

# Natural History of SARS-CoV-2



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Johns Hopkins Bloomberg School of Public Health

# What Happens to People After They Get Infected With SARS-CoV-2?

- ▶ SARS-CoV-2 is the virus that causes the illness we call COVID-19 (short for “coronavirus disease that emerged in 2019”)
- ▶ Not everyone who is infected gets sick
- ▶ If someone gets sick ...
  - ▶ What are the signs and symptoms?
  - ▶ How long does the sickness last?
  - ▶ How long can infected people spread the virus?
  - ▶ Where and how do people shed virus?

# Signs Versus Symptoms: General Definitions

- ▶ **Signs** are objective measurements to characterize illness during a physical exam:
  - ▶ Temperature
  - ▶ Breathing faster than usual
- ▶ **Symptoms** are what patients say about how they feel:
  - ▶ Fatigue
  - ▶ Nausea
  - ▶ Loss of taste or smell
  - ▶ Muscle ache
- ▶ Fever is both a sign and symptom

# Signs and Symptoms of COVID-19

- ▶ Signs and symptoms can vary widely
  - ▶ Some people have no symptoms and are ***asymptomatic***
  - ▶ Some people have mild disease
  - ▶ Some people have more serious disease that can lead to death

## Common signs and symptoms

- ▶ Fever (temperature >100.4°F)
- ▶ Tiredness (fatigue)
- ▶ Chills
- ▶ Muscle pain
- ▶ Cough
- ▶ Loss of taste or smell
- ▶ Difficulty breathing
- ▶ Headache
- ▶ Sore throat

## Specific and Nonspecific Symptoms of COVID-19

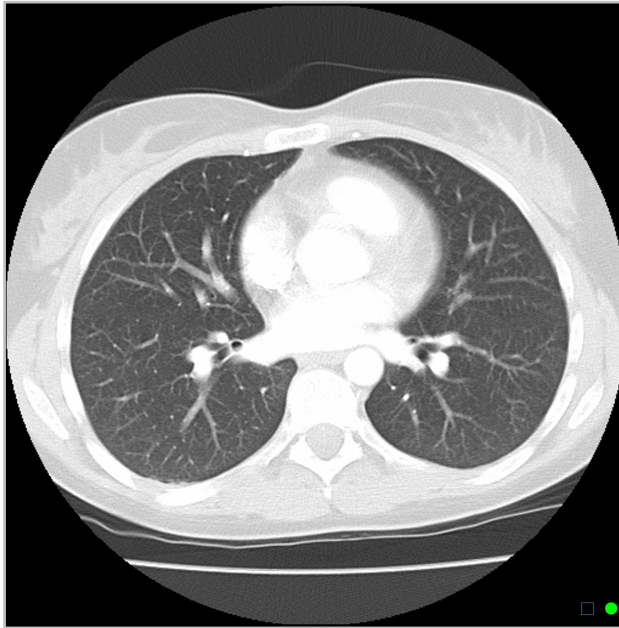
- ▶ Many symptoms (such as fever, cough, and myalgia [muscle pain]) are ***nonspecific***
  - ▶ They are common in COVID-19 and in other respiratory diseases
- ▶ Some symptoms are more ***specific*** for COVID-19
  - ▶ For example, one third of patients report a recent loss of the ability to taste or smell
  - ▶ This is very uncommon in other infections

## Severe Signs and Symptoms

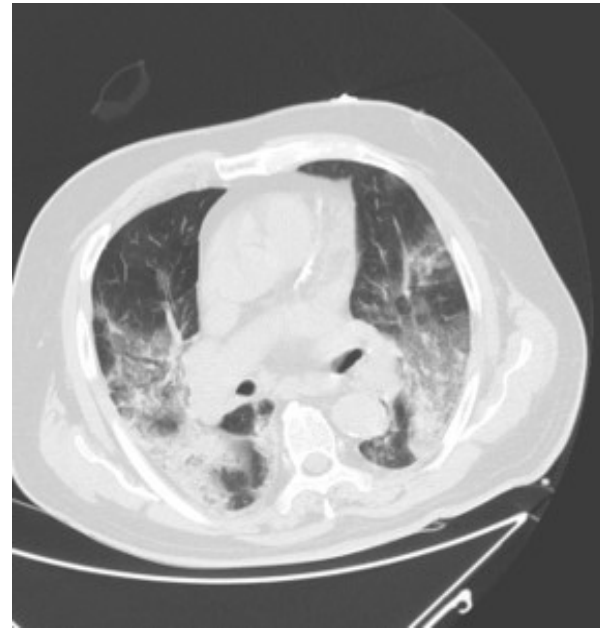
- ▶ Some signs and symptoms mean that the disease is becoming more severe (or *progressing*)
- ▶ The most common signs of progressive infection are increased and more severe fevers and increased difficulty breathing
- ▶ Patients should immediately seek care if they have emergency warning signs or symptoms, such as:
  - ▶ Blue lips or face, which could mean they are not getting enough oxygen
  - ▶ Increased rate of breathing
  - ▶ Shortness of breath
  - ▶ Chest pain when breathing
  - ▶ Waking up during sleep with shortness of breath
  - ▶ New confusion or difficulty waking up

