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The Amazing Adventures of Syrgo and BC

Vol-2. Human papilloma virus vaccine

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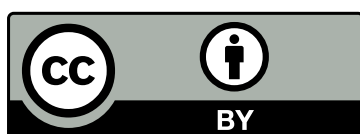
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The Amazing Adventures of Syrgo and BC

Vol-2. Human papilloma virus vaccine

Welcome to the second comic in the “**Amazing adventures of Syrgo and BC**” series. In volume 1, we met a fictional superhero (**BC**) who came from an immune cell (B cells) and his sidekick **Syrgo**, a fact-checking furry hamster. Their mission is to prevent microbes like bacteria and viruses from spreading diseases and misleading information about the safety and effectiveness of vaccines. Together, BC and Syrgo educate readers on why vaccines are one of the most important advances in disease prevention and control, detailing how they are made and why they are an effective and life-saving tool.

In the first volume, we learned how many viruses and bacteria failed to secure victory thanks to vaccination. In this comic, the Human Papillomavirus (HPV) joins his viral pals in disrupting our superheroes. Being alert and quick-witted, BC and Syrgo jump into action, knowing they must continue to work hard if they are to win. Read on as Syrgo and BC meet real life superheroes - scientists Prof. zur Hausen, Prof. Frazer, and many other researchers who were key figures in the development of the effective HPV vaccine. These scientists’ efforts make the elimination of HPV-related cancer possible and highlight the benefits of safe and effective vaccination.

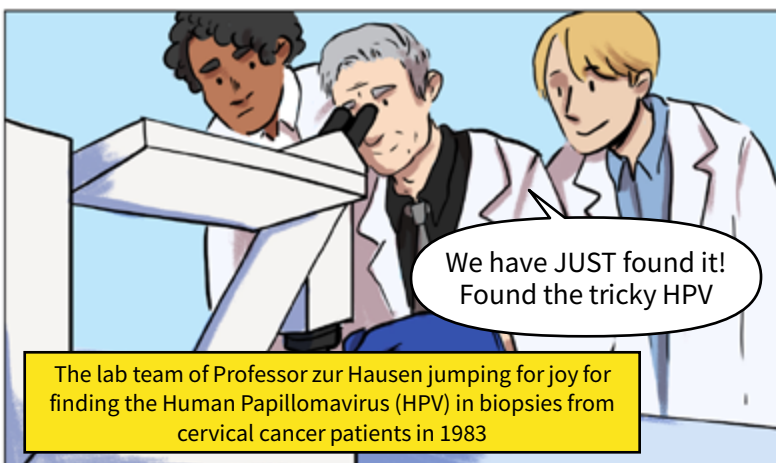
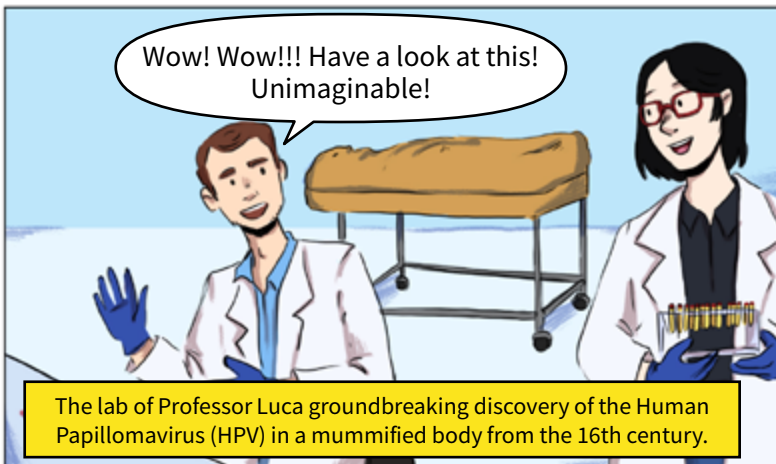
Now let us dive into the adventure!

Syrgo and BC gaze through the enchanted lens, crossing time and space to observe the microscopic creatures in moments of grief.

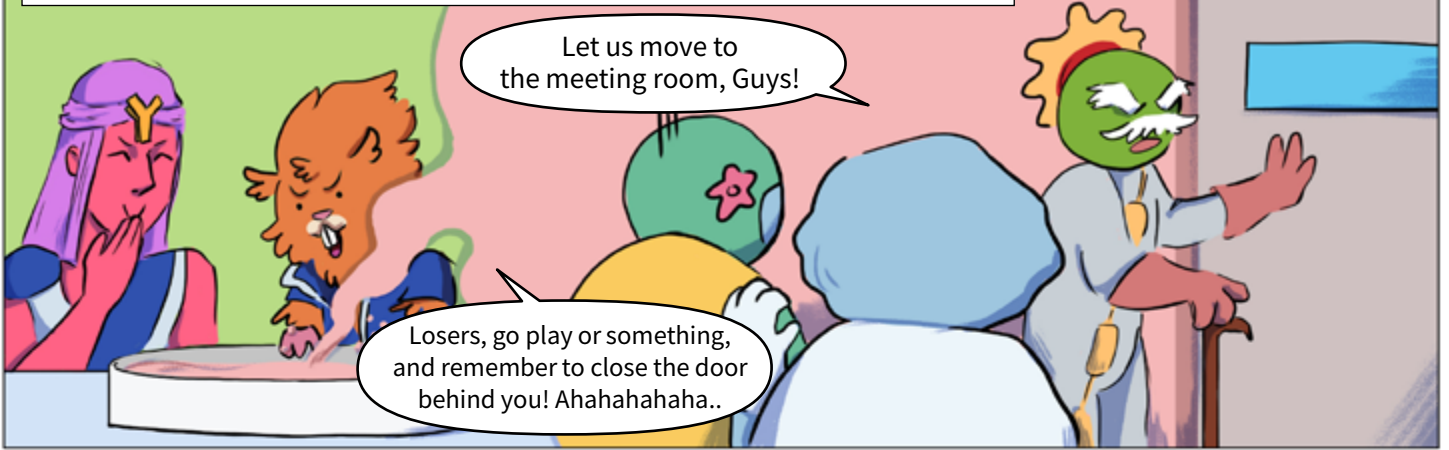
Ahahahahaha...

Hehehehehehe

CHAPTER 1: A STARRY SHIELD



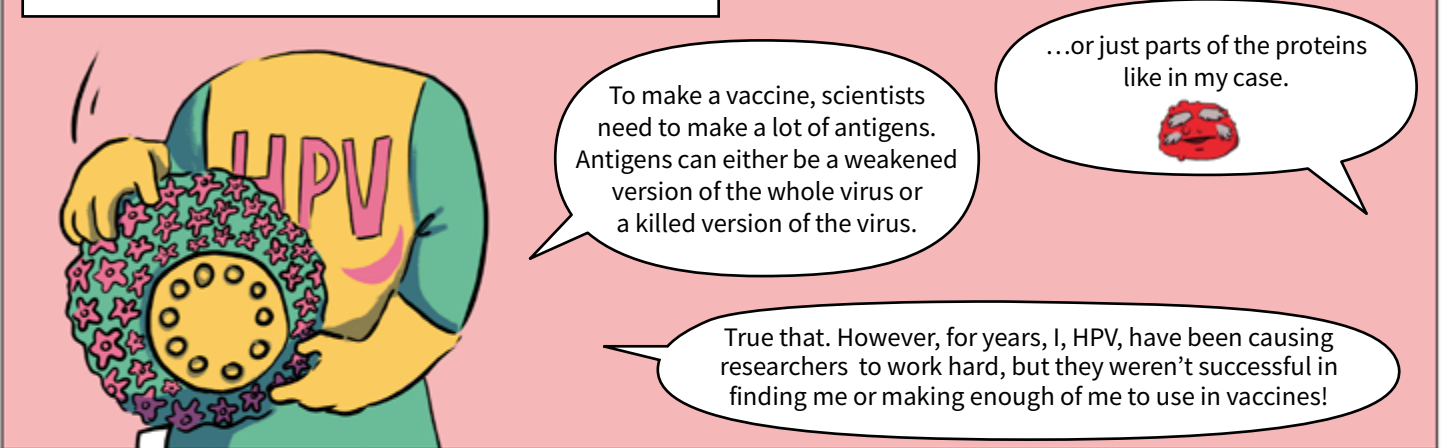
Syrgo and BC continue to gaze through the enchanted lens, while microbes are leaving the space.



Let us move to the meeting room, Guys!

Loser, go play or something, and remember to close the door behind you! Ahahahahaha..

In the meeting room, HPV presenting his case to his microbial gang

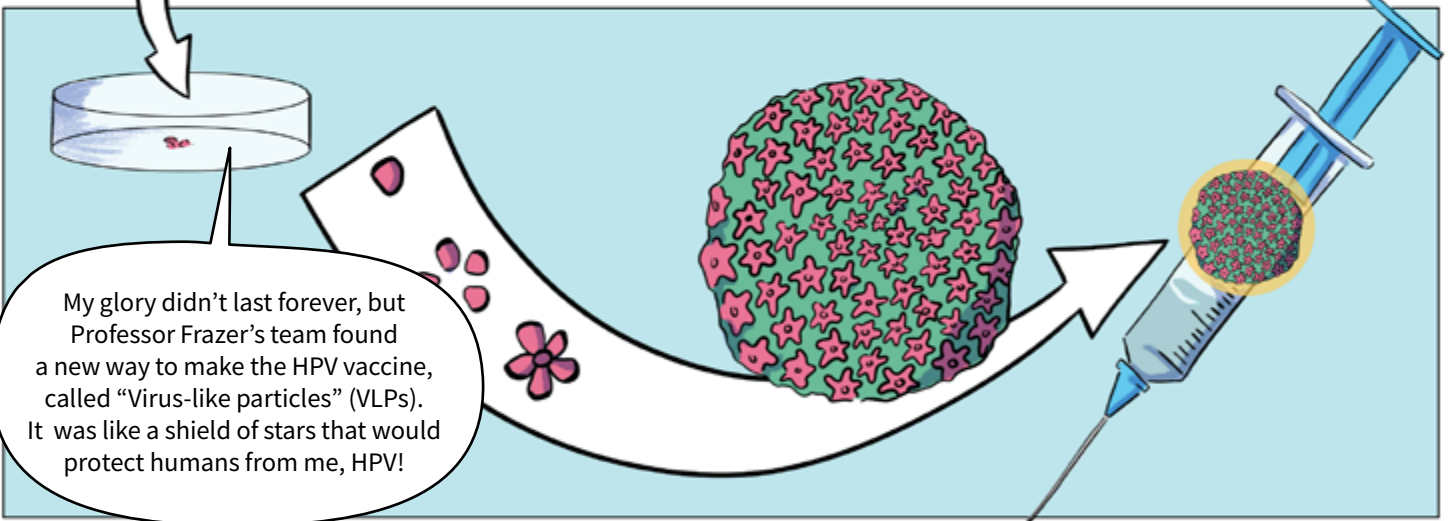


To make a vaccine, scientists need to make a lot of antigens. Antigens can either be a weakened version of the whole virus or a killed version of the virus.

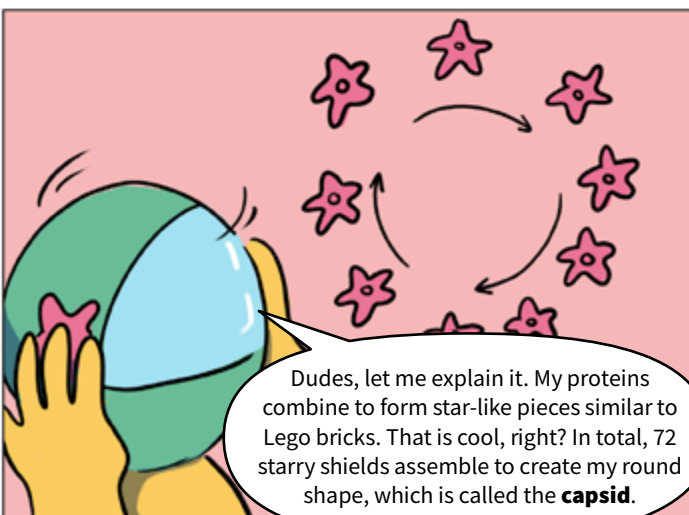
...or just parts of the proteins like in my case.



