Archaea and Monera

Archaea and Monera are mainly single celled **prokaryotic** organisms.

Prokaryotic cells – have no nucleus and membrane bound organelles and are smaller.

Eukaryotic cells - have nucleus and membrane bound organelles and are larger.

Archaea

- Archaea are microscopic **prokaryotic** single celled organisms that are quite different than “normal” bacteria
- very ancient life form thought to have been around for 3.5 billion years when the earth was a harsh inhospitable environment

Archaea

- Originally “normal” bacteria and Archaea were classified into one kingdom (Monera) because they are both comprised of prokaryotic cells (the other four kingdoms are all comprised of eukaryotic cells).

Archaea

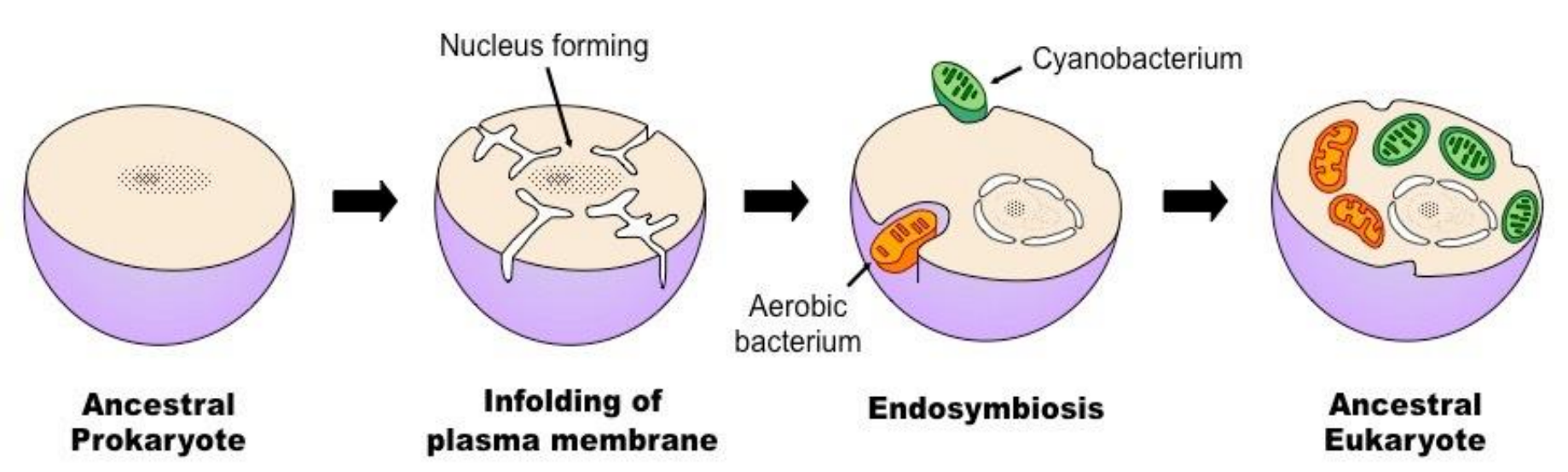
- However recent genetic gene sequencing and biochemical studies suggest that Archaea are actually significantly different than “normal” bacteria and thus belong in their own unique grouping or kingdom.

Archaea

- Archaea typically live in and can tolerate very extreme conditions such as deep ocean sulfur vents and volcanic hot spring where they tolerate extreme temperatures, pH, and salt levels.

Archaea

- The theory of endosymbiosis suggests that eukaryotic cells may have originally formed when large Archaebacteria engulfed smaller “normal bacteria” and started to utilize them as “organelles” such as mitochondrion and chloroplasts.



Types of Archaea

- **Halophiles**
- live in and require very salty environments that would kill all other life forms.
- "halophile" means "love salt”.

Types of Archaea

- **Methanogens**
- methane gas generators.
- anaerobic only.
- live in intestines of cows and other ruminants, and even in some humans.
- can also be found in mud and some swamps where methane gas is produced.

Types of Archaea

- **Thermoacidophiles**
- live in hot and acidic environments.
- temperatures usually around 60℃ but some as high as 113 ℃.
- pH around 2.0 but as low as 0.9 which is extremely acidic.

