SUMMARY OF COVID 19 IMAGING

➲ **DEFINITION:** **COVID-19** (**coronavirus disease 2019**) is an infectious disease caused by **severe acute respiratory syndrome.**

➲ **1ˢᵗ case:** Wuhan, China **Dec 2019**

→ spread all over the world as **pandemic.**

➲ **Incubation Period:** 5 : 14 days

➲ **TTT or vaccine :** **Non up till now**

➲ **Mortality rate:** 2-3 %

➲ **Diagnosis :**

✓ **Definitive test** → PCR (false negatives are a real clinical problem)

COVID-19 =
Corona Virus Disease-19
SARS-CoV-2
Severe Acute Respiratory Syndrome Coronavirus 2

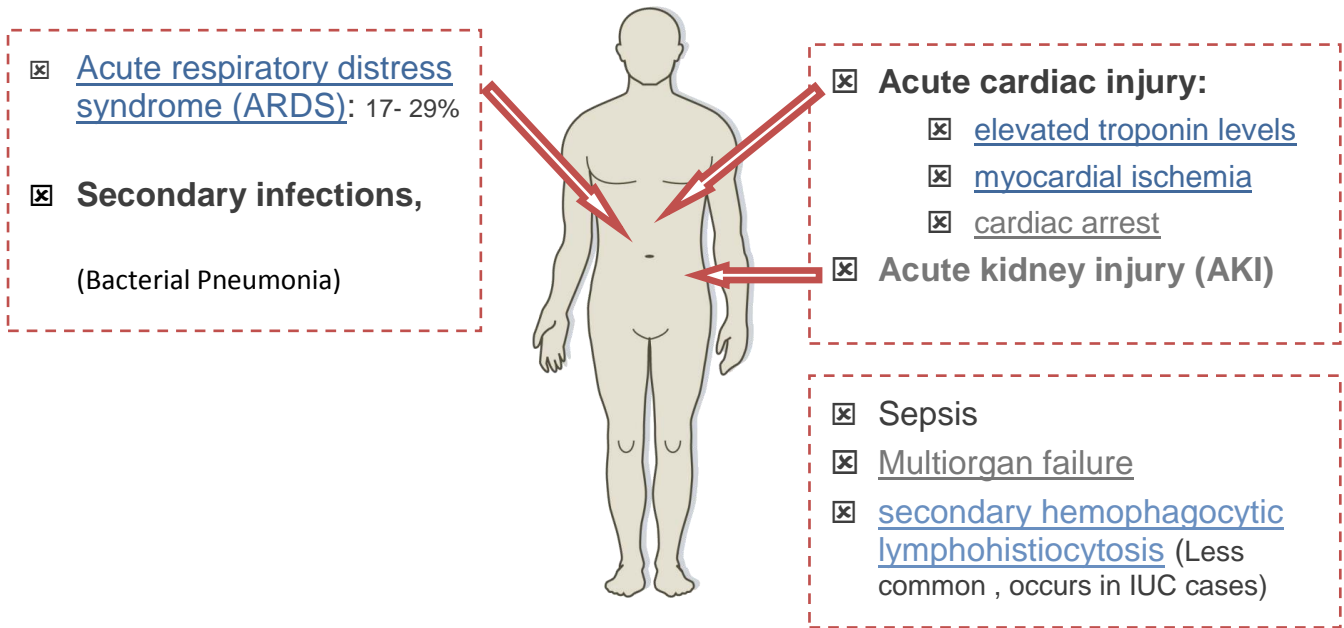**Several negative tests might be required in a single case to be confident to exclude**

✓ **Lab :** **lymphopenia** / increased **prothrombin time (PT)** /

increase **lactate dehydrogenase**

NB: Epidemiological parameters of any new disease are likely to change as larger cohorts of infected people are studied,

COVID 19	CLINICAL PICTURE	Generally Non specific
Common > 20%	**Less common** 10-15%	**Rare**
✓ **Fever** 85-90% ✓ **Cough** 65-70% ✓ **Fatigue** 35-40% ✓ **Sputum** production 30–35% ✓ **Dysponea** 15-20%	➲ **Myalgia**/arthralgia ➲ Headaches ➲ Sore throat ➲ Chills ➲ **Pleuritic pain**	1. nausea, vomiting, <10% 2. Nasal congestion <10% 3. Diarrhea < 5% 4. Palpitations, 5. Chest tightness

Children

➲ Relatively unaffected by this virus,

➲ Infants under 12 months likely to be more seriously affected.

