

Brief Overview of the ILO System for Classifying Chest Radiographs

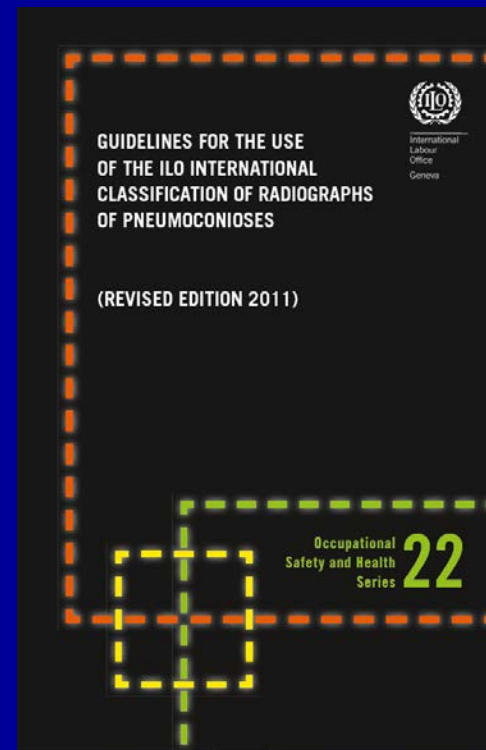
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National Institute for Occupational Safety and Health
Morgantown, WV

The findings and conclusions in this report are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health.



The ILO Classification



- International Conference on Silicosis, Johannesburg, 1930
 - Modifications/revisions 1950, 1959, 1970, 1980, 2002
 - Most recent revision 2011 for digital radiography
- “A means for describing and recording systematically the radiographic abnormalities in the chest provoked by the inhalation of dusts.”

NIOSH “B” Reader Program

- Certifies licensed physicians as proficient in the classification of chest x-rays of the pneumoconioses using the International Labour Office (ILO) Classification System
- Developed in response to large inter-reader variability early in the Coal Worker’s X-ray Surveillance Program.
- Fully operational since 1978.
- Self-study syllabus available
- “B” Reader: passed the B-reader certification examination.
- Information
 - <https://www.cdc.gov/niosh/topics/chestradiography/breader.html>
 - <https://www.cdc.gov/niosh/topics/chestradiography/breader-info.html>

NIOSH Form for ILO Classification Of Chest X-rays

Classified items:

- Film quality
- Abnormalities
 - Parenchymal
 - Pleural
 - Other

CHEST RADIOGRAPH CLASSIFICATION
 FEDERAL MINE SAFETY AND HEALTH ACT OF 1977
 DEPARTMENT OF HEALTH AND HUMAN SERVICES
 CENTERS FOR DISEASE CONTROL & PREVENTION
 Coal Workers' Health Surveillance Program
 National Institute for Occupational Safety and Health
 1095 Willowdale Road, MS LB208
 Morgantown, WV 26505
 FAX: 304-285-6058

Reset Form

OMB No.: 0920-0020
 CDC/NIOSH (M) 2.8
 REV. 01/2015

DATE OF RADIOGRAPH (mm-dd-yyyy) - -

EXAMINEE'S Social Security Number - -

FACILITY Number - Unit Number -

TYPE OF READING
 A B F

Full SSN is optional, last 4 digits are required.

Note: Please record your interpretation of a single radiograph by placing an "x" in the appropriate boxes on this form. Classify all appearances described in the ILO International Classification of Radiographs of Pneumoconiosis or Illustrated by the ILO Standard Radiographs. Use symbols and record comments as appropriate.

1. IMAGE QUALITY

<input type="checkbox"/> Overexposed (dark)	<input type="checkbox"/> Improper position	<input type="checkbox"/> Underinflation
<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4	<input type="checkbox"/> Underexposed (light)	<input type="checkbox"/> Poor contrast
(If not Grade 1, mark all boxes that apply)	<input type="checkbox"/> Artifacts	<input type="checkbox"/> Poor processing
		<input type="checkbox"/> Mottle
		<input type="checkbox"/> Other (please specify) _____

2A. ANY CLASSIFIABLE PARENCHYMAL ABNORMALITIES? YES Complete Sections 2B and 2C NO Proceed to Section 3A

2B. SMALL OPACITIES

a. SHAPE/SIZE

PRIMARY	SECONDARY
<input type="checkbox"/> P <input type="checkbox"/> S	<input type="checkbox"/> P <input type="checkbox"/> S
<input type="checkbox"/> Q <input type="checkbox"/> T	<input type="checkbox"/> Q <input type="checkbox"/> T
<input type="checkbox"/> F <input type="checkbox"/> U	<input type="checkbox"/> F <input type="checkbox"/> U

b. ZONES

R L	
UPPER	<input type="checkbox"/>
MIDDLE	<input type="checkbox"/>
LOWER	<input type="checkbox"/>

c. PROFUSION

<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2
<input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
<input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8

2C. LARGE OPACITIES

SIZE O A B C Proceed to Section 3A

3A. ANY CLASSIFIABLE PLEURAL ABNORMALITIES? YES Complete Sections 3B, 3C NO Proceed to Section 4A

3B. PLEURAL PLAQUES (mark site, calcification, extent, and width)