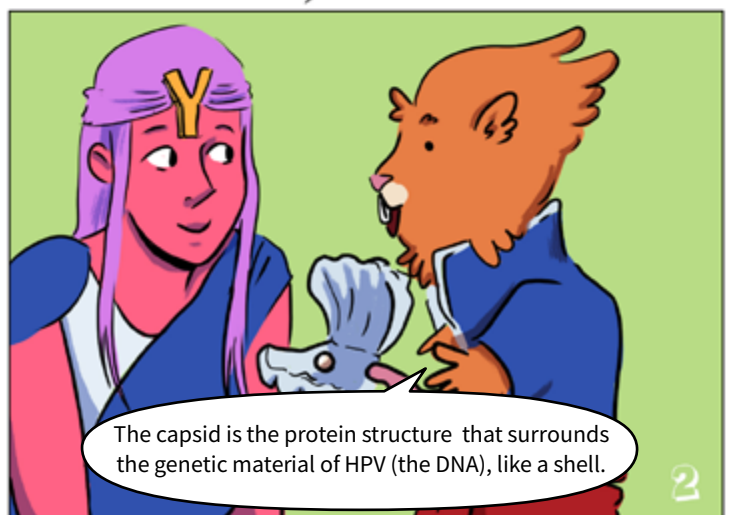
True that. However, for years, I, HPV, have been causing researchers to work hard, but they weren't successful in finding me or making enough of me to use in vaccines!



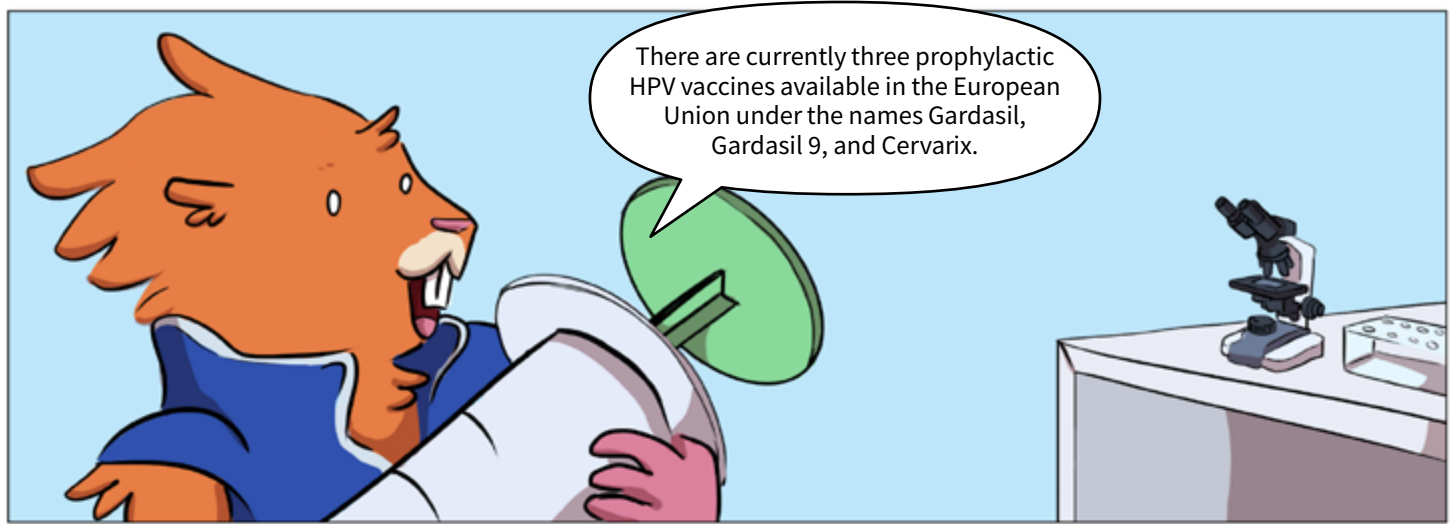
My glory didn't last forever, but Professor Frazer's team found a new way to make the HPV vaccine, called "Virus-like particles" (VLPs). It was like a shield of stars that would protect humans from me, HPV!



Dudes, let me explain it. My proteins combine to form star-like pieces similar to Lego bricks. That is cool, right? In total, 72 starry shields assemble to create my round shape, which is called the **capsid**.



The capsid is the protein structure that surrounds the genetic material of HPV (the DNA), like a shell.



16 18 6 11

GARDASIL

a quadrivalent vaccine contains antigens against four HPV types 6, 11, 16, and 18, hence “quad”. It prevents cancer in the cervix and genital warts.



16 18 31 33 45 52 58 6 11

GARDASIL 9

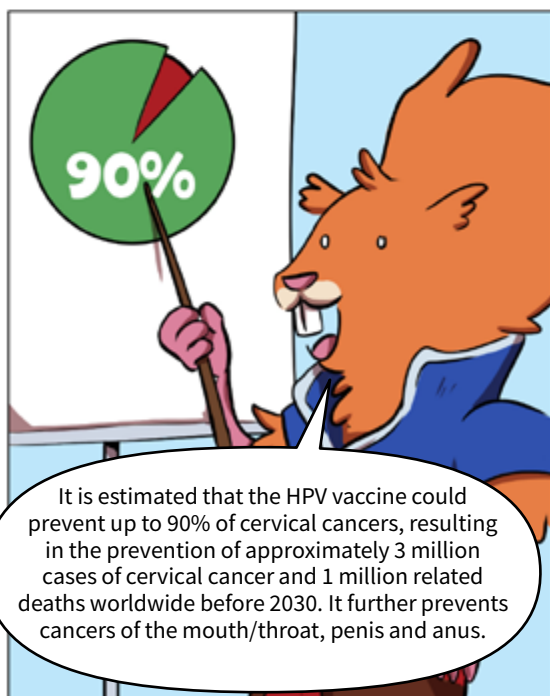
protects against genital warts, precancerous growths and cancers in the cervix, vulva or vagina and anus that might be caused by nine types of the human papillomavirus (HPV types 6, 11, 16, 18, 31, 33, 45, 52 and 58).



16 18


CERVARIX

a bivalent vaccine contains antigens for 2 HPV types: HPV-16 and HPV-18. It protects against cancer of the cervix or anus, abnormal cell growth in the genital area (cervix, vulva, vagina or anus).



CHAPTER 2:


I WAS A LONELY VOICE AT THAT MEETING




Heidelberg! What a lovely city!

Yes! And we are going to meet a Nobel Prize laureate at the university. Prof. Harald zur Hausen!


Arriving at Heidelberg, Germany



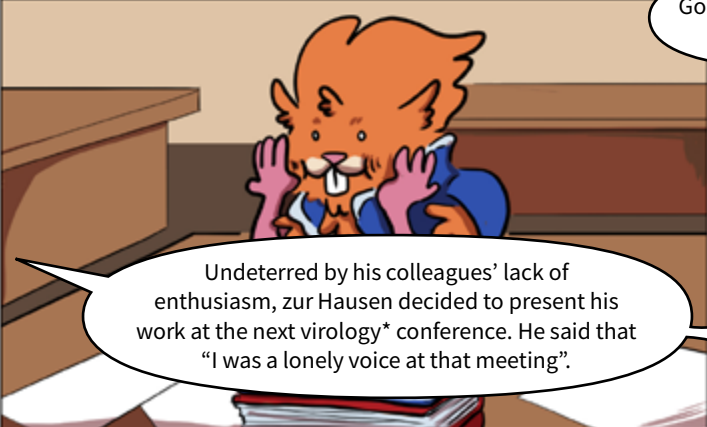
On October 16, 2008, Prof. zur Hausen received the Nobel prize for his outstanding discovery of the link between the human papillomavirus (HPV) and cervical cancer! Cervical cancer is the second most common cancer affecting women in the European Union, and the fourth globally! Nearly all cases of cervical cancer can be attributed to an HPV infection.



I am very sorry to disappoint you. The professor had to go away for urgent work.

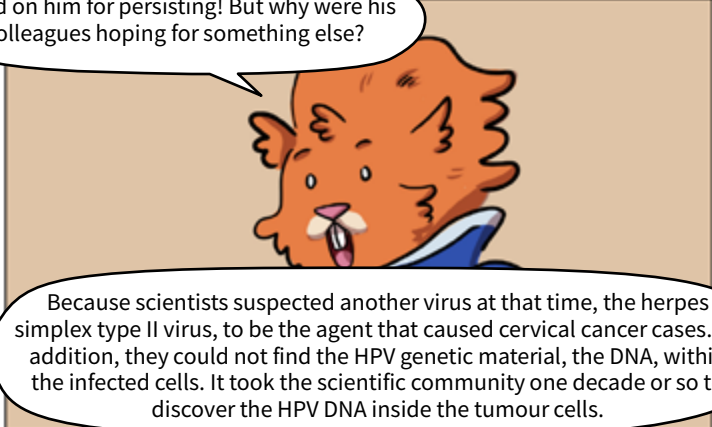


When Prof. zur Hausen first suggested that HPV may cause cervical cancer in women, his colleagues were disappointed. They had been hoping to find proof of something else.



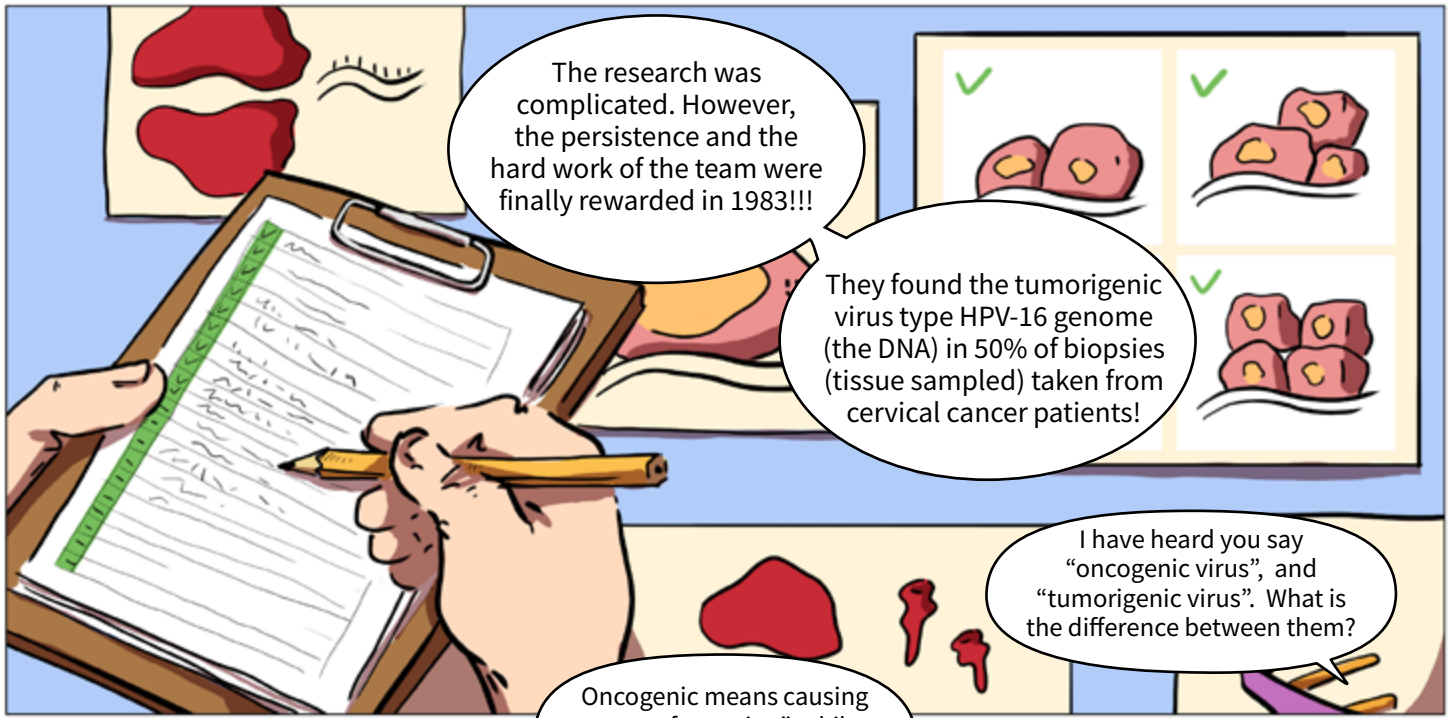
Good on him for persisting! But why were his colleagues hoping for something else?