# Effect of COVID-19 on the Lungs

**Healthy lungs**



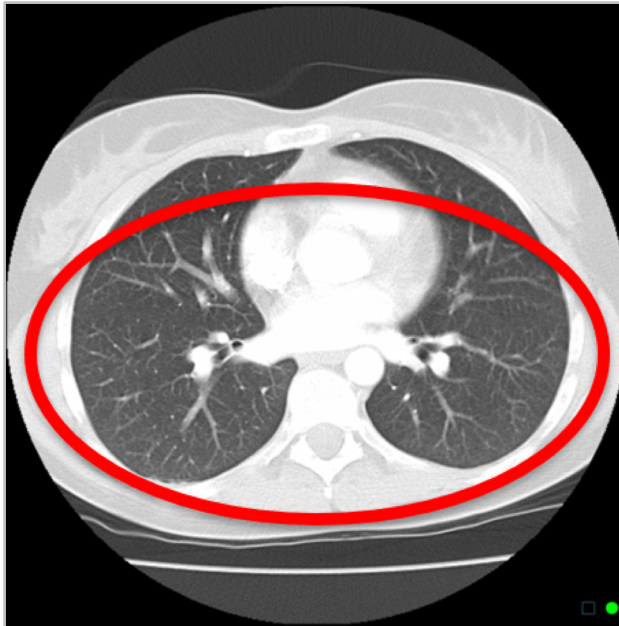
**Lungs of someone with severe COVID-19**



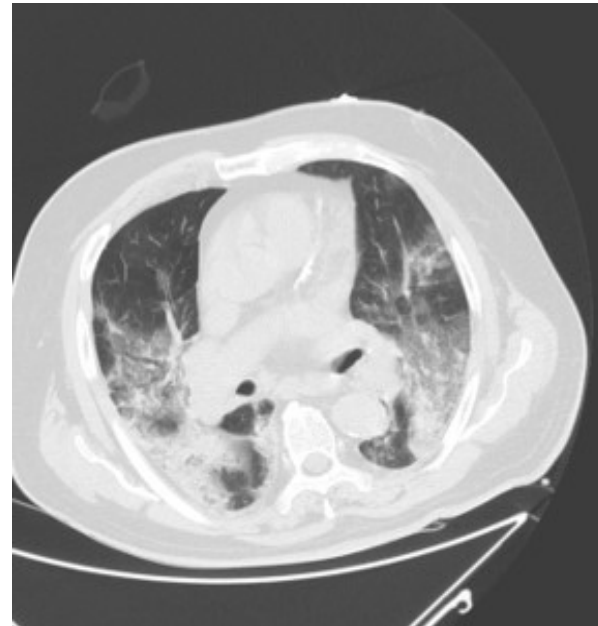
Left: Case courtesy of Assoc Prof Frank Gaillard, [Radiopaedia.org](https://radiopaedia.org/case/8095), rID: 8095.  
Right: Case courtesy of Dr Fabio Macori, [Radiopaedia.org](https://radiopaedia.org/case/74867), rID: 74867.