Kingdom Monera

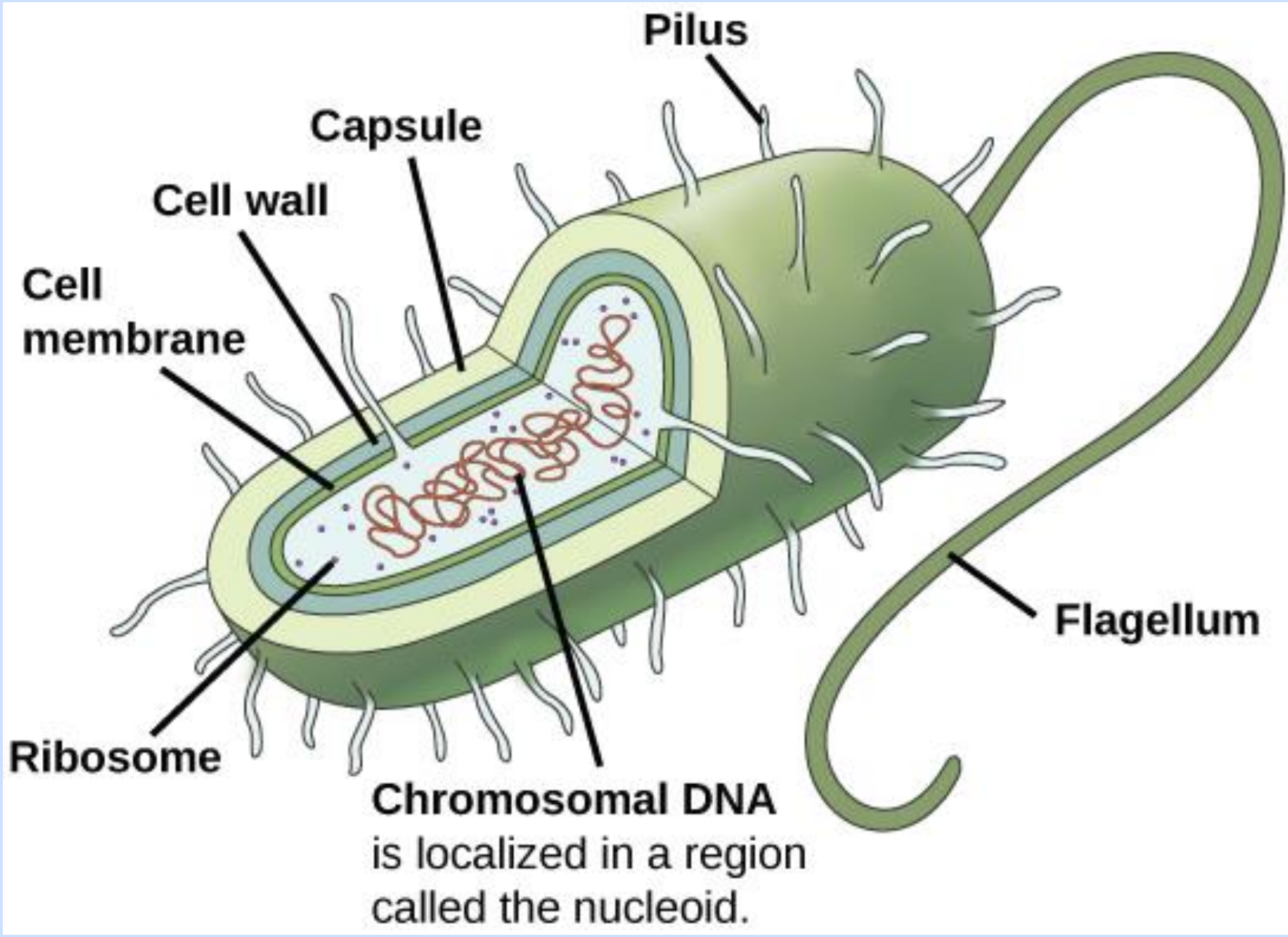
- Monera are microscopic **prokaryotic** single celled bacteria. Most feed and dead material (decomposers) but some make their own food (autotrophic). Some have been on earth for 3 billion years.
- Some are classified as harmful as they cause disease in both plants and animals (including humans). Some are classified as helpful.

Some Interesting Facts

- There are 500-650 different bacteria that can inhabit your mouth.
- 100-200 different species are probably living there right now.
- Depending on brushing habits an average person might have more that 6 billion bacteria living in their mouth at any given time.

Some Interesting Facts

- We have an estimated 1500 bacteria living on every square centimeter of skin.
- We have an estimated 100 trillion bacteria living in our digestive tract.


Pilus
Capsule
Cell wall
Cell membrane
Flagellum
Ribosome
Chromosomal DNA
is localized in a region
called the nucleoid.

Harmful Examples

- Cause disease in various plants including agriculturally important crops such as various grains, fruits and vegetables.
- Cause disease in animals including humans. Refer to our bacteria PowerPoint for a look at some of the more common bacterial infections that have plagued humans.

Helpful Examples

- Nitrogen fixing bacteria live in association with fugal roots of some plants and help convert nitrogen found in the air into a useful form which can be picked up by plants and used to make amino acids and eventually proteins.
- Production of some foods such as some yogurts, cheeses, fermented beverages, sauerkraut etc.
- Production of some antibiotics.
- Play important role as decomposers.

