What You Need to Know

An in-depth look into the immune system, the contact-tracing process trying to keep COVID-19 from spreading, a look at the steps being taken to combat superbugs, and more

How Your Body Fights Viruses

The immune system is one of the human body’s most complex systems, which makes it challenging to comprehend exactly what is going on inside you when you're ill, how you can develop immunity to particular diseases so you don't catch them again, and how vaccines work to prevent you from getting sick in the first place. Ed Yong, science journalist for The Atlantic, helps break down the complicated concept of immunology into some understandable, if not simple, steps to help us better grasp it. First, when the body detects an invader, a virus, for instance, it attacks these foreign pathogens with proteins that typically cause inflammation—redness, swelling, pain—to stop the infection from reproducing and spreading. Next, the immune system tries to target the specific pathogen using T-cells, which are programmed to destroy it, and B-cells, which produce antibodies that can disable it. Finally, these “memory cells” will stick around for a while, for months, years, or perhaps your lifetime, so that particular pathogen won't make you sick next time. That’s how the system is supposed to work, and how it generally successfully fights off viruses, but every person—and their immune system—is different, and sometimes things don't go as planned. Some viruses, like COVID-19, are tricky to defend against, and in some cases, your immune system, if left unchecked, may actually turn against your own body and damage its tissues and organs. Unfortunately, even if you recover from a disease, there’s no guarantee of immunity against it in the future—whether the antibodies just don’t last for long, or the pathogen itself mutates into a new strain and effectively becomes a new one. For all the complexity of the immune system, it’s important for immunologists to figure out how it will respond to a pathogen in order to create cures and vaccines to protect the body against it; it’s also important for you to understand how immunity works, for a realistic idea of what doctors and researchers are up against in defeating COVID-19, and how you can protect you and your loved ones from getting it.
Data Analysis — Lifting the Curtain on Contact Tracing

**Contact tracing is another tool to help prevent the spread of COVID-19.** In short, when a positive case is identified, public health workers call everyone that person was in close contact with to let them know, so they can quarantine themselves and help identify other contacts. Contact tracing also affords valuable information about where the virus is being transmitted in the community, which can help inform policies and the choices people make about what activities are safe outside their homes. More states around the country have been embracing contact tracing in their efforts to control the pandemic, and **now 14 of them are sharing what they have learned from the practice so far with the public.** Some states, like Pennsylvania, are open about their contact-tracing staffing, others, like Delaware and Virginia, are posting transmission data to government websites; and some are sharing both sets of data, including New Jersey, Massachusetts, and Oregon. This helps reveal some interesting trends. In New Jersey, contact tracers have found that half of the new cases they call refuse to provide the names of those with whom they’ve been in contact. Louisiana is publishing a weekly list of outbreak events, showing that the top local COVID-19 hot spots include bars and restaurants. The more data that can be gathered about where and how the virus is spread, the better prepared we are to get it under control.

Medication Safety — The Antibiotic Market Needs a Shot in the Arm

**With COVID-19, we know that the recovery can be as bad—or worse—than the disease itself.** And now we are also learning that **50% of patients who died from COVID-19 in the hospital had secondary bacterial infections, versus 1% of hospitalized COVID-19 survivors,** according to research recently published in *The Lancet*. Hospital-acquired infections and bacteria “superbugs” that have grown resistant to antibiotics have been longstanding problems in healthcare, and now they’re compounding the challenges of treating patients during the pandemic. The only way to slow the evolution of bacteria into more powerful, drug-resistant strains is to limit the use of antibiotics, but scientists are trying to stay ahead of superbugs by developing brand-new antibiotics to kill them—which are only used when there’s no other alternative, to ensure they remain effective. Unfortunately this means that the expensive business of making antibiotics is far from profitable, creating a Catch-22 that may only be solved with legislation around drug reimbursements for antibiotics used in the hospital and incentivizing scientists and investors to work on novel antibiotics. If the broken antibiotic market can't be fixed—soon—one day superbugs will pose an even more devastating health threat to the world than today's global catastrophe.