Chest wall	Site	Calcification	Extent (chest wall; combined for in profile and face on)	Width (in profile only) (3mm minimum width required)
In profile	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L	Up to 1/4 of lateral chest wall = 1 1/4 to 1/2 of lateral chest wall = 2 > 1/2 of lateral chest wall = 3	3 to 5 mm = a 5 to 10 mm = b > 10 mm = c
Face on	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L		<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L <input type="checkbox"/> O <input type="checkbox"/> L
Diaphragm	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	<input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c
Other site(s)	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	<input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c

3C. COSTOPHRENIC ANGLE OBLITERATION R L Proceed to Section 3D NO Proceed to Section 4A

3D. DIFFUSE PLEURAL THICKENING (mark site, calcification, extent, and width)

Chest wall	Site	Calcification	Extent (chest wall; combined for in profile and face on)	Width (in profile only) (3mm minimum width required)
In profile	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L	Up to 1/4 of lateral chest wall = 1 1/4 to 1/2 of lateral chest wall = 2 > 1/2 of lateral chest wall = 3	3 to 5 mm = a 5 to 10 mm = b > 10 mm = c
Face on	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> O <input type="checkbox"/> R <input type="checkbox"/> L	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	<input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c

4A. ANY OTHER ABNORMALITIES? YES Complete Sections 4B, 4C, 4D, 4E NO Complete physician info and sign form

5. PHYSICIAN'S Social Security Number* - -

Full SSN is optional, last 4 digits are required.

READER'S INITIALS

DATE OF READING (mm-dd-yyyy) - -

SIGNATURE _____ PRINTED NAME (LAST, FIRST MIDDLE) _____

STREET ADDRESS _____ CITY _____ STATE ZIP CODE

CDC/NIOSH 2.6 (E), Revised January 2015, CDC Adobe Acrobat 11.0, S508 Electronic Version, August 2015

Save Form
Print

Note: Please record your interpretation of a single radiograph by placing an "x" in the appropriate boxes on this form. Classify all appearances described in the ILO International Classification of Radiographs of Pneumoconiosis or Illustrated by the ILO Standard Radiographs. Use symbols and record comments as appropriate.

1. IMAGE QUALITY

1 2 3 4

(If not Grade 1, mark all boxes that apply)

Overexposed (dark)

Underexposed (light)

Artifacts

Improper position

Poor contrast

Poor processing

Underinflation

Mottle

Other (please specify)

Film quality:

“1”: good, free of technical imperfections or artifacts

“2”: acceptable, no technical defects or artifacts likely to impair classification of the radiograph for pneumoconiosis (minor positioning errors, handling artifacts not overlying heart or lungs)

“3”: acceptable, with technical defects or artifacts but still adequate for classification purposes (minor over- or under-exposure, minor departures from proper contrast)

“4”: unacceptable for classification purposes (gross over- or under-exposure, motion, poor film screen contact, poor contrast)

2A. ANY CLASSIFIABLE PARENCHYMAL ABNORMALITIES?

YES Complete Sections 2B and 2C NO Proceed to Section 3A

2B. SMALL OPACITIES

a. SHAPE/SIZE

PRIMARY SECONDARY

p	s	p	s
q	t	q	t
r	u	r	u

b. ZONES

R L

UPPER	<input type="checkbox"/>	<input type="checkbox"/>
MIDDLE	<input type="checkbox"/>	<input type="checkbox"/>
LOWER	<input type="checkbox"/>	<input type="checkbox"/>

c. PROFUSION

0-	0/0	0/1
1/0	1/1	1/2
2/1	2/2	2/3
3/2	3/3	3/4

2C. LARGE OPACITIES

SIZE O A B C Proceed to Section 3A

Small opacities:

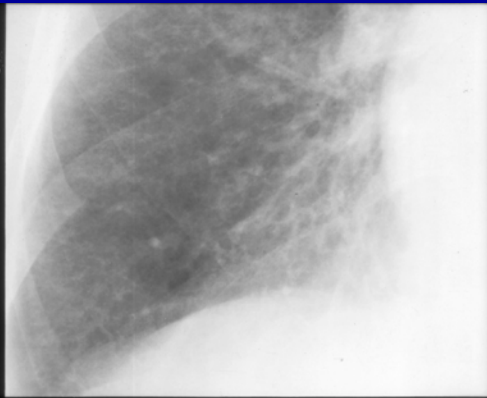
- Rounded: p – diameter up to 1.5mm; q – 1.5 to 3.0 mm; r - > 3.0mm to 10.0 mm
- Irregular: s – diameter up to 1.5mm; t – 1.5 to 3.0 mm; u - > 3.0mm to 10.0 mm

Profusion:

- “Concentration” of small opacities; number per unit of area
- Assessed relative to ILO standard radiographs. 0 represents no opacities and 3 the highest level of profusion
- Numerator: ILO major category most closely matched
- Denominator: ILO major category next most seriously considered
- Average score for significantly involved lung zones



p



s



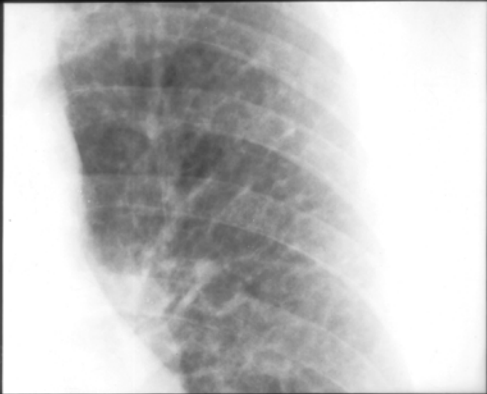
q



t



r

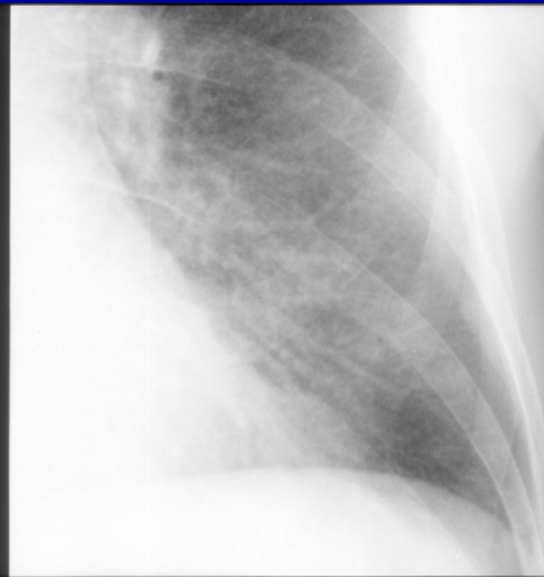


u

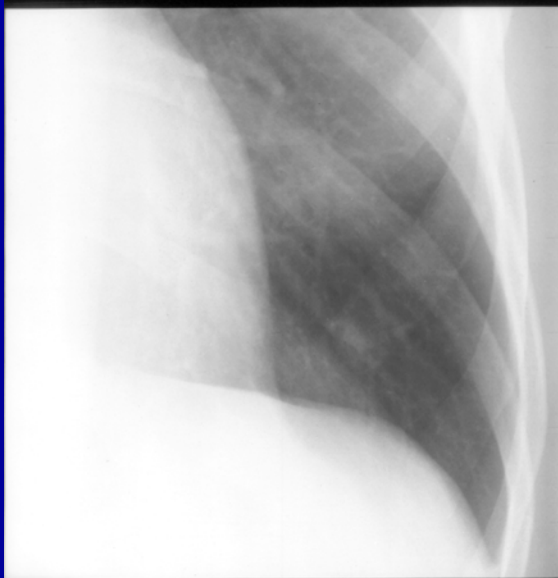




t/t - 1/1



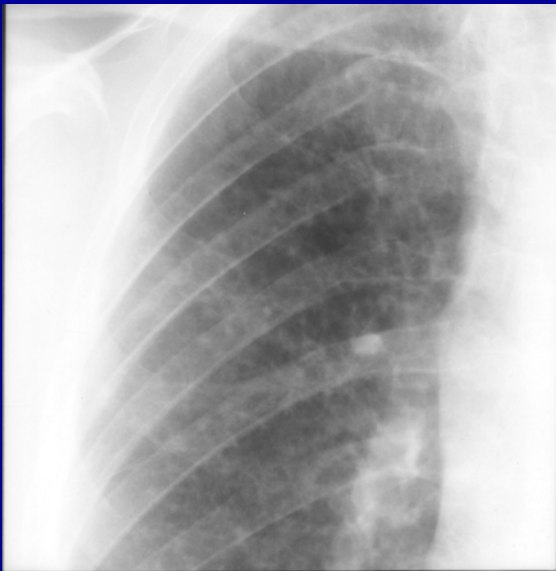
t/p - 2/2



normal - 0/0



t/t - 3/3



u/q - 1/1



u/q - 2/2



normal - 0/0



u/u - 3/3

2A. ANY CLASSIFIABLE PARENCHYMAL ABNORMALITIES?

YES Complete Sections 2B and 2C NO Proceed to Section 3A

2B. SMALL OPACITIES

a. SHAPE/SIZE

PRIMARY SECONDARY

P	S	p	s
Q	T	q	t
r	u	r	u

b. ZONES

R L

UPPER	<input type="checkbox"/>	<input type="checkbox"/>
MIDDLE	<input type="checkbox"/>	<input type="checkbox"/>
LOWER	<input type="checkbox"/>	<input type="checkbox"/>

