COVID Information and Resources

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Model of a coronavirus. The red 'spikes' bind the virus to target cells. Image from the CDC.

The rapid spread of the coronavirus (SARS-CoV-2) and the disease it causes (COVID-19) impacts all of us. On this page we provide some basic information about the virus, the disease and vaccines available in the U.S.

What is a virus?

Viruses can be thought of as seeds. The virus particles are extremely small. Much too small to be seen with the naked eye, viruses can only be seen with electron microscopes. All viruses contain proteins and genetic material (DNA or RNA). Some are also surrounded by a fatty (lipid) layer.

When a virus particle - called a virion - lands on a target cell, the virus binds tightly and enters the cell. Once inside, the virus undergoes a change in shape and begins to hijack the machinery of the infected cell. After infection, the host cell becomes a virus-producing factory, releasing more viruses to repeat the cycle.

Different viruses infect different kinds of cells and different kinds of hosts. Some only infect a single species (i.e. only cats or only humans) and some can infect several different kinds of hosts. Even bacteria have viruses that attack them.

What is a coronavirus?

Coronaviruses are viruses that are known to infect several kinds of animals and cause disease in humans and animal hosts. The virus’ genetic material is RNA and the protein core is surrounded by a double lipid layer (called a bilayer). Sticking out of the lipid layer are proteins that act like magnets to bind the virus to target proteins on host cells.[1]

Different coronaviruses can cause human diseases ranging from mild to very severe. Previous outbreaks of severe disease caused by coronaviruses include SARS and MERS.

The current global outbreak (pandemic) is being caused by a coronavirus that has been named SARS-CoV-2. The name reflects the close relatedness between the current virus and the one that caused the SARS and MERS outbreaks.[2][3]

What is COVID-19?

The SARS-CoV-2 virus is spread by droplets released when infected people cough, sneeze, or just breathe out. Those droplets can be inhaled by nearby people or can land on surfaces and then get onto the skin of other people. If the virus-containing droplets come in contact with mucous membranes, the viruses can enter the body and start a new infection in that person.

The virus causes fever, pain and difficulty breathing. The breathing problems can be severe enough to require patients to be put on a ventilator to assist their breathing. In the US (as of 4/6/20) about 2.5% of confirmed cases (1 in 40 COVID patients), infections are lethal.[4] The actual percentage of infected people who die is almost certainly lower because many people are not tested for the virus and it is thought that about 1 in 4 infected people do not show any symptoms.[5][6][7][8]

Are cancer patients at higher risk of getting very ill or dying from COVID-19?

The pandemic is ongoing and there has not been time to do any large studies on the role of cancer as a condition (also called a co-morbidity) that leads to increased severity of disease or death from
COVID. Because cancer patients very often have weakened immune systems, they are at greater risk of becoming seriously ill and/or dying from other types of infections and with the information on hand, that appears to be true for COVID. It is still not certain.

January 2021:

So far, it’s clear that two populations are especially at high risk:

1. Old people (>60 years of age)
2. People with a suppressed immune system

We know that many types of cancer can drastically affect the immune system. Furthermore, some data is beginning to paint a picture of how exactly cancer affects cancer patients’ vulnerability to COVID19. It’s important to keep in mind that new data is constantly being published, and our current understanding can change. Also, because of the novelty of this situation, much of the epidemiological data are from countries outside of the United States.

In a hospital in Wuhan, physicians observed that cancer patients who visit the hospital for care had a significantly higher proportion who tested positive for COVID19 (Yu et al., JAMA Oncol). Here, cancer patients who are already infected with SARS-COV2 are also more likely to experience poor outcomes, severe symptoms, and death (Zheng, L, et al., Ann Oncol). Finally, they found that patients who receive antitumor treatment within 14 days of positive COVID19 diagnosis had a higher chance of experiencing severe symptoms.

In a national study conducted in the UK, they found that patients with blood cancers (e.g. leukemia, lymphoma, and myeloma) usually suffer from more severe COVID-19, while patients with solid tumors tend to experience a less severe disease trajectory. Leukemia patients, in particular, seem to suffer a significantly higher fatality when infected with the coronavirus. Finally, hematological patients who have recently done chemotherapy were at higher risk (Lee et al., The Lancet Oncology).

View a lay summary

The COVID-19 situation is rapidly changing and guidelines are being developed as quickly as possible.

Should I skip my cancer treatment because of COVID-19?