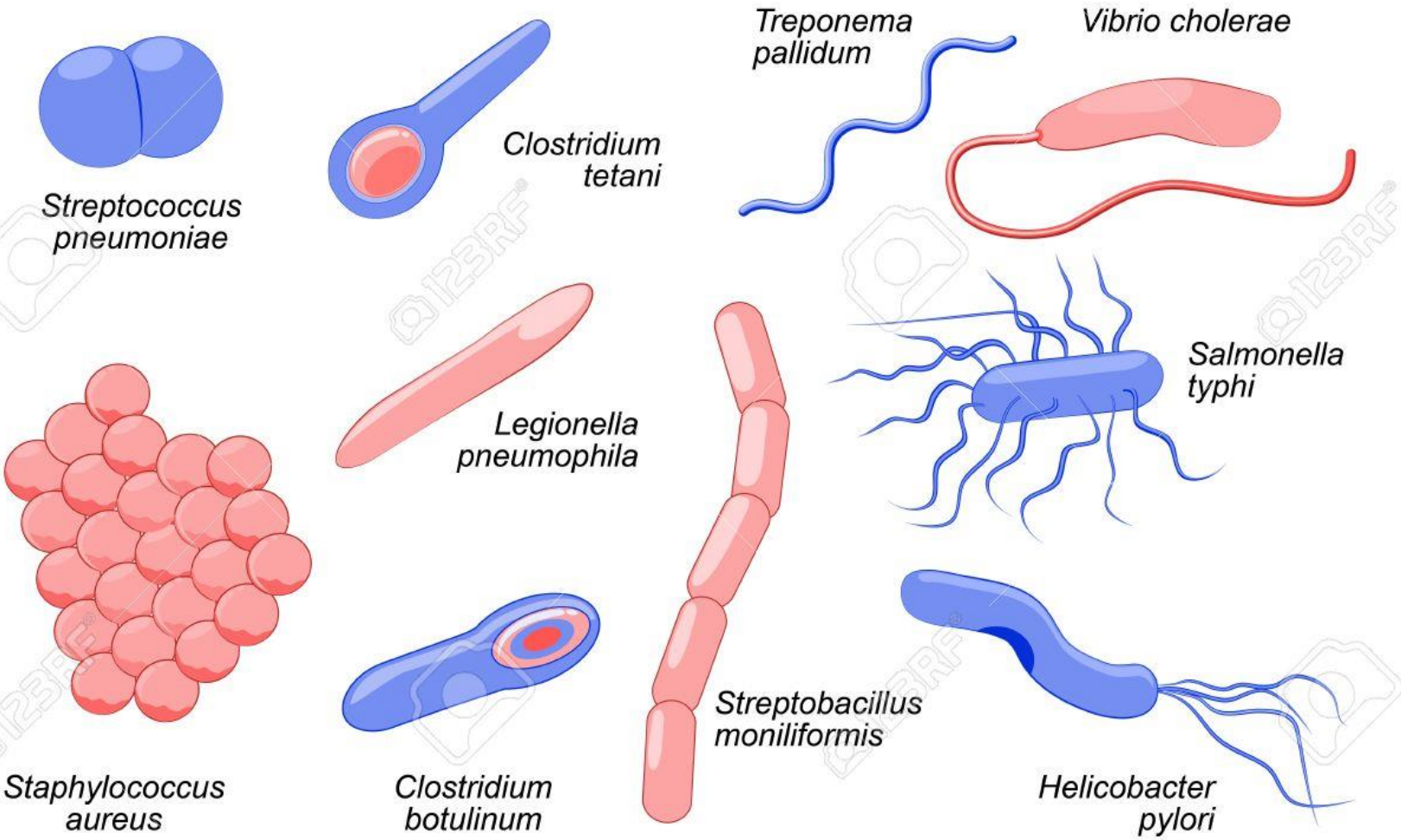
Size of Bacteria

- 1-2 microns in diameter.
- 5-10 microns long.
- For reference a micron is 1 millionth of a meter.
- For reference a human cheek cell is 60 microns.

