LA LIBERTÉ

SCIENCES Mag JUNIOR

NOVEMBER 2020
VOL. 1 | N° 2



Illustration: Tadens Mpwene

TOGETHER AGAINST THE CORONAS!

LA LIBERTÉ | SCIENCES Mag JUNIOR

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A special thank you to all the scientists and health professionals, as well as Danielle and Laure Ghia who graciously participated in this edition. Thanks also to Nancy Eibner, Dan and Patricia Harper for their friendly and attentive proofreading.

**The title Professor (Prof.) used in the magazine includes all the different levels of professorship (assistant, associate and full).*

La Liberté's *Sciences Mag Junior* was made possible with the support of …

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LA LIBERTÉ
Depuis 1913

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Magazine unit cost:
$4.50 + Taxes
Annual subscription to *La Liberté*:
$65.90 (GST and provincial tax included)
la-liberte.ca

ISSN 0845-0455

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POSTAL CONVENTION -PUBLICATIONS N° 40012102 | REGISTRATION 7996

La Liberté and its *Sciences Mag Junior* are products of the publishing company Presse-Ouest ltée.

MESSAGES FROM
THE EDITORIAL TEAM FOR THIS SPECIAL ISSUE



SOPHIE GAULIN
EXECUTIVE DIRECTOR AND EDITOR-IN-CHIEF OF *LA LIBERTÉ*

As COVID-19 continues to wreak havoc around the world, the *La Liberté* team has once again rolled up its sleeves to prepare a second 64-page-long youth science magazine, six months after the first issue ***No Mercy for the Coronas*** which was a national and international success. Many readers asked us: *When will the next issue be published?* Well, it's here!

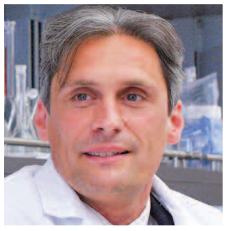
Although researchers are making progress every day in understanding this new virus, many questions still remain. For the children, many of whom went back to school in September, and their parents, the main question remains: *How can I make sure I don't catch and then transmit SARS-CoV-2, the COVID-19 virus?*

Once again, in this pandemic context where false news circulates faster than viruses, *La Liberté* takes its responsibility as a reliable news source seriously in order to publish a relevant scientific resource. It is nonetheless simple and fun and deals with the tools at our disposal to fight against SARS-CoV-2. And while waiting for researchers in the scientific world to find treatments or a vaccine, this second magazine ***Together against the Coronas!*** helps us understand how these tools, which anyone can use, work.

As you likely understand, we are convinced that children need to know as much if not more than adults if we hope to win this fight against COVID.

I would like to thank all those who have contributed to this magazine, whether through their hard work, their talent, their expertise or their financial support. Without you, this second issue of *Sciences Mag Junior* would not have been possible!

It is thanks to this spirit of collaboration and solidarity, so essential in these times of crisis, that together we will be able to resist the attacks of this virus and overcome this pandemic. Together, let's be patient, vigilant and caring.



PROF. JEAN-ERIC GHIA
SCIENTIFIC DIRECTOR OF THE MAGAZINE

I would like to thank my fellow Manitoban and Canadian scientists and healthcare professionals for answering the call to ensure an optimal scientific presence in this magazine.

Each of you, in your own field, provided the most reliable scientific content to explain to young readers the concepts related to COVID-19 and the actions to be taken to prevent it. In order to talk about a virus, which we learn more about every day, we need to rely on experts.

I am very proud to have been able to participate in this magazine, as well as in the first issue, which was published in May 2020. As a professor and researcher, I believe it is essential to share our scientific knowledge, while simplifying it, in order to equip even the youngest children with the necessary understanding of scientific concepts. This way they can consciously adopt the most up-to-date techniques in order to fight against COVID-19. And why not encourage scientific vocations at the same time!



CAMILLE HARPER
COORDINATOR OF THE MAGAZINE

As coordinator of this magazine, I would like to acknowledge the exceptional work done by the entire team. I would like to salute the talent and professionalism of the whole artistic team, which has not hesitated to deploy all its massive talents and creativity in order to produce the best possible magazine: our illustrators Tadens Mpwene and David MacNair, whose artwork has given life and realism to scientific concepts that are sometimes quite abstract; our colourists Marta Guerrero and Sonia Roussault, who managed to create a beautiful and welcoming universe for the readers; and of course our production manager and graphic designer Véronique Togneri who once again put her overflowing creativity at the service of information and science. I can't forget Laëtitia Kermarrec, for her constant writing support and her precious advice in popularizing science.

It was a great pleasure for me to work with this team, under the direction of Sophie Gaulin and in collaboration with Prof. Jean-Eric Ghia, to combine the reliability of science, the power of words and the magic of illustrations; and to be able to contribute, in our own way, to the fight against COVID-19.

THE TEAM

VÉRONIQUE TOGNERI
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TADENS MPWENE
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SONIA ROUSSAULT
COLOURIST



LAËTITIA KERMARREC
WRITER



MESSAGE FROM CENTRE DE SANTÉ SAINT-BONIFACE



SERGE BISSON
PRESIDENT

The Centre de santé Saint-Boniface is pleased to support this children's science magazine, ***Together against the Coronas!*** in order to help young children and families understand the tools available to us to fight the spread of COVID-19.

We are convinced that this resource, developed in collaboration with multiple researchers and healthcare professionals, will help stimulate and support people in taking charge of their own health, especially in times of a pandemic.

Preventive healthcare plays a key role in this health crisis. And since prevention also requires relevant and quality information, our organization fully supports this type of initiative.

Finally, the availability of this resource in both of Canada's official languages is perfectly in line with one of our values, which is to provide equal access to healthcare services in the preferred language of our clients, either French or English.

On behalf of the Board of Directors, management and all professionals at Centre de santé Saint-Boniface, we are pleased to contribute to this innovative project as it will become part of the range of resources that promote the health and well-being of our community.

MESSAGE FROM THE DIVISION SCOLAIRE FRANCO-MANITOBAINE



ALAIN LABERGE
GENERAL MANAGER

The Division scolaire franco-manitobaine (DSFM) is proud to be associated with the second issue of the ***Sciences Mag Junior – Together against the Coronas!*** by ***La Liberté***. The first issue from the spring of 2020, ***No Mercy for the Coronas***, having proven to be an instructive tool that was highly appreciated not only by the community, but also by the teaching staff of the DSFM schools. It was obvious for us to continue our support of the project, by funding the creation and helping with promotion of this second publication.

Presented in a creative, engaging and amusing way, the *Sciences Mag Junior* magazine can easily reach a wide audience, including our school communities. Therefore, it has become an essential resource in education for professionals and parents alike, who are looking for the tools they need to answer their children's questions as well as possible.

At the DSFM, we believe that this resource is a must-have tool, not only to inform the community about COVID-19, but also to generate discussion about its impact on the health and well-being of all.

We wish another great success for the second edition of *Sciences Mag Junior – Together against the Coronas!*

Thank you and congratulations to the entire team at *La Liberté* for such professionalism, and especially thank you for supporting the learning process of our students, our parents, our staff and our community.

Hats off to the whole team!

MESSAGE FROM ST. BONIFACE HOSPITAL



MARTINE BOUCHARD
PRESIDENT
AND CHIEF EXECUTIVE OFFICER

The St. Boniface Hospital is very proud to be associated with the second issue of ***La Liberté Sciences Mag Junior*** entitled ***Together against the CORONAS!***

Our commitment to the first magazine released in May 2020 has been greatly appreciated by families, teachers and even professionals in the field of research and health in general.

We were thrilled to see that the digital and paper versions had exceeded 173,000 copies viewed to date.

The leadership of ***La Liberté*** and the expertise of our collaborators at the Research Centre's Youth BIO Lab Jeunesse have been recognized not only in Canada, but also beyond our borders as the first magazine has been adapted and used in other countries around the world.

Once again, the *La Liberté Sciences Mag Junior* focuses on the major concerns of Canadians and provides scientifically reliable answers about the tools at our disposal to slow the spread of SARS- CoV-2 while waiting for a treatment or a vaccine.

We wish this second issue as much success as the first one. Once again, we are convinced that health depends on the transmission of reliable and quality information. Understanding science will be our best tool while we go through and wait for the end of the pandemic. Until then, let's remain vigilant!

MESSAGE FROM ST. BONIFACE HOSPITAL FOUNDATION



KAREN FOWLER
INTERIM PRESIDENT AND CHIEF EXECUTIVE OFFICER,
AND MOM TO ERIKA AND HALLA

As a mom, I am concerned about the impact of the COVID-19 pandemic on my family, friends, and most of all, my children. I want to understand the best way to protect us from catching the virus.

I understand that as a young person, you probably have a lot of questions about the pandemic too.

Scientists and doctors are learning more about the virus every day, but there is still a lot that we do not understand. One of the best ways to find answers to our questions is through research, like the kind our scientists do at St. Boniface Hospital.

We are very lucky to have them, and a world-class research and health facility like ours, here in Winnipeg. The Foundation – where I work – helps the Hospital in many ways to support the work of these scientists and researchers. For example, by providing them with microscopes and other lab equipment so they can do their important work.

St. Boniface Hospital Foundation is very proud to support the work of ***La Liberté*** in providing young people like you with scientific resources, such as this magazine, to help you understand how to stop the virus from spreading.

Happy reading!

Six friends Asha, Emma, Idriss, Juan, Li-Na and Sam's summers were turned upside down. Emma, Idriss and Sam were to visit their families in other countries. Asha, Juan and Li-Na had planned to travel to other provinces in Canada to visit their cousins. But none of these trips could take place because of COVID-19 (COrona VIrus Disease 2019), which is still prevalent around the world.



Illustration: Tadens Mpwene

And now it's already time to go back to school. A very unique back-to-school for them, as they unfortunately have to share it with SARS-CoV-2 (Severe Acute Respiratory Syndrome CoronaVirus 2), the famous virus that causes COVID-19...



Illustration: Tadens Mpwene

Emma is a little anxious about the new school year. She wonders, "How are we going to be able to resist the Coronas' attacks? I'm so afraid of getting sick! »

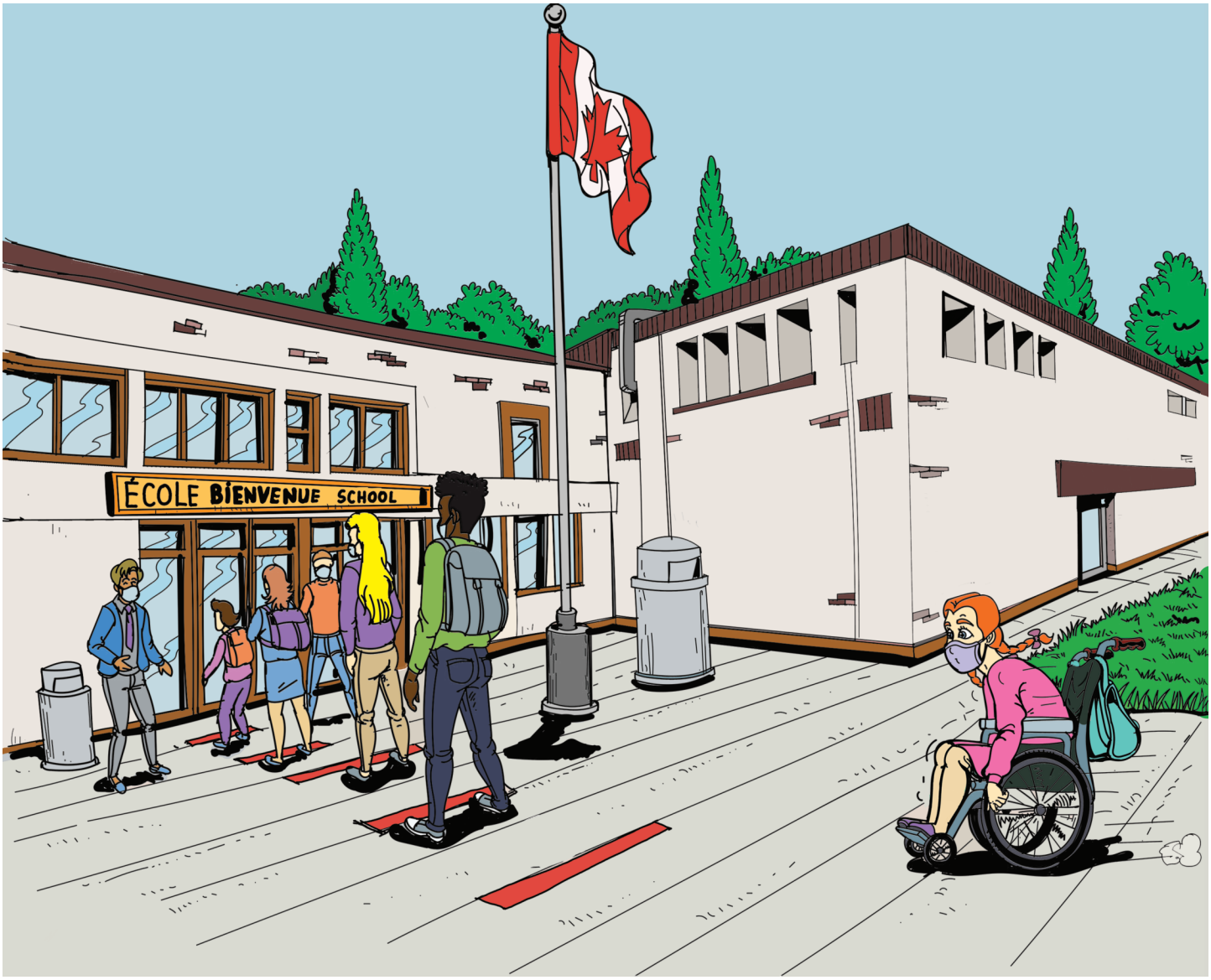
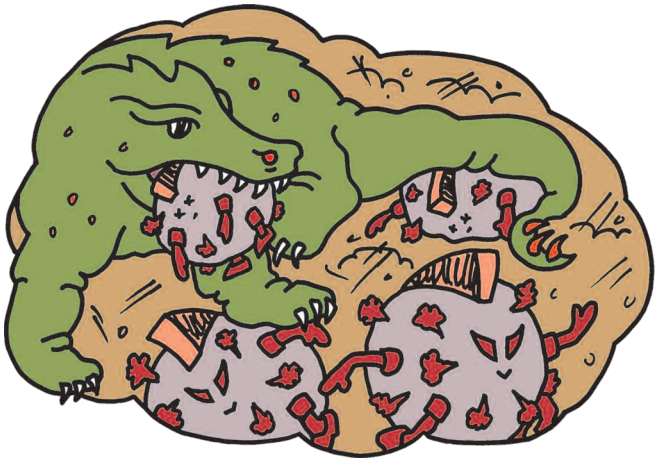
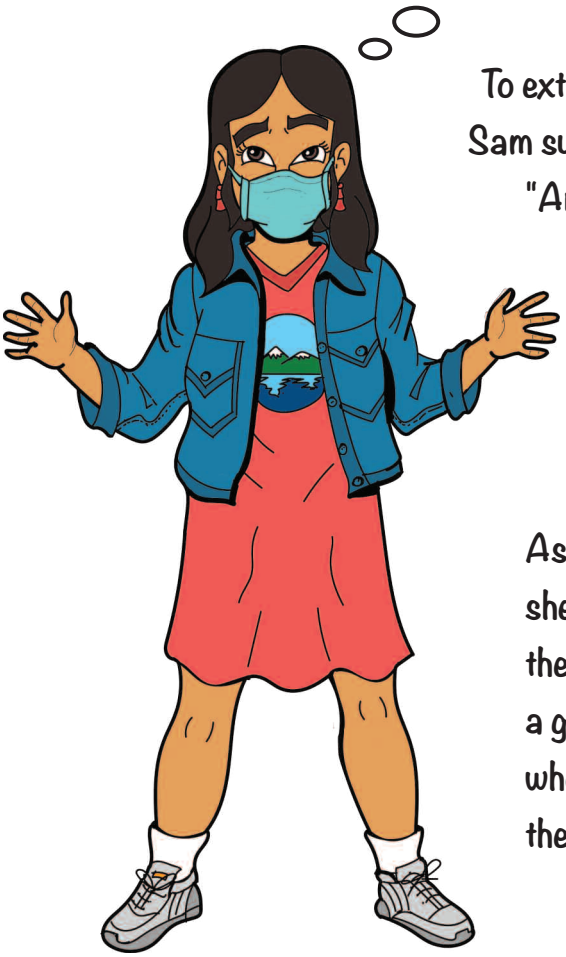


Illustration: Tadens Mpwene

At school, Emma meets up with her classmates. She hopes to find an answer from them. Unfortunately, they just have some wild ideas.







To exterminate the Coronas, Sam suggests using a special "Anti-Corona" laser gun!



As for Asha, she pictures them devoured by a giant dinosaur who came from the bowels of the Earth...

Illustrations: Tadens Mpwene and David MacNair

The overflowing imagination of her friends allows Emma to relax a little before going to class. She knows she will have Ms. Laura again this year. She will ask her all her questions.

The teacher presumed the children would come back to her class with many questions about the coronavirus because even though it has been present in Canada since March 2020, it is still very new and we learn a lot about it every day.

As she did last year, Ms. Laura asked several Canadian scientists to appear as guests via videoconference to explain to the children how to fight the spread of SARS-CoV-2 while waiting for a reliable treatment or vaccine.

Since her students love stories, she tells them the story of Terratum's fantasy world.

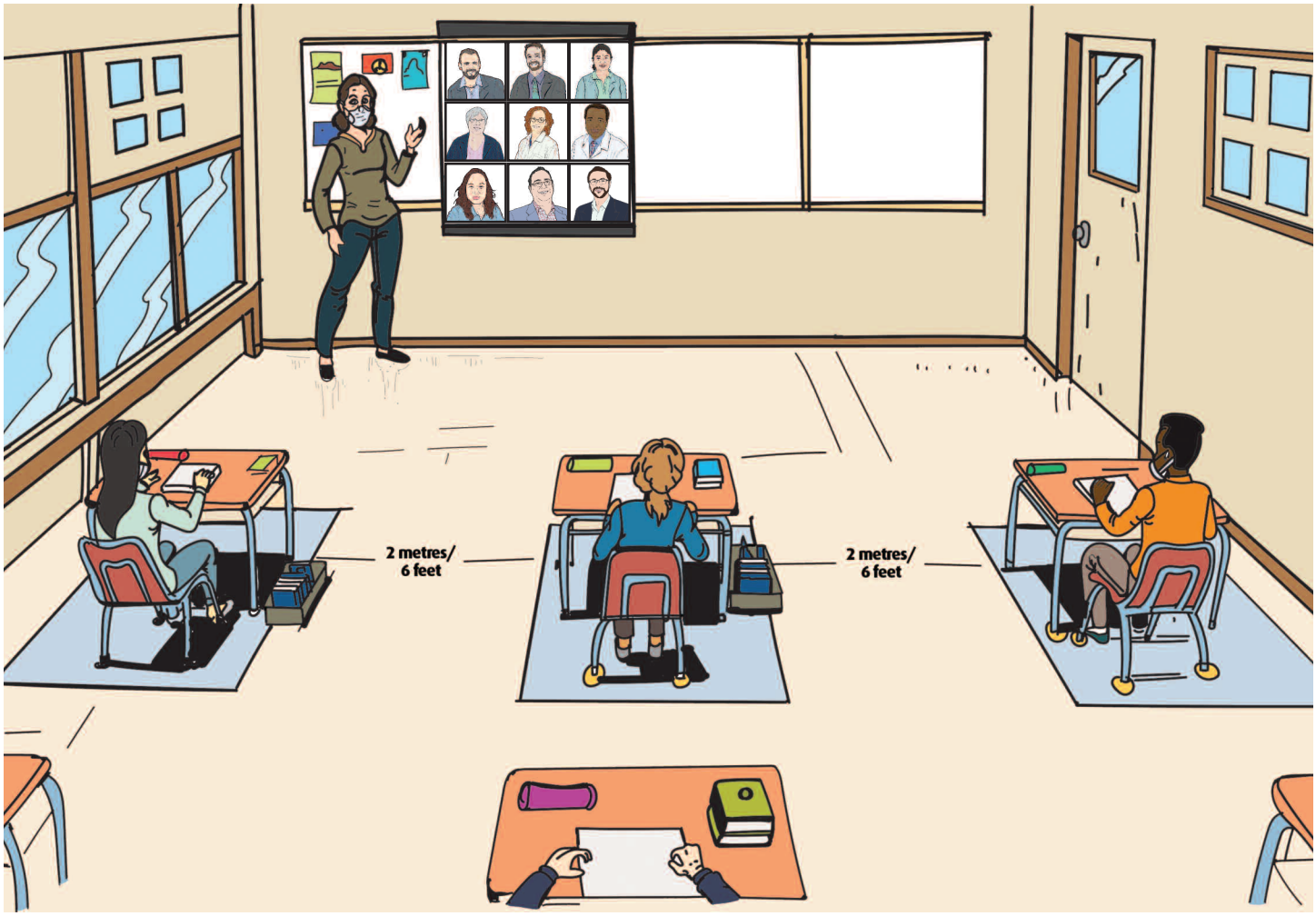


Illustration: Tadens Mpwene

THE WORLD OF TERRATUM

There once was a world named Terratum, in which majestic castles stood, housing villages where the inhabitants lived in perfect harmony, mostly.