Undeterred by his colleagues' lack of enthusiasm, zur Hausen decided to present his work at the next virology* conference. He said that "I was a lonely voice at that meeting".



Because scientists suspected another virus at that time, the herpes simplex type II virus, to be the agent that caused cervical cancer cases. In addition, they could not find the HPV genetic material, the DNA, within the infected cells. It took the scientific community one decade or so to discover the HPV DNA inside the tumour cells.

* **Virology/Virologists** - the branch of science that deals with the study of viruses.



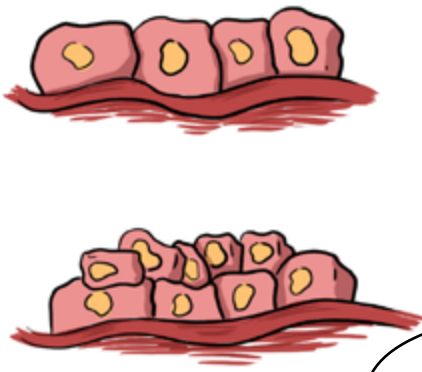
The research was complicated. However, the persistence and the hard work of the team were finally rewarded in 1983!!!

They found the tumorigenic virus type HPV-16 genome (the DNA) in 50% of biopsies (tissue sampled) taken from cervical cancer patients!

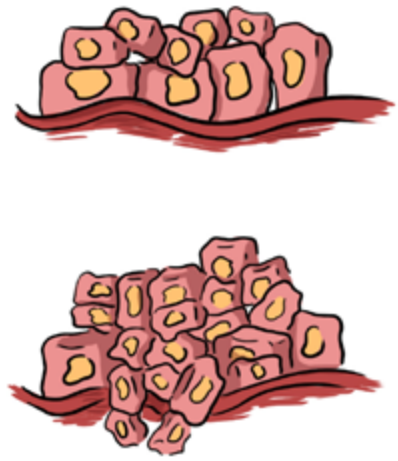
I have heard you say "oncogenic virus", and "tumorigenic virus". What is the difference between them?

Oncogenic means causing cancer formation", while tumorigenic means "causing tumour formation".

TUMORIGENIC



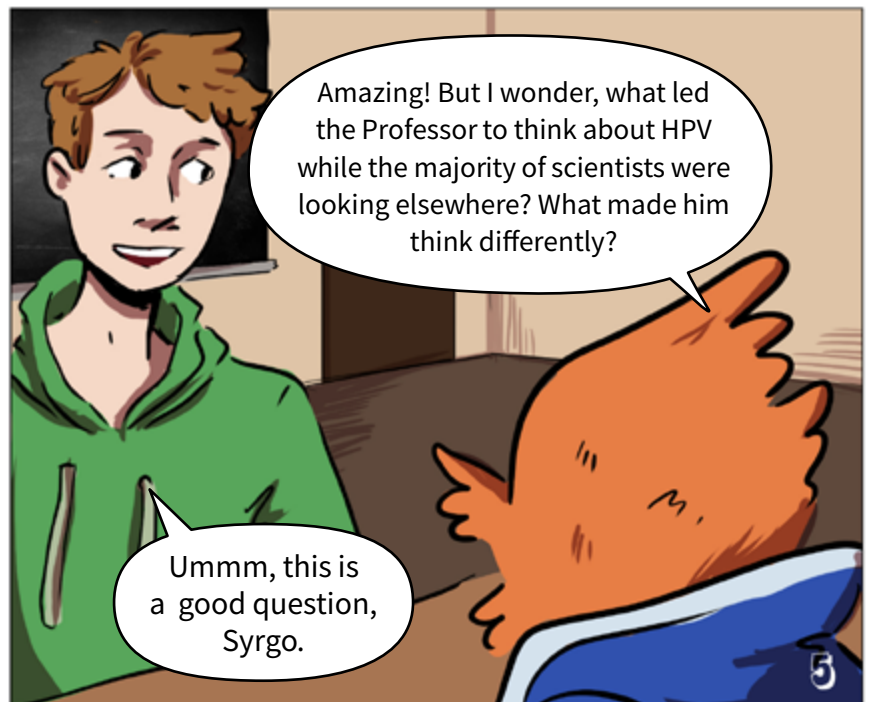
ONCOGENIC



All cancer are tumours but not all tumours are cancer. They could be benign (harmless) tumours.

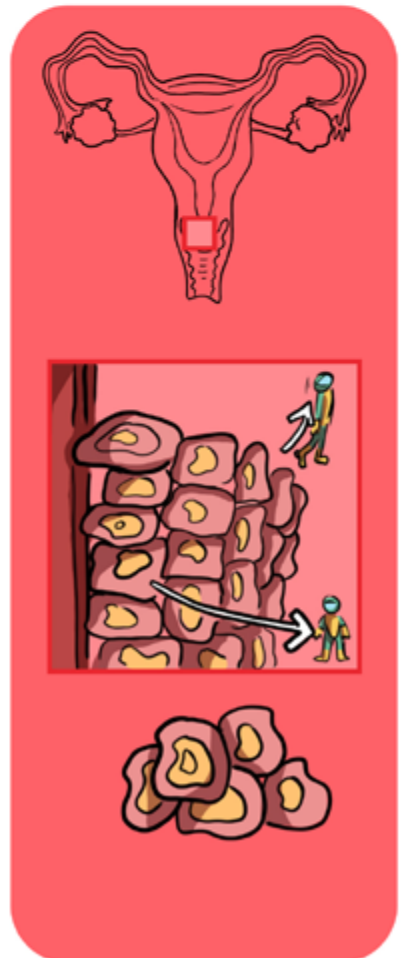
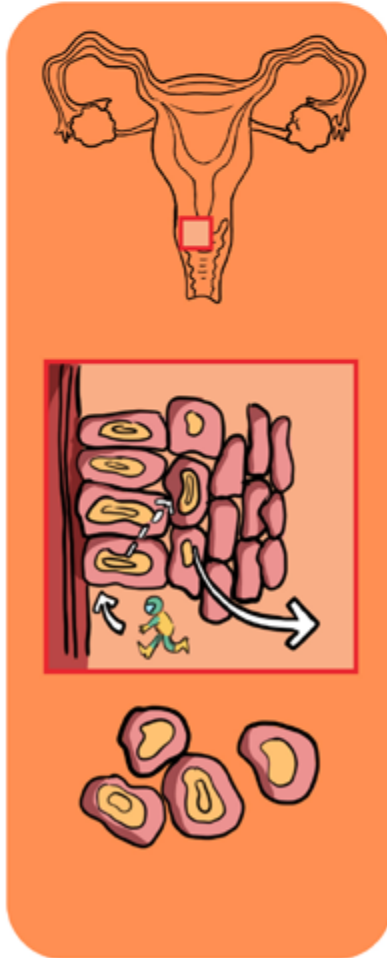
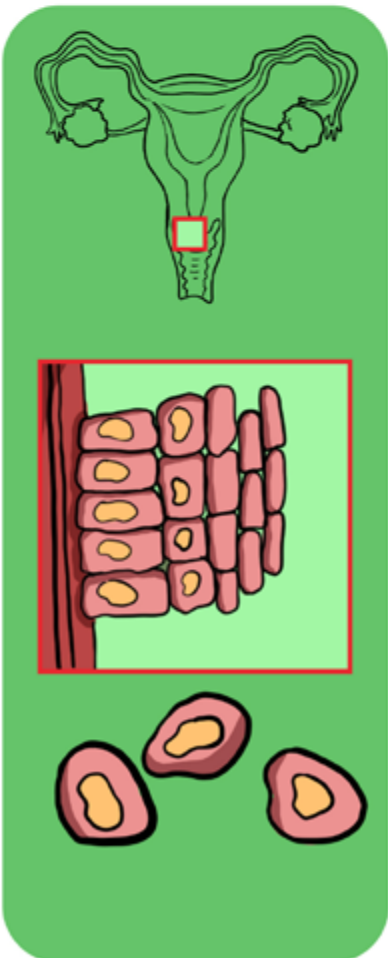
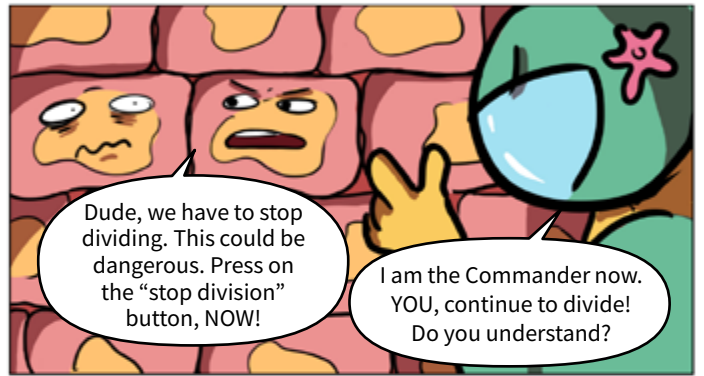
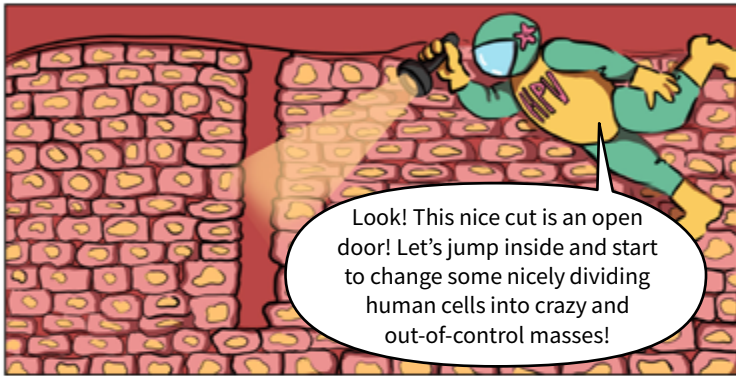
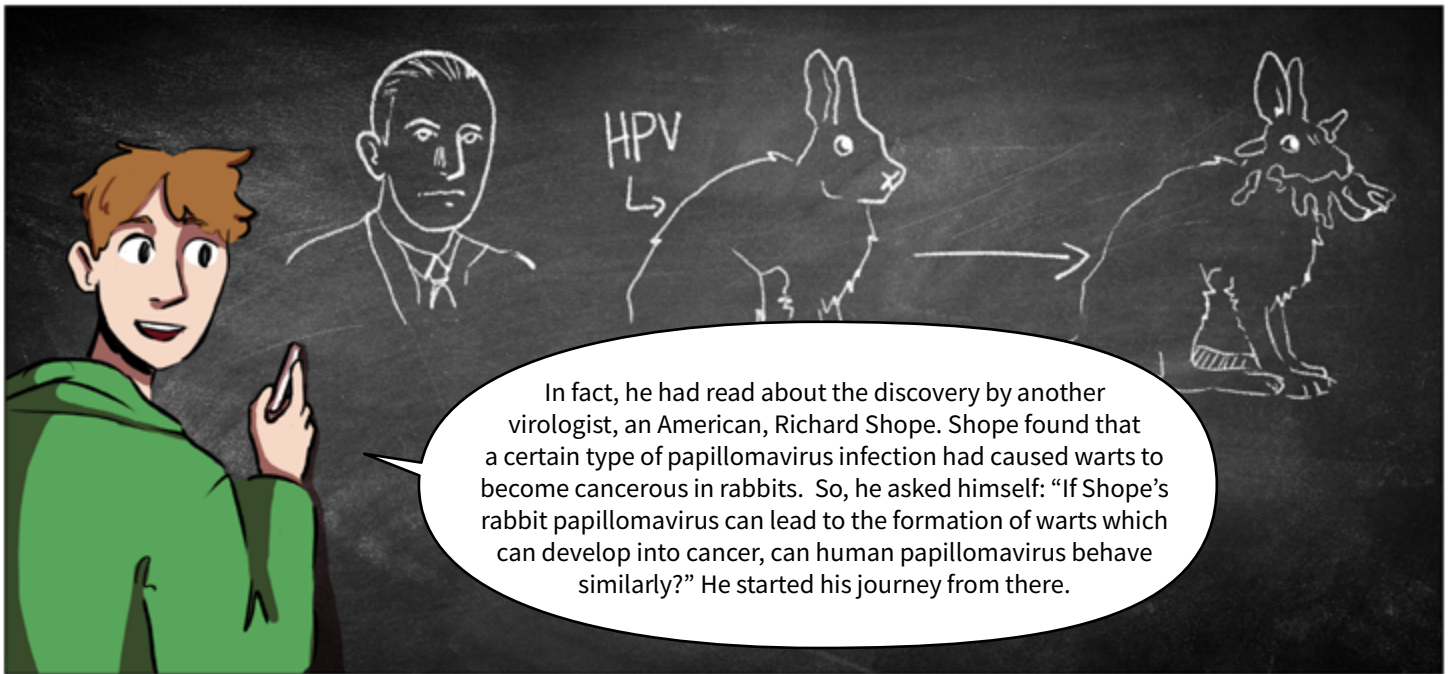