Mental Health — Alone Together

**The effects of the pandemic are rippling throughout society,** disrupting jobs, healthcare, education—and even the very fabric of society itself. To protect against COVID-19, many of us have been isolating ourselves, in our own homes, behind masks, keeping six feet between us and people whenever we’re outside. We are depriving ourselves of the basic necessities of human companionship, comfort, and contact. Zoom and social media are no substitute for face-to-face interactions, and those shared experiences that happen in restaurants and movie theaters or sporting events, which bring people and communities together. The links between loneliness
and mental health are well known, and so it’s not surprising that pandemic-related isolation has increased symptoms of depression by 31%, according to the Centers for Disease Control and Prevention (CDC). Stress-related disorders have increased by 26%. Illegal drug use has risen by 13%. And in Fresno, California, the suicide rate has skyrocketed by 70%. Along with the mental health decline of healthcare workers on the front lines, the CDC estimates that adverse behavioral health conditions are three to four times higher than they were last year. A holistic approach to our health—physical, emotional, and mental—must take all this into account as we weigh the risks and consider the costs of responding to COVID-19 and prepare to deal with the long-term consequences.

Patient Perspective — When Lies Cause Harm

If “Dr. Google” wasn’t bad enough, doctors are now seeing the sometimes deadly consequences of patients who believe conspiracy theories and misinformation they read online—even more than they trust the advice of healthcare professionals. Physicians report that their patients are demanding dangerous treatments that have not been proven effective against COVID-19, such as hydroxychloroquine, and being hospitalized for ingesting bleach—which was responsible for at least 800 deaths early this year, according to a study in the *American Journal of Tropical Medicine and Hygiene*. Some people sick with COVID-19 have delayed medical attention because they were convinced the virus is a hoax, with tragic results, and others are buying into misconceptions that face masks lower oxygen levels, demanding notes exempting them from wearing a mask. If you have a question about your health, including ways to prevent or treat COVID-19, always check with your doctor. Before you follow the advice of something you saw on TV or read online, first ask yourself what makes them qualified to be giving advice. And try to verify it by checking other sources, like your doctor or local hospital.

Long-Term Care — Striking Back at COVID-19

An outbreak of COVID-19 in a nursing home is an emergency, and some states are treating them like one, by creating COVID “strike teams” that can come in and employ strategies commonly used to manage natural disasters and trauma settings. Comprised of nurses, doctors, paramedics, clergy, therapists, and more, these teams can provide temporary staffing, coordinate onsite medical care, and perform rapid testing for COVID-19 to help contain the spread, which most long-term care (LTC) facilities aren’t equipped for even in the best of times, let alone with a large number of residents and staff afflicted with the virus at once. Although data isn’t available on the effectiveness of this type of response, most who have received the assistance believe it helped save lives. So far at least eight states have sent strike teams to LTC facilities, as well as many counties and local jurisdictions, largely on a voluntary basis. Bipartisan legislation could help establish similar strike teams across the country and provide federal funds to bolster their efforts.
**General Interest — A Cancer Diagnosis, 77 Million Years Later**

**What killed the dinosaurs?** Aside from the asteroid that ultimately wiped out the gargantuan creatures, dinosaurs faced plenty of other deadly threats, including other dinosaurs, flooding, tar pits—and even, it turns out, cancer. A team of Canadian scientists recently picked over hundreds of dinosaur bones in search of cancer before finding the malformed fibula of a *Centrosaurus apertus*, a horned herbivore that lived 76–77 million years ago, part of the Royal Tyrell Museum’s collection. The fibula was originally discovered in a bone bed in Alberta, Canada, in 1989 and documented as a healing broken bone. But when researchers performed a CT scan on it and studied it under a microscope, they realized they were looking at the first identified case of osteosarcoma in a dinosaur. This suggests that dinosaurs were afflicted with the same bone diseases humans are, such as tuberculosis and osteomyelitis, and possibly other cancers as well. Because the centrosaurus died not from its disease, but by a flood, along with the rest of its herd, this enlightening information also hints at a different understanding of the social structures of dinosaurs.

**Infection Prevention — Reusing N95 Masks May Not Be Safe After All**

**N95 masks, considered essential personal protective equipment (PPE) to help prevent contracting COVID-19,** are designed to be disposable, but they have been in such short supply since the start of the pandemic that many healthcare workers who are fortunate enough to have them have had to wear them multiple times. The FDA approved a variety of methods of decontaminating N95 masks; however, researchers have recently proven that some of these recommended procedures actually damage the masks—rendering them much less effective at screening out the virus. Their study in *Infection Control & Hospital Epidemiology* showed that using a high-concentration of gas plasma hydrogen peroxide causes immediate, significant damage to N95 respirators, which allows particles to leak through the material. In comparison, using ultraviolet light to decontaminate the masks is safe for up to nine cleaning cycles before they lose structural integrity. There are still many other decontamination methods that have yet to be tested, leaving healthcare workers in the dark on just how much protection their masks provide when they are reused over and over again.