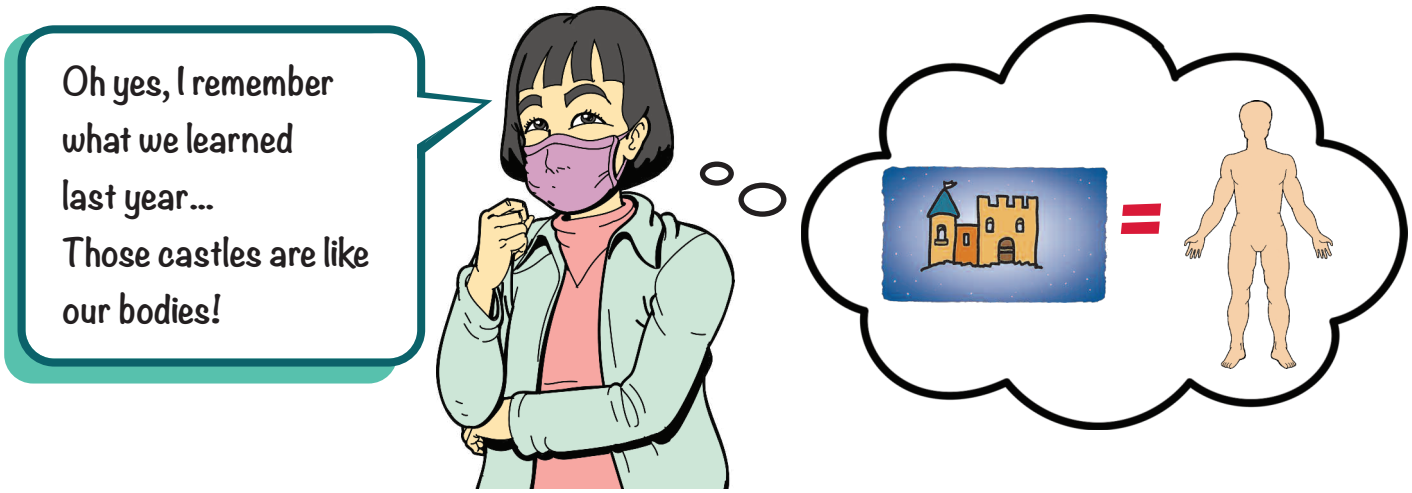


Thanks to their very thick defensive walls, deep moats and well-guarded gates, the castles seemed indestructible to enemies.

Illustration: David MacNair



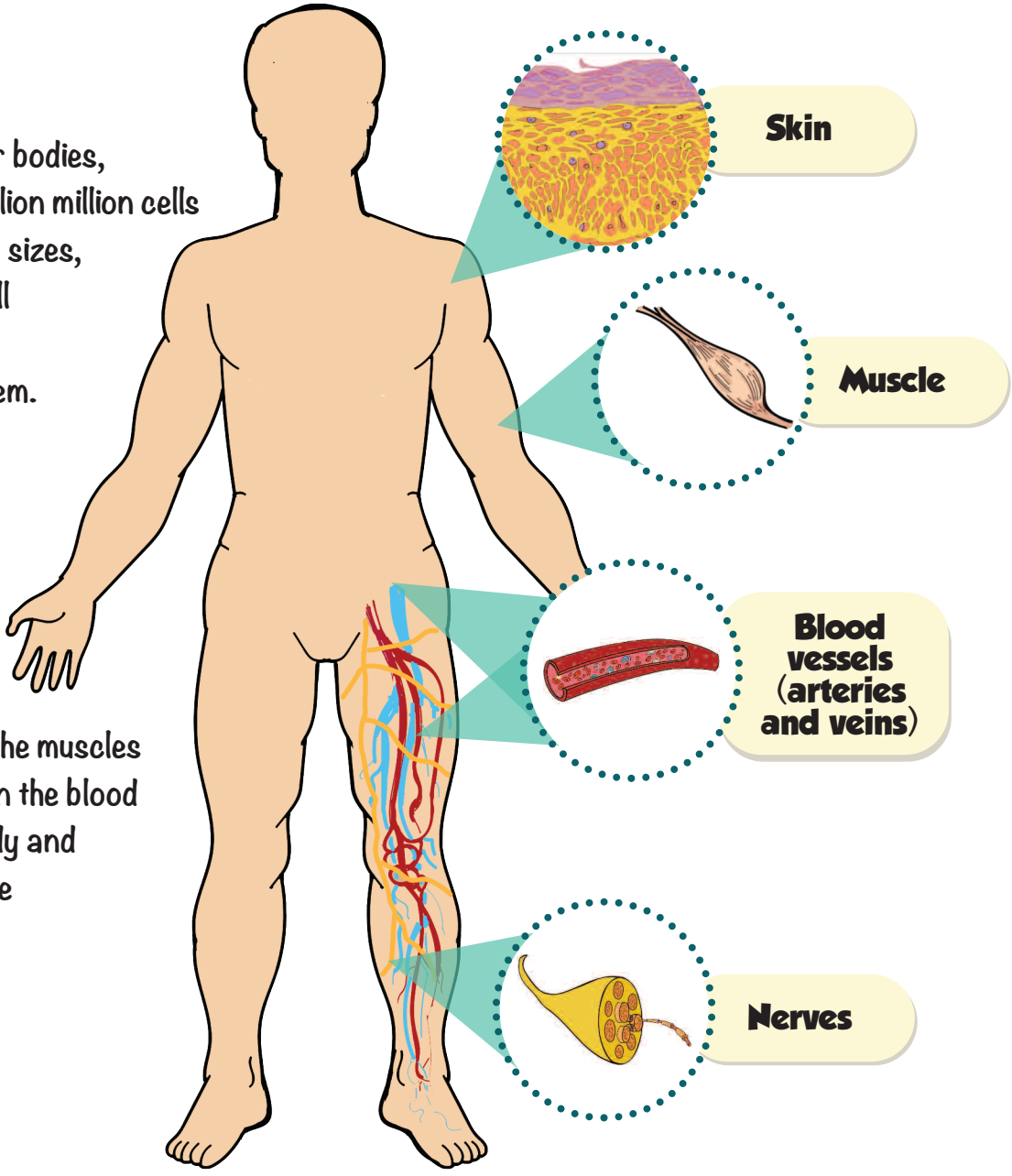
Illustration: David MacNair



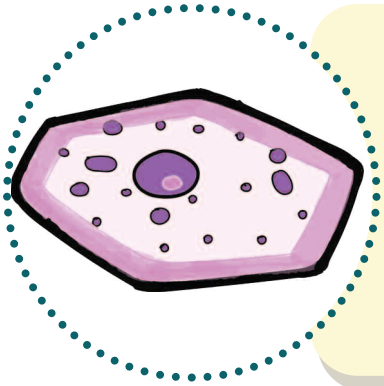
Remember friends, Li-Na says. In our bodies, there are about 30 million million cells of different shapes and sizes, all of which are so small that you have to use a microscope to see them.

Our cells are like the inhabitants of the castle: they each have a role to play.

Cells in the skin protect us, the ones in the muscles keep us moving, those in the blood vessels nourish our body and give it oxygen and those in the nerves transmit messages, etc.



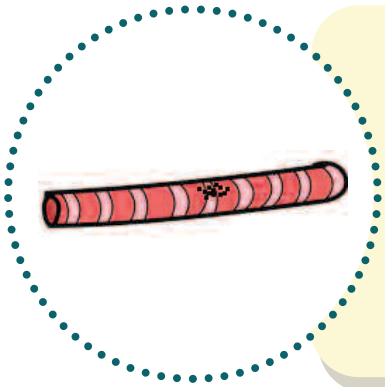
Illustrations: Tadens Mpwene and David MacNair



Name: **Skin cells**

Location: Covering the whole surface of the body.

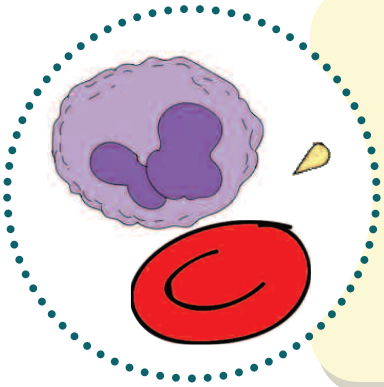
Job: Protect us.



Name: **Muscle cells**

Location: Attached to the bones, in the digestive system, the blood vessels and the heart.

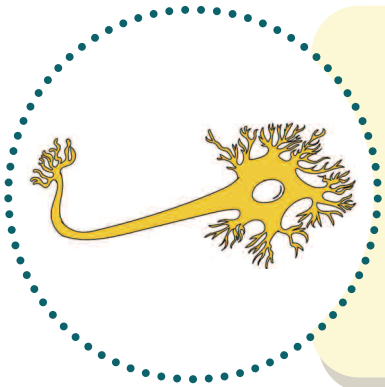
Job: Squeeze or stretch to help move your body and some organs.



Name: **Blood cells**

Location: Floating in the blood.

Job: Carry oxygen to the body (red cells), protect against germs (white cells) and repair injuries (platelets).

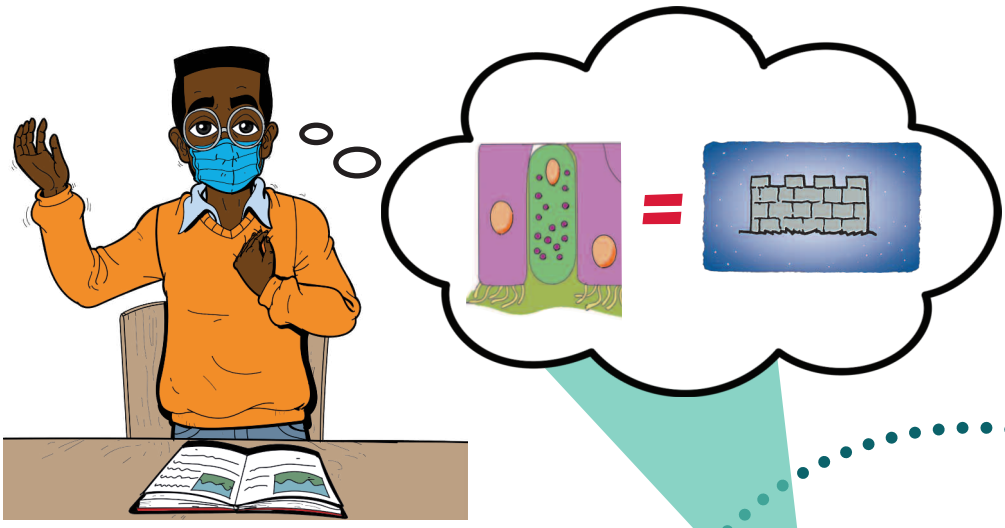


Name: **Nerve cells** (neurons)

Location: Brain and body (nerves).

Job: Send messages from the brain to control the body, think and feel the outside world (see, hear, touch, taste and smell).

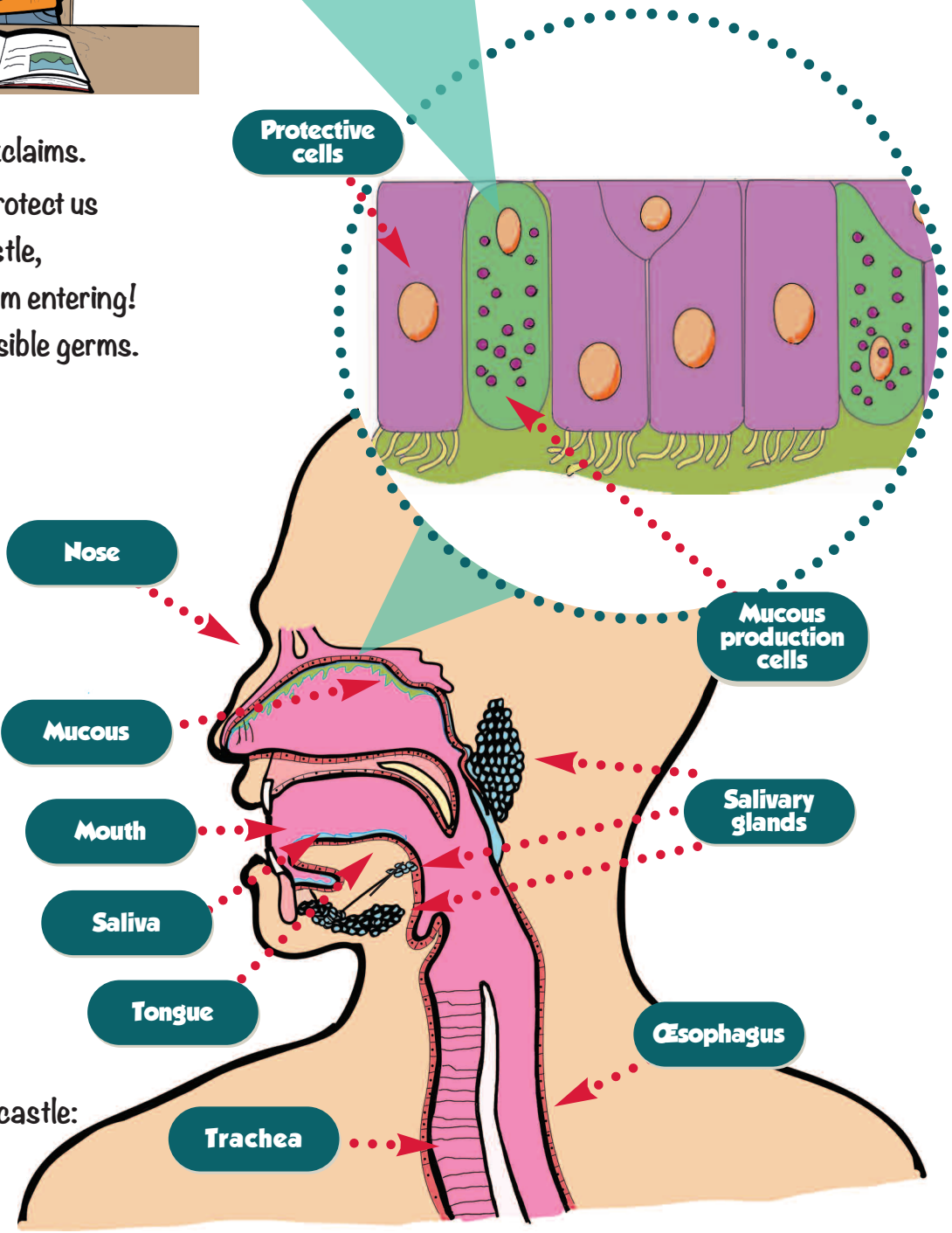
Illustration: Tadens Mpwene



That's right!, Idriss exclaims.
And the cells that protect us
are like the walls of a castle,
they prevent enemies from entering!
Our enemies are the invisible germs.

I remember it well now:
the protective cells
are the ones that make
our skin, lungs,
and many other organs.

They are also
in our nose
and mouth,
and in the middle
of those cells,
there are others
that make spit (saliva)
or snot (mucous).
Saliva and mucous
are like the moats of the castle:
they block the path
of intruders.



Illustrations: Tadens Mpwene and David MacNair



Besides, many germs get into our body through our mouth and nose, and that's why we sometimes get sore throats and coughs, Asha reminds all her friends.

Sometimes, germs can even get into our lungs through the trachea, which is a big tube connected to other smaller tubes called the bronchi and bronchioles. All these tubes look like an upside-down tree!!

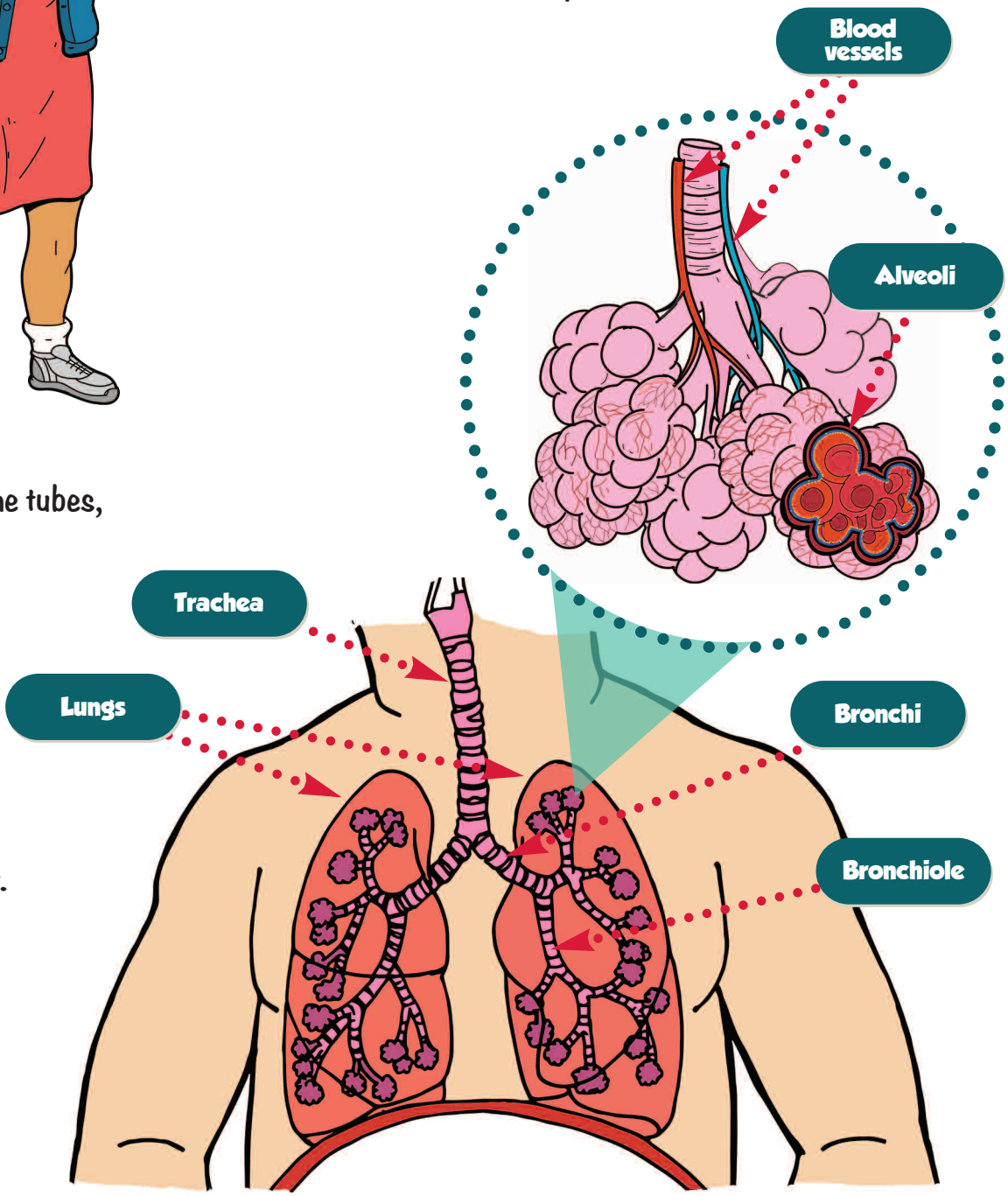


Illustration: Tadens Mpwene

Then at the end of the tubes, there are small bags of alveoli that look like grapes: they take oxygen out of the air we breathe in and release used air when we breathe out.

You are right, Asha, and actually we now know that the COVID-19 virus can not only attack the lungs, but also many other organs, such as the heart and blood vessels, liver, kidneys, skin and nervous system (taste, smell and hearing among others).

The other problem with this virus is that it can spread very quickly within the population. It is estimated that one infected person can contaminate three others, each of which, in turn, can transmit the virus to three others, and so on. This multiplying effect can, over time, infect several tens or even hundreds of people from just a single person.

That's why when things get out of hand and the spread of the virus increases very, very rapidly (exponentially), authorities are forced to ask people to reduce their contact with others.



