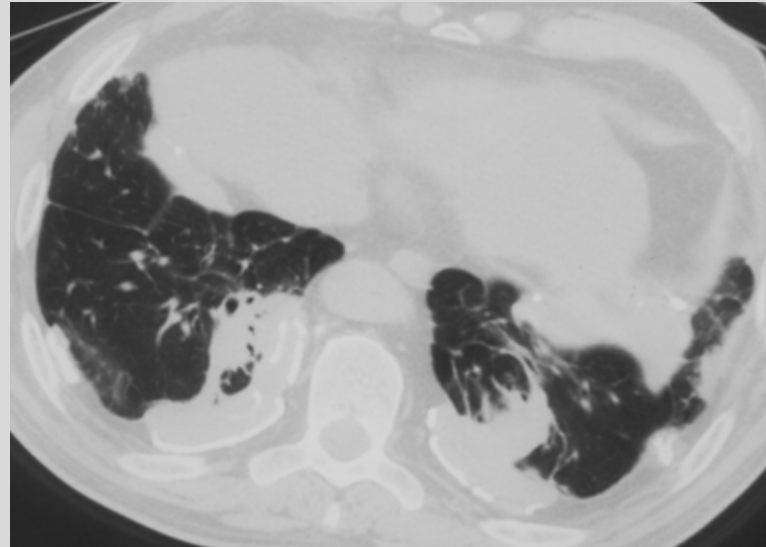
SC

Diagnostic Radiology of Occupational and Environmental Diseases

Symbols: compatible with.....suspicious about

Symbols

| | |
|----------------------------------------|------------------------------|
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| <input type="checkbox"/> AX | Coalescence |
| <input type="checkbox"/> BE | Bronchiectasis |
| <input type="checkbox"/> BR | Bronchitis |
| <input type="checkbox"/> BU | Bulla |
| <input type="checkbox"/> CA | Carcinoma |
| <input type="checkbox"/> CG | Calcified Granuloma |
| <input type="checkbox"/> CV | Cavern |
| <input checked="" type="checkbox"/> DI | Distorsion |
| <input type="checkbox"/> DO | Dependent Opacity |
| <input type="checkbox"/> EF | Effusion |
| <input type="checkbox"/> ES | Eggshell |
| <input type="checkbox"/> FP | Fat Pad |
| <input type="checkbox"/> FR | Fracture |
| <input type="checkbox"/> HI | Hilum |
| <input type="checkbox"/> ME | Mesothelioma |
| <input type="checkbox"/> MP | Mosaic Perfusion |
| <input type="checkbox"/> OD | Other Disease |
| <input checked="" type="checkbox"/> PB | Parenchymal Band |
| <input checked="" type="checkbox"/> RA | Rounded Atelectasis |
| <input type="checkbox"/> SC | Subpleural curvilinear lines |
| <input type="checkbox"/> TB | Tuberculosis |
| <input type="checkbox"/> TD | Tree in Bud |



RA

PB

DI

Diagnostic Radiology of Occupational and Environmental Diseases

Symbols: compatible with.....suspicious about

Symbols

- ☐ No
- ☐ AX
- ☐ BE
- ☐ BR
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- ☐ EF
- ☐ ES
- ☐ FP
- ☐ FR
- ☐ HI
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- ☐ OD
- ☐ PB
- ☐ RA
- ☐ SC
- ☒ TB
- ☐ TD

