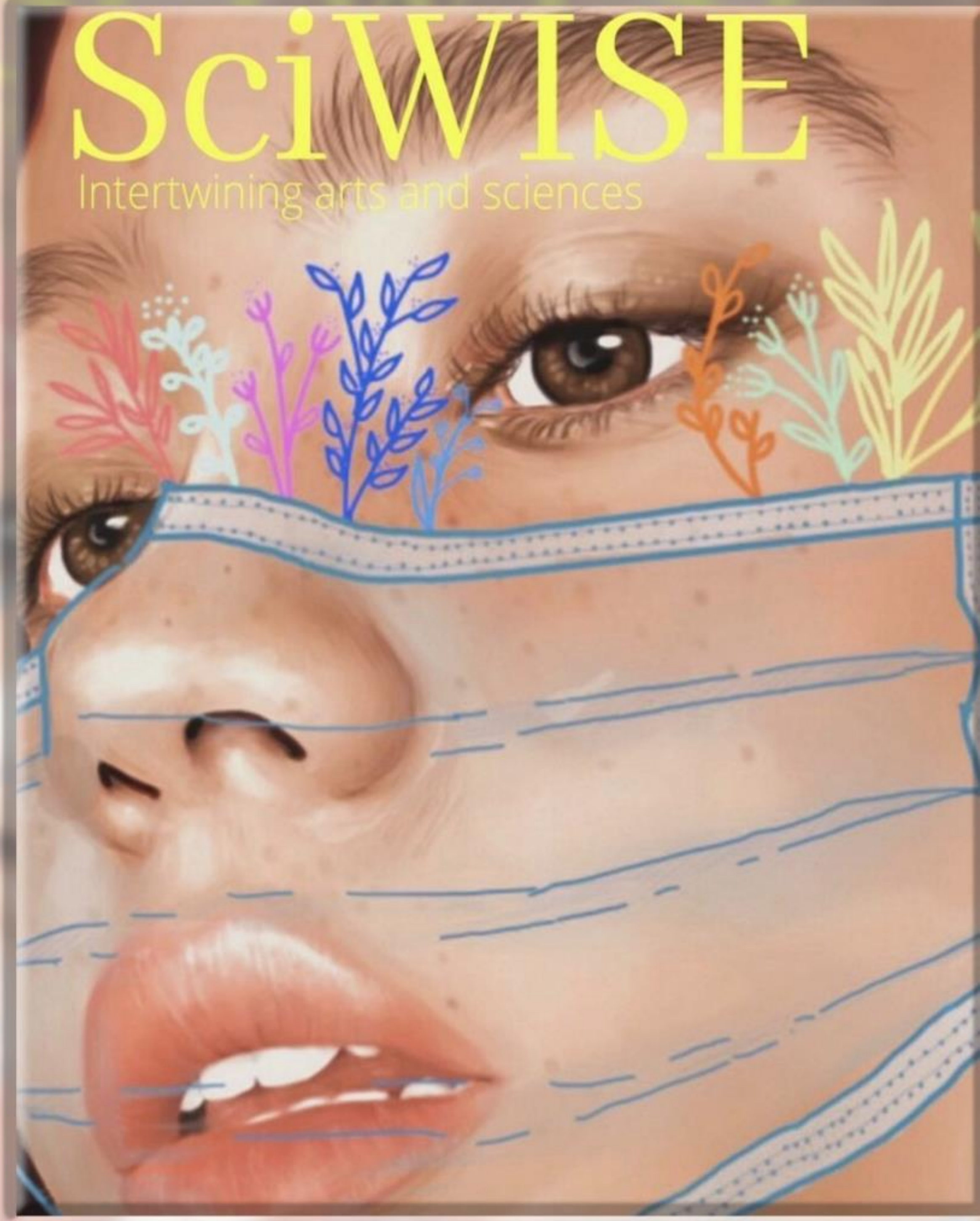
SciWISE

Intertwining arts and sciences



Issue 1 | December 2020

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DECEMBER 2020

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I fought all my demons to tell you what they were saying, I
thought you understood, no need for explaining;
You told me to ‘do some yoga, or go for a walk,
It’s the exercise that’ll make it stop’.
I didn’t need your advice, I just needed you to listen;
‘Do this, do that’; is what you said, putting me back in prison.