PROF. IBRAHIMA DIALLO
Dept. Experimental Sciences
University of Saint-Boniface
Manitoba

The risks of transmission

When a group is divided into two groups of the same size, the potential of transmission is reduced by **50 %**

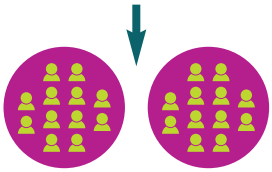
1 group of **24** people



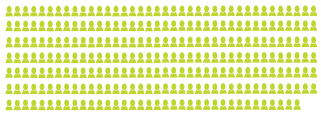
= 552 possible transmissions



2 groups of **12** people



= 264 possible transmissions



When a group is cut in half, the potential of transmission is reduced by about **75 %**

1 group of **24** people



= 552 possible transmissions



1 group of **12** people



= 132 possible transmissions



Graphics based on a source by Prof. Dirk Brockmann of the Robert Koch-Institut, Berlin, Germany

Illustration: Tadens Mpwene

A TERRIBLE ENEMY

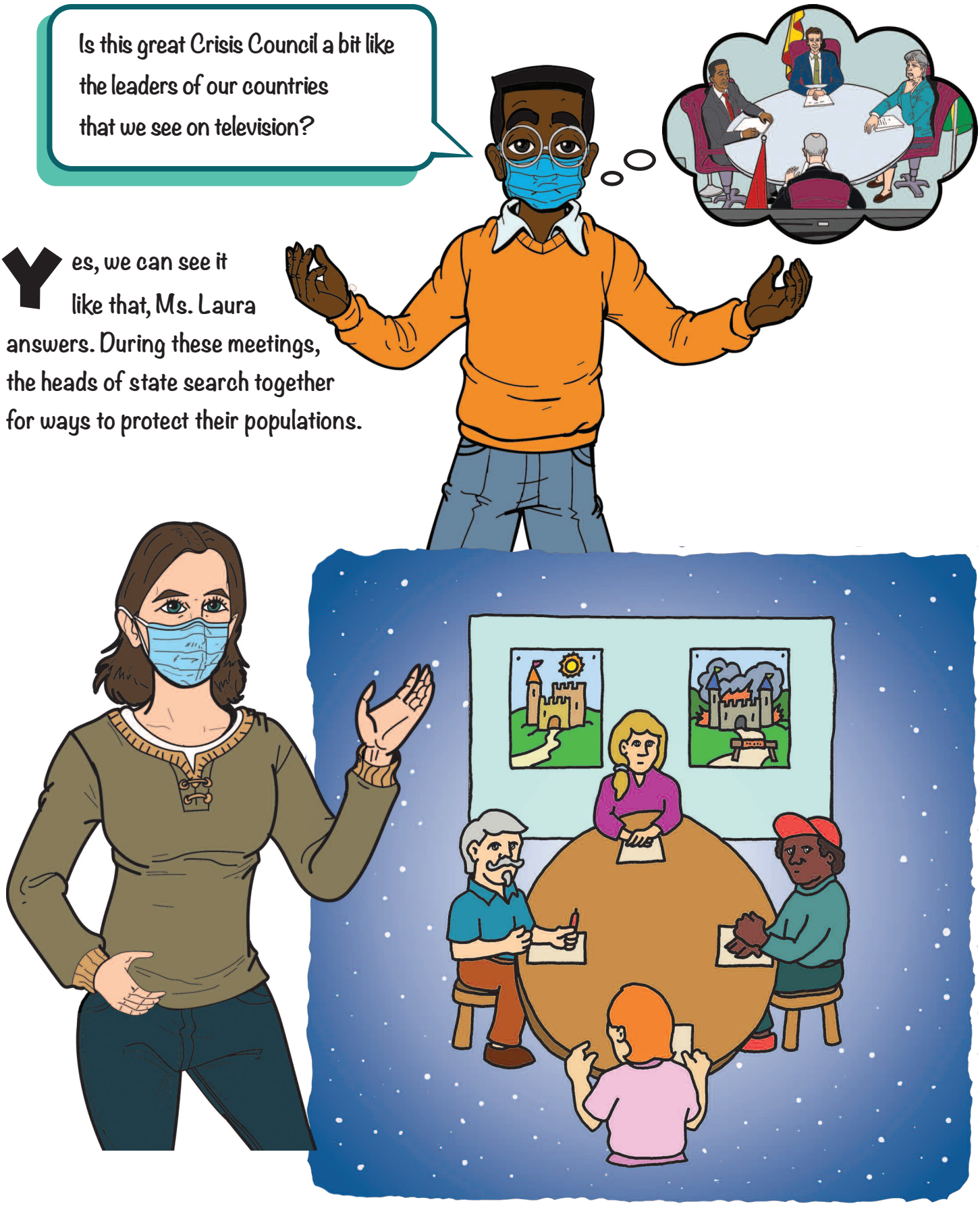
One day, when all is quiet on Terratum, invaders named Coronas make their appearance. They are merciless! They destroy a first castle, then another (epidemic). They cross borders and oceans. Little by little, they invade all the countries in the world of Terratum (pandemic).



Illustration: David MacNair



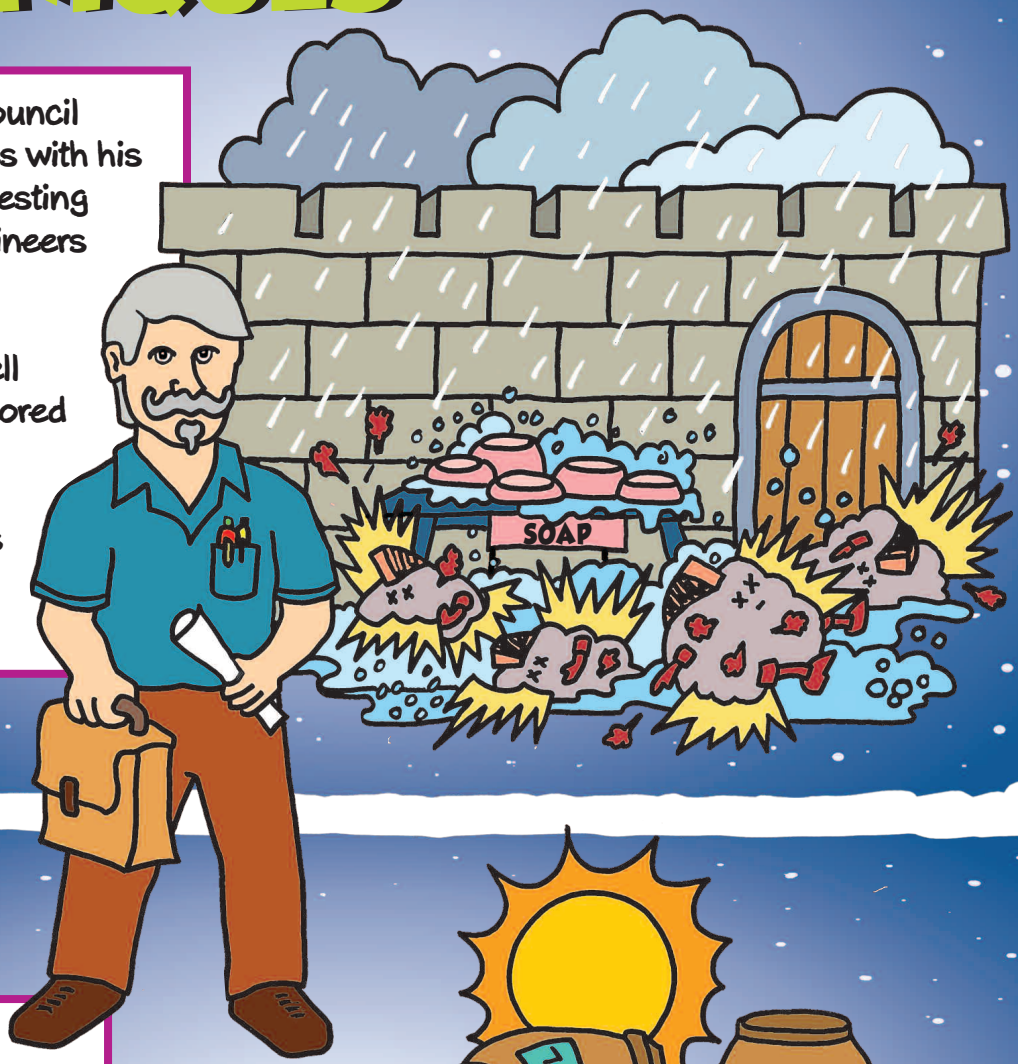
Illustration: David MacNair



Illustrations: Tadens Mpwene and David MacNair

TWO INGENIOUS TECHNIQUES

During the Crisis Council meeting, Paul shares with his colleagues the interesting discoveries his engineers made. The first one happened on a very rainy day. Viruses fell on crates of soap stored outside a castle. To their amazement, CRACK! the viruses exploded in just 20 seconds!



Another day, on a sunny day this time, viruses accidentally fell into barrels of alcohol left at the entrance of a castle. Again, they disintegrated in an instant!

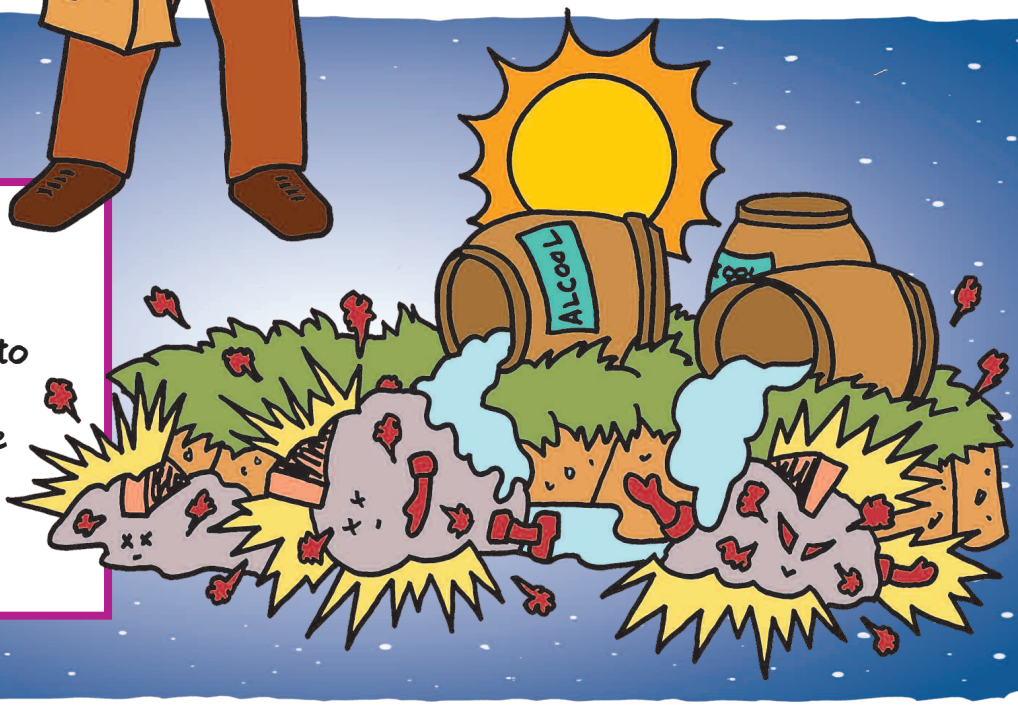
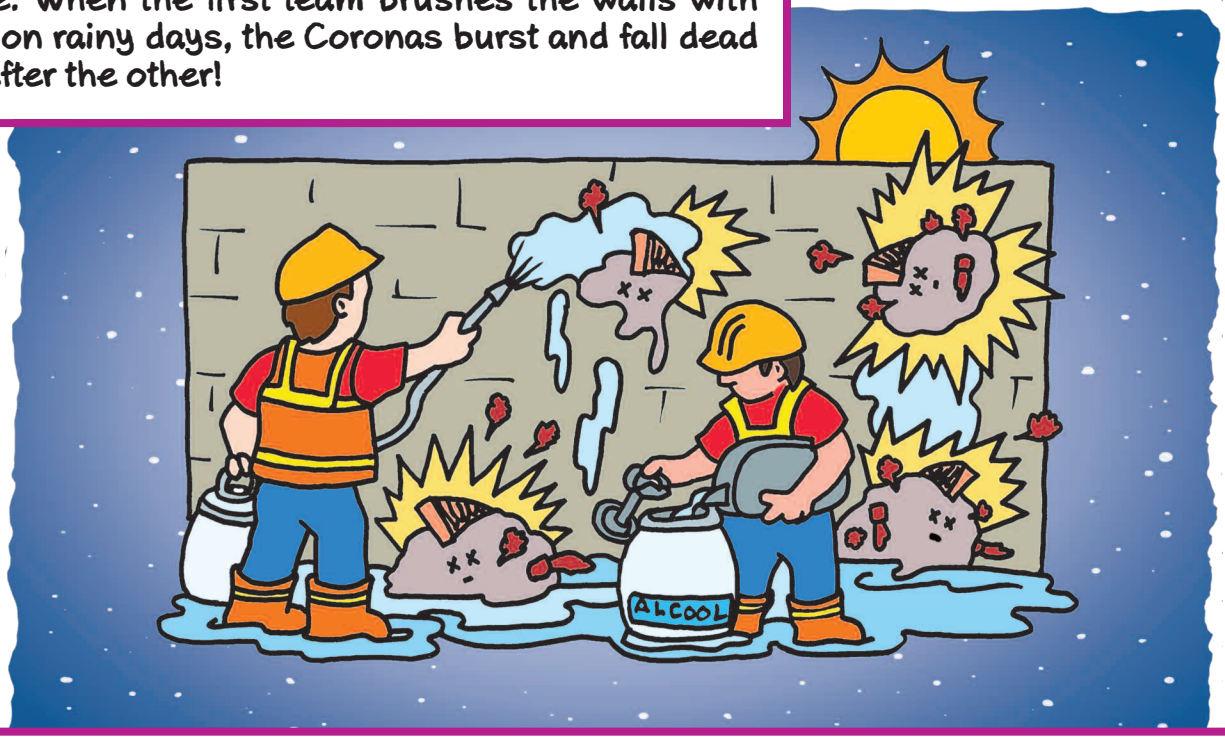


Illustration: David MacNair



Inspired by these two discoveries, the great Crisis Council takes action. It sends its cleaning teams to kill the Coronas who have settled on the walls of the castle. When the first team brushes the walls with soap on rainy days, the Coronas burst and fall dead one after the other!



The second team prefers to work on sunny days when the walls are dry. They spray them with alcohol. There too, the enemies disintegrate by the thousands. Both techniques give great results: very few Coronas succeed in breaking through the walls of the castle.

Illustration: David MacNair

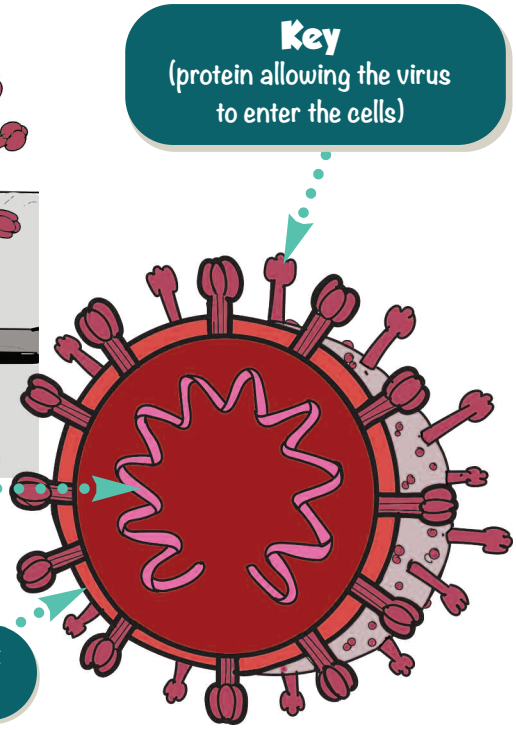
So we can manage to destroy the Coronas?

Yes Juan, as long as the coronaviruses (SARS-CoV-2) have not entered our body, they are very fragile. If you cut one of them in half, you can see its skin, which is called "membrane" and is made of fat.





DR. GUILLAUME POLIQUIN
National Microbiology Laboratory
Public Health Agency of Canada



Without their membrane, the coronaviruses would break into pieces and could no longer make you sick.

Illustration: Tadens Mpwene

"But how do you break the membrane of a virus?" Juan asks.

That's why soap is our best friend! It is made of many identical molecules. Up close, these molecules are pin-shaped (they look just like the one in the magnifying glass), with one part that likes water (hydrophilic) and the other part that doesn't like it at all (hydrophobic).

The one that doesn't like water prefers fat (lipophilic), so it sticks to the membrane of the virus.

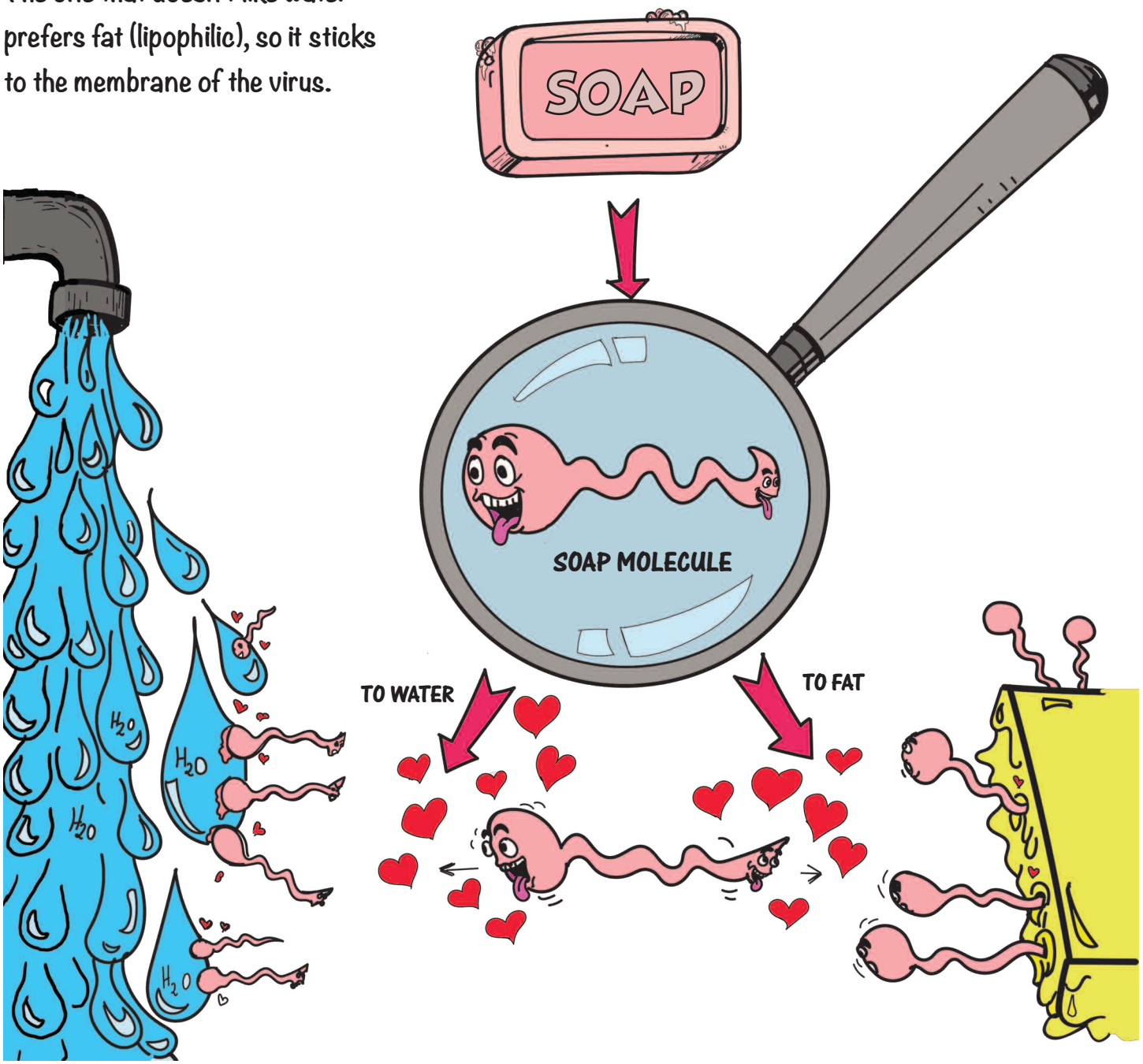
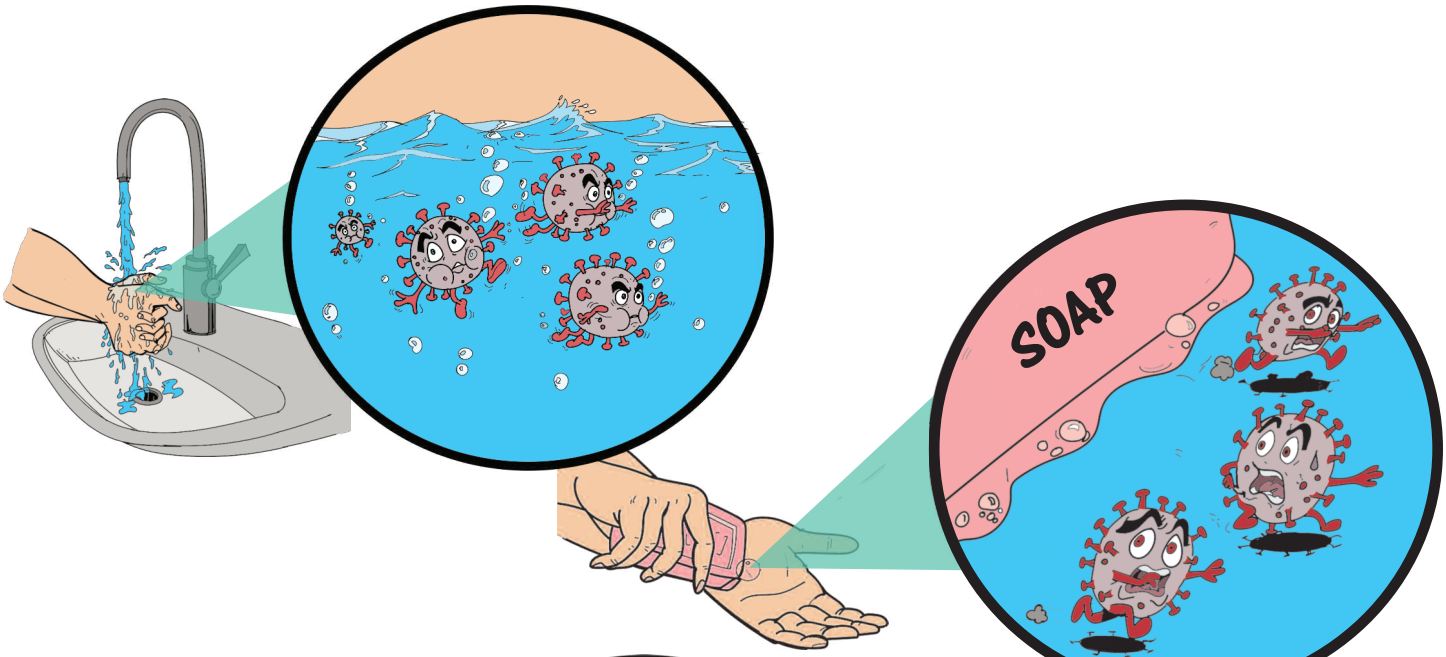
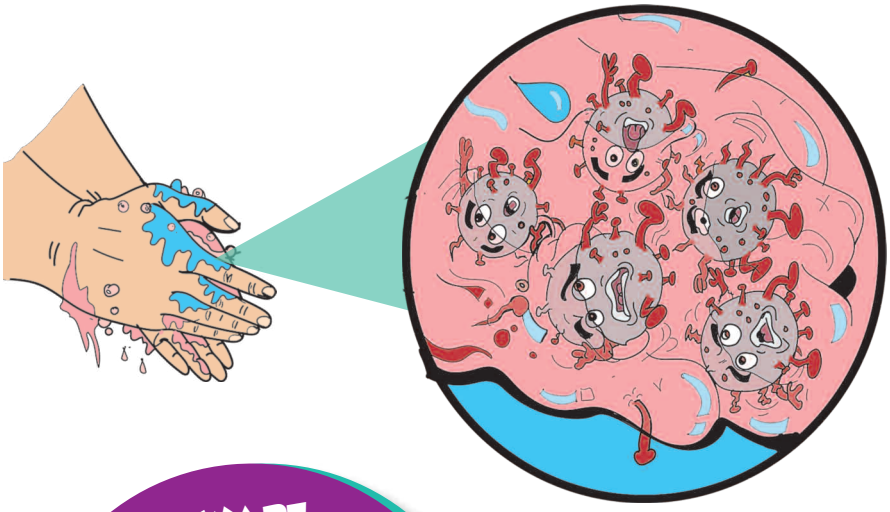