Excellent! This research eventually led to the development of a very effective vaccine against high-risk HPV!



Amazing! But I wonder, what led the Professor to think about HPV while the majority of scientists were looking elsewhere? What made him think differently?

Ummm, this is a good question, Syrgo.



Arriving in Napoli

Syrgo,
what is so special about
the "mummified lady"?

Wait for it.

Aeroporto Internazionale di Napoli

CHAPTER 3:
THE NUMBER 18

Do you speak Italian?

Yes

Say something?

PIZZA

HAHAHAHA...

Are you hungry?

Yes, please.

Fine. Let us try this
restaurant. Which table
would you prefer?

18

No.
Take 6 or 11.

Huh?

16 and 18 are not my
favourite numbers in
this journey. Soon, you
will understand what
I mean...

What should I eat?

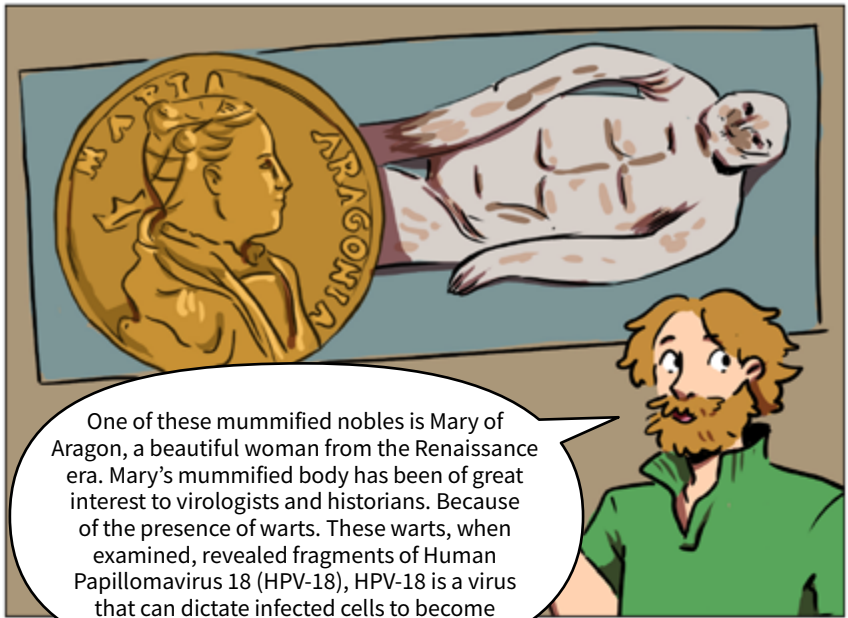
Luca has just
arrived. I am sure
he can help.

Your friend?

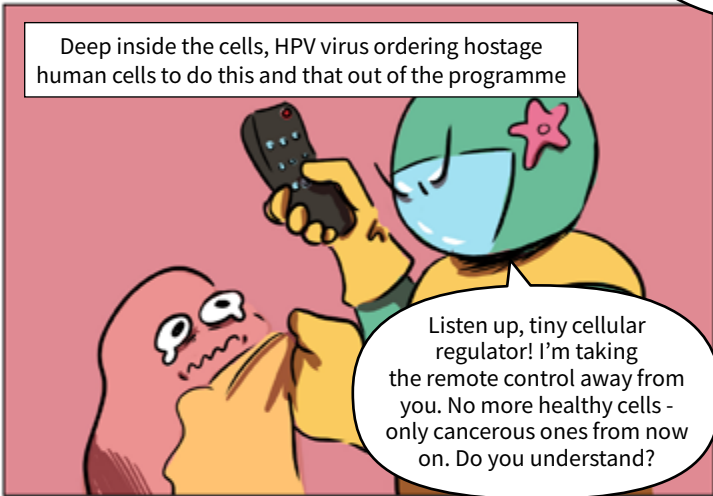
Luca is a professor in
the History of Medicine. He
will take us to the "Basilica of
Saint Domenico Maggiore" to
see The mummy of Mary of
Aragon (1503-68).



The Basilica of Saint Domenico Maggiore dates back to the 14th century. It is one of the largest and most important churches in Naples, Italy. It contains 38 wooden sarcophagi with ten mummified Aragonese kings and other Neapolitan nobles who died in the 15th and 16th centuries.

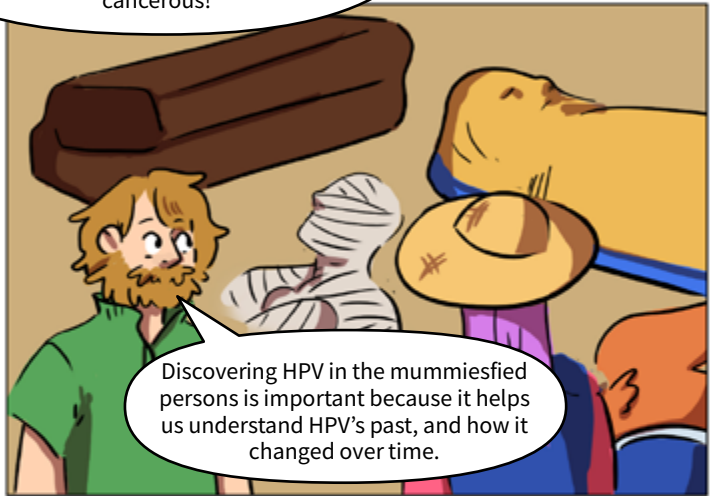


One of these mummified nobles is Mary of Aragon, a beautiful woman from the Renaissance era. Mary's mummified body has been of great interest to virologists and historians. Because of the presence of warts. These warts, when examined, revealed fragments of Human Papillomavirus 18 (HPV-18), HPV-18 is a virus that can dictate infected cells to become cancerous!



Deep inside the cells, HPV virus ordering hostage human cells to do this and that out of the programme

Listen up, tiny cellular regulator! I'm taking the remote control away from you. No more healthy cells - only cancerous ones from now on. Do you understand?

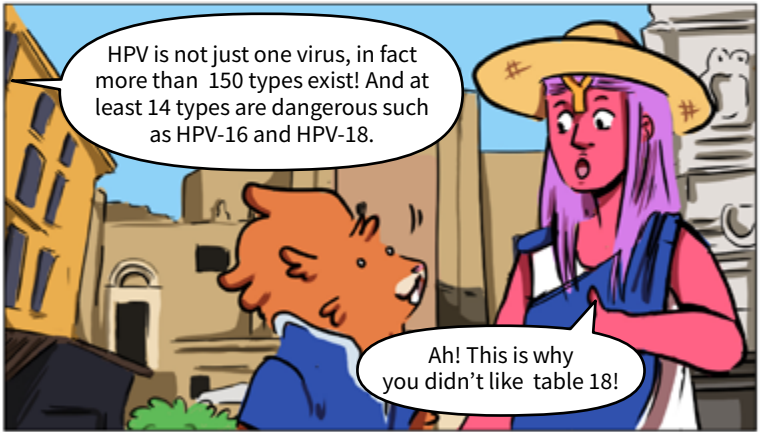


Discovering HPV in the mummified persons is important because it helps us understand HPV's past, and how it changed over time.



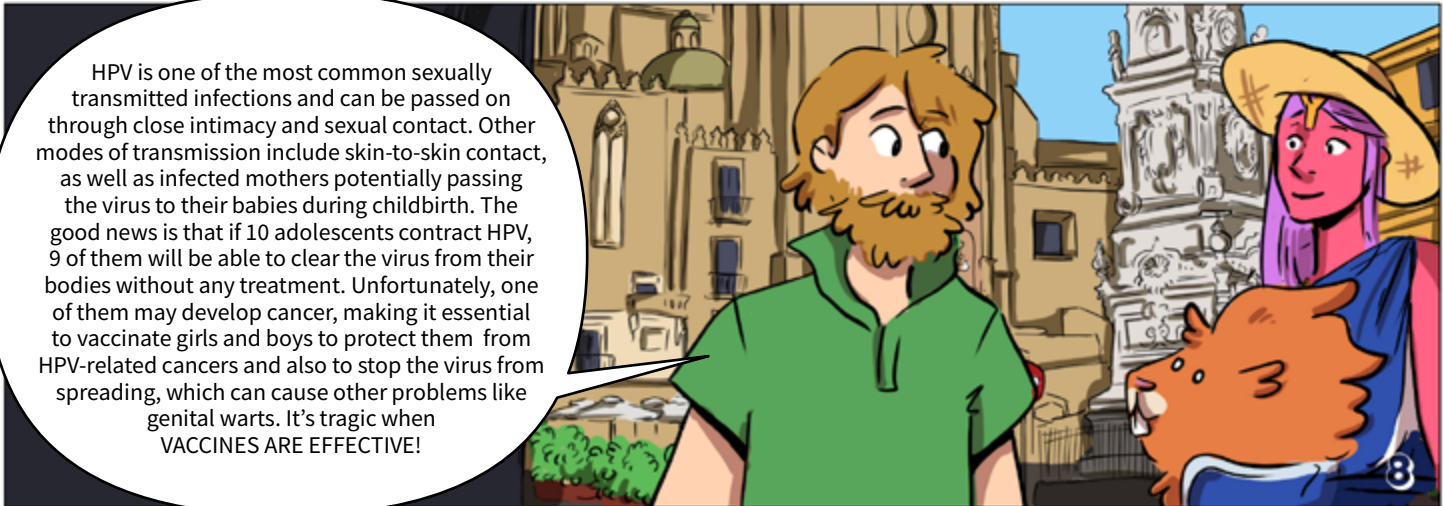
Bizarre, some people still believe that viruses are newly created from modern technology! In reality, they existed before life!