Bacterial Shape and Arrangement

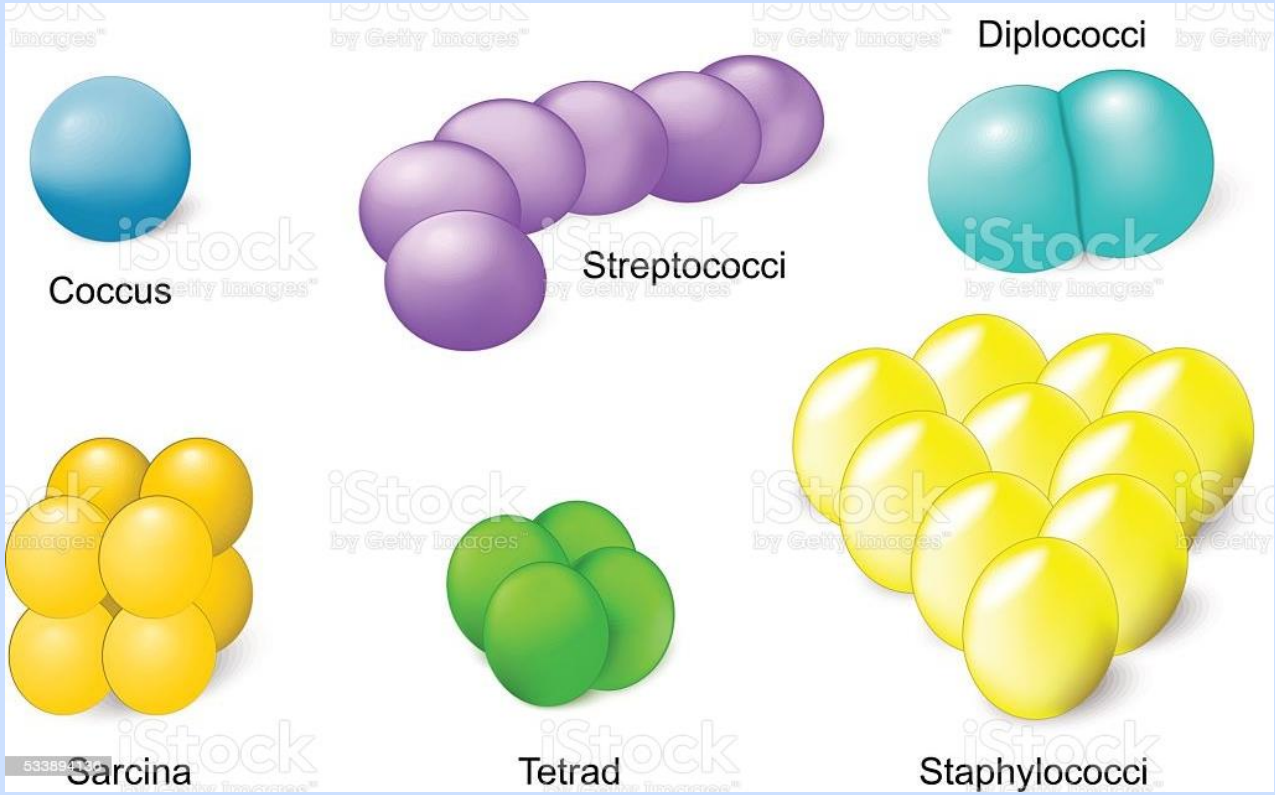
- Three of the most common shapes are; Cocci, Bacilli and Spirillum.
- They are often named based on their shape and arrangement.
- For example “strep” means chains of.

SHAPES OF BACTERIA

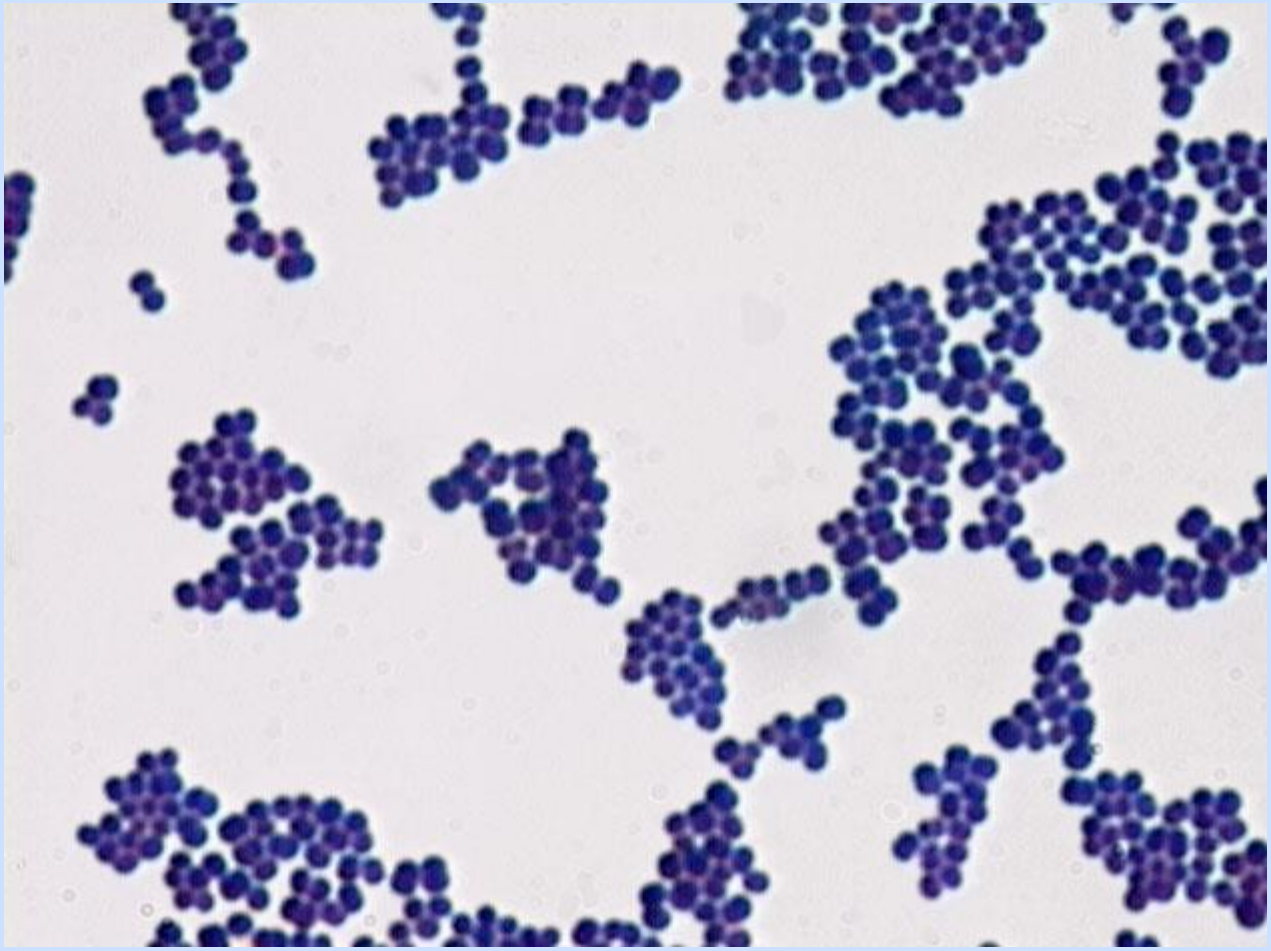


Coccus

- These bacteria are round.
- Can exist as singles or form clusters or chains.