Illustration: Tadens Mpwene

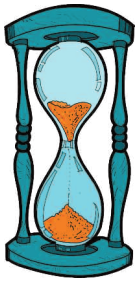
"So what is the water for?," Juan continues.





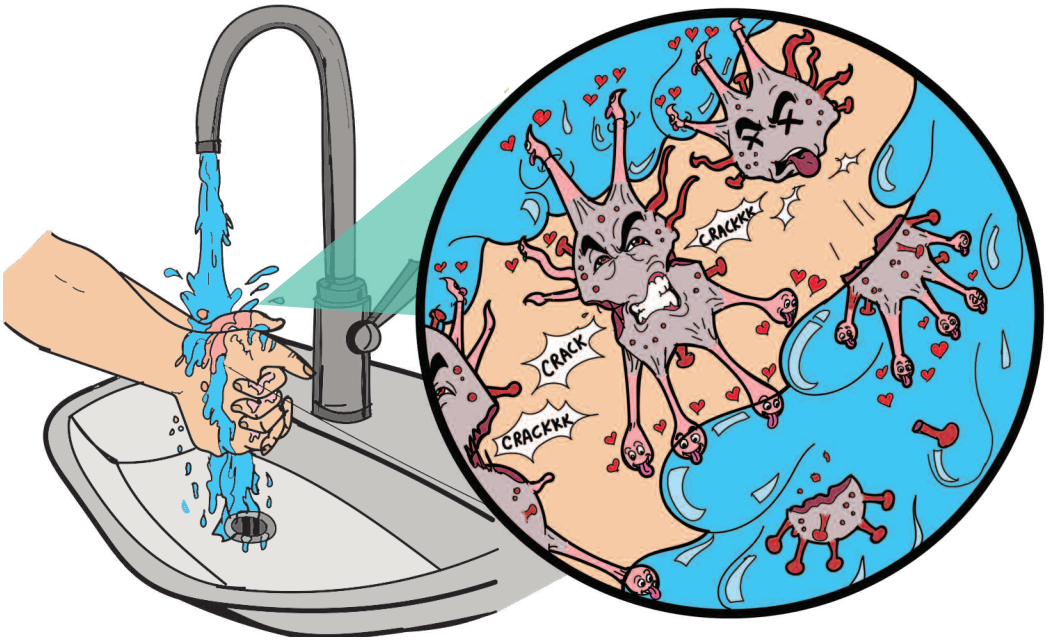
When soap and coronaviruses meet, the fat-loving part of the soap attaches itself to the membrane of the virus.

BEWARE,
some viruses have a membrane made of proteins, not fat. Soap does not bind to proteins as well, so these viruses are not as sensitive to soap. This is the case with the virus that causes polio, for example.



AFTER 20 SECONDS OR MORE

Illustration: Tadens Mpwene



Then once you rinse your hands with water, the water-loving part of the soap will attach to it.

Then there is a power struggle between the part of the molecule that likes water and the one that likes fat!

When we wash our hands well, there is enough water to ensure the victory of the water-loving part. The result: **CRACK!** Lots of small pieces of coronavirus disappear at the bottom of your sink.

That's why in the story, soap only works on rainy days: you need water!

The temperature of the water has no effect on how the coronaviruses on your hands are killed.

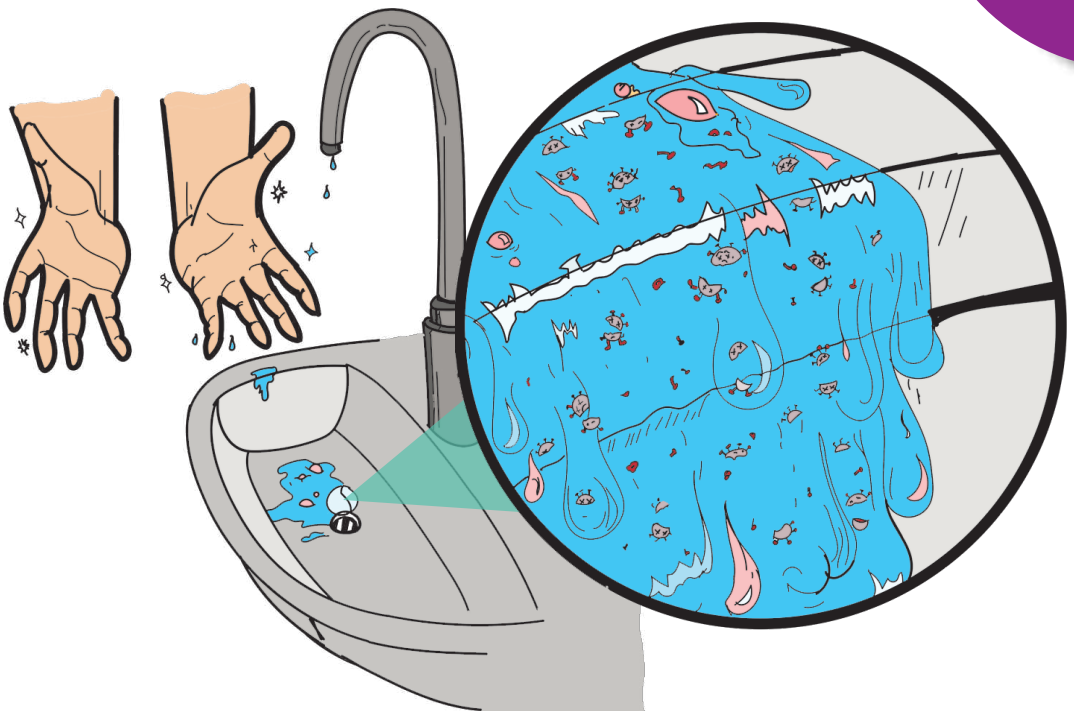
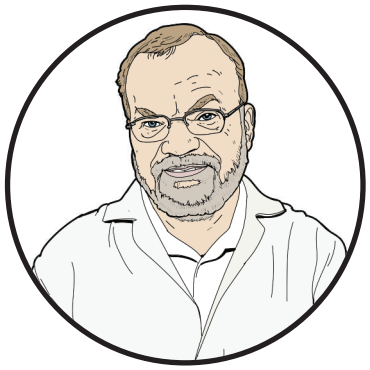


Illustration: Tadens Mpwene

I sometimes use hydro-alcoholic gel.
I know there is water in it, but there is no soap.
So how does it protect me?





BEWARE,
for your hydro-alcoholic gel
to be effective,
it must contain
at least
60 % alcohol.

PROF. KEVIN COOMBS
Dept. Medical Microbiology
and Infectious Diseases
Rady Faculty of Health Sciences
University of Manitoba



Gels contain different kinds of alcohol and other chemicals. These molecules attack viruses a few different ways. Alcohol makes the membrane of a virus more fragile by making small holes in it. It can also go inside the virus and "lock in place" the molecules that are essential for its survival. This makes it possible to kill the virus.

Like soap, hydro-alcoholic gels do not kill all viruses, but they do kill the coronavirus.

Gels are also more effective when hands are dry. That's why in the story, alcohol only works on sunny days!

Illustration: Tadens Mpwene

TECHNICAL DATA SHEET FOR SERIOUS HAND WASHING

Here is the best way to get rid of coronaviruses by cleaning your hands with soap and water:

1. hold your hands under running water;
2. apply soap to the entire surface of your hands;
3. rub your hands palm to palm;
4. rub the back of each hand;
5. rub between your fingers;
6. rub your fingertips;
7. rub your thumbs and between your thumbs and forefingers;
8. rub your fingernails against your palms;
9. after rubbing your hands together for 20 to 40 seconds, rinse them well with water;
10. use a disposable towel to dry your hands;
11. keep the same towel to turn off the faucet, then throw it in the garbage;
12. now, your hands are really clean!





If you don't have access to soap and water, you can do the same thing with some hydro-alcoholic gel containing at least 60 % alcohol, or an alcohol-free gel certified by Health Canada. To be sure it is certified, look for your gel's NPN or DIN number.

When your gel has evaporated after rubbing all your fingers together, your hands are dry and virus-free!

Illustration: Tadens Mpwene

PROTECTING ENTRANCES



Rebecca, another Terratum leader, calls a new meeting of the Crisis Council.

Illustration: David MacNair

She shares with her colleagues that the scientists on her continent noticed that the Coronas liked to enter through the main door and windows of a castle.

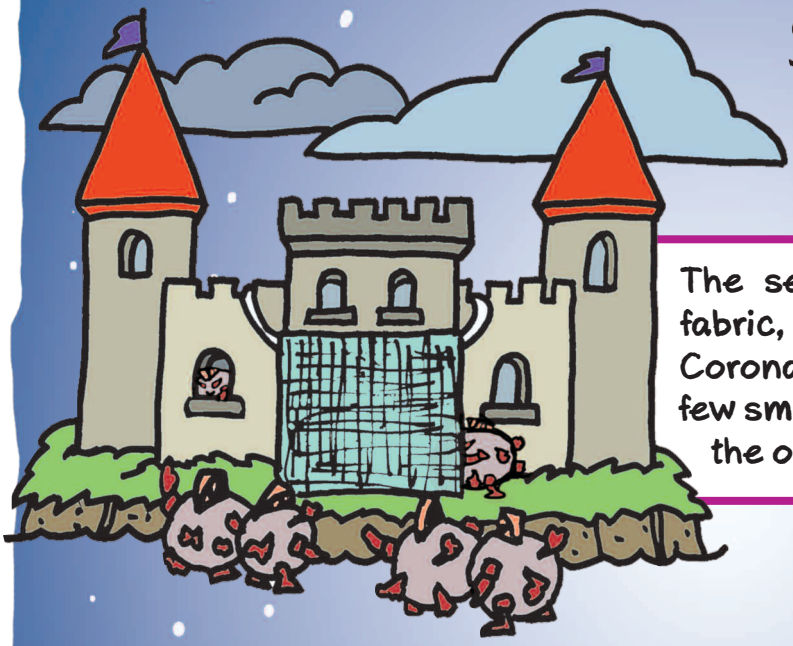
The scientists then experimented with several barricades to the castle's entrances.



Illustration: David MacNair

The first scientist placed a cloth sheet over the entrance of the castle. The advancement of the Coronas was slowed down, but the texture of the cloth was a bit loose and some very strong Coronas were able to sneak through.





The second scientist set up a thicker fabric, with a tighter mesh. Even fewer Coronas were able to get through, but a few smart guys still managed to overcome the obstacle.

As for the third scientist, he was inspired by chain mail which soldiers use in battle, especially that of Knight N95, who has never been wounded.

The scientist therefore had the largest and finest coat of chain mail ever seen on Terratum made, and he covered the entrance of the castle with it.

The result was ground-breaking: almost no Coronas were able to make it through!

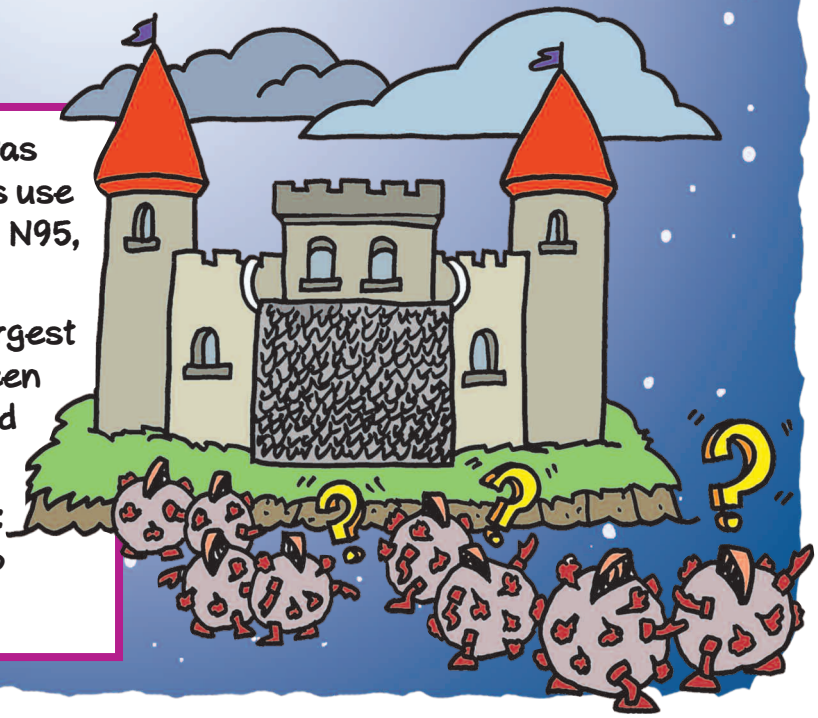
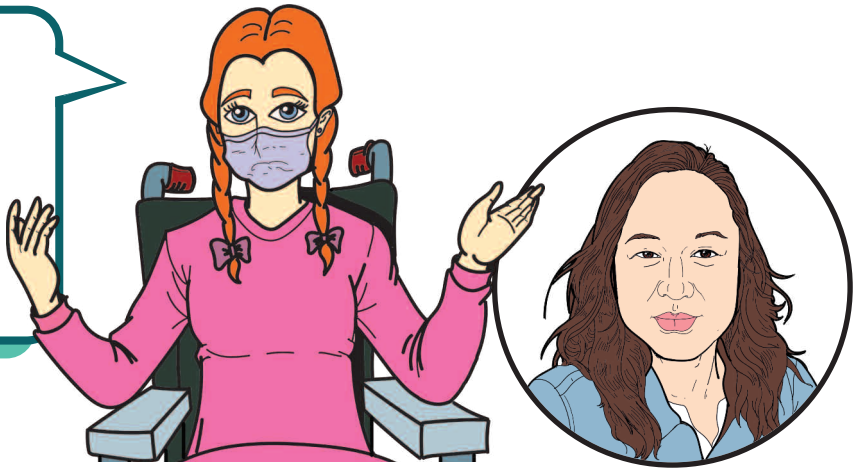


Illustration: David MacNair

This story reminds me of the facemasks we have to wear! I've heard there are different kinds of masks and that they don't protect us the same way.



PROF. EVELYN LO
Medical Director for Infection Control
St. Boniface Hospital
Manitoba

You're absolutely right, Emma, there are indeed several kinds of facemasks. Facemasks are worn for two reasons: to protect us and also to protect others from us.

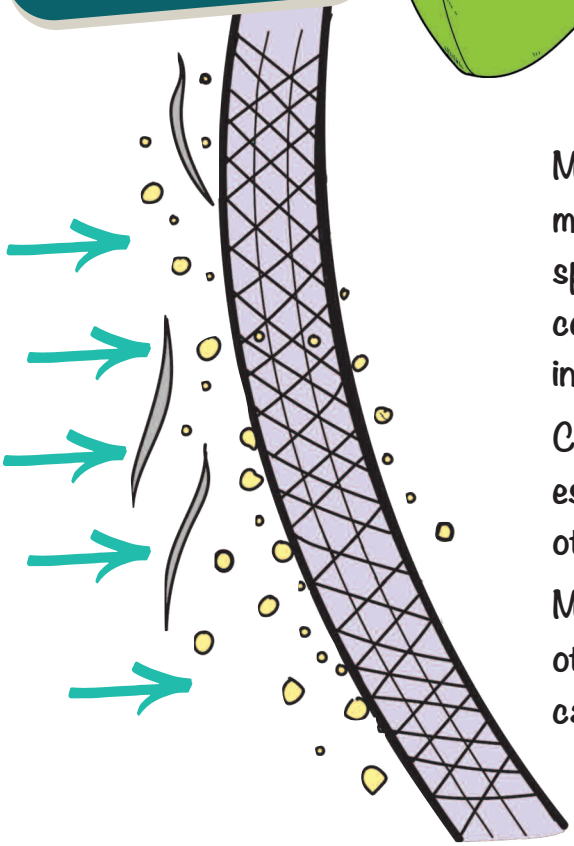
Cloth facemask



Must be replaced as soon as it is dirty or wet, and washed after each use.

Your mask should have at least three layers: two layers of tightly woven fabric (linen or cotton) and a third layer in between, such as a non-woven polypropylene fabric filter.

Cross section of a cloth facemask



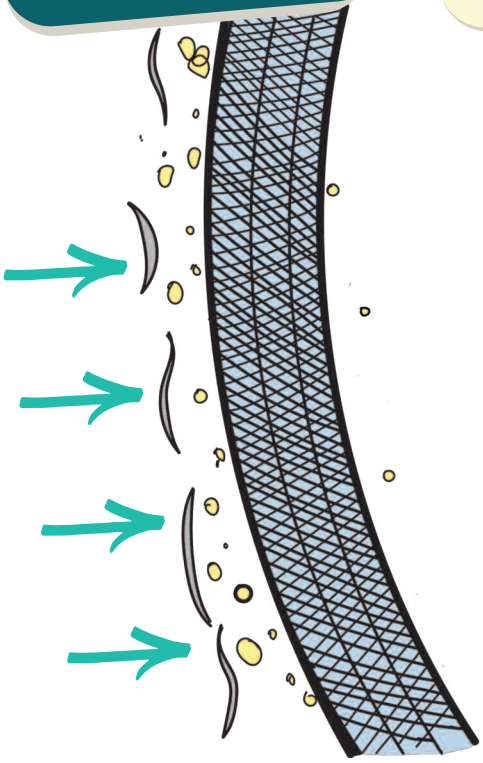
Most people use CLOTH FACEMASKS. These masks are mostly used to catch our germs and prevent them from spreading to people close to us. The droplets from our sneezes, coughs, singing and talking that contain our germs get "caught" in the mask, so they usually cannot reach the people around us.