Exactly!



HPV is not just one virus, in fact more than 150 types exist! And at least 14 types are dangerous such as HPV-16 and HPV-18.

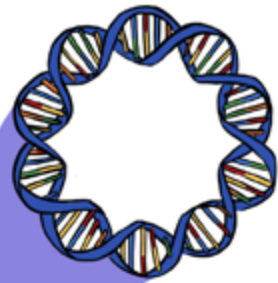
Ah! This is why you didn't like table 18!



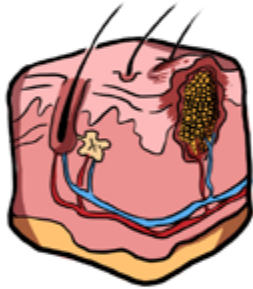
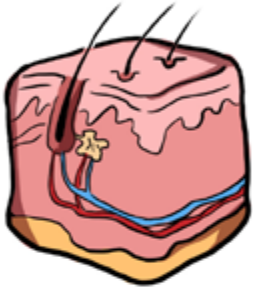
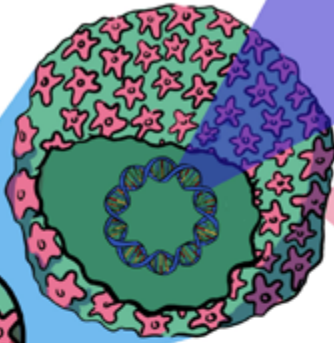
HPV is one of the most common sexually transmitted infections and can be passed on through close intimacy and sexual contact. Other modes of transmission include skin-to-skin contact, as well as infected mothers potentially passing the virus to their babies during childbirth. The good news is that if 10 adolescents contract HPV, 9 of them will be able to clear the virus from their bodies without any treatment. Unfortunately, one of them may develop cancer, making it essential to vaccinate girls and boys to protect them from HPV-related cancers and also to stop the virus from spreading, which can cause other problems like genital warts. It's tragic when **VACCINES ARE EFFECTIVE!**



HPV has a round shape. Its diameter is 55 nm (1 nm = 0.0000001 cm). This is a million times smaller than a tennis ball! This means HPV, like most known viruses, cannot be seen under a light microscope! You need a powerful electron microscope.



HPV is composed of proteins and genetic material (DNA). Some of the proteins that make up HPV assemble themselves into starry shield shapes (kind of like a star built from LEGO bricks). 72 starry shields combine to form the capsid, which encloses the viral DNA like a shell.



Each kind of HPV has a slightly different looking starry shield and therefore, has unique characteristics. Scientists have given each type of HPV a number to identify it.

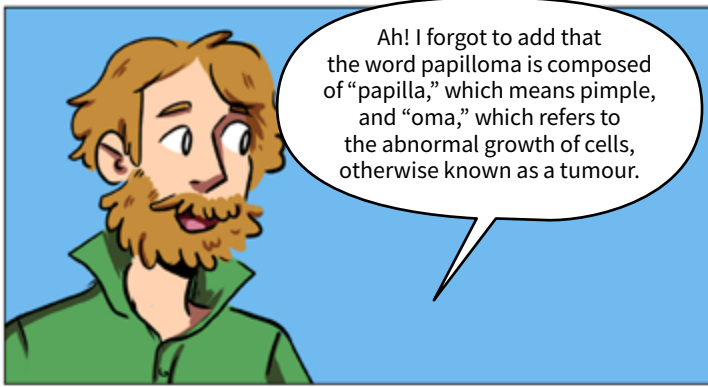
Most HPV types, such as 6 and 11, can cause different types of warts (including genital warts, condylomas) and are considered low-risk HPV. However, some types of HPV, like 16 and 18, are very harmful to humans (high-risk HPV) and can cause cancers in various parts of the body, including the vulva, vagina, penis, or anus. These can also cause cancer in the back of the throat (called oropharyngeal cancer) and may even include the base of the tongue and tonsils.

HIGH-RISK HPV

16	31	33
45	52	53

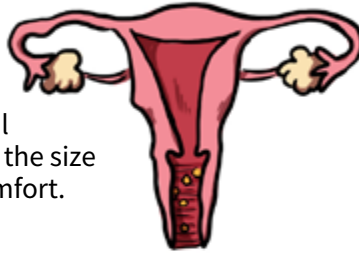
LOW-RISK HPV

6
11



ANAL OR GENITAL WARTS

(also called ‘condyloma acuminata’) These are warts that affect the skin in the area of the back passage or the genital tract. They may grow larger than the size of a pea and cause pain or discomfort.



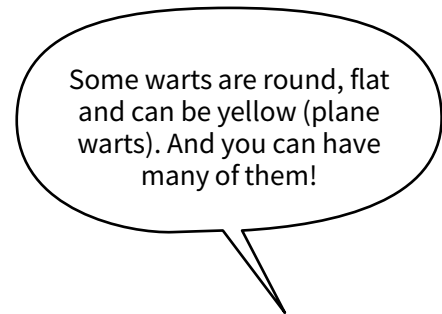
COMMON WARTS

These warts feel firm and rough, and they can appear on the palms, knuckles, knees, and fingers.



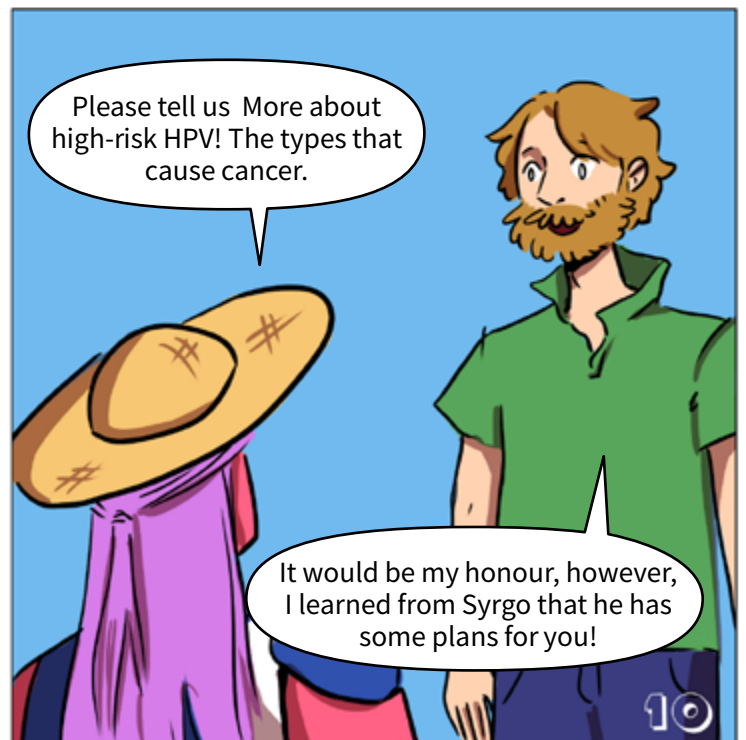
VERRUCAS

Often found on weight-bearing areas such as the ball of the foot or the heel. They have tiny black dots under the hard skin, appearing like a “fisheye,” and it is often painful.



RECURRENT RESPIRATORY PAPILOMATOSIS (RRP)

is a rare disorder characterised by the growth of warts (papilloma) on the surface of the vocal cords or tissue around the vocal cords. RRP causes voice hoarseness, and additional difficulties with breathing, speaking, and swallowing. These warts are messy as they can often return even after being removed through surgery! HPV vaccines are the best tool we have to prevent RRP too!



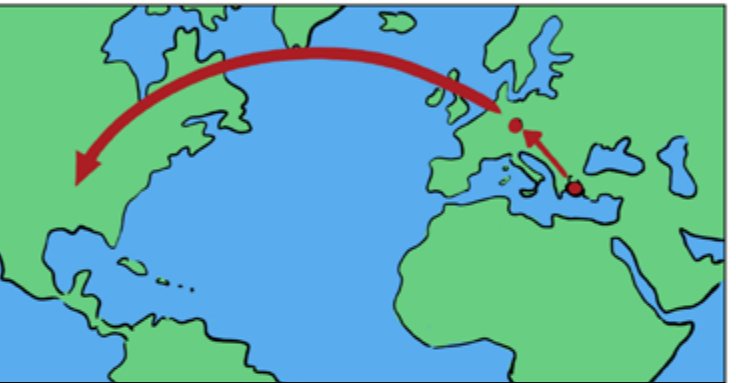
In Euboia island, Greece

On this island, a brilliant scientist was born in 1883. His work saved millions of lives from cervical cancer.

Papanicolaou!

CHAPTER 4: I'M NO LONGER A DREAMER

Yes! Dr Georgios Papanicolaou!

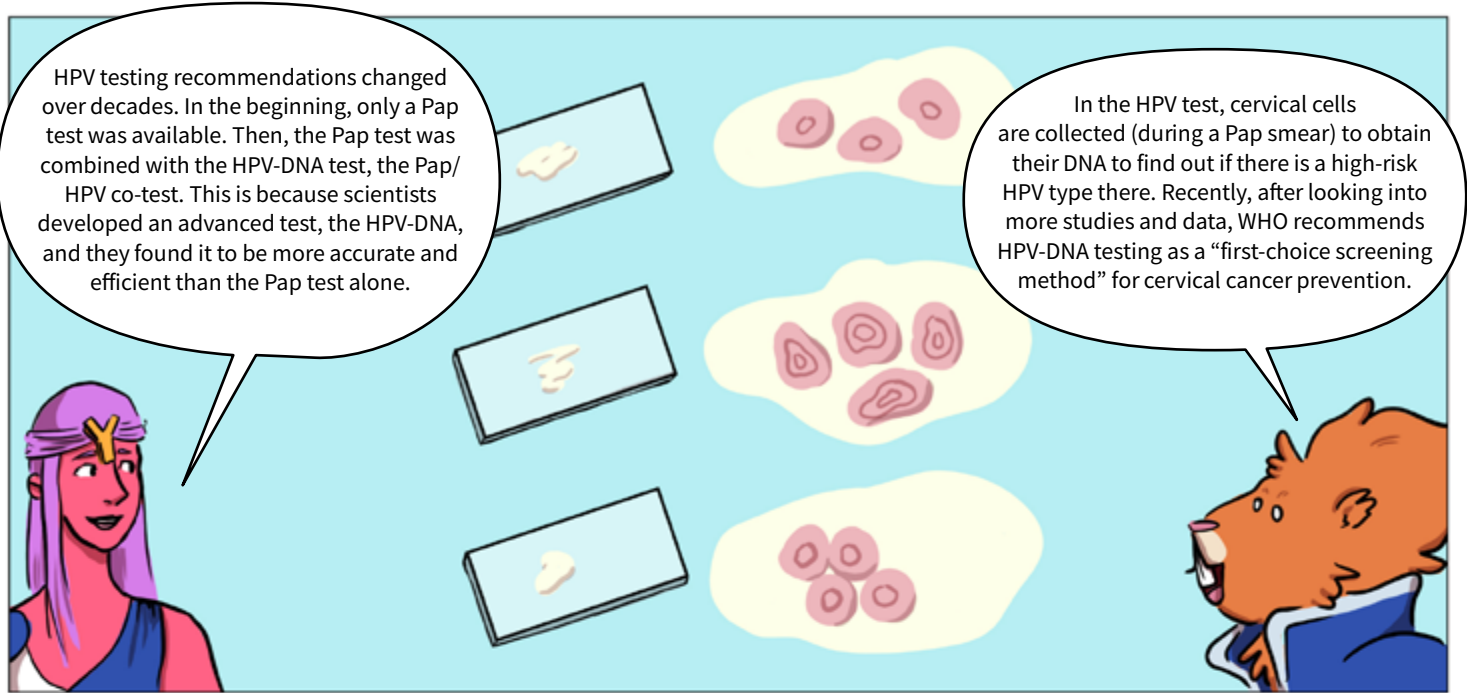


Papanicolaou bid farewell to his hometown in Greece and journeyed to Germany and then to the United States in pursuit of work. In a letter to his family back home, he wrote: *"I am no longer a dreamer"*. But a DOER!