## Effect of COVID-19 on the Lungs: Healthy Lungs

**Healthy lungs**



**Lungs of someone with severe COVID-19**

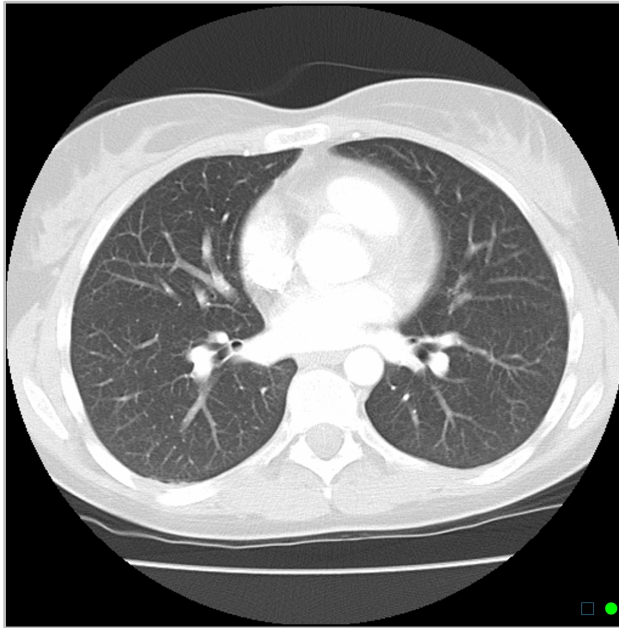


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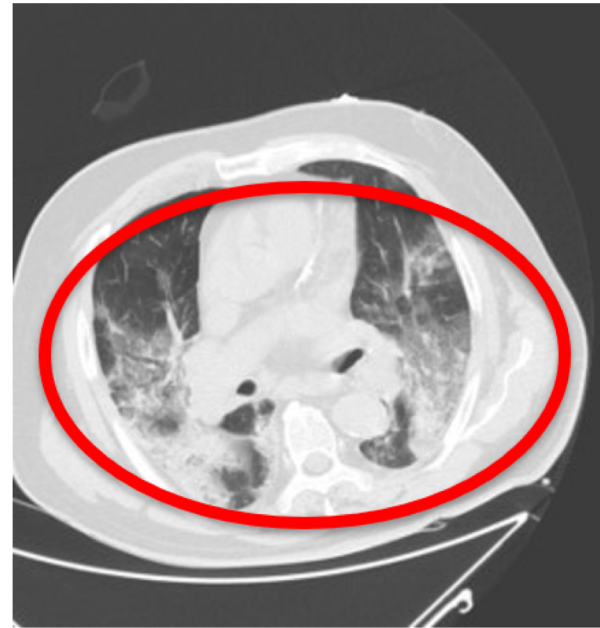


## Effect of COVID-19 on the Lungs: Congested Lungs

**Healthy lungs**



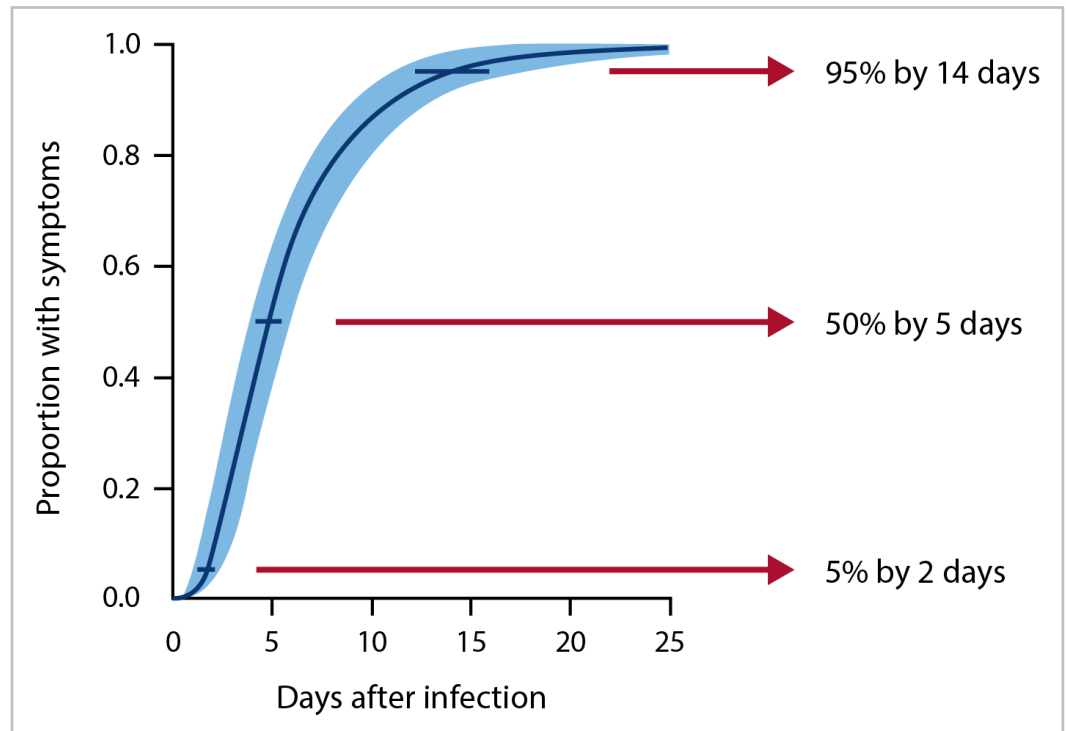
**Lungs of someone with severe COVID-19**