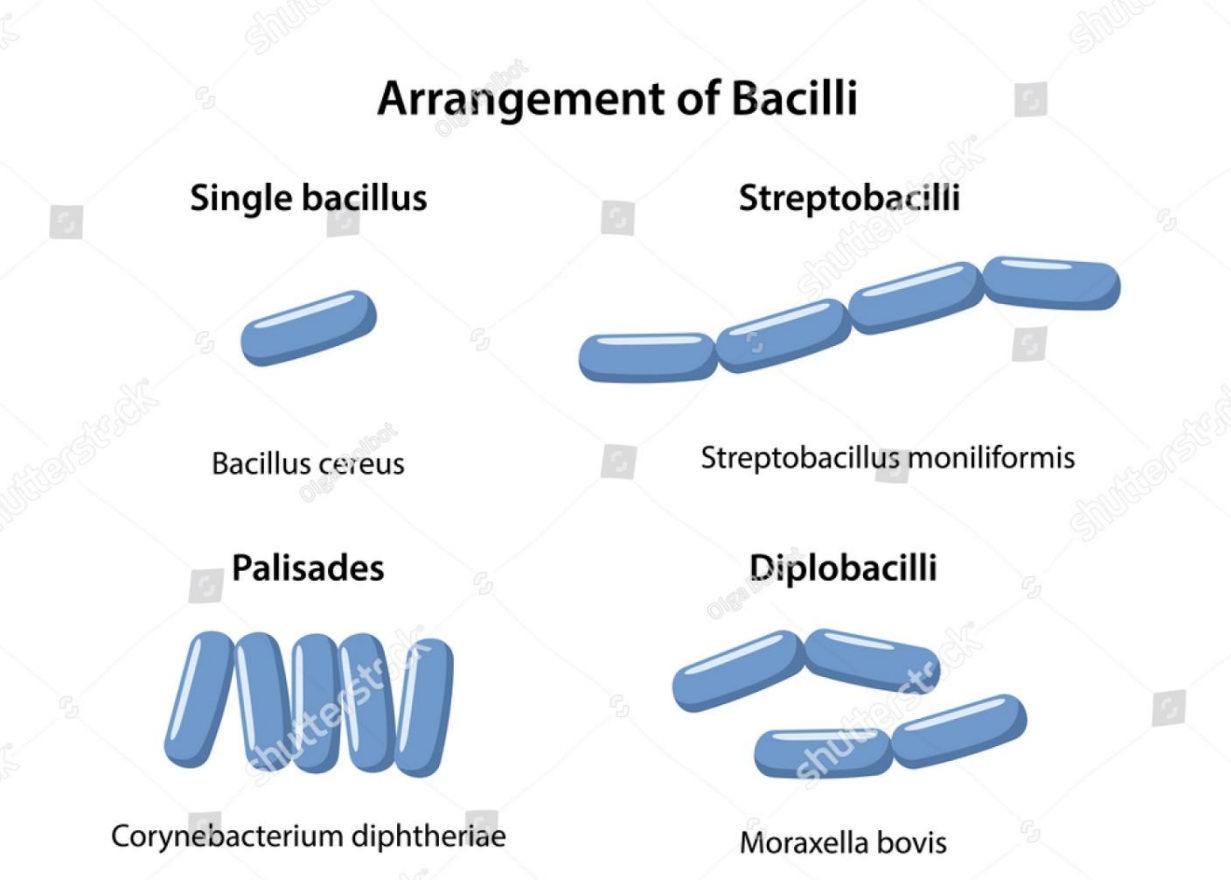


Coccus viewed under microscope

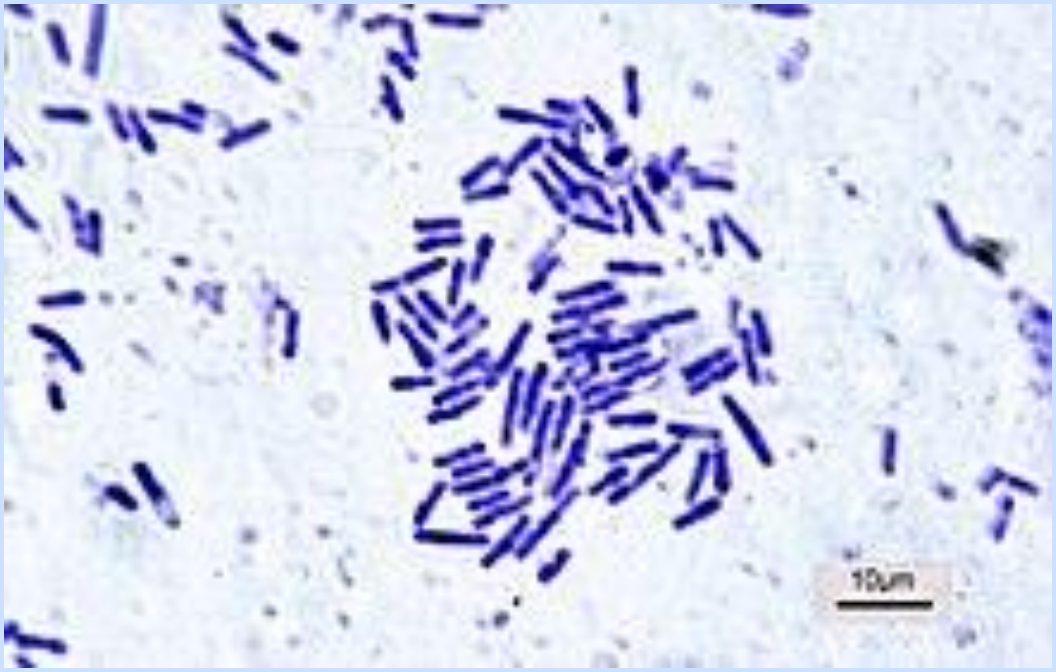


Bacillus

- These bacteria are rod-shaped.