You cared about every opinion other than my own,
Expecting your ideal version of me, making me feel alone.
Little do you know I can’t think, feel, or even breathe,
It’s hopeless explaining this raging hurricane underneath.

Both you and I know it’s a disease, and not just ‘all in my head’;
It’s not a phase, it’s not a trend – it’s not something I just read.
It’s not linen that you can hide, and store in a bin;
It’s my chemicals off-balance, it’s the serotonin.
But after all that’s been said, at the end of the day,
I’ll just have to stare at the ceiling and shrug it all away.

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SEASONAL AFFECTIVE DISORDER

An Infographic

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SEASONAL AFFECTIVE DISORDER[7]

Seasonal ffective Disorder (S D) is a type of depression characterized by lethargy, reduction of interest in daily activities, oversleeping, loss of concentration, and appetite and weight fluctuation as a result of unusually frequent sugar cravings.

Our bodies have two types of messenger molecules, known as neurotransmitters and hormones, that relay signals from the central nervous system to the rest of the body. Among the neurotransmitters, **Serotonin**[7] has a starring role, especially in regulation of mood and digestion.

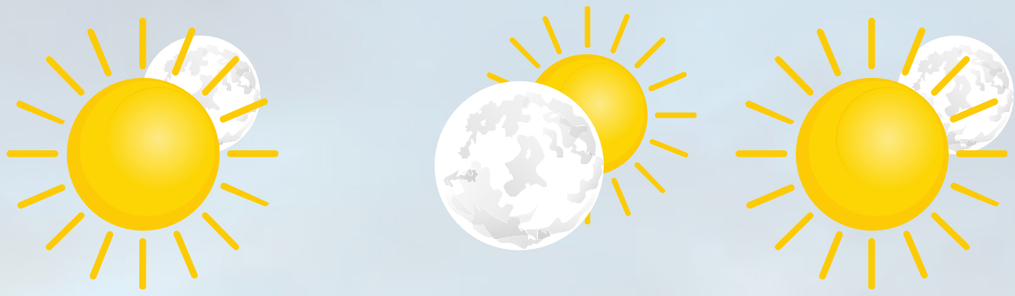
Tryptophan, a precursor molecule of Serotonin, is a building block for many proteins and can be found in foods like poultry, dairy and nuts. The conversion of Tryptophan to Serotonin is facilitated largely by **Vitamin D**, the 'sunshine vitamin'.

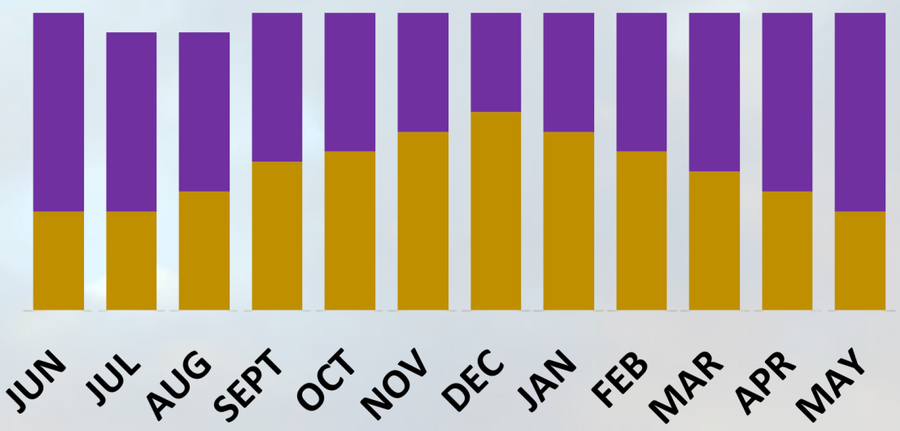
Tryptophan → Serotonin (Vitamin D)

Serotonin deficiency is linked to **mood disorders, low sex drive, and obesity**. Through a series of chemical reactions, some of the Serotonin is converted into Melatonin, which is a hormone that regulates our sleep-wake cycle. Most of the Melatonin, however, is produced **independently**, through a different mechanism.