Dr. Papanicolaou developed a method for collecting cells from the cervix (the lower, narrow end of the uterus that connects the uterus and vagina) Using a small brush. He then spread these cells onto glass slides and examined them through a microscope. With this technique, he was able to determine which cells were normal and which were abnormal. This procedure became known as the **Pap test** or **Pap smear**, named after him.





HPV testing recommendations changed over decades. In the beginning, only a Pap test was available. Then, the Pap test was combined with the HPV-DNA test, the Pap/HPV co-test. This is because scientists developed an advanced test, the HPV-DNA, and they found it to be more accurate and efficient than the Pap test alone.

In the HPV test, cervical cells are collected (during a Pap smear) to obtain their DNA to find out if there is a high-risk HPV type there. Recently, after looking into more studies and data, WHO recommends HPV-DNA testing as a “first-choice screening method” for cervical cancer prevention.

RISK FACTORS

- Multiple pregnancies - more than 5 times
- Early and/or multiple sexual partners
- Family history (inherited genes)
- Smoking
- Having a weakened immune system.



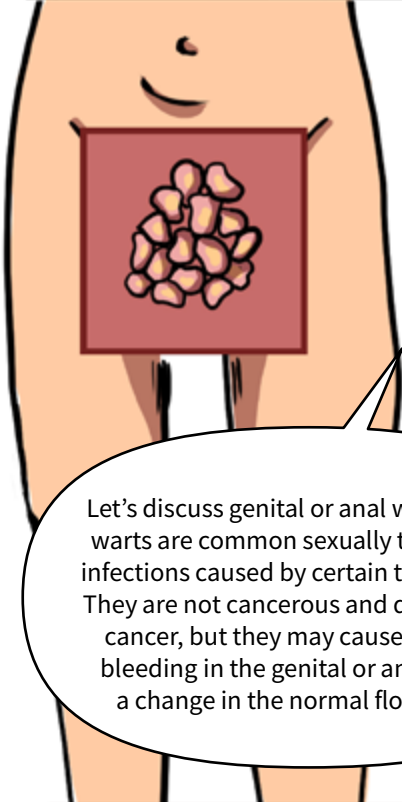
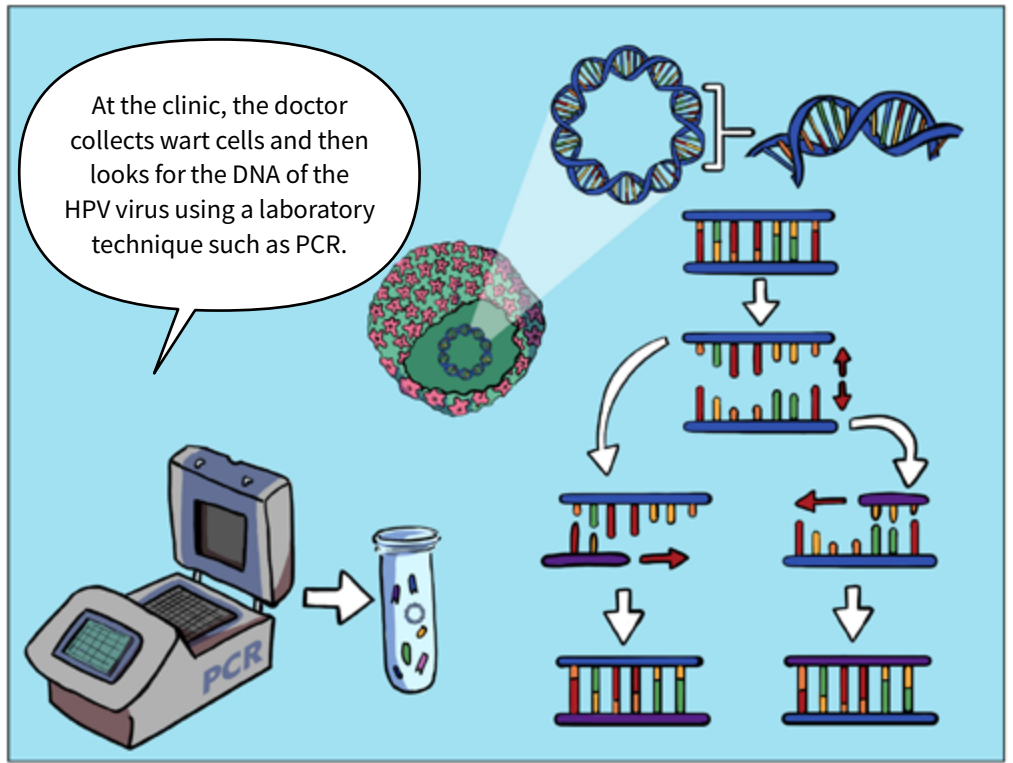
Pap tests have been offered since 1960. Correct? However, only women who visited doctors were examined. What about those who did not?

Thankfully, over the past three decades, many countries have initiated national screening programmes to invite women from the target group for Pap screening and keep track of their progress for years, even if they have not previously had any contact with a doctor.

Remember, don't wait for the first signs, as they often appear late.

- Unusual vaginal discharge
- Long or heavier period
- Unexplained weight loss
- Abnormal vaginal bleeding
- Discomfort while urinating
- Loss of bladder control
- Leg pain

Women should think about screenings as a part of their healthy lifestyle, just like exercising, eating healthy or getting a routine checkup at the dentist.



YOU CAN GET WARTS EVEN IF YOU:

- don't have penetrative sex
- use condoms (a condom does not cover all genital skin).

WAYS TO STOP HPV FROM SPREADING INCLUDE:

- The HPV vaccine. It protects against the types of HPV that cause most genital warts and cervical cancer, as well as some other cancers.
- Avoid having sex, or sharing sex toys, during treatment for genital warts

Let's discuss genital or anal warts. These warts are common sexually transmitted infections caused by certain types of HPV. They are not cancerous and do not cause cancer, but they may cause itching or bleeding in the genital or anal area, or a change in the normal flow of pee.



There is no cure for HPV. However, warts can be treated or removed. The treatments for genital warts can cause pain, discomfort, or scarring from surgery.



Cream or liquid
Patients can apply it at home, a few times a week for several weeks.



Freezing
A doctor or nurse freezes warts with liquid nitrogen, usually once a week for 4 weeks.



Surgery
if the warts are not responding to cream or freezing, a doctor or nurse can cut, burn or laser off the warts. Even though, the warts may come back in some people. This why vaccination is the tool to avoid these painful warts!

The viral gang in an urgent meeting

Team, listen. We cannot allow humans to defend themselves against our friend HPV. Yes, the HPV vaccine is safe and effective, but we are intelligent and know how to stir up doubts and challenge public confidence in vaccines



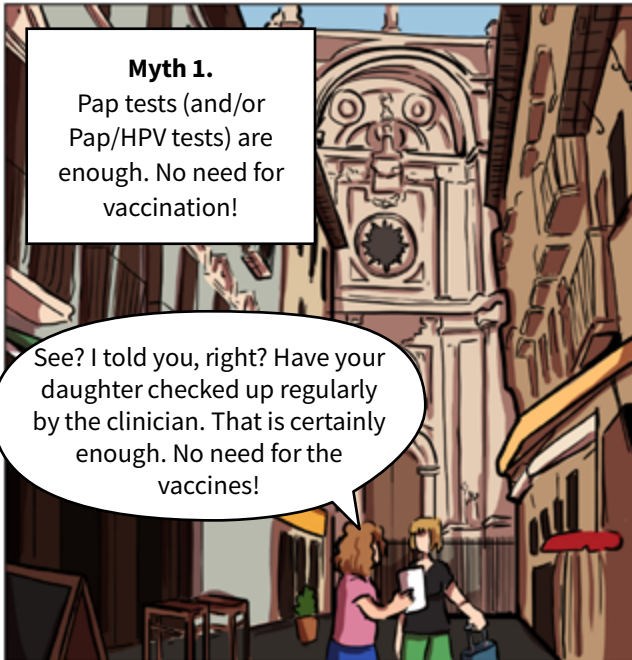
Right? Now, TO WORK!

CHAPTER 5: MISINFORMATION

Myth 1.

Pap tests (and/or Pap/HPV tests) are enough. No need for vaccination!

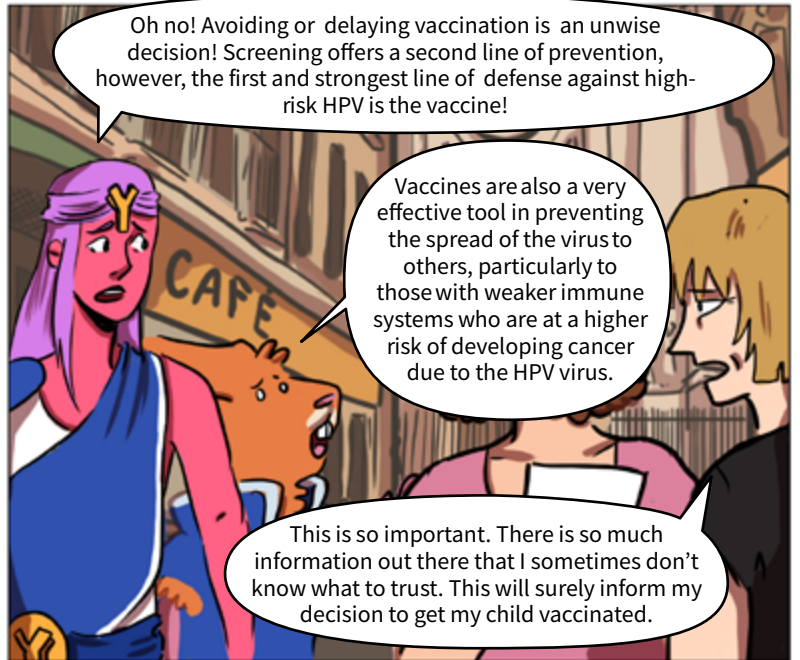
See? I told you, right? Have your daughter checked up regularly by the clinician. That is certainly enough. No need for the vaccines!



Oh no! Avoiding or delaying vaccination is an unwise decision! Screening offers a second line of prevention, however, the first and strongest line of defense against high-risk HPV is the vaccine!

Vaccines are also a very effective tool in preventing the spread of the virus to others, particularly to those with weaker immune systems who are at a higher risk of developing cancer due to the HPV virus.

This is so important. There is so much information out there that I sometimes don't know what to trust. This will surely inform my decision to get my child vaccinated.



Brussels, Belgium

Myth 2 BUT ... BUT ... HPV vaccines are new so, long term safety and efficacy* data are unavailable!

I hope other tourists who come across this false information do not believe it so easily. It's so dangerous.

The world needs more well-informed people like them!