- Can exist as a pair or chains but not clusters.

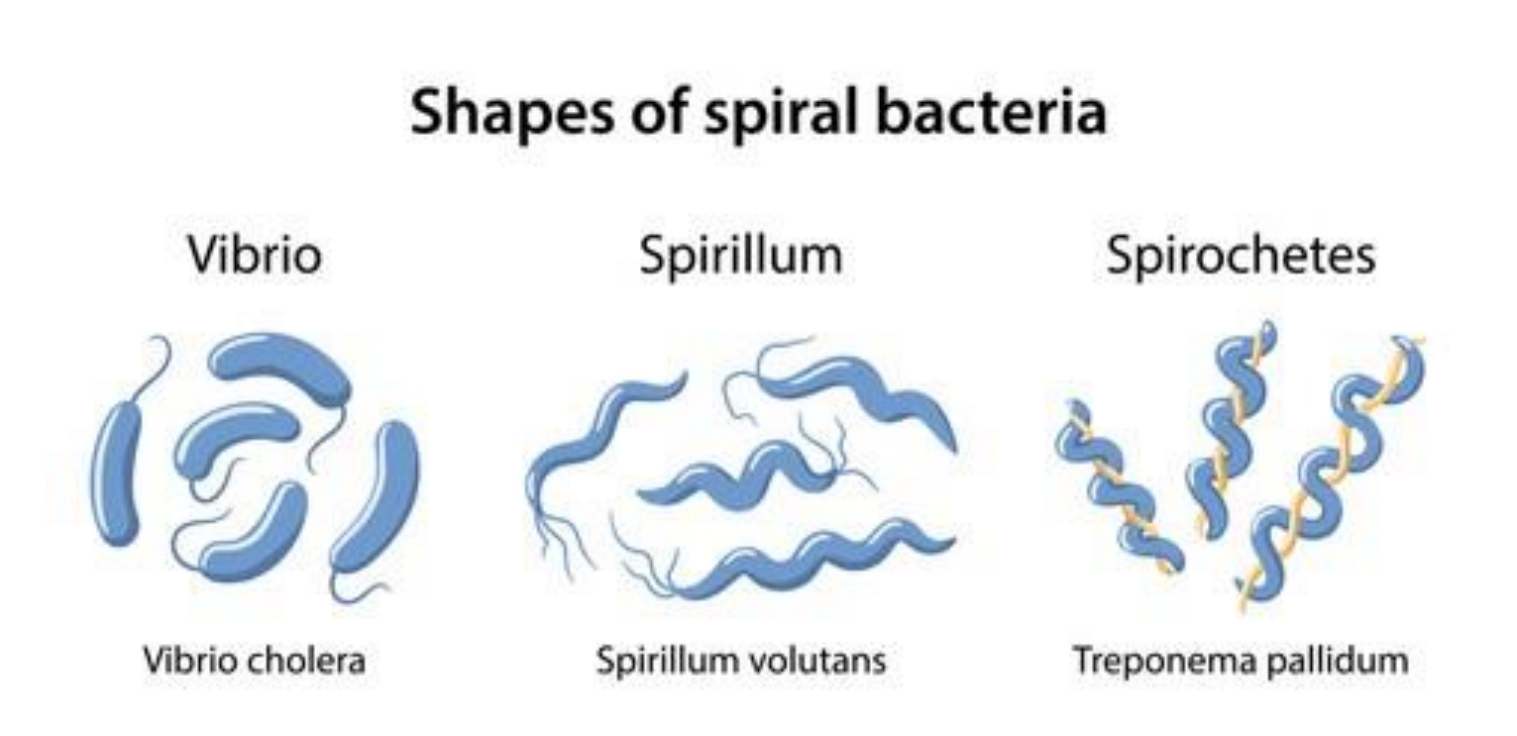


Bacillus viewed under microscope



Spirillum

- These bacteria are spiral-shaped.
- Can exist only as singles.



