

WHAT CORONAVIRUS DOES TO THE BODY ?

**Here's an organ-by-organ look
at how COVID-19 harms humans**

Research by University of Michigan Medical School

CORONAVIRUS AFFECTS:

- The Lungs: Ground Zero
- Lungs 101
- The stomach: A shared gateway
- Blood storm
- Liver: Collateral Damage
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- Pregnancy & Coronavirus ?

THE LUNGS: GROUND ZERO

- WHO reported - COVID-19 disease attacks the lung in three phases: viral replication, immune hyper-reactivity, and pulmonary destruction.
- In the early days of an infection, coronavirus rapidly invades human lung cells.
- Those lung cells come in two classes: ones that make mucus and ones with hair-like batons called cilia.
- SARS infect and kill cilia cells, which then sloughed off and filled patients' airways with debris and fluids, and researchers hypothesize that the same is happening with the novel coronavirus.
- Due to which many patients develop pneumonia in both lungs, accompanied by symptoms like shortness of breath, study suggests.

THE LUNGS: GROUND ZERO

- That's when phase two and the immune system kicks in.
- Our bodies step up to fight the disease by flooding the lungs with immune cells to clear away the damage and repair the lung tissue.
- When working properly, this inflammatory process is tightly regulated and confined only to infected areas. But sometimes your immune system goes haywire and those cells kill anything in their way, including your healthy tissue. "So you get more damage instead of less from the immune response. Even more debris clogs up the lungs, and pneumonia worsens.
- During the third phase, lung damage continues to build—which can result in respiratory failure.

#LUNGS 101

According to the WHO, SARS punched holes in the lungs, giving them “a honeycomb-like appearance”—and these lesions are present in those afflicted by novel coronavirus, too.

- These holes are likely created by the immune system’s hyperactive response, which creates scars that both protect and stiffen the lungs.
- When that occurs, patients often have to be put on ventilators to assist their breathing. Meanwhile, inflammation also makes the membranes between the air sacs and blood vessels more permeable, which can fill the lungs with fluid and affect their ability to oxygenate blood.
- “In severe cases, you basically flood your lungs and you can’t breathe,” Author says. “That’s how people are dying.”

THE STOMACH: A SHARED GATEWAY

- When any virus enters your body, it looks for human cells with its favorite doorways—proteins on the outside of the cells called receptors. If the virus finds a compatible receptor on a cell, it can invade.
- Both SARS and MERS viruses can access the cells that line your intestines and large and small colon, and those infections appear to flourish in the gut, potentially causing the damage or the leakage of fluid that becomes diarrhea.
- But Author says we don't know yet if the novel coronavirus does the same.
- Researchers believe COVID-19 uses the same receptor as SARS, and this doorway can be found in your lungs and small intestines.

BLOOD STORM

- Signs of a full body blitz have been witnessed with all three of the zoonotic coronaviruses. This could be result of a cytokine storm.
- During a runaway coronavirus infection, when the immune system dumps cytokines into the lungs without any regulation, your body is not just targeting the infected cells. It is attacking healthy tissue too.
- Cytokine storms create inflammation that weakens blood vessels in the lungs and causes fluid to seep through to the air sacs.
- The storm spills into circulatory system and creates systemic issues across multiple organs.
- In some of the most severe COVID-19 cases, the cytokine response—combined with a diminished capacity to pump oxygen to the rest of the body—can result in multi-organ failure.

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#LIVER: COLLATERAL DAMAGE

- Doctors have seen indications of liver injury with SARS, MERS, and COVID-19. So what's happening?
- “Once a virus gets into your bloodstream, they can swim to any part of your body,” Author says. “The liver is a very vascular organ so coronavirus can very easily get into your liver.” When you have abnormally high levels of enzymes in your blood, it's a warning sign.
- It might be a mild injury that the liver will quickly bounce back from or it could be something more severe—even liver failure.
- The virus might be directly infecting the liver, replicating and killing off the cells itself. Or those cells might be collateral damage as your body's immune response to the virus sets off a severe inflammatory reaction in the liver.

#KIDNEY: IT'S ALL CONNECTED

- In rare cases, COVID-19 patients have suffered acute renal injury. It may be a relatively uncommon feature of the disease, but it is a fatal one. After the SARS outbreak, the WHO reported that the virus was found in kidney tubules, which can become inflamed.
- As your kidneys are continuously filtering blood, sometimes the tubular cells can trap the virus and cause a transient, or milder, injury.
- Acute kidney injury in SARS patients might be due to a diverse set of causes, including low blood pressure, sepsis, drugs, or a metabolic disturbance.
- Meanwhile, the more severe cases that led to acute renal failure is a cytokine storm. Acute renal failure can also sometimes be brought on by antibiotics, multi-organ failure, or being connected to a ventilator for too long. Everything is connected.

#PREGNANCY AND CORONAVIRUS?

- Mother-to-infant transmission wasn't observed with SARS nor MERS despite numerous cases involving pregnant women. Plus, there are other ways a newborn could catch the coronavirus, Rasmussen says, such as by being born at hospital overrun with infected patients during a hectic emergency.
- A new study published in The Lancet offers preliminary evidence that the coronavirus cannot be passed from mother to child.
- In the report, researchers observed nine women in Wuhan who had COVID-19 pneumonia. Some of the women had pregnancy complications, but all cases resulted in live births without evidence of transmitting the infection. While this study doesn't completely rule out the possibility of transmission during pregnancy,