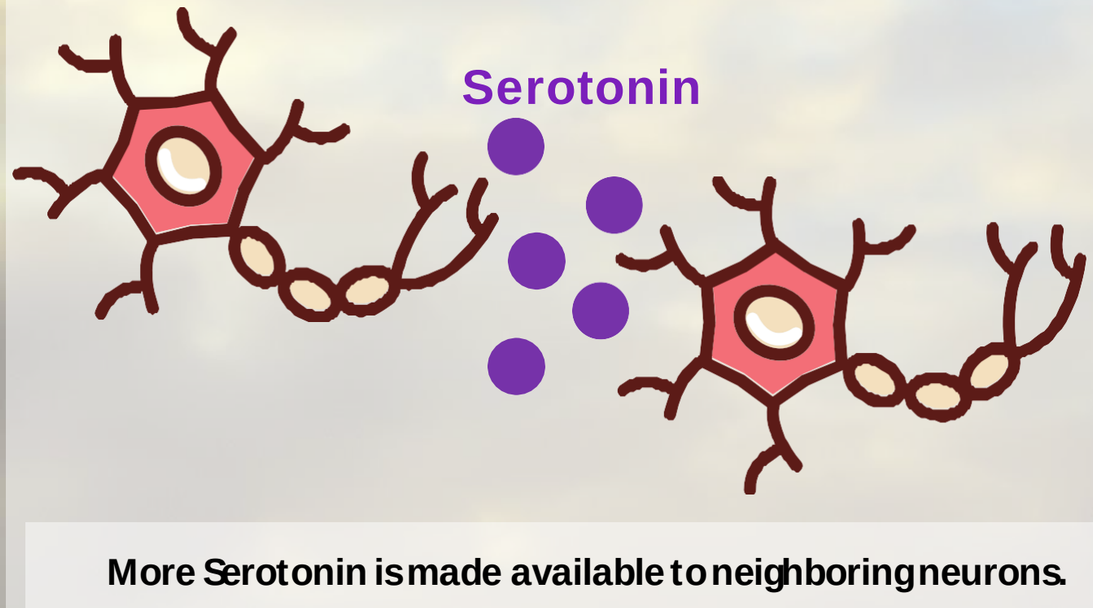
Neurotransmitters mediate communication between neurons, whereas hormones act as messengers that travel through the bloodstream to transmit signals to other organs.

When exposed to sunlight, our bodies produce Vitamin D. With **less exposure to sunshine** in the fall and winter months, our bodies may be faced with **Vitamin D deficiency** which disturbs the production of chemical messengers central to regulation of mood, eating habits, and sleep. Reduced exposure to daylight is also associated with **increase in Melatonin** production.





Since SAD is a type of depression, a class of medication called **Selective Serotonin Reuptake Inhibitors (SSRIs)** have proven to be effective in management of the disorder. These drugs **prevent the reabsorption** of Serotonin, making it more available to the neighboring neurons. This mechanism restores the chemical balance, altogether resulting in an improvement of mood, sleep, and appetite fluctuations.



More Serotonin is made available to neighboring neurons.

Main treatments of SAD include **light therapy, medications, and dietary changes**. A balanced diet, can alleviate the symptoms of SAD because it promotes the **growth of healthy gut bacteria.** The microbes facilitate the conversion of Tryptophan into Serotonin and restore the disturbances. **Vitamin D supplements** are also recommended as a treatment for SAD because this compound is known to support healthy gut function.