Spirillum viewed under microscope

Classification of Bacteria

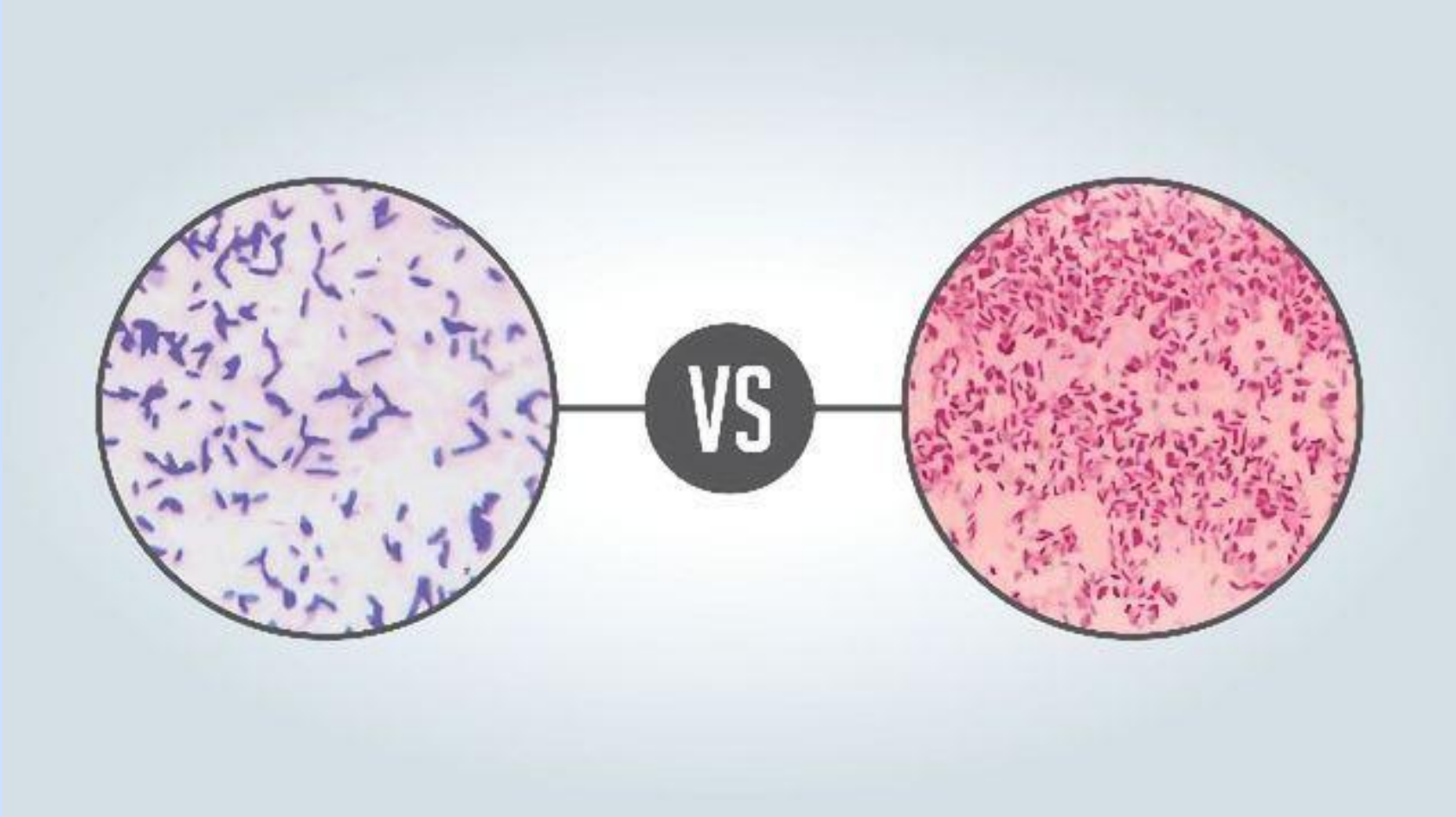
- Bacteria are classified into two main groups.

1. Eubacteria
2. Cyanobacteria

Eubacteria

- known as true bacteria.
- often move with flagella.
- divided into gram-positive (thick cell membranes and turn purple when stained) and gram-negative (thin cell membranes and turn pink when stained).