As described above, it is possible that cancer patients may be at higher risk of getting seriously ill from COVID-19. That said, skipping cancer treatments (including chemotherapy, immunotherapy or radiation) could reduce the positive effect of the treatment.

It is possible to have some appointments via video or telephone. Many cancer organizations are using telemedicine to reduce the number of contacts for their patients and clinical workers.

It is important for all cancer patients to be in touch with their medical team about any scheduled appointments or treatments.

Another good idea is to check the website of the treatment facility, as many have COVID-19 statements for their patients. This is a rapidly changing situation, so check back before going to any in-person office visits.

June 2020: In June, Norman Sharpless, Director of the National Cancer Institute, noted that there is already a steep drop in the number of cancer diagnoses, even though there is no reason to believe that the cancer incidence has dropped. Elective cancer surgeries are being de-prioritized to make room for COVID-19 patients. Some cancer patients are receiving less intensive chemotherapy and radiotherapy treatments than they should. According to modeling data, Sharpless suggests that these delays in diagnosis and care could lead to an excess death toll north of 10,000 in the next two years. In order to prevent long-term disruption, government agencies such as the National Cancer Institute must temporarily but drastically change the system in place for clinical trials, such as allowing remotely informed consent, in order to allow for clinical trials to more easily continue in spite of the ongoing pandemic. Furthermore, new funding must be targeted at studying the effects of COVID19 on cancer to further remediate the damage that cancer patients will endure for the coming months. (Sharpless, Science, 2020).

May 2020: Several studies reported that cancer patients with COVID are more likely to be hospitalized and more likely to die of the disease.
How can cancer patients deal with COVID-related stress?

The COVID pandemic has affected everyone. Cancer patients have ongoing health concerns that can be made worse by the pandemic. Below is an interview with Dr. Wendy Baer, a psychiatrist at the Winship Cancer Institute. Dr. Baer discusses coping strategies for cancer patients and others during this stressful time. Additional resources are provided in the list below the video.

How do the COVID-19 vaccines work? How well do the COVID vaccines work? What's in them? Are they safe?

What is the Emergency Use Authorization (EUA)?

When the EUA is enacted, it lets government use medical treatments like vaccines that have not been approved through the traditional process. This allows the FDA to quickly start treating or preventing diseases that have no other alternative treatments or medical solutions. However, it’s important to note that all COVID-19 vaccines currently being distributed (including the ones from Pfizer/BioNTech, Moderna, and Johnson&Johnson) have been shown to be safe through clinical trials.

Learn more about the EUA and the safety profiling of these vaccines.

How do the vaccines work?

The goal of all vaccines is to 'show' the immune system what it should be fighting. In the case of COVID-19 vaccines, the immune system is triggered to recognize a protein found on the outside of the virus - called the spike protein. The Pfizer and Moderna vaccines both contain information (mRNA) that our cells can use to make spike proteins - but only for a short time. The J&J vaccine is a little different. It contains a defective version of a virus that causes colds. This lab version contains the instructions to make the spike protein. Importantly - the altered virus is not able to cause disease.

When the spike protein is made by any of these vaccines, our immune systems become activated to target it. If the virus that causes COVID-19 (SARS-CoV-2) gets into a vaccinated person, the immune system is able to quickly recognize and eliminate it, preventing infection and/or serious illness.

How effective is the Pfizer-BioNTech (BNT162b2) vaccine...

... based on clinical trials?\[^{15}\]

- Rough-estimate of the first-dose efficacy in-between the administration of the 2 doses:
  - Efficacy estimated at 52%
- Two-dose efficacy 95% reduction in infection rates
- Efficacy was pretty much consistent across age, sex, race, ethnicity, obesity, and presence of co-existing conditions.

... based on UK government reporting?

- Single dose vaccine efficacy estimated at 87-91% during days 15-28 after first dose.
- Vaccine efficacy of the first dose is about 90% from 2 weeks after first dose onwards.
  - NOTE: this is much higher than the rough estimate from the first paper (which they
estimated at 52%).