➲ Incubation period shorter than in adults, (about **2 days**)

➲ Presentation in children is milder than in Adults

⊃ Complications :

☒ <u>Acute respiratory distress syndrome (ARDS)</u>: 17- 29%

☒ **Secondary infections,**

(Bacterial Pneumonia)

☒ **Acute cardiac injury:**
  - ☒ <u>elevated troponin levels</u>
  - ☒ <u>myocardial ischemia</u>
  - ☒ <u>cardiac arrest</u>

☒ **Acute kidney injury (AKI)**

☒ Sepsis

☒ <u>Multiorgan failure</u>

☒ <u>secondary hemophagocytic lymphohistiocytosis</u> (Less common , occurs in IUC cases)

COVID 19 IMAGING:

Medical Imaging Staff are

In **the frontline** in dealing with COVID-19,

Clear infection control guidelines are a must.

✓ Modalities: CXR , CT

✓ **In COVID 19, Imaging is:**

  ✓ Not indicated in suspected case with mild symptoms

  ✓ Indicated as Respiratory symptoms worse.

  ✓ Has limited sensitivity for COVID-19 diagnosis ,

⊃ **CT Protocol :**

  ✓ **Non contrast CT chest** "Unless indicated to specific cause" eg. angio

  ✓ **0.625-mm** to **1.5-mm** slice thickness (gapless)

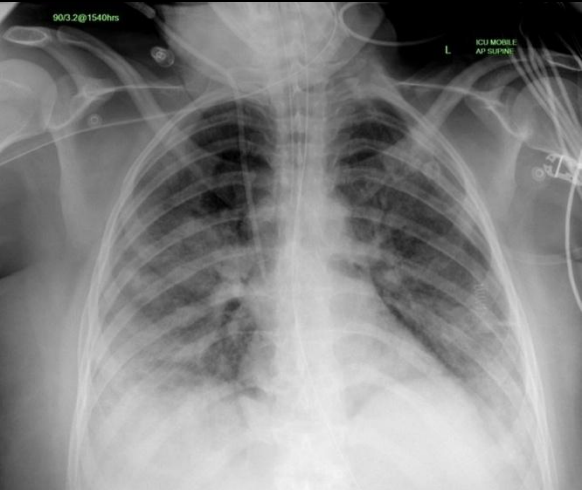## ⊃ IMAGING FINDING

COVID 19 has NO PATHOGNOMONICs

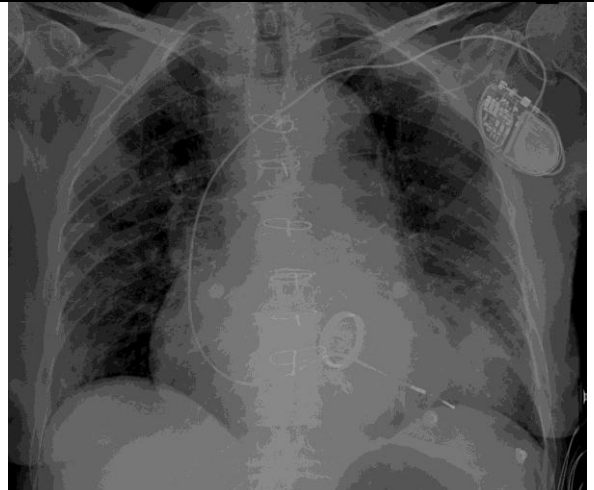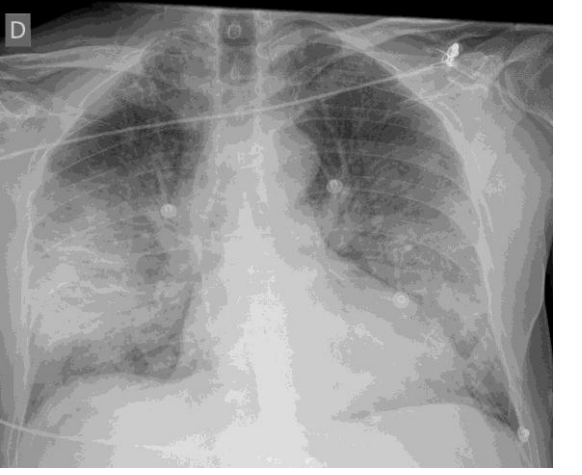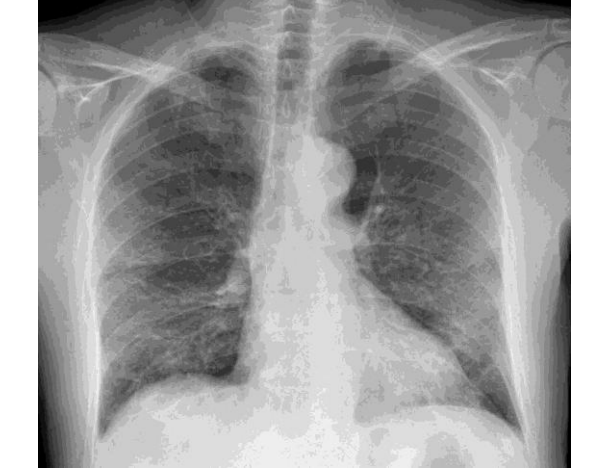**Bilateral &/or Multilobar involvement is common**

