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COVID-19 Preliminary Research

John Hopkins Medicine: What Coronavirus Does to the Lungs
https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/what-coronavirus-does-to-the-lungs

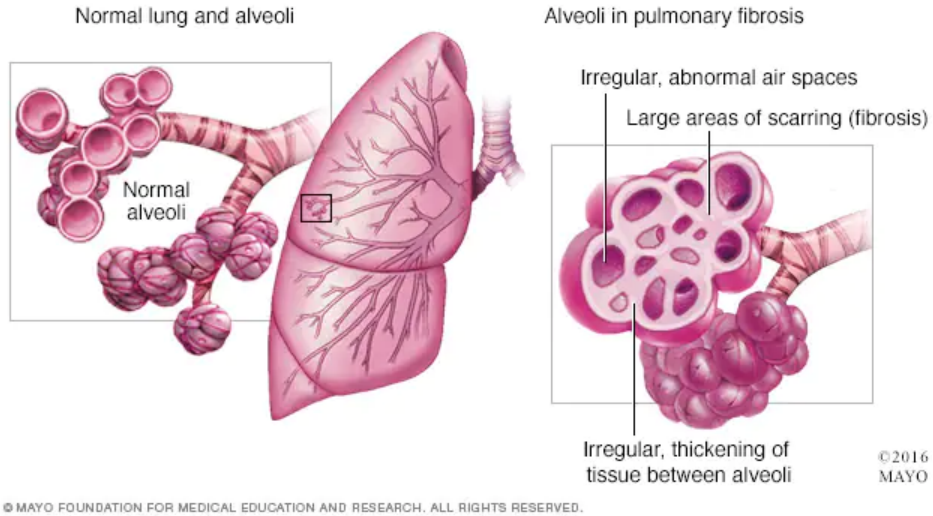
- COVID can cause pneumonia and or acute respiratory distress syndrome (ARDS) in severe cases
- newer variants have shown to also cause bronchitis
- **Pneumonia**:
  - lungs become filled with fluid, inflamed
  - pneumonia caused by COVID-19 tend to take hold in both lungs
  - people usually recover from pneumonia without lasting lung damage, but pneumonia caused by COVID-19 can cause long lasting breathing difficulties
- **Bronchitis**:
  - excess amount of sputum(saliva) in airways
  - patients can experience coughing that stays for months after being infected/recovering from COVID-19
- **ARDS**:
  - air sacs fill with fluid leaking from blood vessels in the lungs
  - ARDS is a form of lung failure
  - patients with ARDS may require a ventilator, unable to breath on their own
- **Sepsis**:
  - occurs when an infection reaches, and spreads through, the bloodstream, causing tissue damage everywhere it goes
  - disrupts cooperation between organs
  - can cause lasting damage to lungs and other organs
- **3 factors**:
  - Severity: how severe the COVID-19 case itself is
  - Health conditions: patients with existing health problems can raise the risk for severe disease. Lungs can already be weak from pre-existing health conditions and older age
  - Treatment: timely support for a patient's recovery can affect how much lung damage is done

WebMD, Coronavirus in the Lungs: What Does COVID-19 Do to your Lungs
https://www.webmd.com/lung/what-does-covid-do-to-your-lungs#1

- chest CT scans may show something called a "ground-glass opacity" because it looks like frosted glass
- severe and critical cases fill air sacs with mucus, fluid, and cells that try to fight the infection that make it harder to breathe
    - lungs become inflamed making it harder to swap oxygen and carbon dioxide
    - critically ill patients can develop clots in lungs, heart, brain, legs, can be life threatening
    - some severe cases have had patients get scarring in their lungs

JAMA Network: Autopsies Reveal Lung Damage Patterns From COVID-19
https://jamanetwork.com/journals/jama/fullarticle/2787569

- COVID-19 infects respiratory epithelial cells, aid in generating and repairing lung tissue
- individuals who died more than 20 days following COVID-19 symptoms showed high levels of pulmonary fibrosis
    - Pulmonary fibrosis: scars and thickens tissue of air sacs in lungs making it harder to breathe



- patients also had widespread Thrombosis
    - Thrombosis: occurs when blood clots veins or arteries, can lead to strokes and heart attack

Forbes: New Insights Into Lung Damage and Repair Relevant to COVID-19
https://www.forbes.com/sites/williamhaseltine/2022/01/06/new-insights-into-lung-damage-and-repair-relevant-to-covid-19/?sh=30be659e138e