Cloth facemasks are most effective when everyone wears them, especially when we can't be at least 2 metres away from each other.

Most people wear cloth masks to save the medical masks (the other 2 types of masks) for the healthcare workers, so that they can safely care for sick people.

Illustration: Tadens Mpwene

Cross section of a surgical facemask



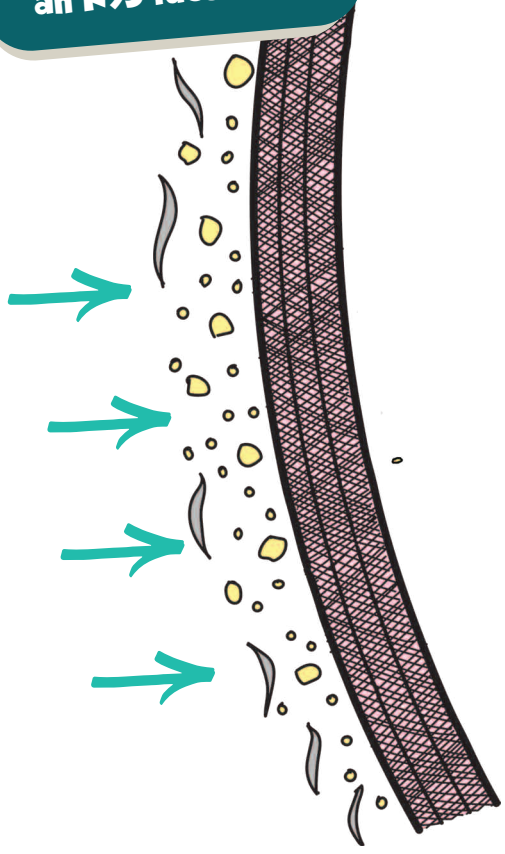
Surgical facemask



Wear for a maximum of **4** hours

Healthcare workers often wear SURGICAL FACEMASKS. They are made of a special material that prevents most droplets from entering or leaving their nose or mouth.

Cross section of an N95 facemask



N95 facemask



Wear for a maximum of **8** hours

And sometimes they wear N95 FACEMASKS. These masks are worn extra tight on the face. They too are made of special materials, which prevent even the smallest particles (aerosols) carrying viruses from getting in. These masks are used in hospitals for special treatments or operations on sick patients.

Illustration: Tadens Mpwene

Protecting others with our cloth facemasks? What do you mean by that?



COVID-19 is spread mostly by droplets that have the SARS-CoV-2 virus germ in them. We spread these droplets by coughing and sneezing, but also by singing and loud talking when we are infected by COVID-19. The problem with COVID-19 is that we can spread the virus before even knowing we are sick.

That's why in order to protect ourselves, **but more importantly to protect others**, we wear a facemask.

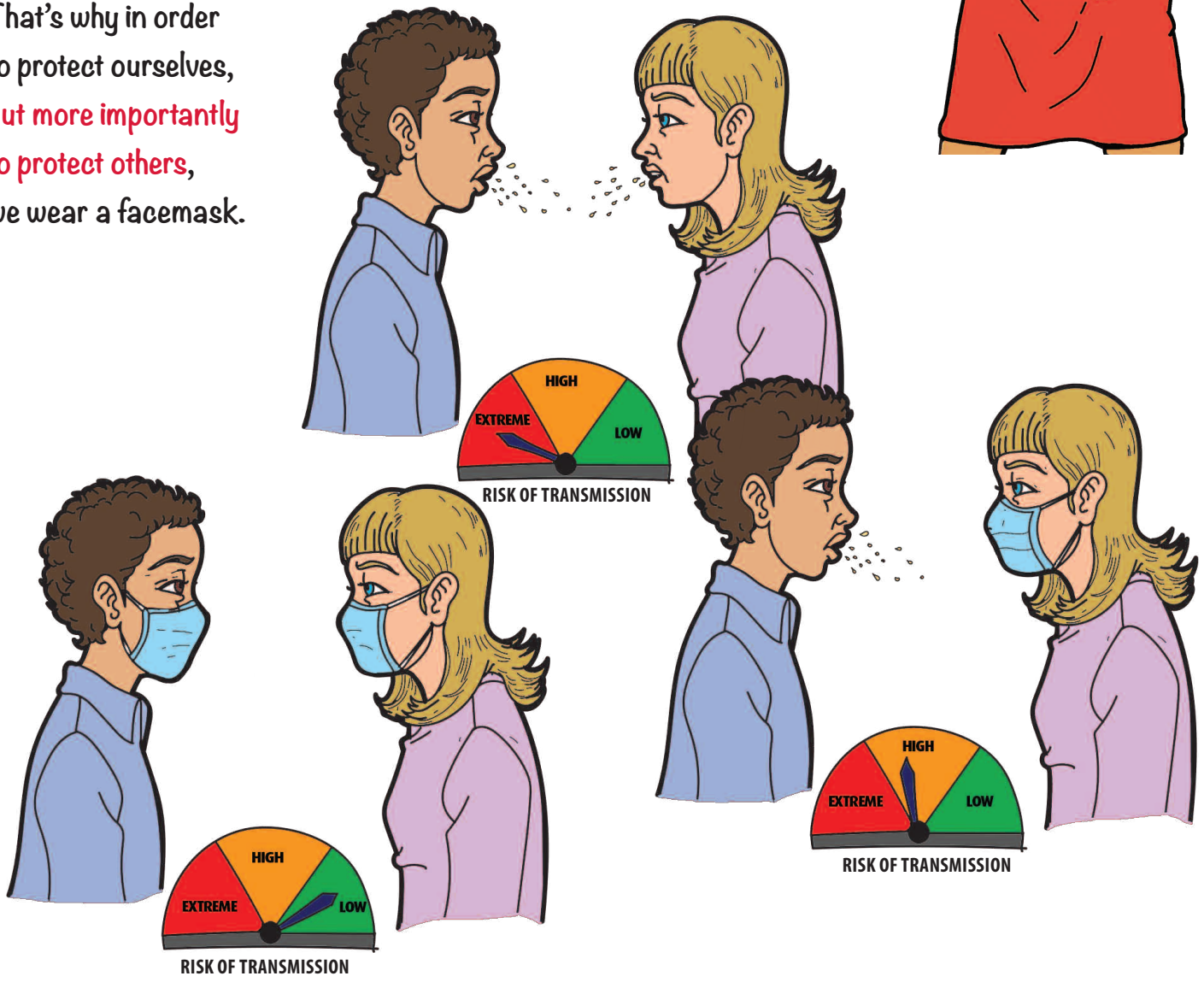
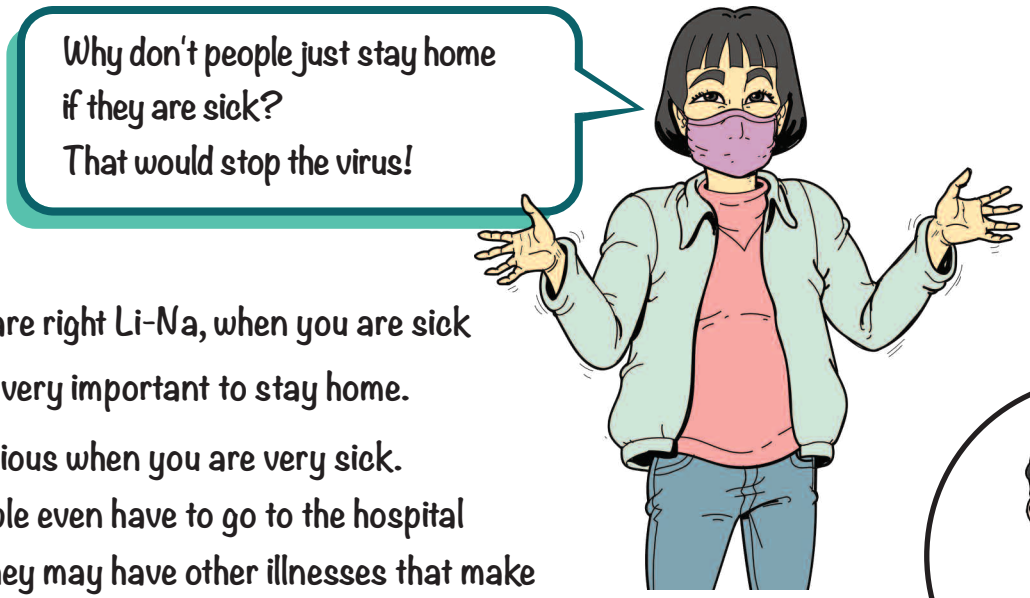


Illustration: Tadens Mpwene



You are right Li-Na, when you are sick it is very important to stay home.

This is obvious when you are very sick. Some people even have to go to the hospital because they may have other illnesses that make them more fragile (co-morbidities) and that can really make COVID-19 worse.

Other people are just a little sick. They have mild symptoms that can vary and may be reminiscent of other illnesses such as a cold or the flu: headache, fever, cough, sore throat, runny nose, stomach ache, diarrhea, loss of taste or smell, fatigue...

Again, it is very important to stay home when you are experiencing any of these symptoms.

The problem is when people carry the virus without having any symptoms. They are called asymptomatic carriers. Even though they are not sick, they are still contagious!



DR. JOSÉ FRANÇOIS
Centre de santé Saint-Boniface
Dept. Family Medicine
Rady Faculty of Health Sciences
University of Manitoba

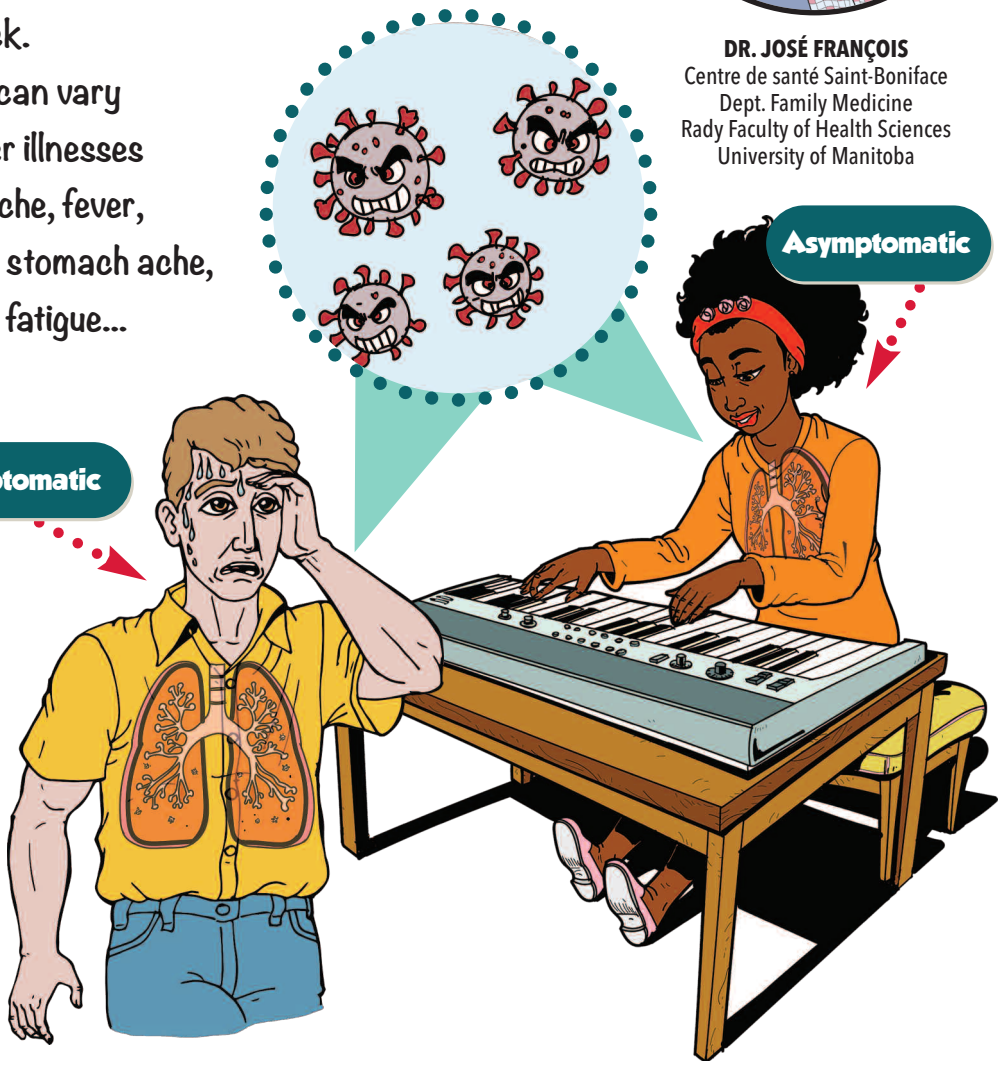


Illustration: Tadens Mpwene

A symptomatic carriers can unknowingly infect others, for example by breathing hard when they exercise. That's why it's really important that everyone wears their facemask around others, even if they feel well. It's also important to go get tested if you think you're sick or if you've been in contact with someone who thinks they're sick. It's the only way to know for sure if you've got COVID-19 or not.

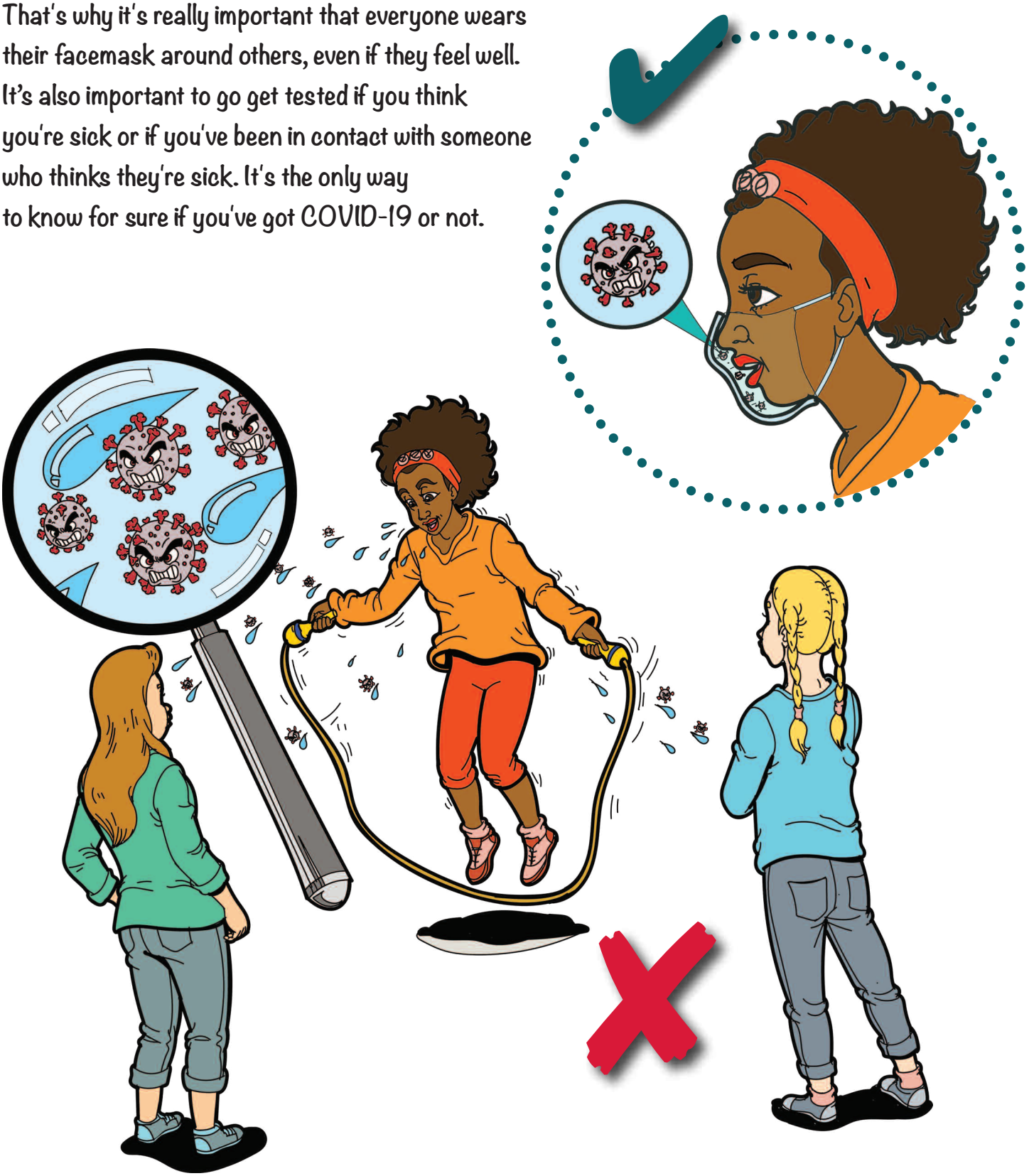


Illustration: Tadens Mpwene

I often see people wearing their facemasks in a weird way... I don't think it's the right way to wear them.



You're absolutely right, Idriss. It's very important to wear your facemask the right way, otherwise it won't be effective. It must cover both your nose and mouth, and go all the way down under your chin. With a well put on mask, you limit the quantity of droplets that you project around you. You can then store your mask in a small, clean plastic box, with the outside of your mask facing the bottom of the box.



MARTINE BOUCHARD
President and Chief Executive Officer
St. Boniface Hospital
Manitoba



Illustration: Tadens Mpwene

"When I put on my mask, how do I keep it clean? Is there a special way to put it on and take it off?"



1 Yes there is. Before putting on your mask, you should first wash your hands.



2 Then you need to hold your mask by the straps on the sides.



3 Place the straps behind your ears.



4 With clean hands, contour the top of your mask to the shape of your nose, and pull the bottom of your mask under your chin so that no air can get through.



5 Before taking your mask off, wash your hands again.



6 Take your mask by the ends of its straps.



7 Remove your mask gently.



8 If it's a single-use mask, dispose of it in a designated area (definitely not on the street or in nature, as it can take hundreds of years to decompose!).



9 After taking your mask off, don't forget to wash your hands again.

Illustration: Tadens Mpwene



Is it really safe to wear a facemask? Sometimes I get a little headache when I wear mine for a long time and I feel like I'm running out of oxygen....



DR. PHILIPPE LAGACÉ-WIENS
Medical microbiologist
St. Boniface Hospital
Manitoba

Don't worry Juan, wearing a facemask isn't dangerous and it shouldn't give you a headache if you're healthy, because it has very little effect on the amount of oxygen your body cells get when you breathe.

Worst-case scenario, it has the same effect as a very small change in altitude, such as between Winnipeg (**239** metres) and Calgary (**1,045** metres). And you can see that even when you go skiing in Banff (**1,383** metres), you have no problem breathing! The vast majority of people, including those with mild breathing problems, can safely wear a mask.

However, the stress and anxiety of this pandemic can certainly cause headaches!

Now if someone has severe lung or heart disease, or severe asthma, facemasks can be a problem.
If this is the case, you should talk to your doctor because each case is unique.

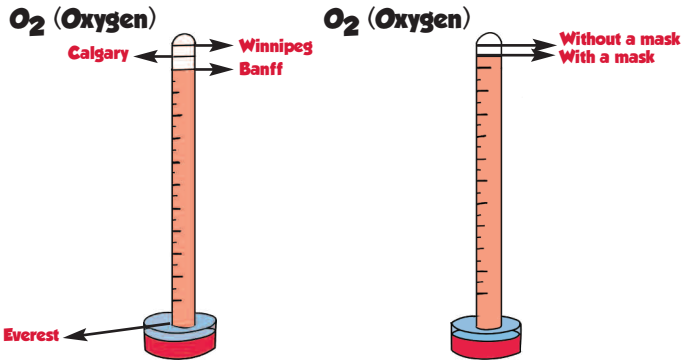




Illustration: Tadens Mpwene

"What if I'm sick and I'm breathing in my own viruses in my mask, am I going to get sicker?," Juan worries...

You know Juan, once a person is infected, there are thousands of viruses in every drop of their mucous and saliva. So they always breathe and swallow their own viruses in large quantities, whether they wear a mask or not.

It is completely wrong to say that the facemask makes the disease worse.