- Read more from the source article: Public Health England. Annex A: Report to JCVI on estimated efficacy of a single dose of Pfizer BioNTech (BNT162b2 mRNA) vaccine and of a single dose of ChAdOx1 vaccine (AZD1222)

... based on ongoing vaccination campaign in Israel?[^16]

- 30% reduction in infection rates 1-14 days after first dose.
- 75% reduction in infection rates 15-28 days after first dose.
- 47% reduction in symptomatic COVID-19 1-14 days after first dose.
- 85% reduction in symptomatic COVID-19 15-28 days after first dose.
- Limitations of this study:
  - Observational (e.g. lacked active lab surveillance of subjects). This could have led researchers to underestimate the asymptomatic cases.

What's in the Pfizer-BioNTech (BNT162b2) vaccine?

List of all ingredients:

- Messenger ribonucleic acid (mRNA) – found naturally in all of our cells; it’s what our cells use to make proteins. The mRNA in the vaccine lets our cells produce part of a protein found on the virus.
- A mixture of lipids – lipids are fatty chemicals; in the vaccine, they are mostly used to keep the mRNA intact until it enters our cells.
- Potassium chloride (KCl) – our body actually needs a certain level of KCl; this is included so that the injection to not change our KCl concentration in our blood too much.
- Monobasic potassium phosphate—used as an electrolyte in Gatorade; also can serve as a buffer.
- Sodium chloride – table salt; use to maintain the sodium concentration of the injection so that it’s easily tolerated by our bodies.
- Dibasic sodium potassium dihydrate (a salt)
- Sucrose (sugar)

Read more about the Pfizer-BioNTech Vaccine on a CDC/FDA information sheet.

How effective is the Moderna mRNA-1273 SARS-CoV-2 Vaccine... 

... based on clinical trials?

- 94.1% effective in reducing infection rate after 2nd dose[^17]

What is in the Moderna mRNA SARS-CoV-2 Vaccine?

List of ingredients from the CDC:

- Messenger RNA (mRNA)
- A mixture of lipids – many of them is used to keep the mRNA intact until it enters our cells.
- Tromethamine and tromethamine hydrochloride – an organic chemical used to maintain the desired acidity (pH).
- Acetic acid – also found in vinegar. *
- Sodium acetate – commonly used to extract DNA; found in many food seasonings.
- Sucrose – a type of sugar.

How does the Johnson & Johnson (also called Janssen) vaccine work?

The vaccine involves an engineered - defective - adenovirus. Adenoviruses can cause the common cold—but the altered ones uses in the vaccine are harmless. The vaccine uses this altered adenovirus as a carrier (like a truck carrying its cargo) for the genes that encode proteins found in the virus that causes COVID-19. The genes produce the proteins and the proteins are recognized by our immune system. If the actual virus tries to infect that person, the immune system recognizes and destroys it.

How effective is the Johnson & Johnson Vaccine...

...from clinical trials in various countries?

- 28 days after vaccination, the vaccine is shown to be 72% effective at preventing moderate and severe levels of COVID-19 in the U.S.
The vaccine is shown to be 66% effective at preventing moderate and severe levels of COVID-19 in Latin America.

The vaccine is shown to be 57% effective at preventing moderate and severe levels of COVID-19 in South Africa.

Read more about the J&J vaccine.

May 2021: A study of 102 cancer patients shows that 90% developed antibodies to the Pfizer-BioNTech vaccine. All of the healthy participants developed antibodies. The antibody levels in the patients were lower than in the non-patients and it is currently unknown if the lower levels impact how well the vaccine protects against SARS-CoV-2/COVID-19.¹⁸

Read more about other key things to know about vaccines from the CDC.

Cancer Patient and Survivor COVID Information (Centers for Disease Control and Prevention) Updated November 2021

Resources for cancer patients and their caregivers during COVID-19

General COVID Information

The Centers for Disease Control and Prevention COVID Information Page.

StatPearls: Features, Evaluation and Treatment Coronavirus (COVID-19)

Johns Hopkins Center For Systems Science And Engineering

Vaccination Recommendations for Cancer Patients

NCCN Guidelines (updated August 2021)

Cancer Patients and COVID

CDC Cancer Patient and Survivor Information (Centers for Disease Control and Prevention - November 2021)

Special Report on COVID and Cancer (American Cancer Society)

COVID-19 Patient Care Information (American Society for Clinical Oncology)

What people with cancer should know (U.S. National Cancer Institute)

Special COVID Issue of Cancerworld

Mental and Spiritual Health

Please visit our page on Psychosocial Effects of Cancer for information and links.

⁵⁵ Statistics retrieved on the date listed from COVID-19 Map Johns Hopkins Center for System Science and Engineering