c. PROFUSION

0/0	0/0	0/1
1/0	1/1	1/2
2/1	2/2	2/3
3/2	3/3	3/4

2C. LARGE OPACITIES

SIZE O A B C Proceed to Section 3A

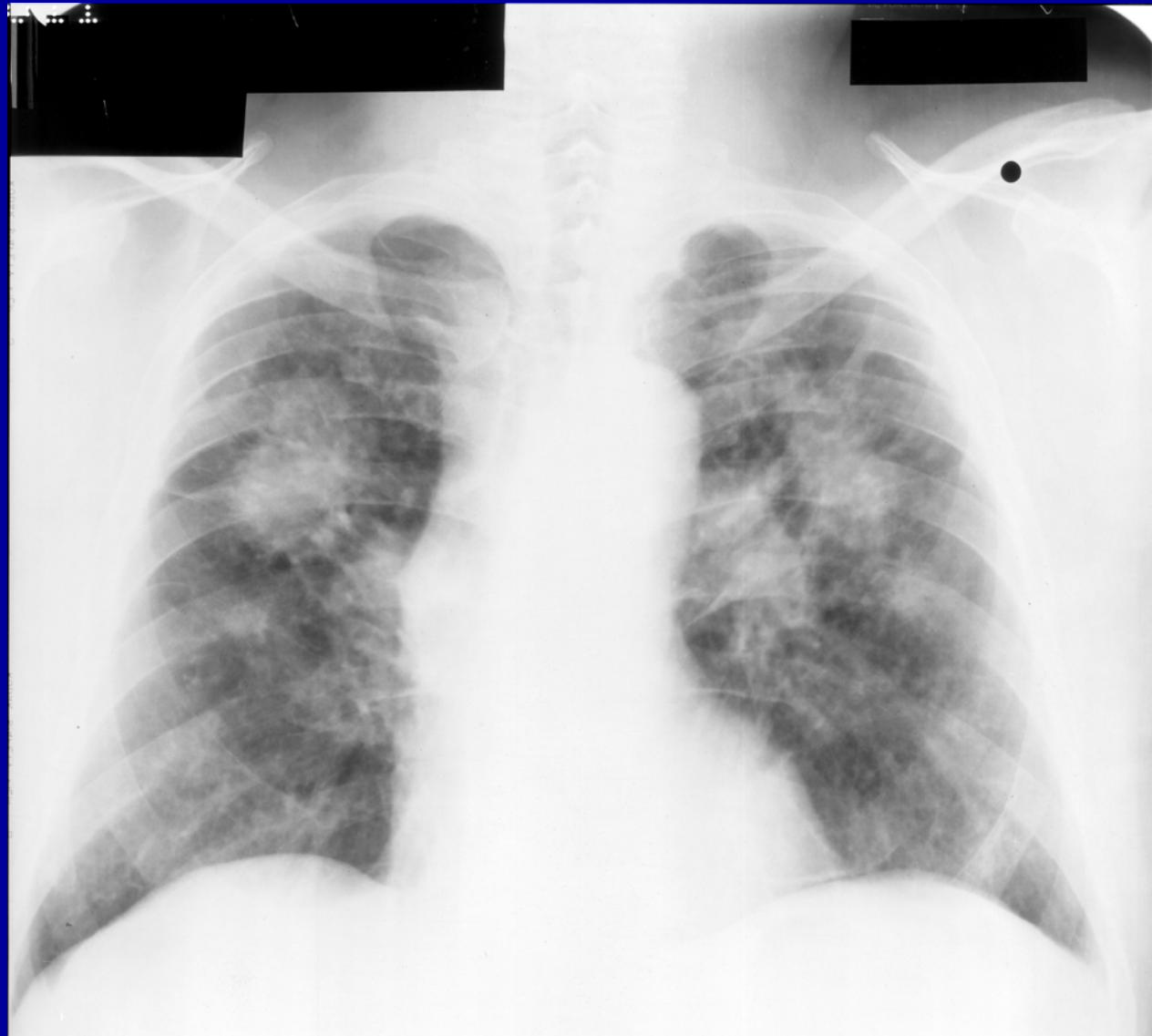
Large Opacities:

- 0 = none
- A = one opacity, greatest diameter > 10 mm and < 50 mm or several opacities each > 10mm but sum of diameters < 50 mm
- B = large opacity, greatest diameter > 50 mm but whose area is not greater than the right upper zone or several large opacities > 50 mm but sum of areas < RUZ.
- C = large opacity whose area exceeds RUZ or several large opacities whose areas when summed exceed the RUZ.