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CANADIAN GOVERNMENT ANNOUNCES PURCHASE OF RAPID COVID-19 TEST

A News Article

Text

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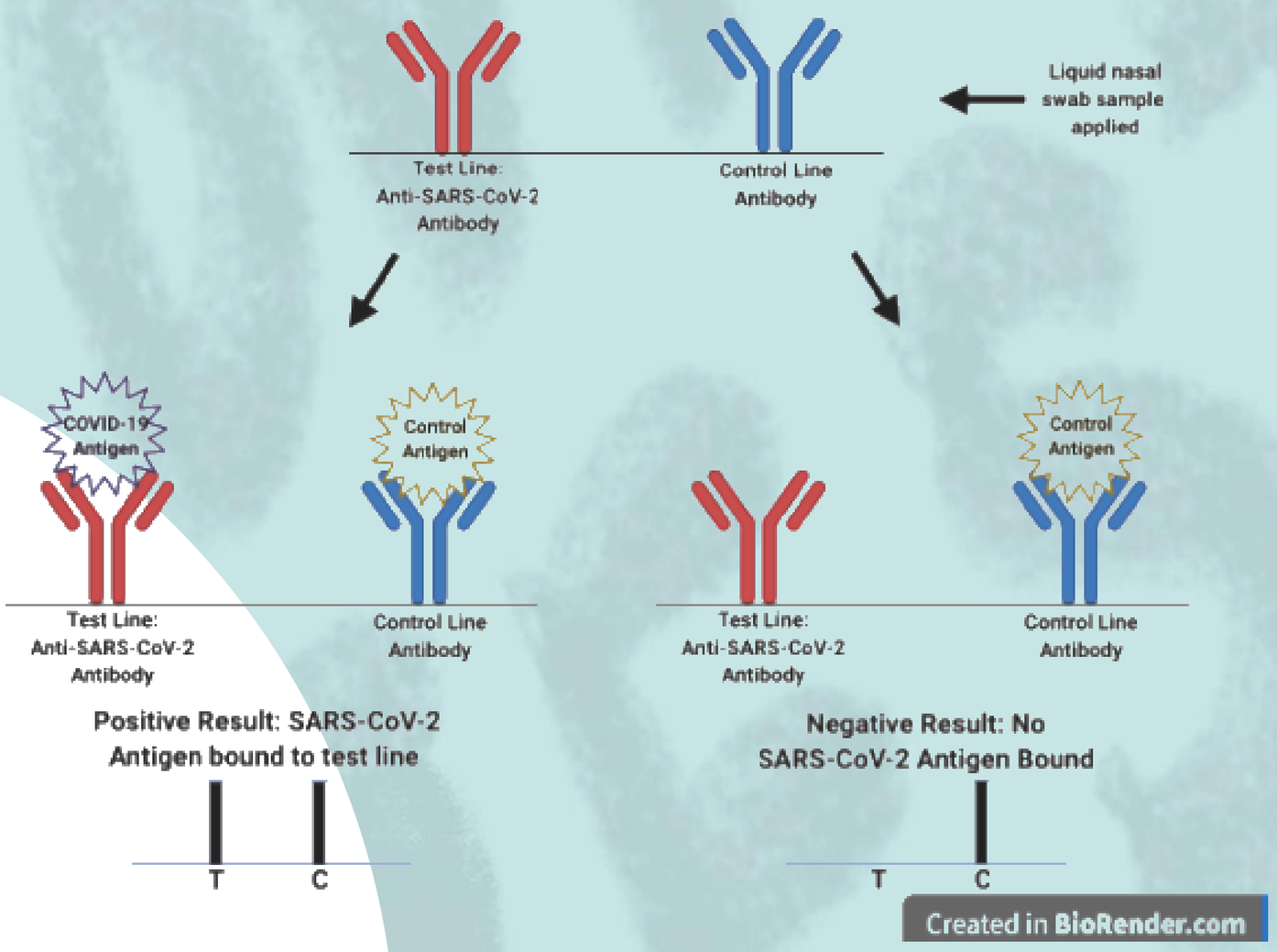
CANADIAN GOVERNMENT ANNOUNCES PURCHASE OF RAPID COVID-19 TEST

Now that we are well into the second-wave of COVID-19, biotech companies are racing to develop new, rapid testing methods. On October 6, the Government of Canada announced that it has signed an agreement to purchase up to 20.5 million Panbio COVID-19 antigen rapid tests from Abbott Rapid Diagnostics (1). An antigen is any substance that elicits an immune response, and the antigen detected by this rapid test is a SARS-CoV-2 viral protein, which is the virus that causes COVID-19. This is a ground-breaking announcement, as the test is Canada's first-approved antigen-based COVID-19 test (1). Many countries, such as the United States, Italy, and Germany, have approved similar antigen-based tests, however there is still disagreement amongst experts about the usefulness of these tests (2,4). PCR tests remain the gold standard in Canada (5).

Abbott's single use test device yields results in approximately 20 minutes, a vast improvement compared to traditional testing methods, which can take days, or even weeks, to generate results (2). The test is the fourth rapid COVID-19 test approved for use in Canada (1). To perform the test, a nasal swab is collected and the sample is swirled in a buffer solution. The solution is then directly applied, in drops, to the test device. If the SARS-CoV-2 antigen is present, it will bind to an antibody on the test line of the device (6). This will cause two lines to appear in the device's result window, indicating a positive test (see diagram) (6). Unlike commonly used PCR-based methods, Panbio antigen test results can be interpreted visually and do not require laboratory analysis, thus allowing for the rapid turnaround time (6).