- lungs that have sustained damage from COVID-19 are characterized by the abnormal presence of basal cells in the tiny air sacs, known as alveoli, of the lungs

    - misplaced basal cells interrupt healing, lead to impaired lung function that can kill the patient
- AEC2 cells responsible for maintenance and regeneration are found in the alveoli,
    - in both in vitro and in vivo models, hAEC2 cells transformed into KRT5+ basal cells
    - this transformation happens in response to severe injuries in the alveolus and it can change the architecture of the lungs leading to further damage and impaired healing

National Heart, Lung, and Blood Institute: COVID-19 and the Lungs
https://www.nhlbi.nih.gov/coronavirus/lungs

- COVID-19 enters cells through the ACE2 molecule, responsible for reducing inflammation, and multiplies
    - because it enters through ACE2, the property of reducing inflammation is lost because COVID-19 not occupies that molecule

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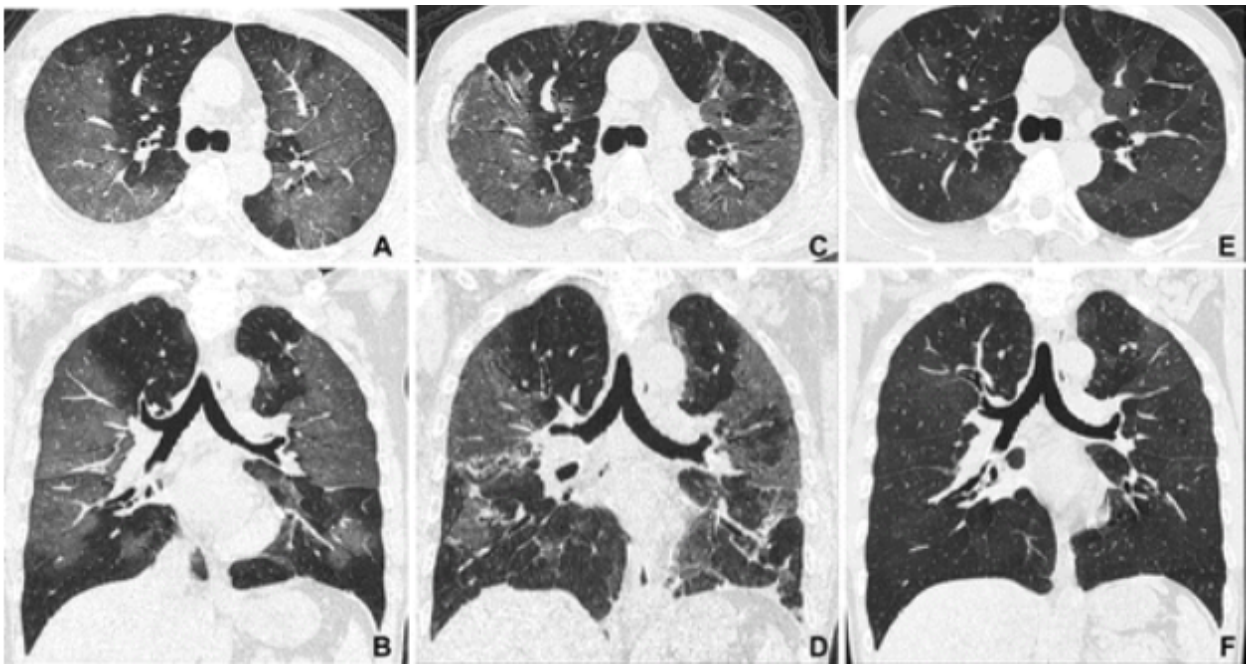
COVID-19 Severity in Lung CT Scans

Six-month Follow-up Chest CT Findings after Severe COVID-19 Pneumonia

https://pubs.rsna.org/doi/full/10.1148/radiol.2021203153#:~:text=A%20cutoff%20CT%20score%20value,patients%20with%20CODE%2D19%20 pneumonia.

Shows damage to the lungs due to COVID-19 6 months after first scan.



Correlation between Chest CT Severity Scores and the Clinical Parameters of Adult Patients with COVID-19 Pneumonia

https://www.hindawi.com/journals/rrp/2021/6697677/

This article shows findings of doctors analyzing severity of covid 19 from analyzing the lungs ct scans.
From the article:

Our study correlates the CT severity score with the clinical severity of the patients who were confirmed to have COVID-19 disease using the 25-point visual quantitative assessment…CT severity score was found to be positively correlated with lymphopenia, increased serum CRP, d-dimer, and ferritin levels ().
The following images were used to rate the CT scans.