“A” Large Opacity



“B” Large Opacities



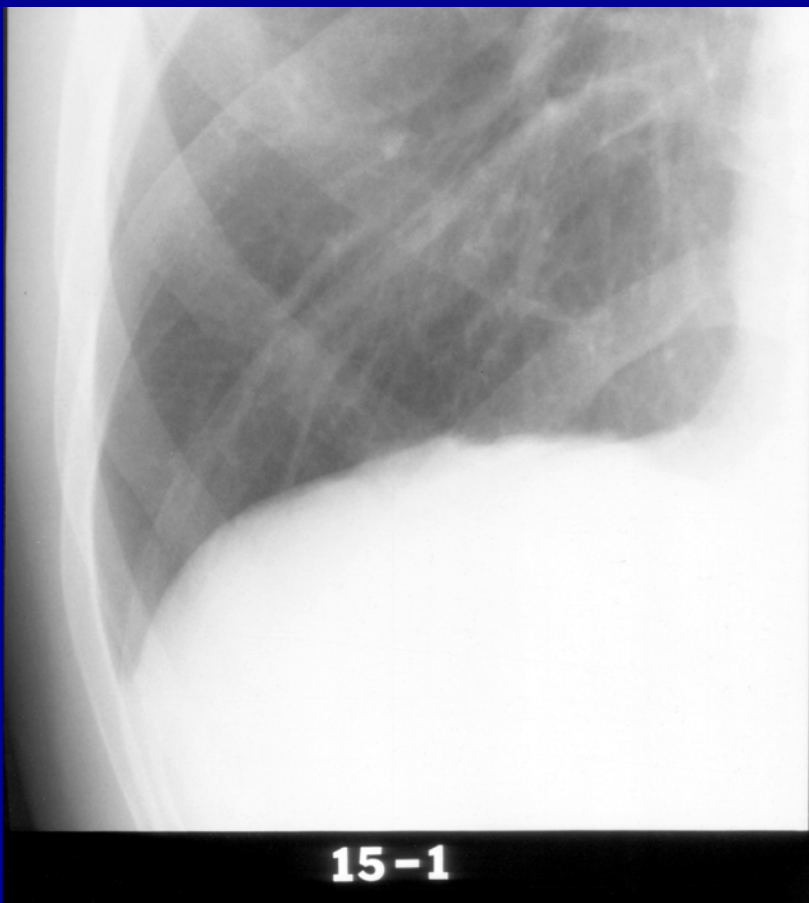
“C” Large Opacities



Pleural Abnormalities

3A. ANY CLASSIFIABLE PLEURAL ABNORMALITIES?		YES <input type="checkbox"/> Complete Sections 3B, 3C	NO <input type="checkbox"/> Proceed to Section 4A
3B. PLEURAL PLAQUES <i>(mark site, calcification, extent, and width)</i>			
Chest wall	<i>Site</i>	<i>Calcification</i>	<i>Extent (chest wall; combined for in profile and face on)</i> Up to 1/4 of lateral chest wall = 1 1/4 to 1/2 of lateral chest wall = 2 > 1/2 of lateral chest wall = 3
In profile	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Face on	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Diaphragm	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
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Hyaline Plaque



Calcified Plaque



In Profile and Face On Plaques



Costophrenic Angle Obliteration

Minimal Blunting Not Recorded



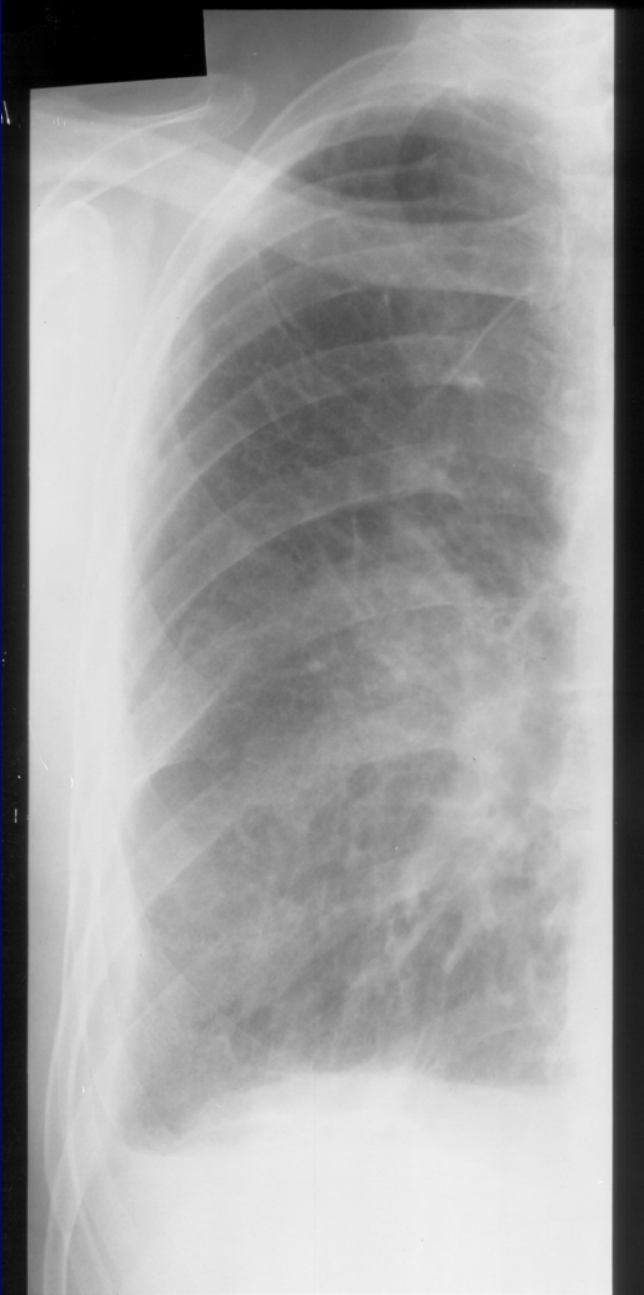
15-3

Substantial Blunting is Recorded



15-4

Diffuse Pleural Thickening



4B. OTHER SYMBOLS (OBLIGATORY)

aa at ax bu ca cg cn co cp cv di ef em es fr hi ho id ih kl me pa pb pi px ra rp tb