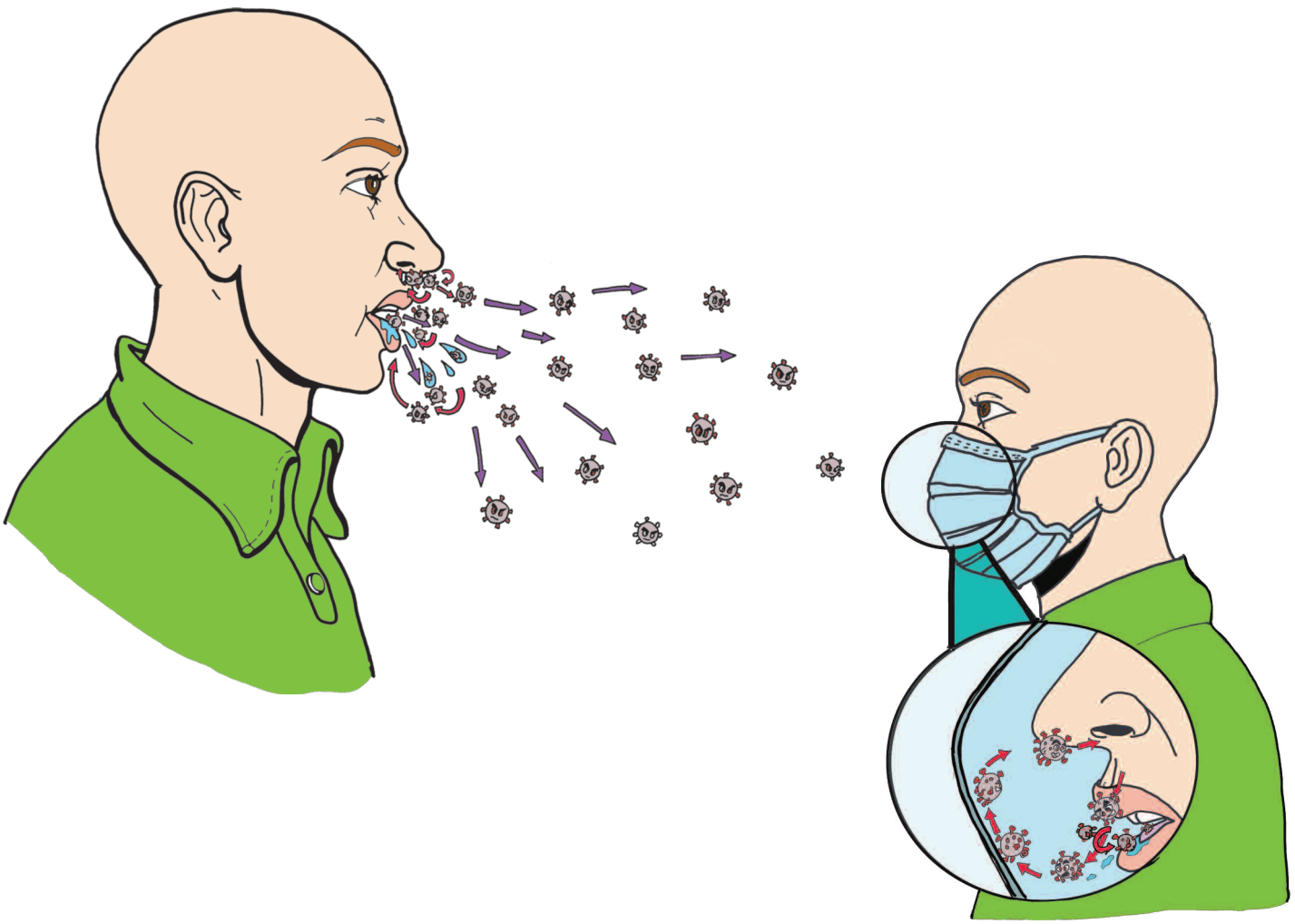


Illustration: Tadens Mpwene

"I'm afraid I'll get pimples too," Juan continues. "Last week I saw my cousin in a videoconference and he showed me that he had pimples on his face. He says it's because of his mask.

Unfortunately, Juan, it's true that wearing a facemask can cause acne pimples and other skin diseases.

Your skin has lots of tiny holes called pores that allow it to make oil to protect itself, like the moats of the castles. Sometimes these pores are clogged by small bacteria that live on your skin. When that happens, pimples appear.

When you wear a facemask, it increases the humidity and temperature around your mouth, and therefore the sweat and oil production of your skin. Unfortunately, this creates an environment more conducive to clogged pores and the growth of bacteria. In some people like your cousin, pimples can appear.

But it's not as bad to get a few pimples as it is to get COVID-19, or to pass it on to someone else!

And don't worry, you can reduce your chances of getting pimples. First you can take off your facemask every 2-3 hours, but only if you are more than 2 metres (6 feet) away from other people!

You can also wear a mask that absorbs moisture better, like a cotton or linen mask. However, avoid masks made of synthetic materials such as polyester or plastic.

And don't forget to wash your mask every night and take care of your skin. To do that, clean your face with a mild soap (noncomedogenic) that does not clog the pores.

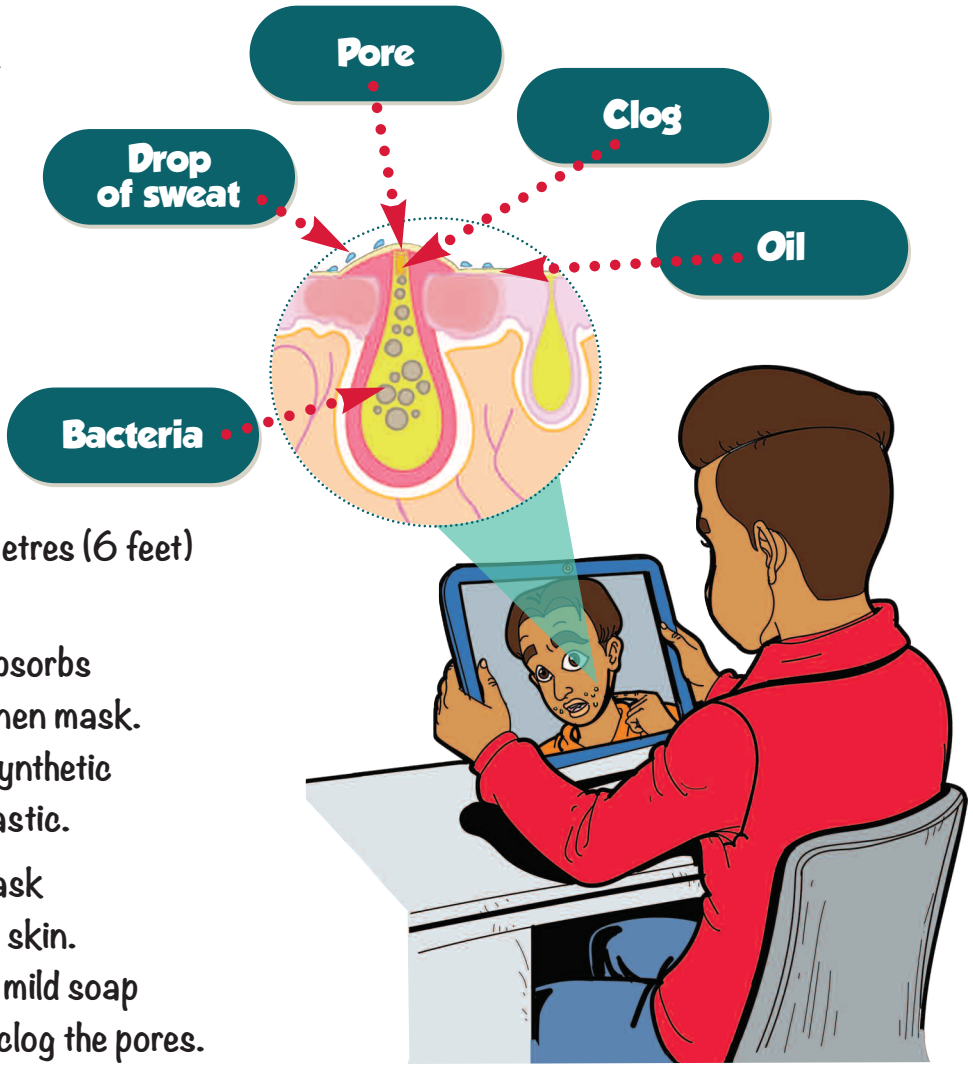
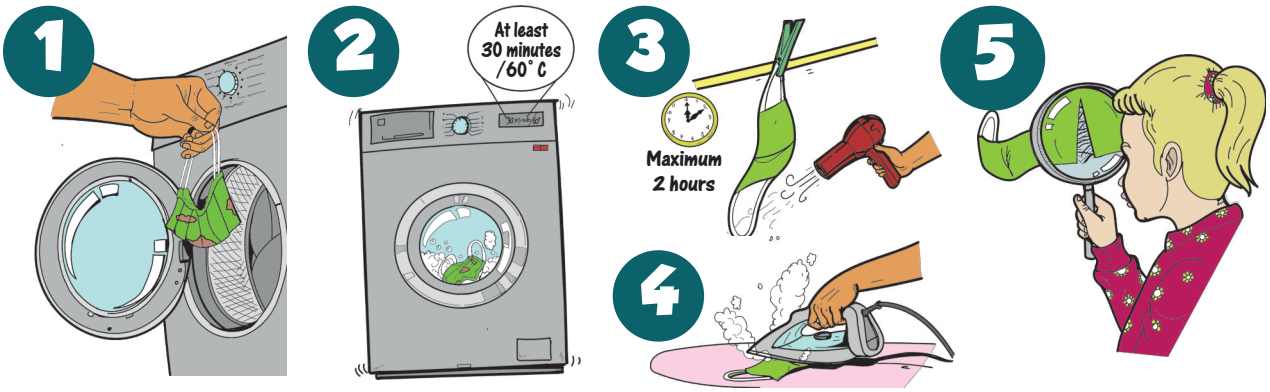


Illustration: Tadens Mpwene

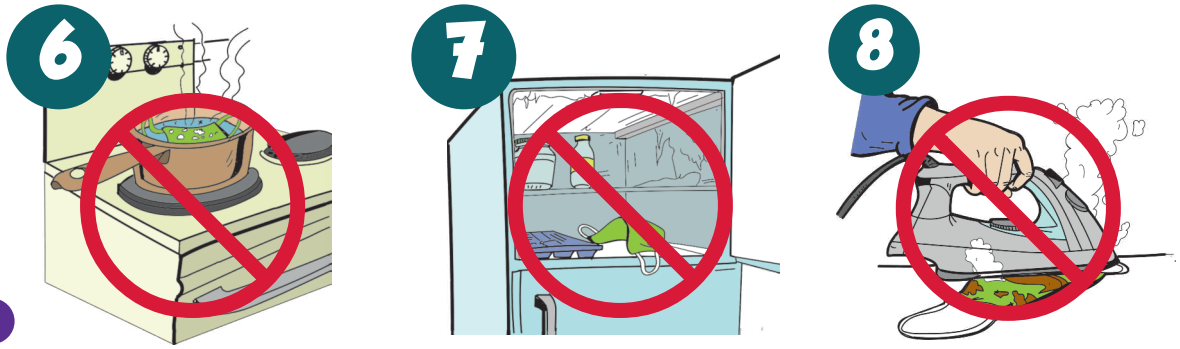
TECHNICAL DATA SHEET

If your mask is washable, it is important to wash it thoroughly after each use. Once removed from your face, you can put it in a bag provided for this purpose and then clean it in a washing machine. Here is what to do:



1. Machine-wash your mask with regular detergent, without fabric softener. You can wash it with something else (towels, bed sheets...).
2. Wash your mask for at least 30 minutes at 60 degrees Celsius.
3. Within 2 hours after washing, dry your mask (tumble dry, blow dry or air dry).
4. Iron your mask at the warmest temperature possible for the type of fabric of your mask.
5. Inspect your mask when it is clean and dry. If you can see a small tear, discard it.

What not to do!



6. Never boil your mask, as it can weaken the fabric!
7. Don't put your mask in your freezer, this level of cold has no effect on the coronavirus!
8. Don't iron your dirty mask without first washing it. You wouldn't think of ironing your dirty clothes, right?!

Illustration: Tadens Mpwene

AN EFFECTIVE RECIPE

The Crisis Council met Walter the Enchanter: a scientist who likes to invent completely new materials. The most recent one to date: "vinylatexus", which looks like rubber...



Walter the Enchanter offers to the members of the council to wrap his "vinylatexus" on the towers of the castles. He is convinced that this will prevent the Coronas from entering!

Mission accomplished: the Coronas could not get through this dense and very resistant material.



Illustration: David MacNair



This product that Walter the Enchanter made is a bit like the latex gloves some people wear! Why can't we all wear gloves during a pandemic?
Then we wouldn't have to wash our hands!



You know Li-Na, wearing gloves does not protect people against viruses. That's because when people wear gloves, they think they can't get sick, but that's not true.

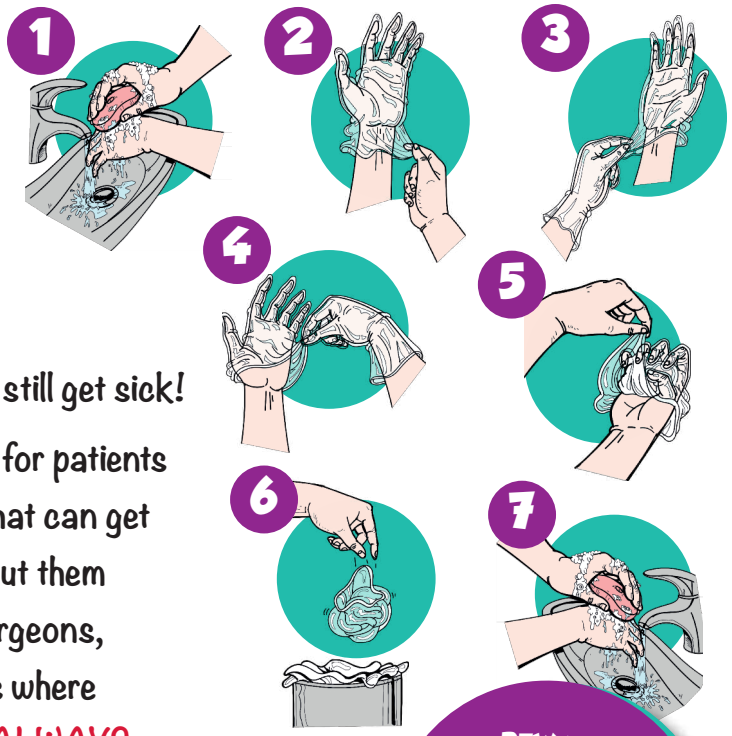
DR. ISABELLE PAQUIN
Head of medical service
Centre de santé Saint-Boniface
Manitoba

The virus that causes COVID-19 (SARS-CoV-2) does not infect us directly through our hands but rather when we touch our mouth, nose or eyes.

So if you touch a surface that has viruses on it with your gloves, your gloves will be contaminated (just like your hands would be if you didn't wear gloves), and then if you touch your face with your contaminated gloves, you can still get sick!

We healthcare workers wear gloves when we care for patients who have COVID-19 to limit the amount of virus that can get on our hands. But for gloves to work, we have to put them on and take them off in a very specific way, like surgeons, being careful not to touch the outside of the gloves where there could be viruses. And most importantly, we ALWAYS wash our hands before putting them on, and after taking them off.

REMEMBER: washing your hands often and for at least 20 seconds is the best way to protect yourself from viruses.



BEWARE
gloves
can take several decades
to decompose.
Don't throw them
anywhere!

Illustration: Tadens Mpwene



When I went to my dentist, I noticed that in addition to all those protections, he was wearing others. Why don't we also wear them? Are they only for dentists?

Juan, when dentists work on your teeth, they are physically very close to you and your mouth. And remember, when you're sick, you have lots of germs in your saliva.

So dentists and other healthcare professionals need to take extra steps to protect themselves.

That's why some of them wear a lab coat, a plastic mask that covers their entire face (face shield), or goggles.

This also allows them to protect their patients from possible germs they may be unknowingly carrying.

But it would be impossible to equip everyone with all of these protections!

DR. MARC MOLLOT
Dentist
Manitoba Dental Association

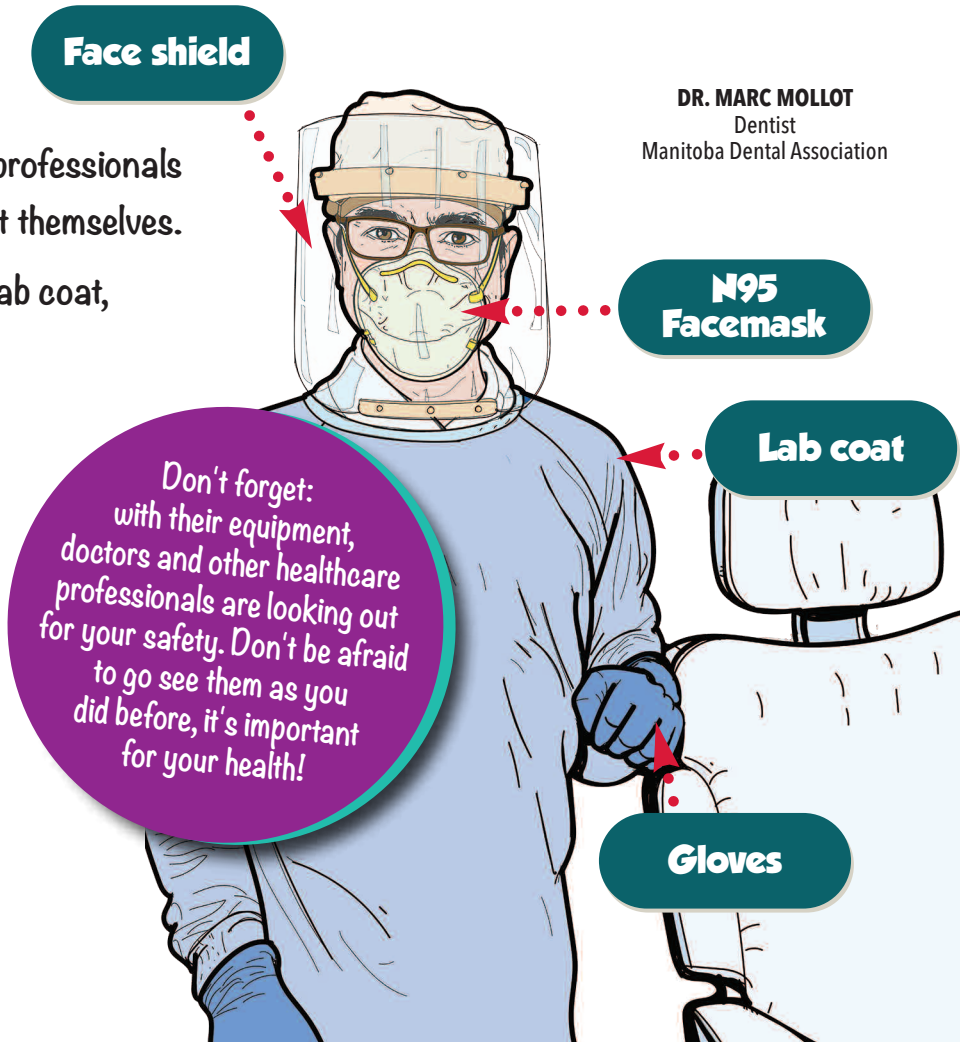


Illustration: Tadens Mpwene



DR. LAURA SLY
BC Children's Hospital Research Institute
University of British Columbia



There are many other things we can do to protect ourselves, our families and our friends from COVID-19. When everyone does their part, we protect each other better.

For instance, we can make sure to disinfect all surfaces and items we have touched.

There is also something called "physical distancing".

The droplets we project which can transmit COVID-19 are pretty heavy so they can't even travel 2 metres (6 feet). That's why it is important to keep at least 2 metres (6 feet) away from other people.



Illustration: Tadens Mpwene

"Sometimes physical distancing is not possible", Idriss points out. "For example when we take a plane..."

Yes, and when physical distancing is not possible, everyone must act responsibly and wear a face mask.

The other thing you have to do, which is even mandatory, is to "self-isolate" when you may have been exposed to someone who has COVID.

That means staying home for 14 days. That's how long it takes to make sure you won't infect someone else if you're sick.

And since you can't even go to the grocery store, you have to get your groceries delivered to your place without any physical contact with the delivery person!



Illustration: Tadens Mpwene



Illustration: Tadens Mpwene

Something worries me. I wonder how you can spot such a small virus in your body and know if you are sick, when there are so many other germs...



We use a technique called "polymerase chain reaction" or PCR

To understand better, imagine if your friend had a megaphone to call you from across the playground.

You would hear him better, wouldn't you? That's because his voice would have been amplified.



DR. ABDELILAH SOUSSI-GOUNNI
Dept. Immunology
Rady Faculty of Health Sciences
University of Manitoba



Illustration: Tadens Mpwene



You see Sam, the PCR technique does the same thing: it amplifies small parts of the virus' genetic material you're looking for, without affecting surrounding viruses and bacteria.

Your teacher, Ms. Laura, uses a photocopier to duplicate the exam pages for your class. Likewise, the researchers use PCR to copy the genetic material of a virus from a sample taken from the back of your nose. What we use in the labs isn't called a photocopier though, but a thermocycler.

Genetic material is made of molecules that dictate how a virus lives and behaves. The PCR allows the researcher to reproduce this material in a test tube by heating, cooling and repeating cycles thousands and thousands of times.