Yeah! The HPV immunisation programme has been highly successful in nearly eliminating cervical cancer in women born after 1995. Real-life data from the millions of schoolgirls who have received the vaccine since 2008 all support this fact! So while it is important to be cautious with new medical treatments, we can be confident in the safety and efficacy of the HPV vaccine based on the available evidence.

Absolutely! It's great to hear people forming opinions and making decisions based on data and scientific evidence! I hope they continue to share this knowledge with their friends and family too.

A few days ago, some tourists were reading the same myth and talking to each other



* Efficacy - the ability, especially of a medicine or a method of achieving something, to produce the intended result

Rome, Italy

Myth 3.
HPV vaccination can cause ovarian failure.

WHAT???. HPV vaccines do the exact OPPOSITE of this claim! They protect from ovarian failure!

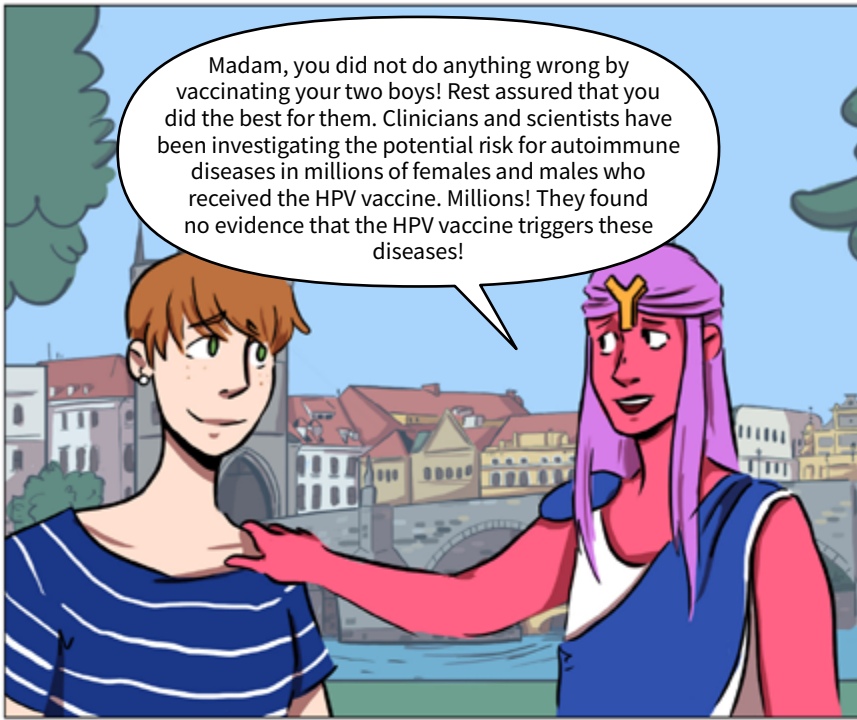


Prague

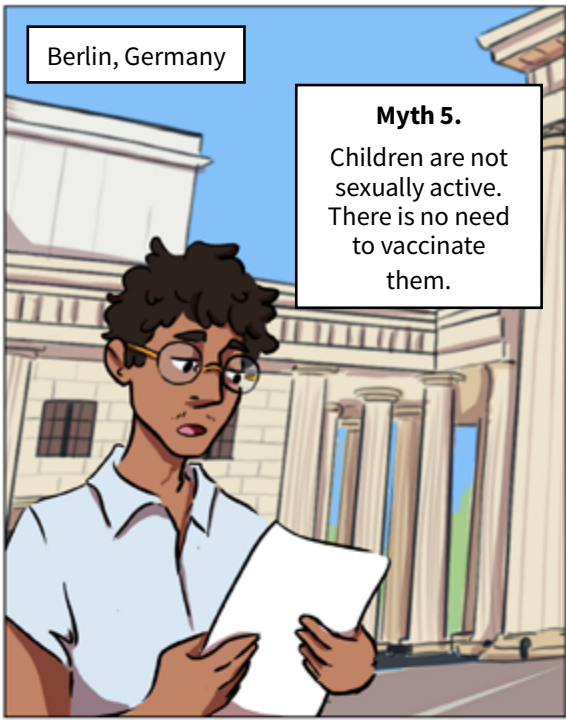
Myth 4.
Vaccines cause autoimmune diseases, neurological diseases, and death. STAY AWAY FROM VACCINES"

What???. My two boys have just received the first dose of their HPV vaccines!

Like with all vaccines, there can be side effects. But as is often the case, HPV vaccine's side effects are usually rare and short lived. For example, there may be some swelling or redness at the injection site. The benefit of vaccines is far greater than the risk of their rare side effects.

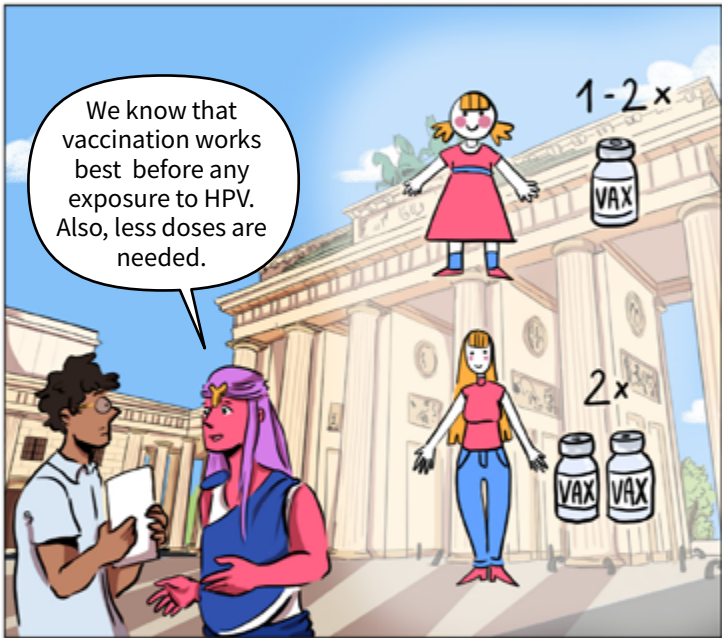


Madam, you did not do anything wrong by vaccinating your two boys! Rest assured that you did the best for them. Clinicians and scientists have been investigating the potential risk for autoimmune diseases in millions of females and males who received the HPV vaccine. Millions! They found no evidence that the HPV vaccine triggers these diseases!

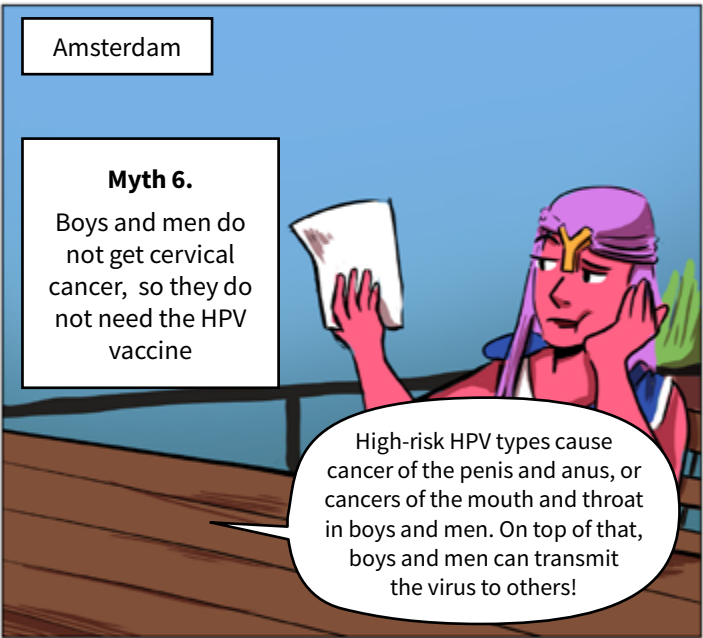


Berlin, Germany

Myth 5.
Children are not sexually active. There is no need to vaccinate them.



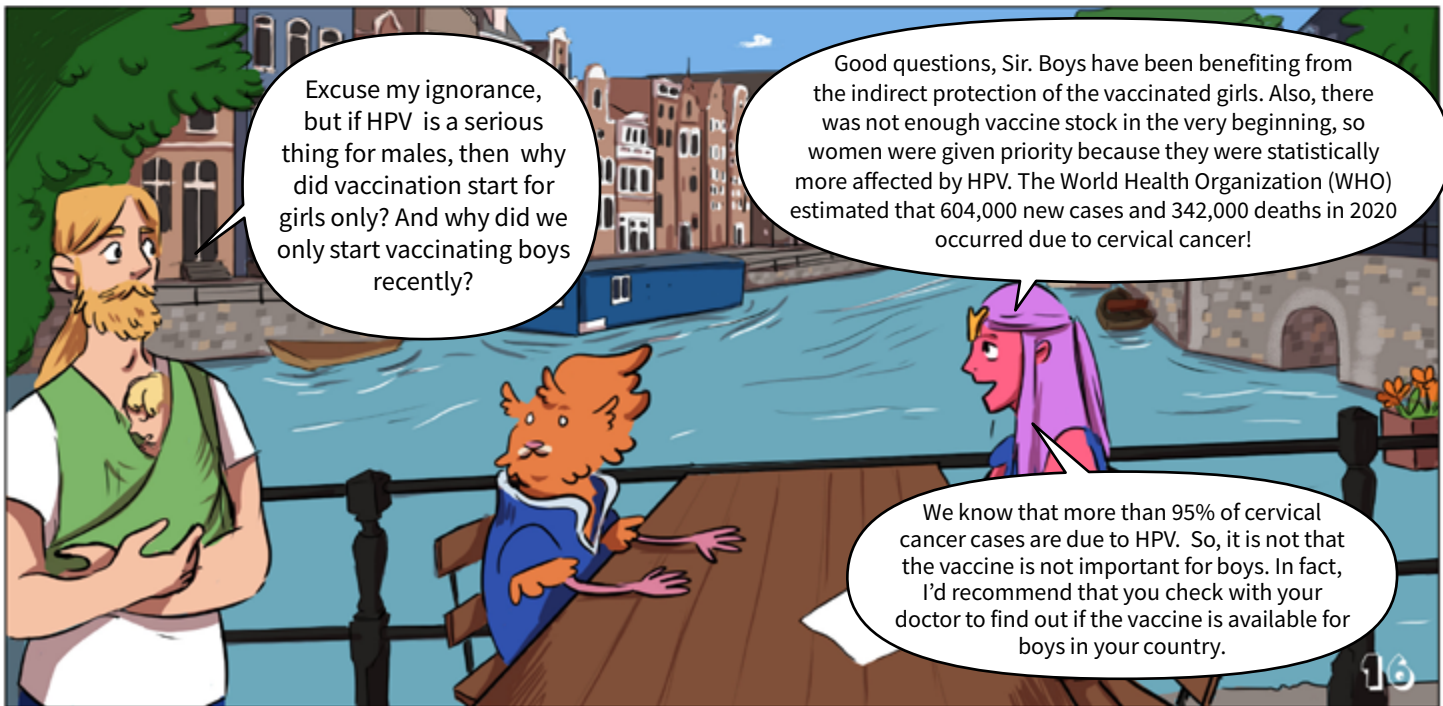
We know that vaccination works best before any exposure to HPV. Also, less doses are needed.