aa	atherosclerotic aorta	hi	enlargement of non-calcified hilar or mediastinal lymph nodes
at	significant apical pleural thickening	ho	honeycomb lung
ax	coalescence of small opacities - with margins of the small opacities remaining visible, whereas a large opacity demonstrates a homogeneous opaque appearance - may be recorded either in the presence or in the absence of large opacities	id	ill-defined diaphragm border - should be recorded only if more than one-third of one hemidiaphragm is affected
bu	bullae	ih	ill-defined heart border - should be recorded only if the length of the heart border affected, whether on the right or on the left side, is more than one-third of the length of the left heart border
ca	cancer, thoracic malignancies excluding mesothelioma	kl	septal (Kerley) lines
cg	calcified non-pneumoconiotic nodules (e.g. granuloma) or nodes	me	mesothelioma
cn	calcification in small pneumoconiotic opacities	pa	plate atelectasis
co	abnormality of cardiac size or shape	pb	parenchymal bands - significant parenchymal fibrotic stands in continuity with the pleura
cp	cor pulmonale	pi	pleural thickening of an interlobar fissure
cv	cavity	px	pneumothorax
di	marked distortion of an intrathoracic structure	ra	rounded atelectasis
ef	pleural effusion	rp	rheumatoid pneumoconiosis
em	emphysema	tb	tuberculosis
es	eggshell calcification of hilar or mediastinal lymph nodes		
fr	fractured rib(s) (acute or healed)		

aa atherosclerotic aorta
at apical thickening
ax coalescence of opacities
bu bullae
ca cancer
cg calcified granuloma or node
cn calcified pneumoconiotic opacity
co abnormal cardiac size or shape
cp cor pulmonale
cv cavity
di distortion intrathoracic organs
ef effusion
em emphysema
es eggshell calcification node
fr fractured rib(s)

hi enlarged hilar or mediastinal nodes
ho honeycomb lung
id ill-defined diaphragm
ih ill-defined heart outline
kl kerley lines, septal lines
me mesothelioma
pa plate atelectasis
pb parenchymal bands
pi pleural thickening intralobar fissure
px pneumothorax
ra rounded atelectasis
rp rheumatoid pneumoconiosis
tb tuberculosis (not primary complex)
OD other disease (make comment)

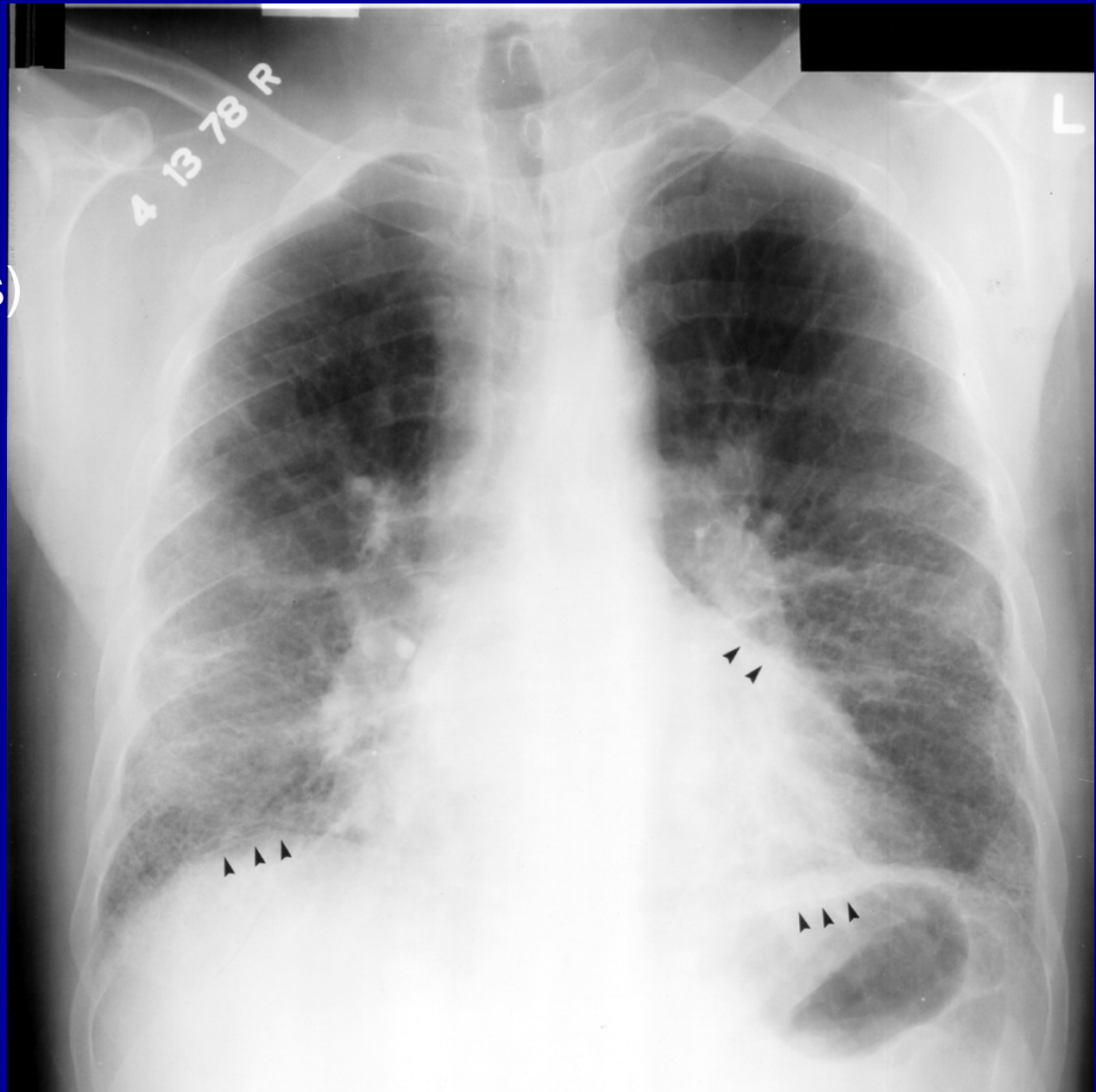
Asbestosis

Film quality: 2
(scapula over lungs)