Finally the material has been amplified up to a billion times so we can easily recognize it.

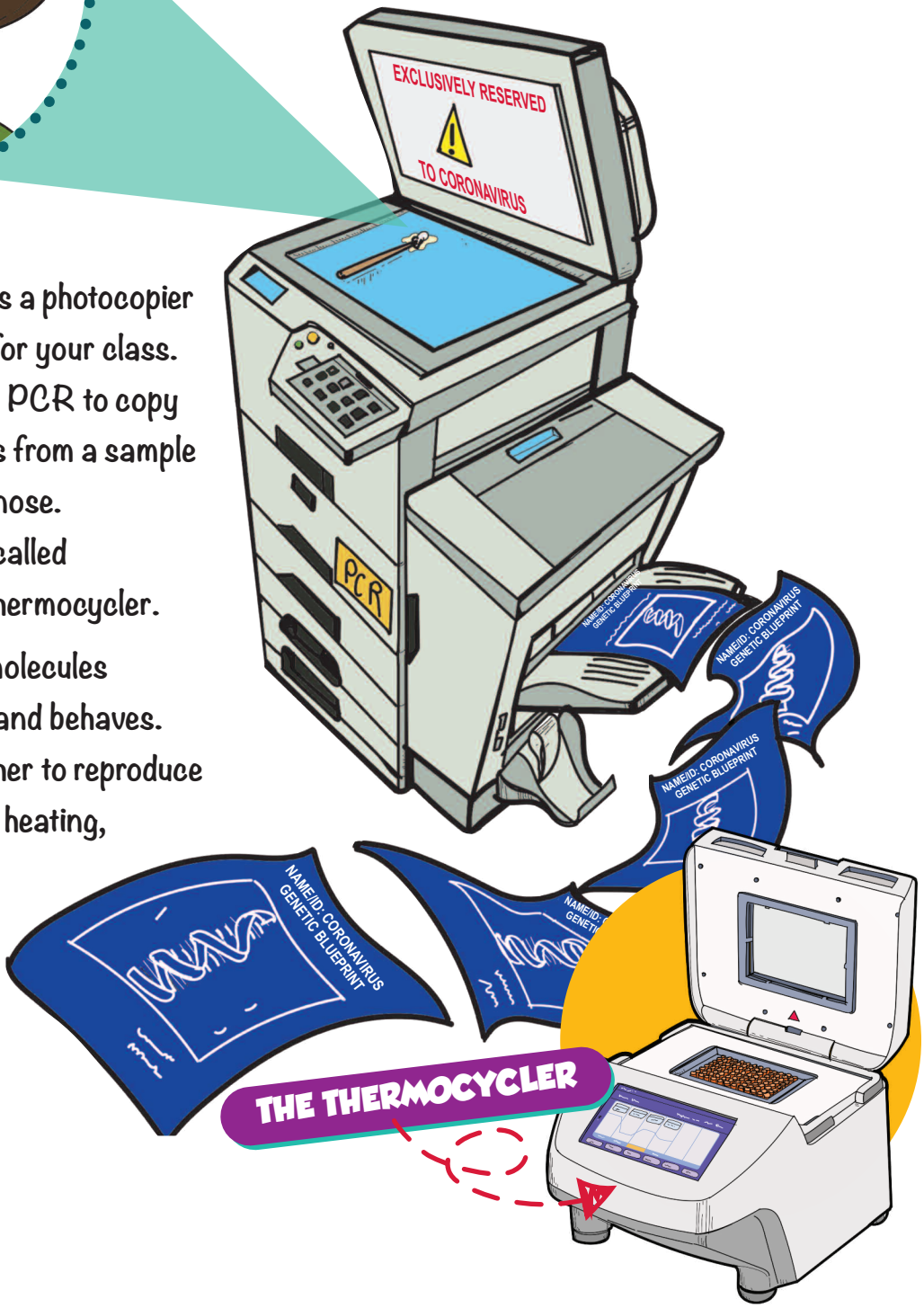


Illustration: Tadens Mpwene



Illustration: Tadens Mpwene

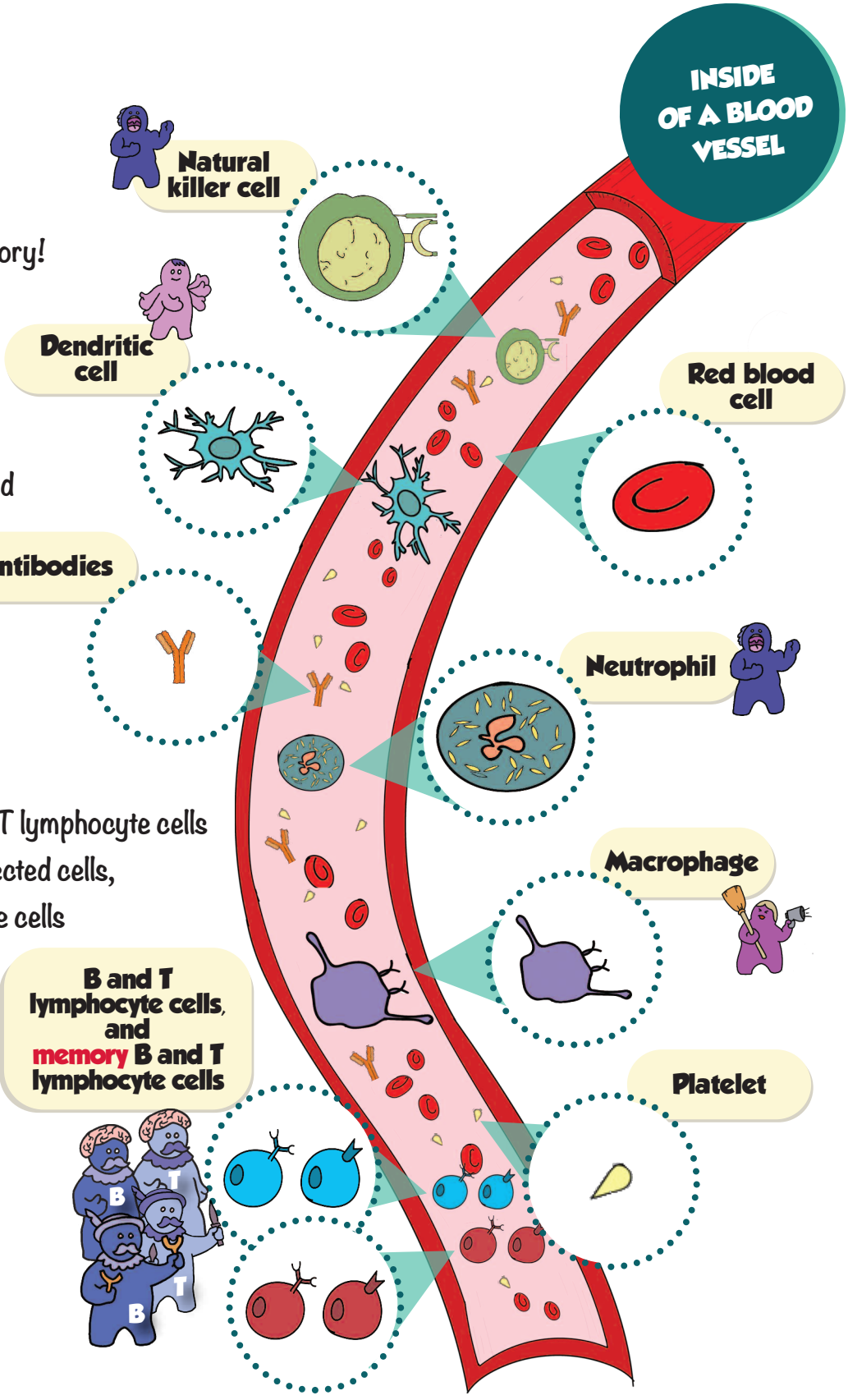


Illustrations: Tadens Mpwene and David MacNair

Good job Sam,
you have a good memory!
Indeed, if germs, or microbes,
make it past the mouth
or nose through saliva
or mucus, we have special
units of white blood cells called
immune cells that
can hunt down germs
and destroy them.

There are guards,
such as neutrophils
and natural killer cells;
soldiers, such as some of the T lymphocyte cells
which attack and destroy infected cells,
and some of the B lymphocyte cells
which produce
Y-shaped antibodies.
There are also garbage
collectors, such
as macrophages.

And there are memory B
and T lymphocyte cells
which remember
all the invaders they have
ever encountered.



Illustrations: Tadens Mpwene and David MacNair

All these immune cells help to protect us, just like the guards and soldiers in a castle. Castles are often under attack and their guards are always on the lookout to find, catch and kill the attackers before they can harm the villagers!

But sometimes attackers are too strong or too sneaky. They overpower the guards and enter the castle. Special backup teams of spies and soldiers then come in to help them.

If the germs are too powerful, other cells are called in to help.

If the germs are too powerful, other cells are called in to help.

Natural Guard Team



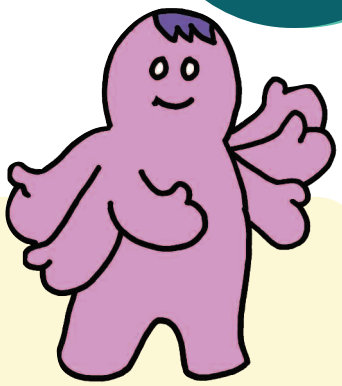
Scientific name:
Neutrophil and natural killer cells
Job:
Some of the first cells to respond to any new infection and go to the infected zone.
Duties:
Attack, eat and kill any dangerous looking germs, outside or inside infected cells of the body.

Garbage Collector Team



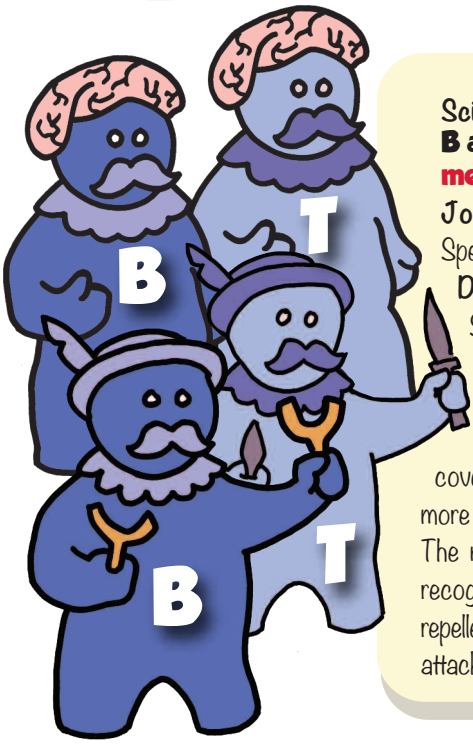
Scientific name:
Macrophage
Job:
Some of the first cells to respond to any new infection and go to the infected zone.
Duties:
Clean up, eat germs and send information to soldiers.

Spy Team



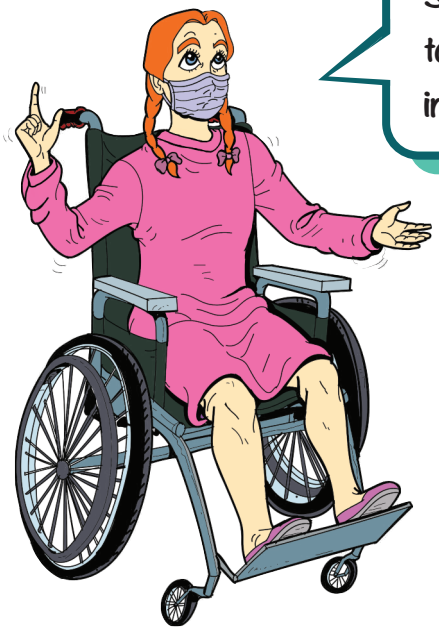
Scientific name:
Dendritic cell
Job:
Relay information between first response cells and specialized soldiers.
Duties:
With their multiple hands (dendrites), they capture germs and bring them to B and T cells to be studied.

Soldier Team



Scientific name:
B and T lymphocyte cells, and memory B and T lymphocyte cells
Job:
Specialized soldiers for targeted attacks.
Duties:
Some T cells will find, attack and kill any cells in our body infected by a particular germ. B cells will throw special Y-shaped chemical targets called antibodies onto germs. When covered wit antibodies, the germs will become more delicious to macrophages and neutrophils. The memory B and T cells will remember and recognize all the germs that the soldiers have repelled so that they can fight them better in the next attack.

Illustration: David MacNair



So, what test do you need to find out if you have been infected before?



PROF. RUEY SU
National Microbiology Laboratory
Public Health Agency of Canada

Remember the Y-shaped antibodies that B cells make to launch at the virus and fight it, Emma?

These antibodies target special markings on SARS-CoV-2 and remain in the blood long after the virus is cleared.

With this knowledge, the scientists created a test called a "serological" test. It requires adding a small amount of your blood to a test material that mimics the markings on the virus to see if Y-shaped antibodies that are present in your blood stick to them. This will determine if there were Y-shaped antibodies to target this virus' markings in your blood already.

This test is easy and fast because only people who have been infected with the virus can have Y-shaped antibodies. However, it can't tell us if the virus is still in the body or not.

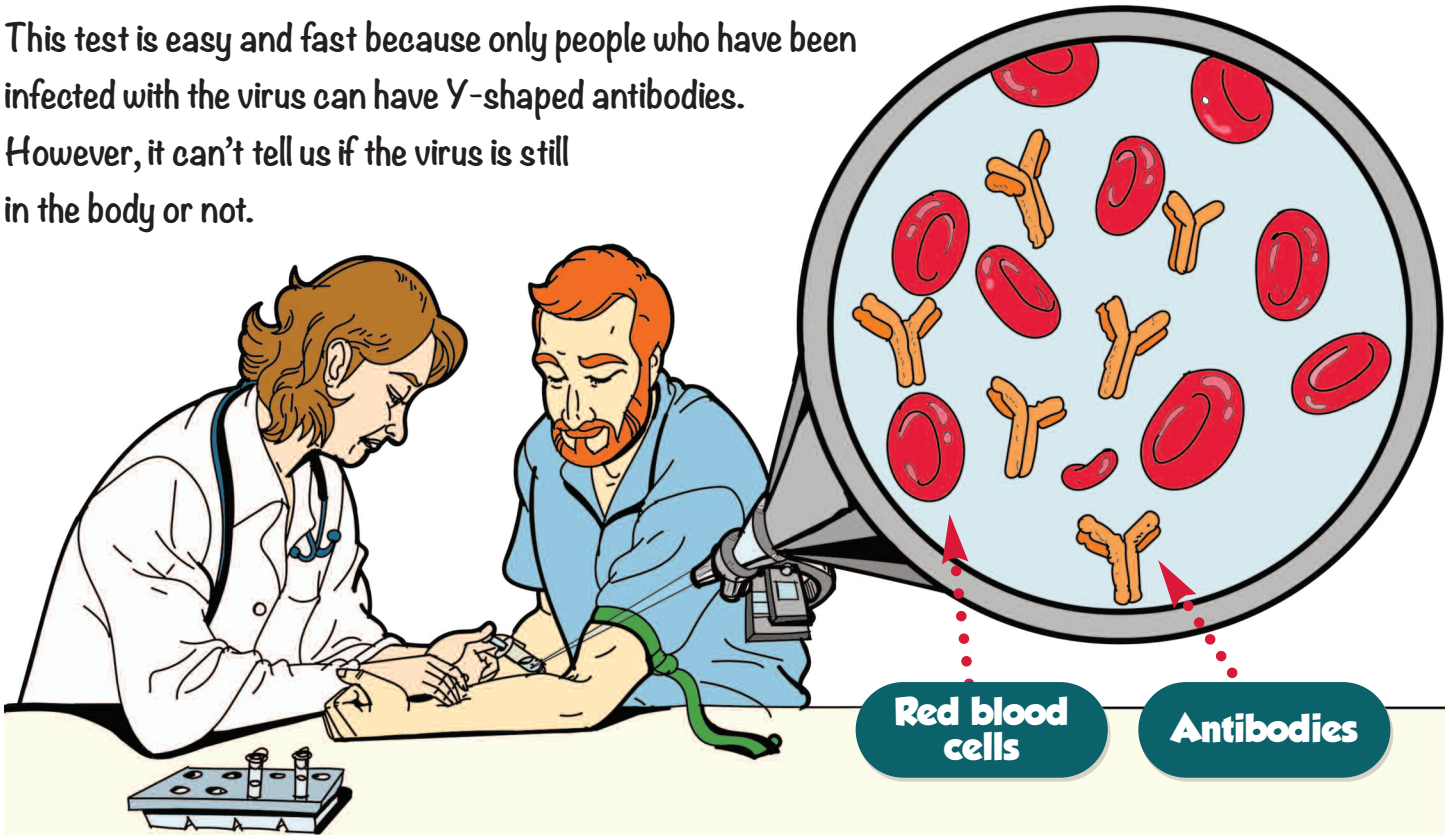


Illustration: Tadens Mpwene

"When you say that antibodies stay in the body for a long time, does that mean a lifetime?," Emma says, astonished.

You see, Emma, it's a difficult question. We know that the Y-shaped antibodies stay in bodies for several months after the virus is cleared, but the exact length of time differs from body to body and from virus to virus.

As long as the antibodies are in your body, if a virus shows up, the antibodies will stop it from entering and infecting you.

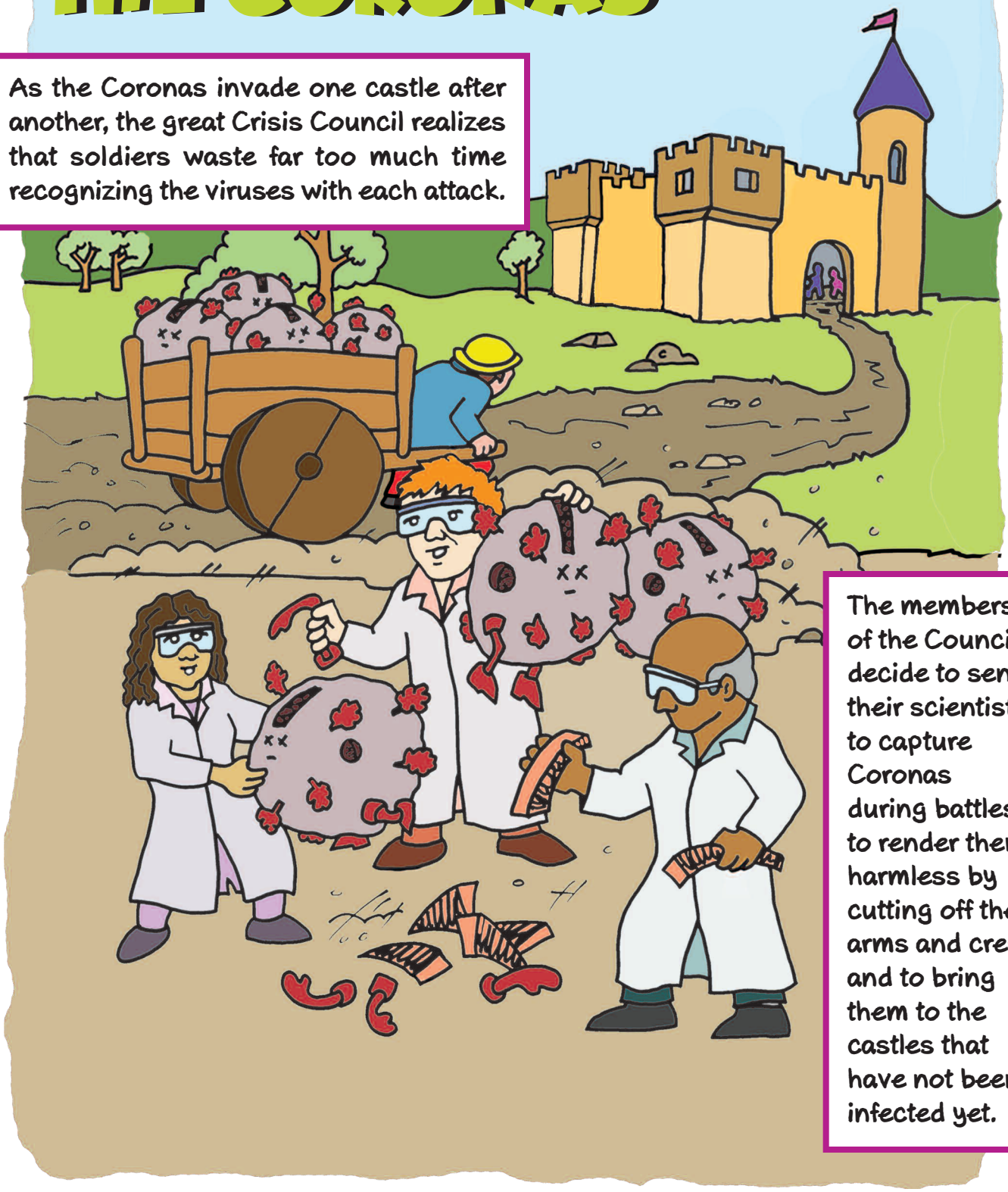
But even when you run out of antibodies, your memory B cells will remember how to make new ones.