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# SARS-CoV-2 Incubation Period

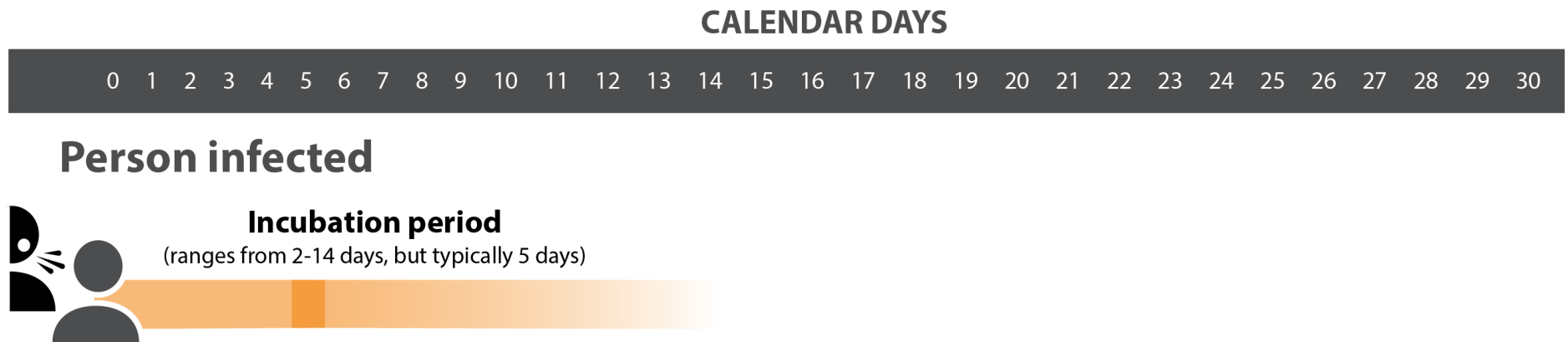
- ▶ The ***incubation period*** is the time from when someone is infected until symptoms develop
- ▶ The SARS-CoV-2 incubation period ranges from 2 to 14 days
- ▶ 50% of people will become ill by 5 days after they are infected