CXR or CT → Normal

- Up to **18%** in mild or early disease

- Only **3%** in severe disease.

SUMMARY OF COVID 19 IMAGING

➲ CXR :

- o 1st line of imaging.
- o Less sensitive than chest CT
- o Use of portable radiography units is preferred.

✓ **Normal** : in early or Mild cases

✓ **The most frequent findings :**

- ▪ Airspace opacities : bilateral, peripheral, & lower zone predominant
- ▪ Pleural Effusion : **Rare**

Patchy areas of air space opacification bilaterally with a lower zone predominance.	consolidation at both lung bases as well as in the peripheral mid zones.The heart is enlarged
Bilateral ground-glass alveolar consolidation with peripheral distribution	➲ No significant findings reported. ➲ Subtle ground-glass pattern can be seen in both lungs, with peripheral distribution.

SUMMARY OF COVID 19 IMAGING

➲ **CT** : **(4 stages in duration / 4 Categories in reporting)**

CT findings had the highest discriminatory value:
- ✓ Peripheral distribution
- ✓ Ground-glass opacity
- ✓ Broncovascular thickening (with in lesions)

➲ **Primary CT Finding:**

- ✓ Ground-glass opacities (GGO): Bilateral, subpleural, peripheral & Basal
- ✓ Crazy paving appearance (GGOs and inter-/intra-lobular septal thickening)
- ✓ Consolidation
- ✓ Bronchovascular thickening in the lesion
- ✓ Traction bronchiectasis

4 Stages of CT Finding			
Early/initial stage (0-4 days)	**Progressive stage** (5-8 days)	**Peak stage** (9-13 days)	**Absorption stage** (>14 days)
Normal CT or GGO only	-increased GGO and crazy paving appearance	Consolidation	- improvement in the disease course, - **"Fibrous stripes"** appear
Abnormalities resolve at one month and beyond			

➲ **Atypical CT Finding:**

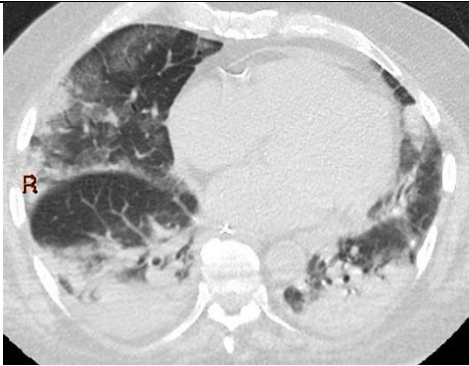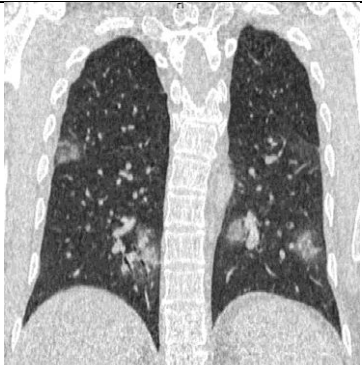**(Adenopathy / Pleural Effusion /Cavity / Nodules / Pneumothorax/ tree in bud)**