Illustrations: Tadens Mpwene and David MacNair

THE CAPTURE OF THE CORONAS

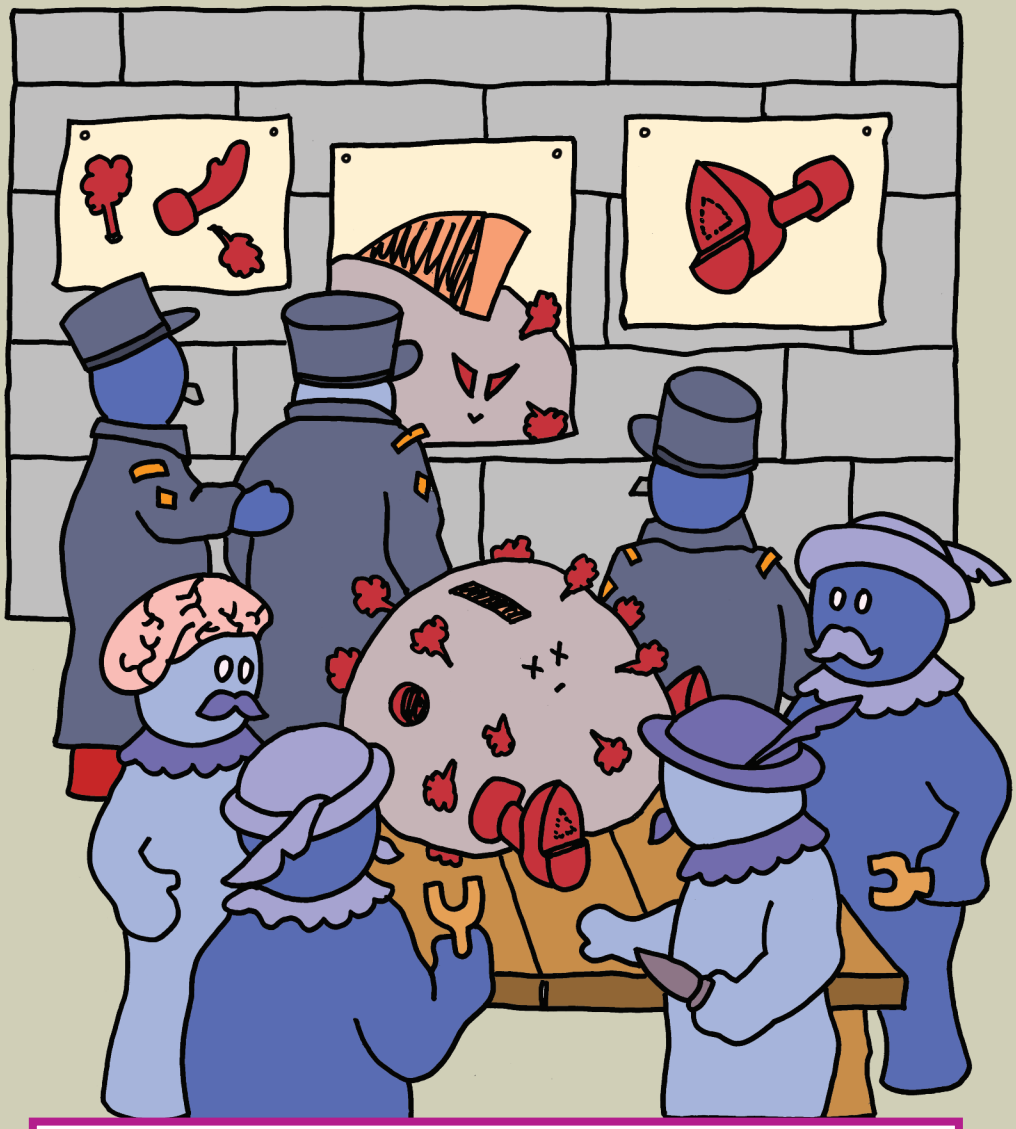
As the Coronas invade one castle after another, the great Crisis Council realizes that soldiers waste far too much time recognizing the viruses with each attack.



The members of the Council decide to send their scientists to capture Coronas during battles, to render them harmless by cutting off their arms and crest, and to bring them to the castles that have not been infected yet.

Illustration: David MacNair

Inside the castles, the harmless Coronas are introduced to the soldiers, who learn to recognize them during training courses.



This allows them to memorize the appearance of the enemy before they even meet them and thus be better prepared for future attacks. They will then be able to fight the Coronas faster without causing too much damage to the castle!

Illustration: David MacNair



In the story, when they capture Coronas to bring them to the castles, it's a bit like a vaccine, isn't it? I don't remember exactly how a vaccine works...

The purpose of vaccination is to fight off infectious diseases by teaching your body to recognize a virus or bacteria more quickly by stimulating the immune system.

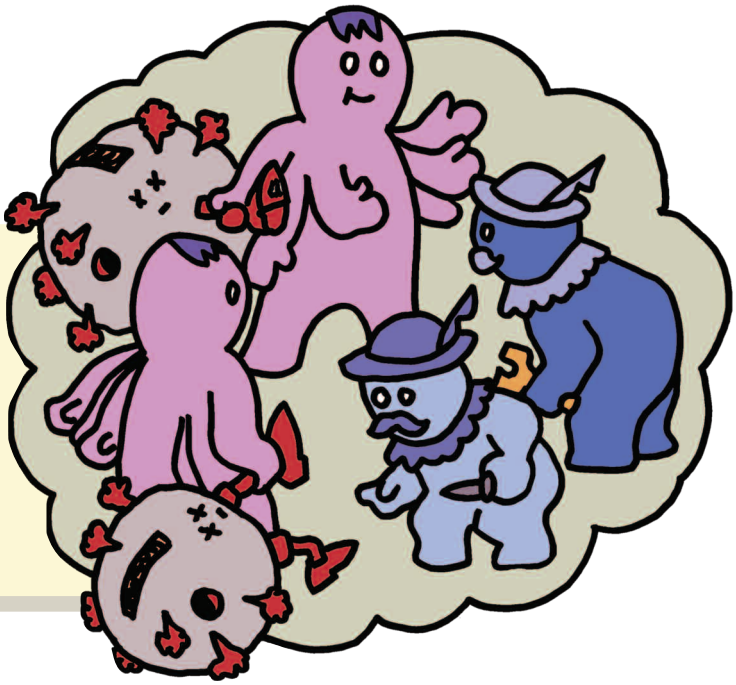


PROF. GARY KOBINGER
Dept. Microbiology-Infectiology and Immunology
Faculty of Medicine
Laval University
Quebec

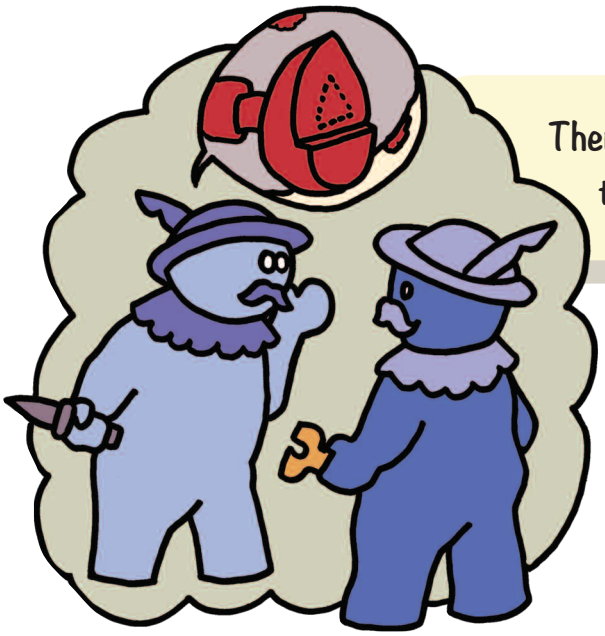
But it's important to understand that vaccines don't contain the live virus or bacteria that cause diseases!

Just as in the story of Terratum, vaccines contain a dead or weakened virus, or fragments of its infectious parts, or small amounts of bacteria. They will not make you sick.

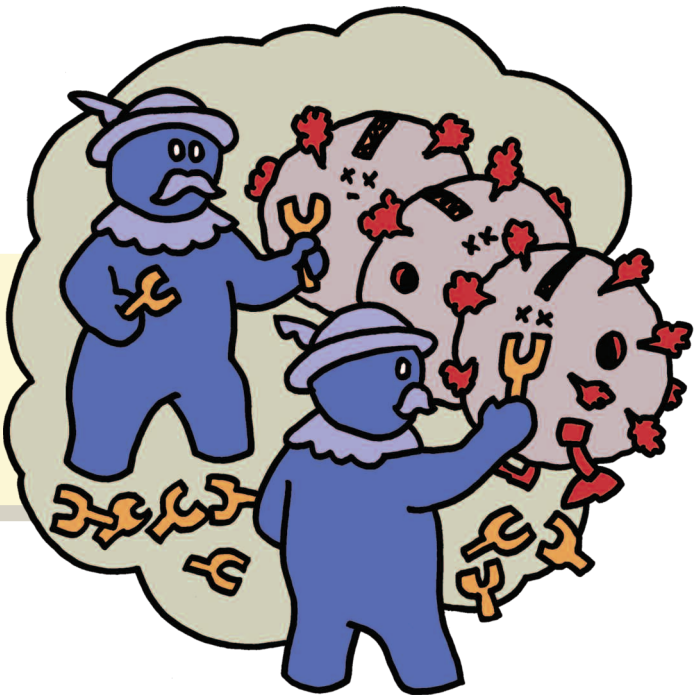
In your body, the dendritic cells of your immune system (Spy Team) will first bring and present the dead Coronas that have been sent into your blood vessels by the vaccine to the B and T cells (Soldier Team).



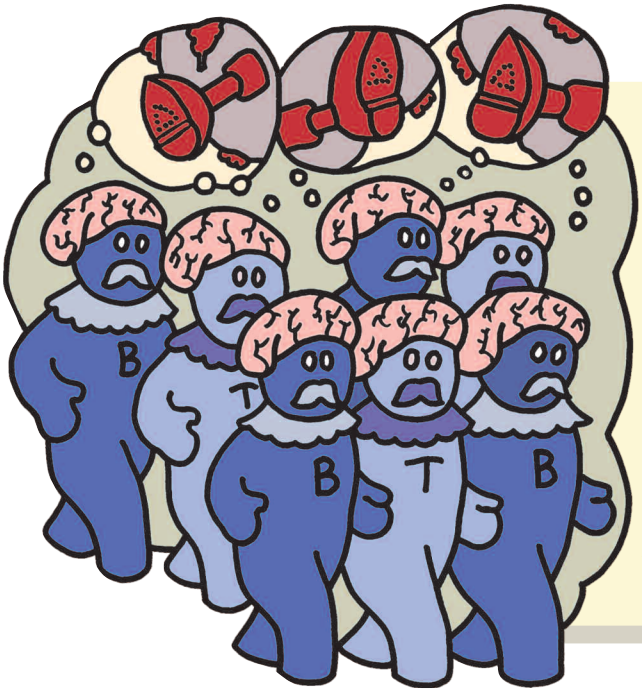
Illustrations: Tadens Mpwene and David MacNair



Then the B and T cells will talk to each other to develop a battle plan against this virus.



Afterwards, the B cells will produce lots of Y-shaped antibodies to eliminate the harmless viruses or bacteria.



Finally, your body will create memory cells that can recognize this virus. These cells will join the soldiers' team. This means that if "real" bacteria or viruses later infect you, your memory cells will make your B and T cells react and produce antibodies quicker to defeat them. You'll be rid of that virus or bacteria before they can even multiply in your body! That's what vaccination is all about.

Illustration: David MacNair



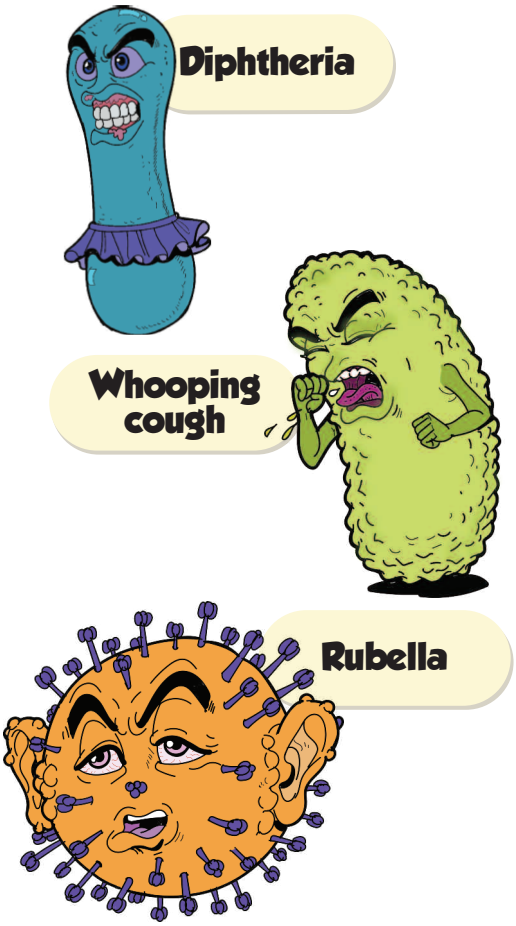
Yes, Idriss, it works! In recent years, vaccination has almost eliminated some diseases such as rubella, mumps and measles.

Vaccination has also made it possible in some countries like Canada to eradicate polio, a disease that paralyzes the legs.

Vaccines that work!

Diseases	Average number per year of cases before the vaccine (1)	Average number per year of cases after the vaccine (2)	Decrease
Whooping cough	17,777	2,332	87%
Measles	53,584	292	99%
Mumps	36,101	103	99%
Rubella	14,974	1	99%
Diphtheria	8,142	1	99%
Polio	2,545	0	100%

Based on data from the Public Health Agency of Canada



(1) The average number of pre-vaccine cases is the average number of cases reported annually in Canada during the 5 years prior to the offer of routine immunization, or the 5 years closest to a stable reporting period.

(2) The average number of cases after the vaccine is the average number of cases reported annually in Canada between 2011 and 2015.

Illustration: Tadens Mpwene

"If vaccines are so effective, why don't we make one right now against COVID-19?" Idriss asks.



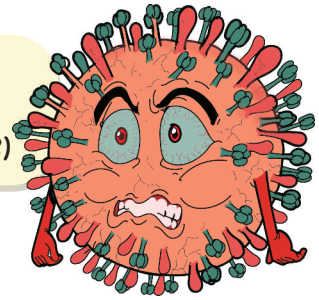
DR. PIERRE PLOURDE
Dept. Community Health Sciences
Rady Faculty of Health Sciences
University of Manitoba

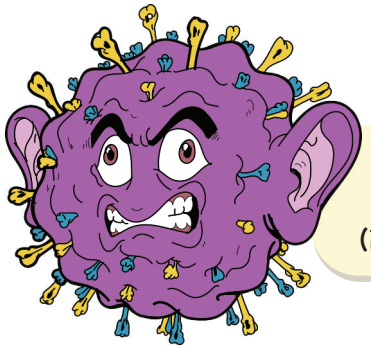
In the past Idriss, it has taken up to 34 years to develop a new vaccine. It took 15 years for the latest one, the human papillomavirus vaccine.

Today, against COVID-19, scientists around the world are working together to try to shorten that time to 15 months. That is very complicated!

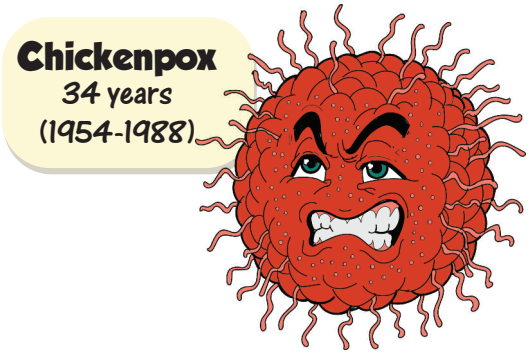
But new technologies now exist to develop new kinds of vaccines, which should be ready for testing and approval in the coming months.

One thing is certain: a coronavirus vaccine is eagerly awaited by the whole world as a key tool to finally bring the COVID-19 pandemic to an end!









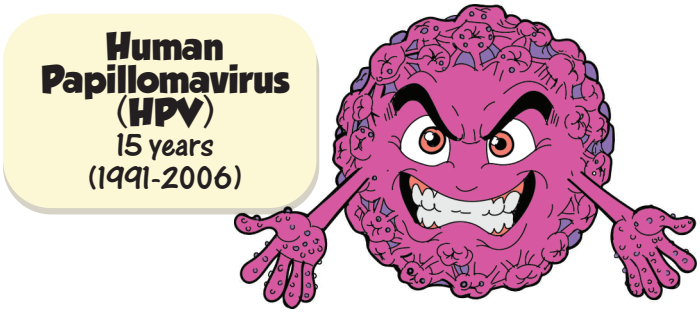


Illustration: Tadens Mpwene

"If scientists are moving faster on COVID-19, are researchers confident that the vaccine will be safe?", Idriss asks.

That's one of the most important questions about brand new vaccines. Vaccines are among the most effective tools ever developed to prevent infections.

UNDER NORMAL CIRCUMSTANCES

15 YEARS



DISCOVERY AND EXPLORATION

2 TO 5 YEARS

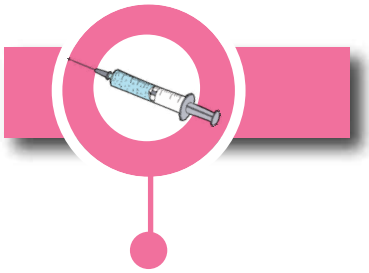
This is the time when researchers discover the piece of an infectious germ with special shapes (antigens). They start making a vaccine to try out in experiments.



LAB TESTING

1 TO 2 YEARS

Using experiments, researchers test the new vaccine in their labs. If researchers see that the new vaccine works in the lab and is safe, then they can plan to test it in humans.



PHASE 1

1 TO 2 YEARS

Researchers test the new vaccine in a small group of healthy people to make sure it is safe to use (20-100 volunteers). Researchers study how the immune system responds. If the vaccine helps people make antibodies and it is safe, they can move on to the next phase of tests.

IN TIME OF CRISIS

15 MONTHS



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Dept. Microbiology
and Infectious Diseases
Rady Faculty of Health Sciences
University of Manitoba

DISCOVERY, EXPLORATION AND LAB TESTING

3 TO 6 MONTHS

PHASE 1

2 TO 3 MONTHS

PHASE 2

2 TO 3 MONTHS

PHASE 3 AND REGULATION

? MONTHS

In order to speed up the making of one or more potential COVID vaccines that meet Canadian safety and efficiency standards, Phase 3 trials are currently overlapping with data submissions from ongoing trials. In Canada, vaccine manufacturers whose products are in Phase 3 trials can submit data as it is collected by Health Canada. For the moment, we don't know how long it may take.

But since COVID-19 is a new and devastating pandemic, researchers around the world are working together to try to speed things up, while making sure that the vaccines work and are safe to use.

PHASE 2

2 YEARS

Researchers test the vaccine in larger groups of people (100s of volunteers) who might be exposed to the new germs, to see if the vaccine helps prevent them from getting sick. They might also try different ways of giving the vaccine (taking pills or getting a needle) to see which works best. If it is safe and it works to help protect people, they will move on to the next phase of tests.

PHASE 3

3 YEARS

Researchers test the new vaccine in very large groups (1000s of volunteers) to make sure there are no bad side effects that they might miss in small group testing. This phase brings in a wider variety of volunteers who may come in contact with the new germs in their daily life. If it helps lower the number of people who get sick and side effects are low, the vaccine is almost ready to be approved for use in health care.

REGULATION

2 YEARS

Now that the vaccine has been shown to be safe and we know that it works, governments need to say that it is OK to use for everybody. They will look at all the information that researchers have collected. Once they approve it, companies can make lots of the vaccine so everyone can get it from their doctors.

MONITORING • PHASE 4

AT LEAST 2 YEARS

Following vaccination, doctors and researchers will continue to monitor the safety of the vaccine over time, just to make sure everything is OK.



DR. HEATHER WILSON
Vaccine & Infectious Disease Organization
University of Saskatchewan

PHASE 4

AT LEAST 3 OR 4 MONTHS

When new types of vaccines are developed for a new virus, researchers put additional safety measures in place to ensure that the vaccine is both effective and safe. People who receive the vaccine will be closely monitored, both during research testing and for many months afterwards.

Illustration: Tadens Mpwene

By learning about this virus
and the ways to better protect ourselves against it,
we can better slow down its spread
while we wait for researchers
to find a vaccine or drugs.



In the meantime, let's remain vigilant.