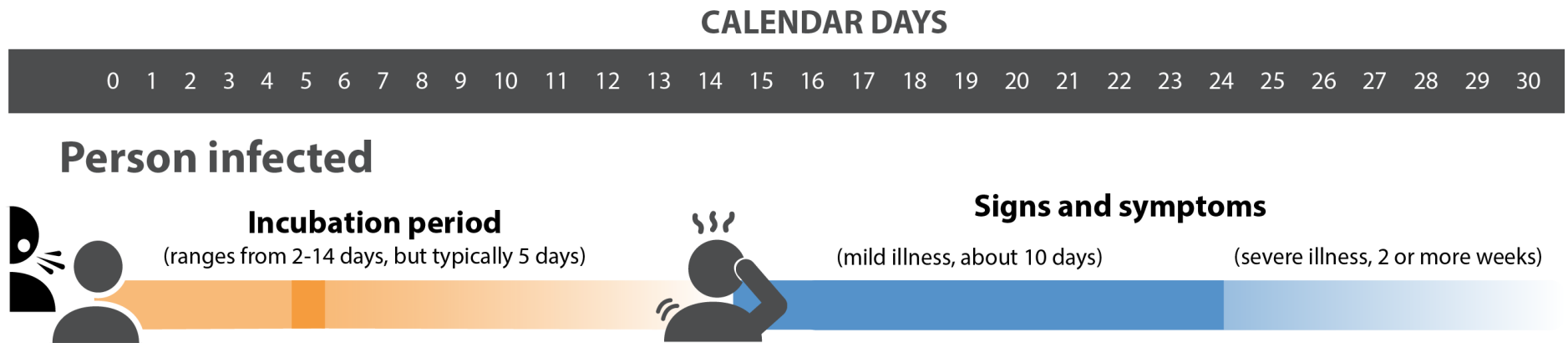
# SARS-CoV-2 Infectious Period

- ▶ The ***infectious period*** is the time during which someone infected with SARS-CoV-2 can transmit the virus to other people
- ▶ For people with COVID-19 disease:
  - ▶ The infectious period begins 2 days before the start of signs and symptoms of disease
  - ▶ The end of the infectious period is defined as when:
    - It is at least 10 days after the onset of illness
    - AND symptoms are improving
    - AND there has been no fever within the past 3 days
- ▶ *People who are asymptomatic can also be infectious*
  - ▶ For these people, the infectious period is more difficult to define

# Timeline of Infection: Incubation Period



# Timeline of Infection: Signs and Symptoms



# Timeline of Infection: Infectious Period

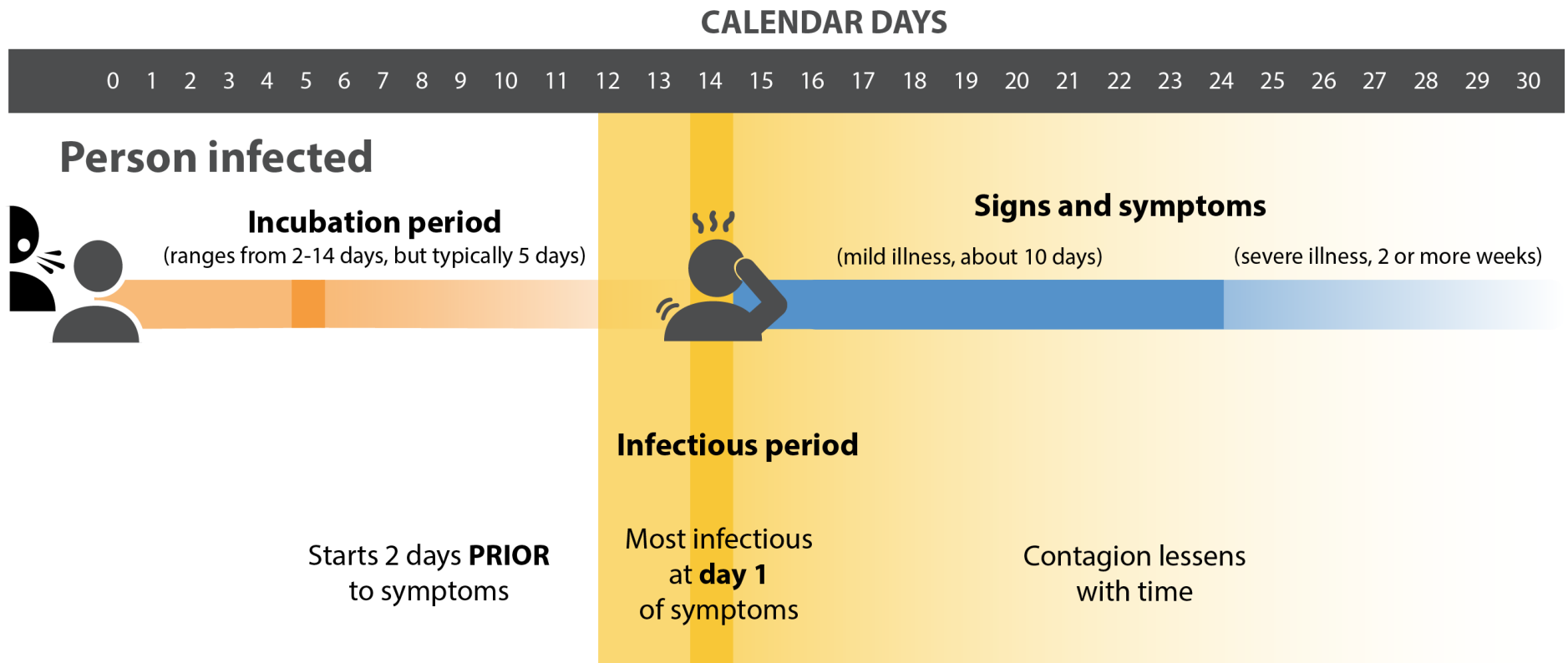


Image source: Center for Teaching and Learning, Johns Hopkins Bloomberg School of Public Health.