CANADIAN GOVERNMENT ANNOUNCES PURCHASE OF RAPID COVID-19 TEST

However, the Panbio antigen test is less sensitive than other testing methods. This means that it is not as effective at detecting infections, and will generate more false negative results. The product manual clearly states that a negative result does not necessarily mean that the individual is not infected, and additional tests should always be used before making treatment decisions (6). This is evidenced by a clinical performance study of 140 known positive patient samples, where 12 samples were found to be negative according to the Panbio test (6). Overall, the clinical performance study results indicate that the test has a sensitivity of 91.4 %(6). To put this into context, PCR-based methods have a sensitivity of nearly 100%, as shown by Public Health Ontario in an assay validation study (5) Although the low sensitivity of the test may be concerning, a recent modeling study from Harvard University and the University of Colorado found that, when it comes to effectively monitoring COVID-19 levels in a population, test frequency and turnaround time are more important than test sensitivity (7). Practically speaking, their models imply that disease surveillance can be greatly improved by increasing frequency of testing, but only slightly improved by using a highly sensitive test (7).

Click to add text

Locations where the Panbio test will be used have not been announced, but will likely focus on areas that are at an increased risk for outbreak, such as hospitals, schools, and nursing homes (2, 4). Access to a method that does not require lab analysis could dramatically shorten the wait-time for test results, thus helping prevent or slow down outbreaks in high-risk areas (2, 4). However, despite the potential benefits of a rapid test, it is important to remember that the comparatively low sensitivity of antigen-based tests like Abbott's Panbio device has caused skepticism about their usefulness (3, 4). While models suggest that low-sensitivity tests may play a role in disease monitoring, it is too early to determine whether this will hold true when these tests are put into widespread use (4, 7) Canada's first antigen- based COVID-19 test could be a game-changer by improving test accessibility and reducing wait times, but only time will prove it's effectiveness in reducing outbreaks.

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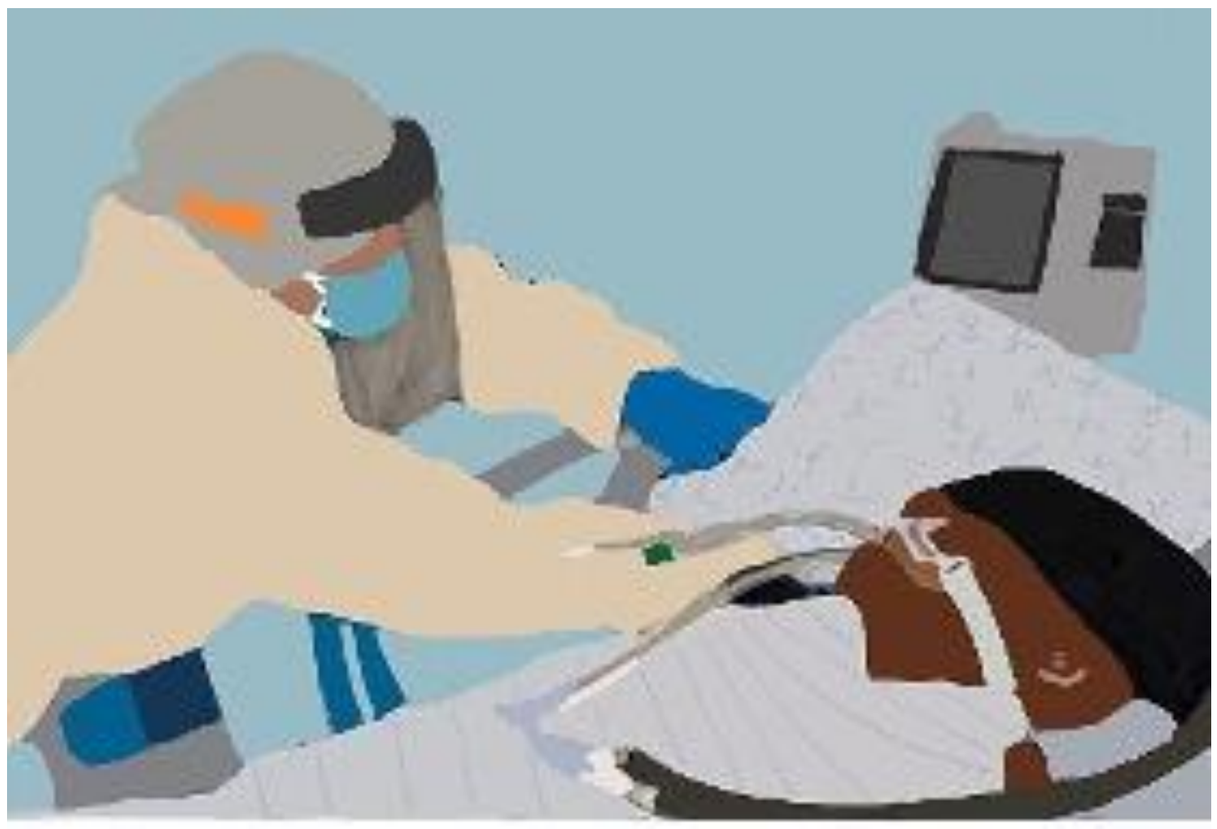
REMDESIVIR UNABLE TO CURE COVID-19 PATIENTS