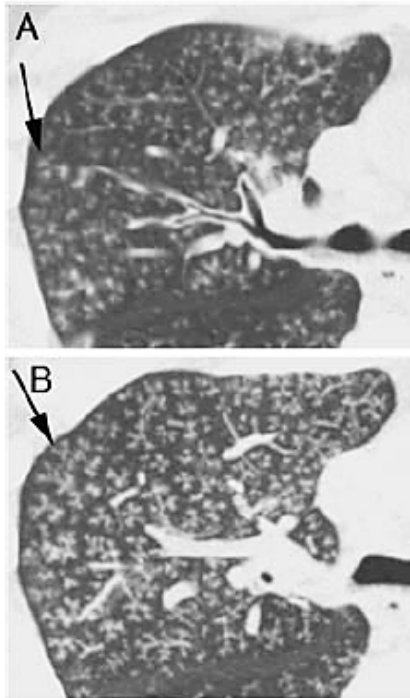


FIGURE 1. A, Noncontrast chest CT shows diffuse branching opacities (arrow) in the right upper lobe consistent with the tree-in-bud sign in this patient with parainfluenza pneumonia. B, Maximum-intensity projection reconstruction increases the conspicuity of the branching pattern (arrow) in the tree-in-bud sign.

Tree-in-Bud Sign

Small centrilobular nodules with concomitant Y- and V-shaped branching opacities

Differential diagnosis

Infection

Bacterial

- Mycobacterium tuberculosis*
- Non-tuberculous mycobacterium
- Mycoplasma pneumoniae*

Fungal

- Aspergillus*

Viral pneumonia

- Respiratory syncytial virus

Congenital

- Cystic fibrosis

Neoplasm

- Pulmonary arterial metastases

- Endobronchial spread of low-grade adenocarcinoma

Miscellaneous

- Aspiration

- Diffuse panbronchiolitis

- Immotile cilia syndrome

Verma, Nupur; Chung, Jonathan H.; Mohammed, Tan-Lucien H.
Journal of Thoracic Imaging. 27(2):W27, March 2012

Diagnostic Radiology of Occupational and Environmental Diseases

Reading ICOERD in an Online-Setting

Vorsorge-Portal

Gesundheitsvorsorge (GVS)
Eine Gemeinschaftseinrichtung der Deutschen Gesetzlichen Unfallversicherung
vormals: Zentrale Erfassungsstelle asbeststaubgefährdeter Arbeitnehmer (ZAs)

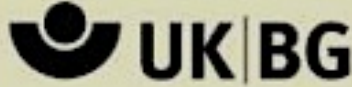
Bitte geben Sie Benutzernamen und Kennwort ein.

Benutzername:


Kennwort:

Bitte Groß- und Kleinschreibung beachten!

[Kennwort vergessen? / Benutzerkennung beantragen](#)



| |
|----------------------------|
| Aufträge |
| Zweitbeurteilungen |
| ILO-/ICOERD-Klassifikation |
| Persönliche Kontaktdaten |
| Mein Profil |
| Berechtigungen |
| Logout |



| |
|----------------------------|
| Aufträge |
| Zweitbeurteilungen |
| ILO-/ICOERD-Klassifikation |
| neu |
| in Bearbeitung |
| fertiggestellt |
| Zusatzuntersuchungen |
| Persönliche Kontaktdaten |
| Mein Profil |
| Berechtigungen |
| Logout |

Herzlich willkommen im Vorsorgeportal.

Verordnung zur arbeitsmedizinischen Vorsorge (ArbMedVV) vom 18.12.2008, zuletzt geändert durch Art. 1 der Verordnung vom 23.10.2013

Die Änderungsverordnung ist am 31.10.2013 in Kraft getreten. Den Text der neuen ArbMedVV und „Fragen und Antworten zur ArbMedVV“ des Bundesministeriums für Arbeit und Soziales finden Sie hier:

[Link: ArbMedVV](#)
[Link: Fragen und Antworten zur ArbMedVV](#)

Eine wesentliche Änderung ergibt sich gegenüber den bisherigen Vorschriften: Die Arbeitgeber sind verpflichtet, die körperliche oder klinische Untersuchungen der Ärzte oder die Ärzte deren Erforderlichkeit nach pflichtgemäßem ärztlichem Ermessen zu prüfen und den oder die Beschäftigten über die Inhalte, den Zweck und die Risiken der Untersuchung aufzuklären hat.

Die Anpassung der Formulare und insbesondere des Untersuchungsbogens „Mineralischer Staub“ an die neuen Erfordernisse wird einige Zeit beanspruchen. Bis dahin empfehlen wir, die Aufträge - unter Beachtung der neuen ArbMedVV - wie bisher zu bearbeiten.