Only seen in a small minority of patients

COVID-19

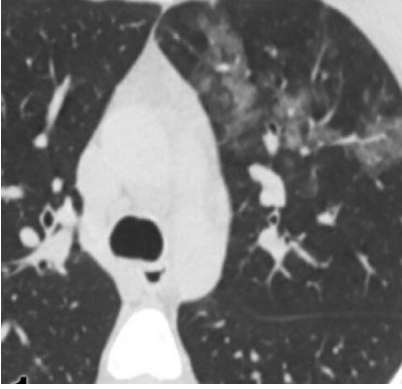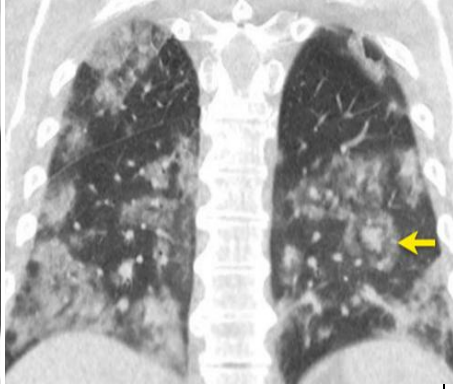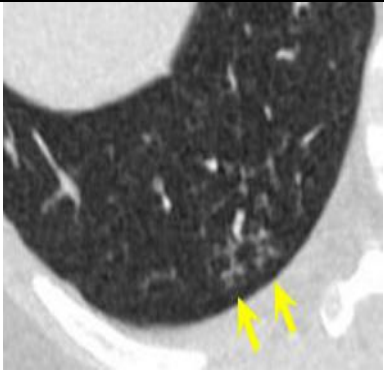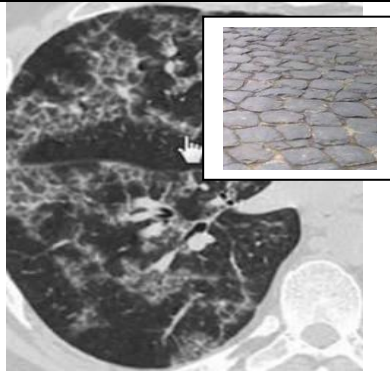| **Typical findings**	**Atypical findings**
Multifocal groundglass opacities	Central or peribronchovascular
Peripheral and basal distribution	More apical distribution
Unsharp demarcation	Lymphadenopathy *
Vascular thickening	
Round	**Very Atypical**
Crazy paving	Cavitation - calcification
Ground glass and Consolidations	Tree-in-bud, bronchiolitis
(Reversed) halo	Nodular pattern
Spider web	Mass
	Pleural thickening

➲ Radiology Report (**4 Categories**)

Radiological Society of North America (RSNA) ,Society of Thoracic Radiology and the American College of Radiology (ACR) that classifies the CT appearance of COVID-19 into **4 categories** for standardized reporting language :

	Typical	**Intermediate**	**Atypical**	**Negative**
GGO	-Peripheral, bilateral, more basal or -Multifocal,Round	-Few, very small Non rounded Non peripheral	**No**	**No**
Conolidation	+/-	-Non Rounded -Non peripheral	- Isolated - Lobar or segmental	**No**
Reverse hallo Sign	+/-	No	No	-
Crazy Pavin	+/-	No	No	-
			Others : -Small Nodules -Tree in bud - Effusion	

-Multifocal consolidation and ground-glass opacifications. - Peripheral and basal predominance	Multiple patchy ground glass opacities and consolidations are scattered in both lungs predominantly at subpleural	Bilateral large areas of ground-glass opacities with crazy paving and, more evident at both bases, areas of consolidation

Consolidation	**Ground Glass Opacity**	**Halo Sign**
Notice air bronchogram with in	Area of hazy increased lung opacity, ground glass = الزجاج المصنفر	Ground-glass opacity surrounding a nodule or mass
Tree In Bud	**Crazy paving**	**Traction Bronchiactasis**
dilated bronchioles, thick walled & filled with exudate	thickened interlobular septa and intralobular lines on a background of ground-glass opacity,	Irreversible dilatation of bronchi and bronchioles within areas of pulmonary fibrosis or distorted lung parenchymal architecture.

CO-RADS classification & Reporting

CO-RADS*		
Level of suspicion COVID-19 infection		
		CT findings
CO-RADS 1	No	normal or non-infectious abnormalities
CO-RADS 2	Low	abnormalities consistent with infections other than COVID-19
CO-RADS 3	Indeterminate	unclear whether COVID-19 is present
CO-RADS 4	High	abnormalities suspicious for COVID-19
CO-RADS 5	Very high	typical COVID-19
CO-RADS 6	PCR +	

CT-Report	
Duration of complaints	in days
CT findings	GGO - consolidation - distribution Crazy paving (Reversed) halo - spider web sign Vascular thickening Pleural fluid Enlarged lymph nodes etc
CORADS	Determine level of suspicion COVID-19
CT severity score	
Additional findings	co-morbidity
Conclusion	CORADS Severity

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SOURCES:

- ✓ https://radiopaedia.org/articles/covid-19-3?lang=us

- ✓ https://radiopaedia.org/search?lang=us&q=covid+19

- ✓ https://radiologyassistant.nl/chest/covid-19-corads-classification
- ✓ **CHEST IMAGING WHAT EVERY RADIOLOGIST SHOULD KNOW**

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