A News Article

The novel coronavirus has become the focus of our world. In just under a year, this infectious disease has claimed the lives of nearly two million people and put so many others at grave risk.
Many potential drug treatments have been designed since the successful genotyping and sequencing of SARS-CoV-2. this includes Remdesivir, an antiviral medication approved by the United States Food and Drug Administration (FDA) in October. The drug is intended for hospitalized adult and pediatric patients above the age of 12 with a weight of at least 40 kilograms.[6]

Remdesivir has been effective against viruses in the coronavirus family, including Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS).[3] It interferes with one of the key enzymes that coronaviruses need to replicate their genetic material, RNA, thereby preventing them from multiplying and spreading.[3]

Unfortunately, Remdesivir has not shown the same success in patients diagnosed with COVID-19. In a clinical trial conducted by Massachusetts Medical Society, 541 COVID-19 patients out of 1062 were given Remdesivir.[1] These patients has a slightly shorter recovery time than those who received standard care (placebo group). However, there was no significant difference reported in mortality. A subsequent trial showed similar results, where 14% of 158 hospitalized COVID-19 patients receiving Remdesivir died, compared to 13% of the 79 patients part of the control group.[4] This was not a significant enough difference to conclude that Remdesivir is effective against severe COVID-19 symptoms.



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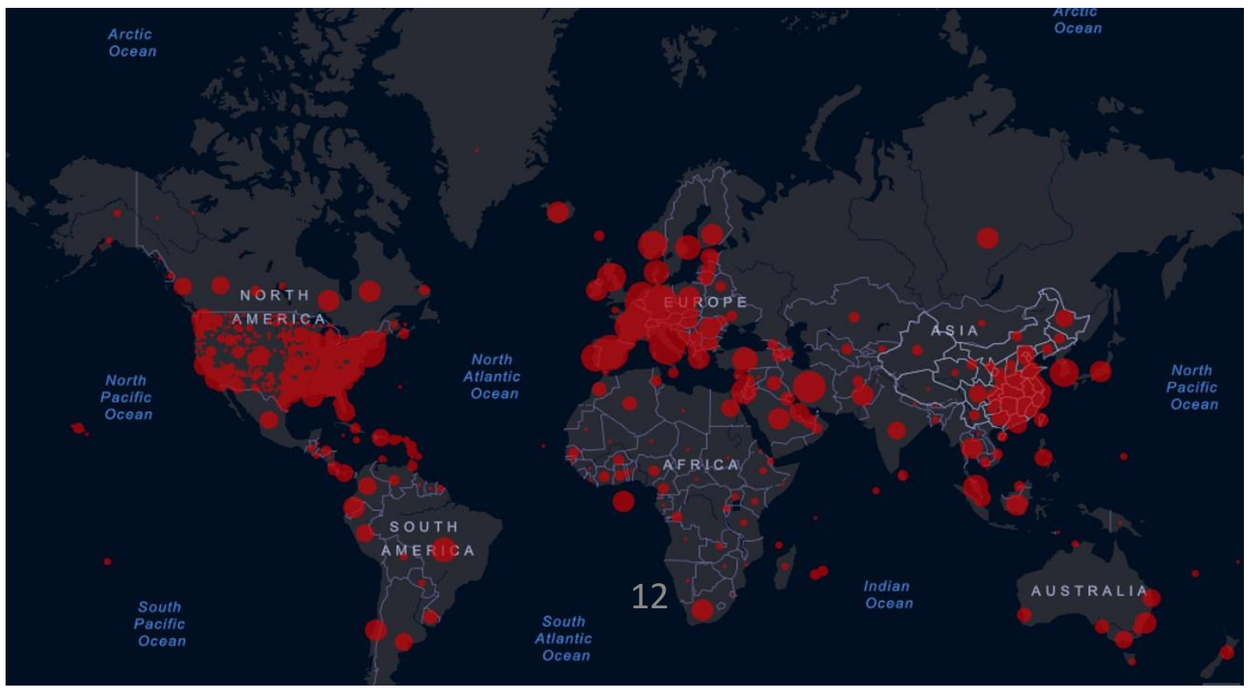
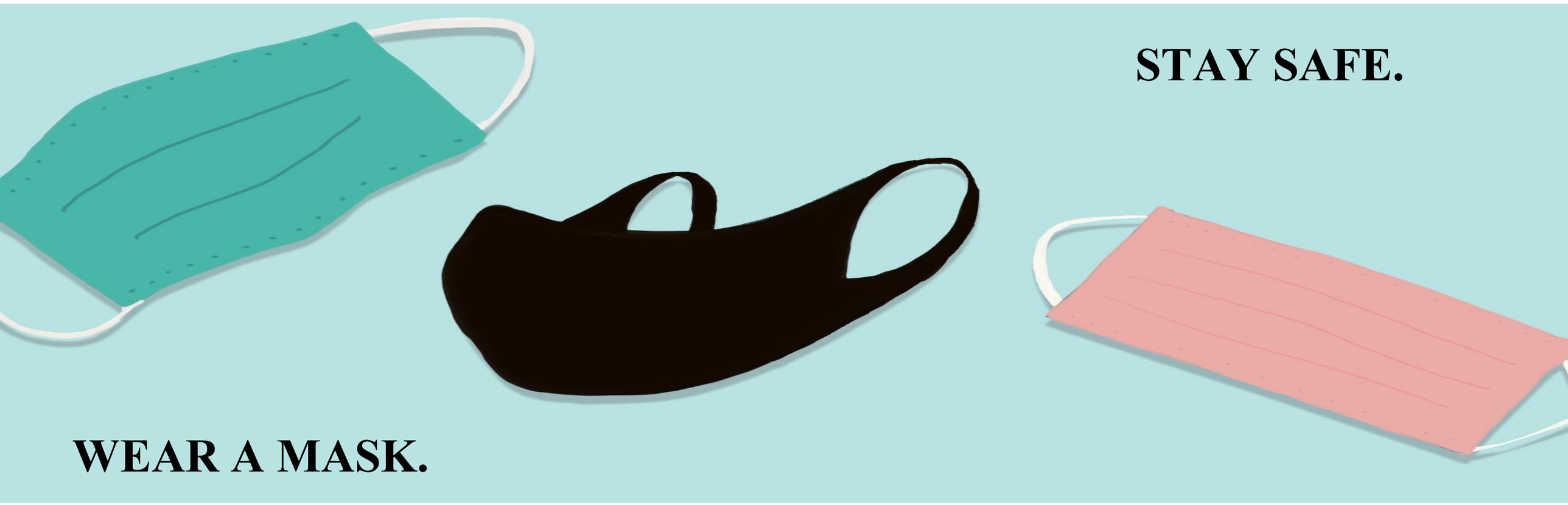


Several patients have prematurely ended Remdesivir therapy for COVID-19 due to side effects like nausea, vomiting, and liver damage.[5] In fact, investigators in China stopped administering Remdesivir due to side effects in 18 patients compared to 4 in the placebo group.[4] Considering that Remdesivir does not produce a significant improvement in hospitalized patients and can potentially have other deleterious effects, it may not be very useful in treating severe COVID-19 cases.

The novel coronavirus, SARS-CoV-2, is not to be taken lightly. Its rapid spread has overburdened healthcare systems to the point of collapse. Multiple drug treatments have been proposed to treat the virus, with Remdesivir being the first to be approved for emergency use authorization by the FDA.[6] However, Remdesivir did not produce significant improvement in patients with COVID-19. Since its approval, vaccines with over 90% efficacy have been developed by companies such as Moderna and Pfizer-BioNTech. We must commend the work of researchers, who have developed reliable treatments that will hopefully bring the pandemic to an end.



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