Vielen Dank.

[Link: Benutzerhandbuch für das Vorsorge-Portal Version 1.7 \(1,2 MB\)](#)

Neue ILO-/ICOERD-Klassifikation (bildmorphologisch) LV-Nr: 11626964 Dr. med. Hering Kurt Georg, Dortmund

Zur Bearbeitung bitte Untersuchungstermin/Uhrzeit eintragen und anschließend das Feld mit der TAB-Taste verlassen.

| Auftrags- datum | UV-T | Name, Geb.-datum | U-Art | Vor- befund | HRCT | DIVA Wismut | GS | Fälligkeits- termin | Untersuchungs- termin/Uhrzeit | Status Satz I - IV | Indiv. Status |
|--------------------|------|------------------|-------|----------------|------|----------------|----|------------------------|----------------------------------|-----------------------|------------------|
|--------------------|------|------------------|-------|----------------|------|----------------|----|------------------------|----------------------------------|-----------------------|------------------|

Diagnostic Radiology of Occupational and Environmental Diseases

Reading ICOERD in an Online-Setting

| | | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------------------------|--------------------------|-----------------------------|-------------------------|
| CT-Nr. / Datum <input type="text"/> / <input type="text"/> | | Technical Data | | | |
| Schichtzahl <input type="text"/> | CTDI <input type="text"/> | Sequenztechnik <input type="checkbox"/> | kV <input type="text"/> | Position | Qualität |
| Schichtdicke <input type="text"/> | DLP <input type="text"/> | Single slice Spir. <input type="checkbox"/> | mAs <input type="text"/> | BL <input type="checkbox"/> | 1 <input type="radio"/> |
| Fenstereinstellungen <input type="text"/> | BMI <input type="text"/> | Multi slice Spir. <input type="checkbox"/> | sec <input type="text"/> | RL <input type="checkbox"/> | 2 <input type="radio"/> |
| | | | | KM <input type="checkbox"/> | 3 <input type="radio"/> |
| | | | | | 4 <input type="radio"/> |
| Symbole | | Symbols | | | |
| Lunge | | Lung | | | |
| Pleurale Befunde | | Pleural Abnormalities | | | |
| Bemerkung / Zusammenfassung | | Comment / Summary | | | |
| Die nächste Vorsorgeuntersuchung ist durchzuführen am: <input type="text"/> (mm.jjjj) | | | | | |
| <div></div> | | | | | |
| ICOERD-Klassifikation wurde durchgeführt von: | | ICOERD-Reader | | | |
| <div>Dr. med. Kurt Georg Hering Am Knappschafts Krankenhaus 1 44309 Dortmund</div> | | | | | |
| <div>Aufträge</div> <div>Zweitbeurteilungen</div> <div>ILO-/ICOERD-Klassifikation</div> <div>neu</div> <div>in Bearbeitung</div> <div>fertiggestellt</div> <div>Zusatzuntersuchungen</div> | | | | | |

Reading ICOERD in an Online-Setting

Conclusion and Take Home Points:

- ◆ HRCT-findings of occupational respiratory lung diseases should be classified using a standardized coding and scoring system. Reference films are obligatory to harmonize description and documentation to achieve a reproducible score of the disease.
- ◆ Using the coding system as part of guidelines for coding asbestosis, asbestos-related pleural findings, silicosis and other occupational lung diseases, the HRCT-reference films are part of the standardized classification system (ICOERD).
- ◆ The documentation of reading and general surveillance data of dust exposed workers at a Online-Server meets the demand for displaying, reading, classifying and reproducing subject data.
- ◆ Online-access and data protection according to the German [Data Protection Directive](#)

Diagnostic Radiology of Occupational and Environmental Diseases

ICOERD: Comments and Conclusion

Comments / Summary

Give a final judgement!

Date

Signature

Thank you for your attention!

Diagnostic Radiology of Occupational and Environmental Diseases