s/s, 2/3

Fine linear
calcifications
diaphragms and lt
heart border
(arrowheads)

ho (rt. lower zone),
ih, id



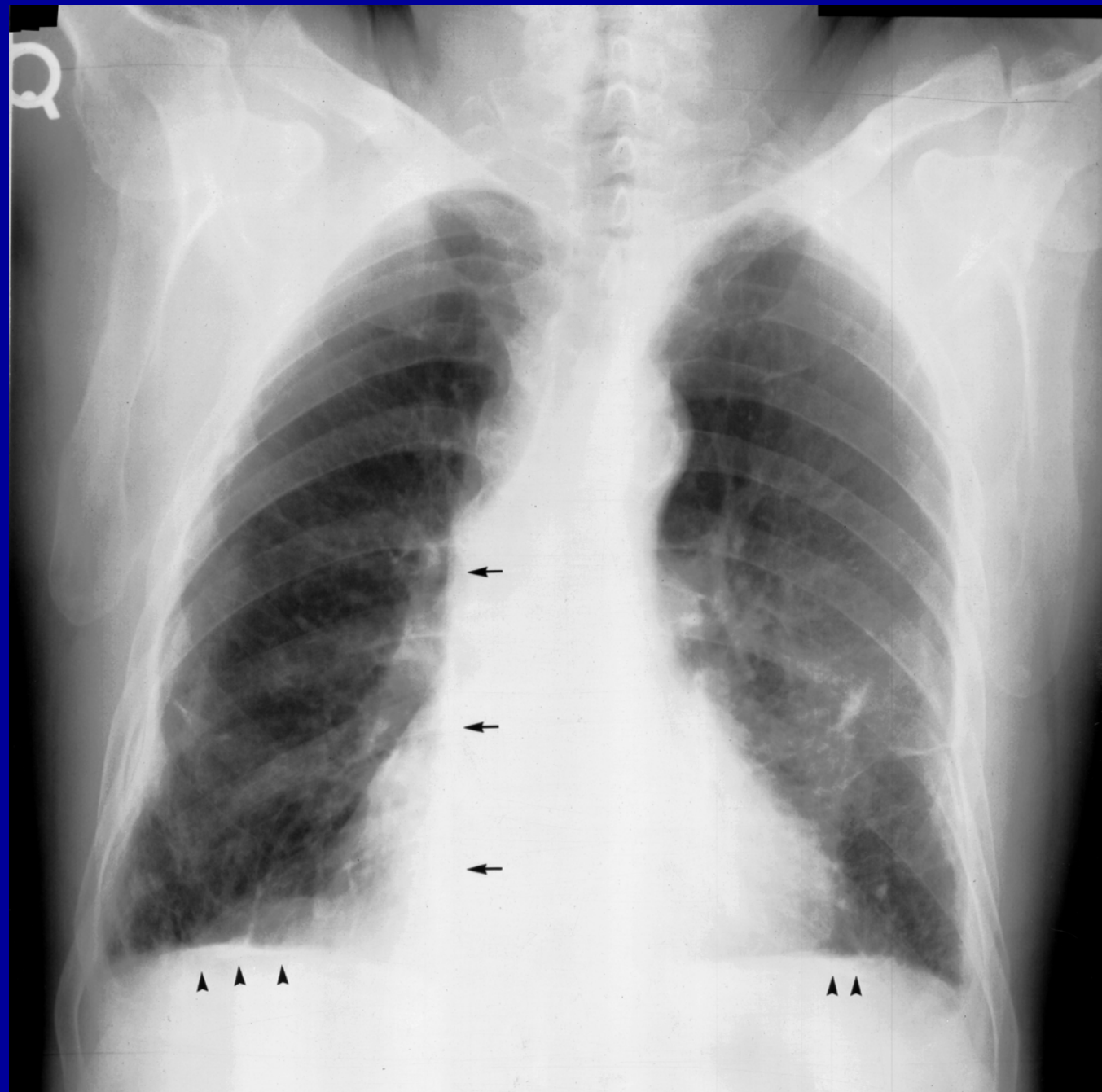
Asbestosis

Film quality: 2
(roller marks)

s/t, 1/2

calcifications
(arrowheads); *in
profile* plaque (rt);
face on plaque
(lt); costophrenic
blunting (bilat);
diffuse thickening
(lt)