Amsterdam

Myth 6.
Boys and men do not get cervical cancer, so they do not need the HPV vaccine

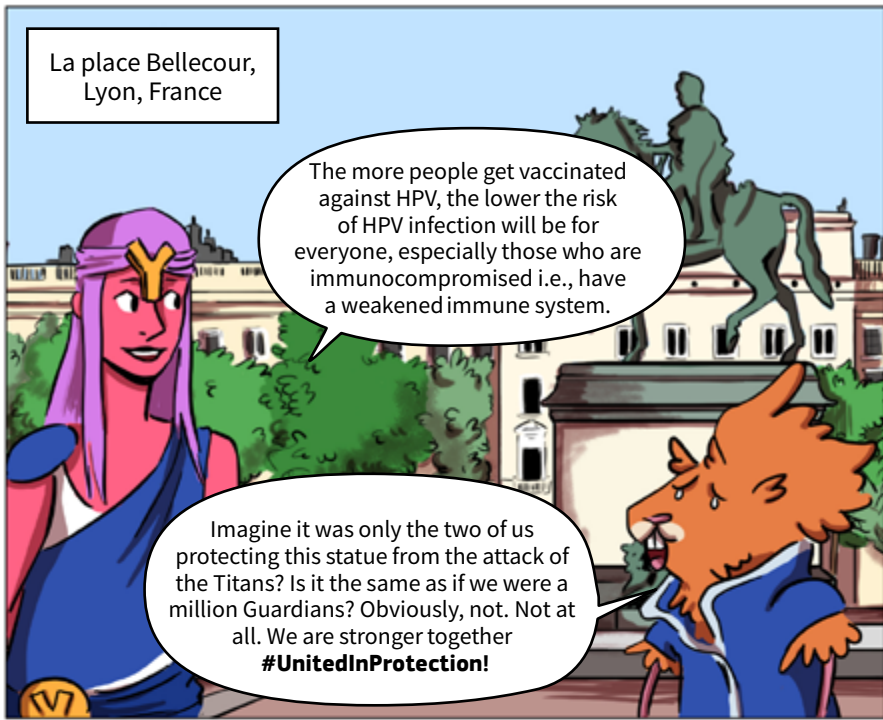
High-risk HPV types cause cancer of the penis and anus, or cancers of the mouth and throat in boys and men. On top of that, boys and men can transmit the virus to others!



Excuse my ignorance, but if HPV is a serious thing for males, then why did vaccination start for girls only? And why did we only start vaccinating boys recently?

Good questions, Sir. Boys have been benefiting from the indirect protection of the vaccinated girls. Also, there was not enough vaccine stock in the very beginning, so women were given priority because they were statistically more affected by HPV. The World Health Organization (WHO) estimated that 604,000 new cases and 342,000 deaths in 2020 occurred due to cervical cancer!

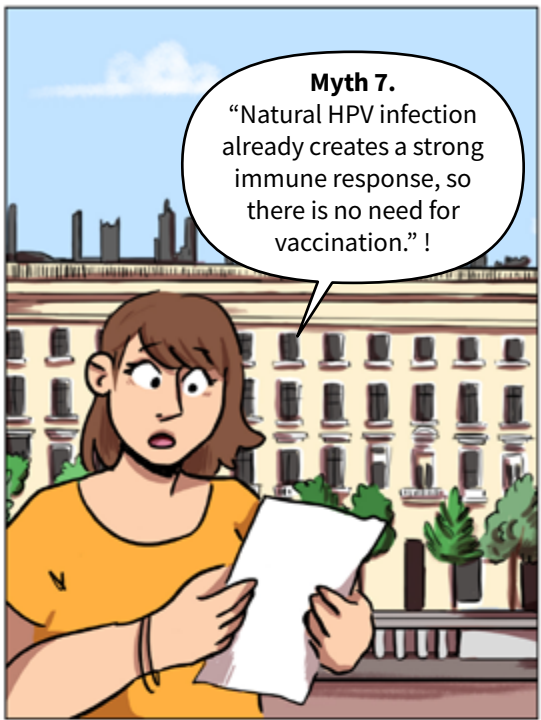
We know that more than 95% of cervical cancer cases are due to HPV. So, it is not that the vaccine is not important for boys. In fact, I'd recommend that you check with your doctor to find out if the vaccine is available for boys in your country.



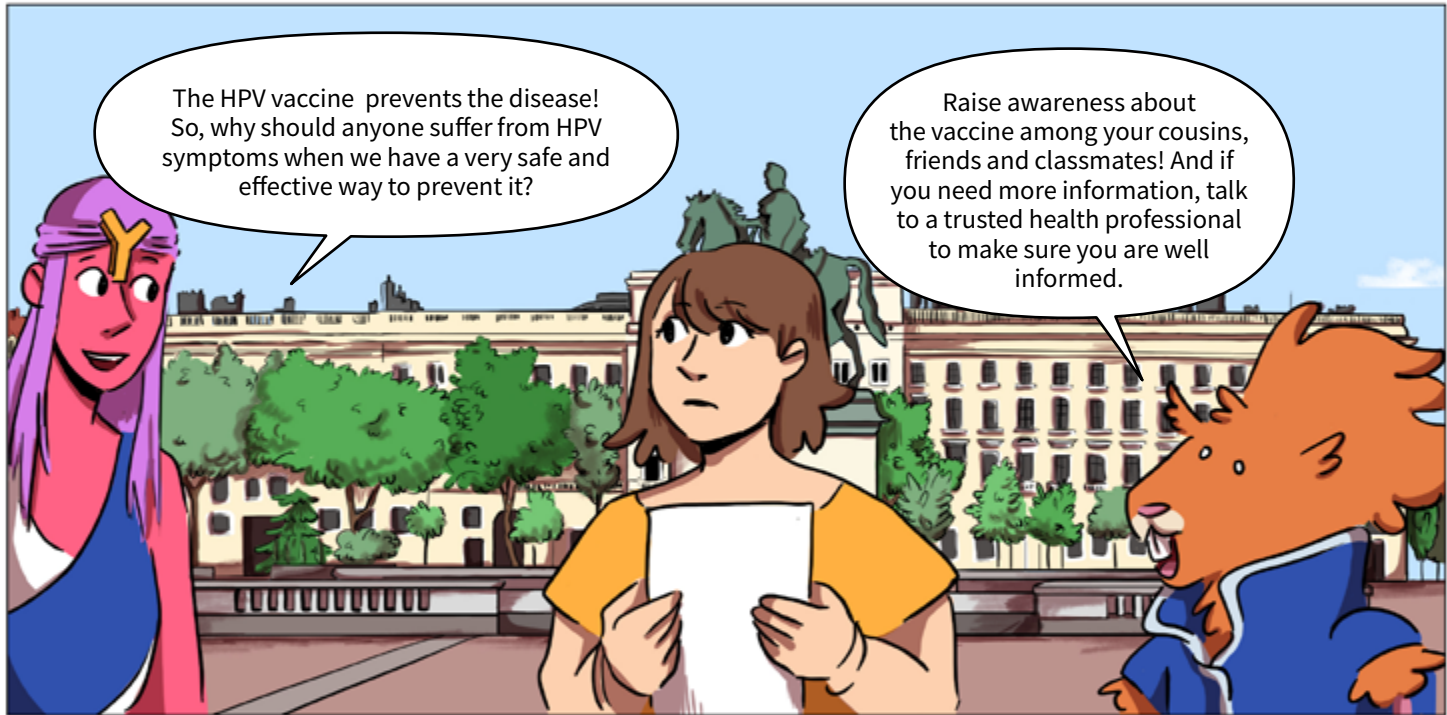
La place Bellecour,
Lyon, France

The more people get vaccinated against HPV, the lower the risk of HPV infection will be for everyone, especially those who are immunocompromised i.e., have a weakened immune system.

Imagine it was only the two of us protecting this statue from the attack of the Titans? Is it the same as if we were a million Guardians? Obviously, not. Not at all. We are stronger together
#UnitedInProtection!



Myth 7.
“Natural HPV infection already creates a strong immune response, so there is no need for vaccination.”!



The HPV vaccine prevents the disease! So, why should anyone suffer from HPV symptoms when we have a very safe and effective way to prevent it?

Raise awareness about the vaccine among your cousins, friends and classmates! And if you need more information, talk to a trusted health professional to make sure you are well informed.



Hard luck, Guys.
We lost this battle!

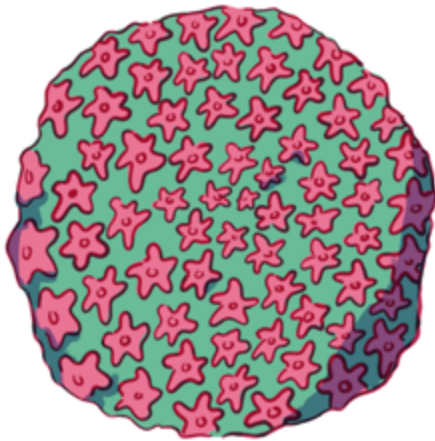
We will not give up that easily.
Onwards.



Well, we have travelled a lot and achieved a lot. But there is more to be done fighting other diseases and the accompanying misinformation.

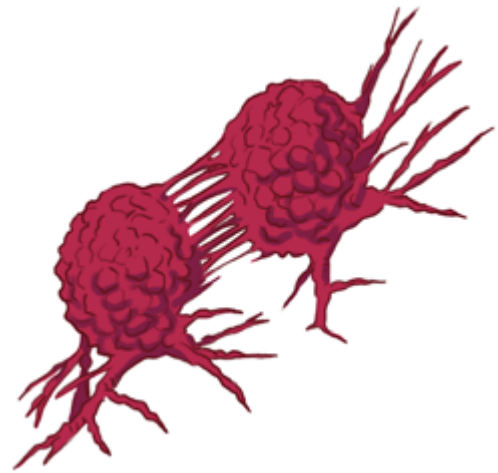
Yes... so I don't think we can rest just yet.

ILLUSTRATIVE GLOSSARY



PAPILLOMAVIRUSES

- viruses that cause warts and abnormal tissue growth



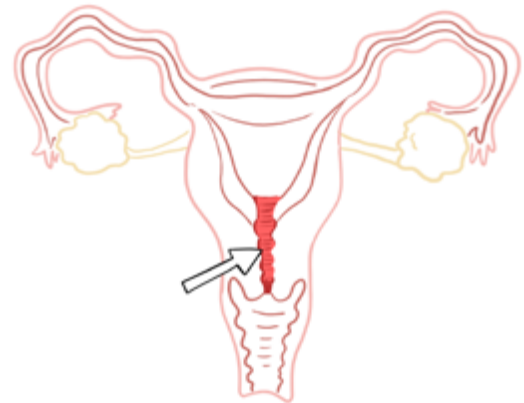
CANCER

- a large group of diseases that can start in almost any tissue or organ of the body when abnormal cells grow uncontrollably. It can go beyond its usual location and spread to other tissue and/or organs.



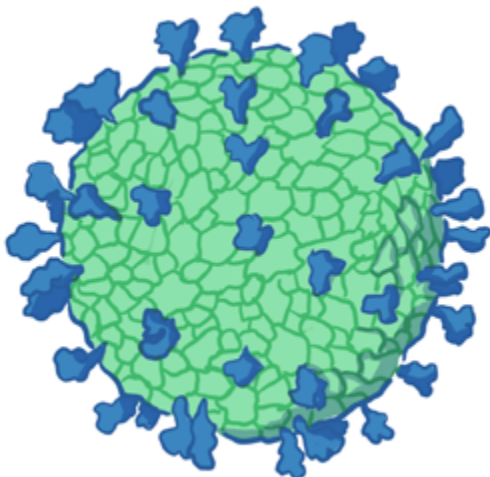
TUMOUR

- abnormal tissue growth



CERVIX

- the neck of the uterus.



HPV VIRUS-LIKE PARTICLE VACCINE

- a vaccine that uses a modified version of a virus, such as just the protein shell, triggers an immune response inside the body, resulting in the formation of protection against the foreign protein. This modified virus cannot reproduce or cause disease as it lacks the viral genetic material and consists of only the capsid.

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