ih, id, co



Coal Worker's
Pneumoconiosis

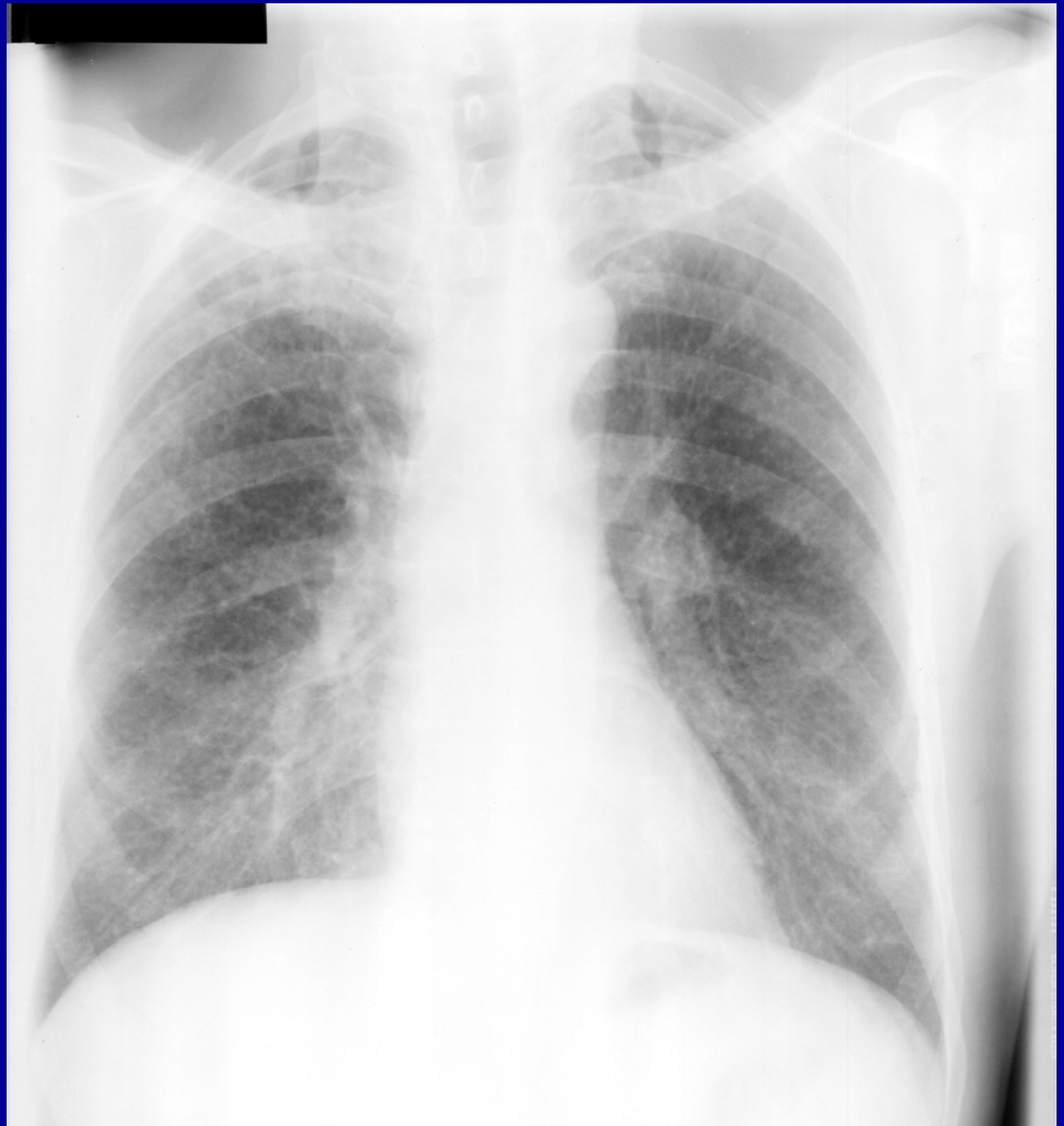
Film quality: 1

q/s, 2/3

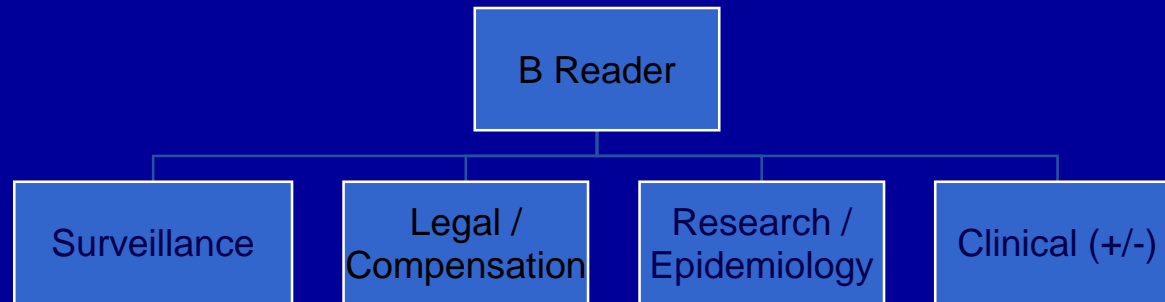
RUZ "A" Large
opacity

No pleural
abnormalities

ax, tb



Settings for Film Classification by B Readers



- B Readers classify chest radiographs in a variety of settings
- Depending on setting, the following approaches should be considered:
 - choose B-readers in the mainstream of reading tendencies
 - use multiple readers
 - use blinded readers
 - Monitor performance of readers and provide feedback

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