Gram-Positive and Gram-Negative



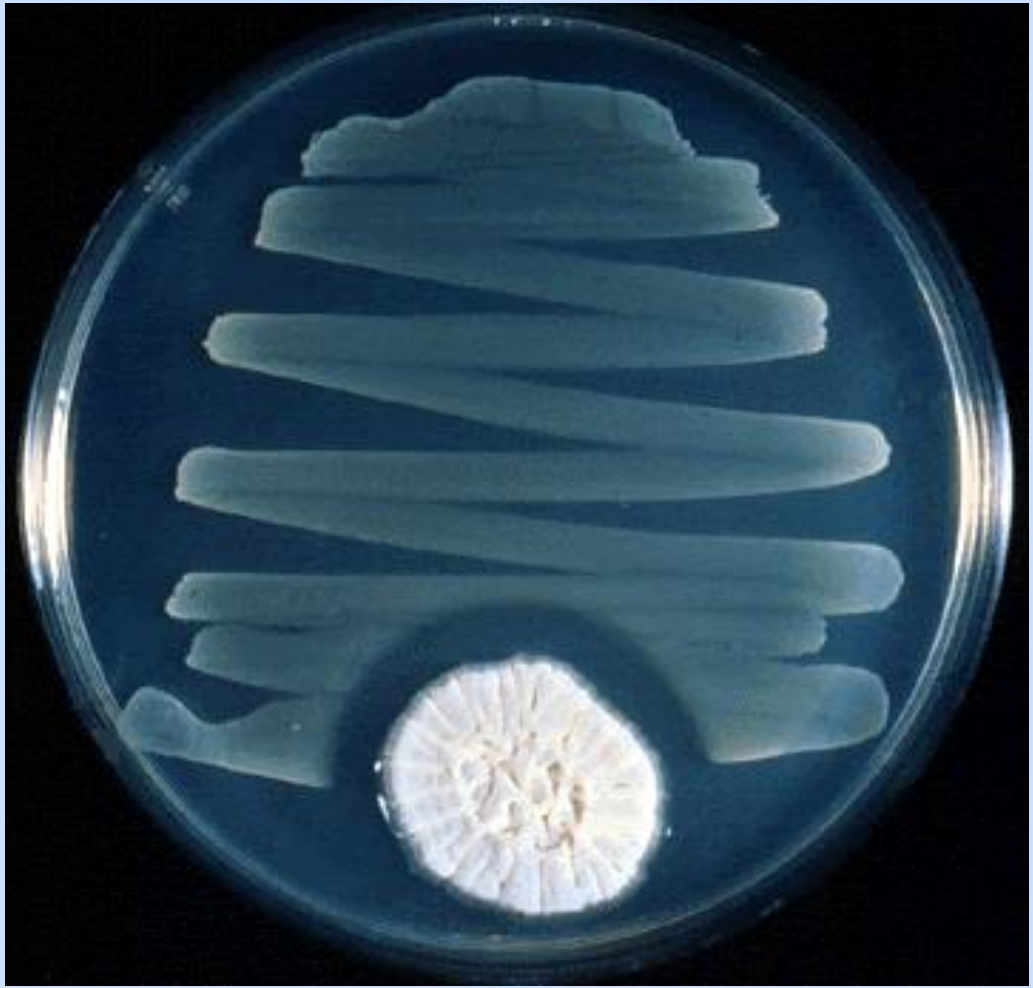
Cyanobacteria

- known as blue-green algae and are aquatic.
- most are photosynthetic and most contain chlorophyll or other pigments.

Salmonella

E. Coli (*Escherichia coli*)

What is this and how did it lead to one of the most important medical discoveries in human history?



Alexander Fleming

- Credited with discovering antibiotics (penicillin) in 1928.
- Went away on holiday and left petri dishes inoculated with a staphylococcus bacteria.
- Upon return noticed a fungus growing on the dish.
- Fleming did not realize its potential as an antibiotic.
- 1938 Florey and Chain (Australian scientists) realized its potential as medicine and worked out how to concentrate and dry the penicillin for mass production and use as antibiotic/medicine.
- 1945 after contributions from several other scientists penicillin began to be widely used as an antibiotic.

What is our BEST defense against disease causing bacteria?

- Antibiotics
- Are used to treat and prevent bacterial infections.
- Have been used for centuries long before people knew what they where and why they were helpful.
- For example ancient Egyptians using molds and plant extracts to treat infections.

Some Common Antibiotics

- Amoxicillin
- Doxycycline
- Cephalexin
- Ciprofloxacin
- Clindamycin
- Metronidazole
- Azithromycin
- Amoxicillin

Common Infections Treated with Antibiotics

1. Acne
2. Bronchitis
3. Conjunctivis (pink eye)
4. Otitis Media (ear infection)
5. STIs
6. Skin infections
7. Strep throat
8. Diarrhea
9. Respiratory tract infections
10. Urinary tract infections

How Effective are Antibiotics?

- Pre-antibiotics 30.4% of all deaths occurred among children under the age of 5.
- Post-antibiotics that number is less than 1.4%

How are Bacterial Infections Spread

- contaminated water (cholera and typhoid fever)
- contaminated food (botulism, *E coli* food poisoning, salmonella food poisoning)
- sexual contact (syphilis, gonorrhea, chlamydia)
- the air, when infected people sneeze or cough (tuberculosis)
- contact with animals (anthrax, cat scratch disease)
- touching infected people (strep throat)
- from one part of the body, where they are harmless, to another part, where they cause illness (as when *E coli* spread from the intestines to the urinary tract).

How does resistance occur?

As bacteria reproduce, mutations occur in their genes.

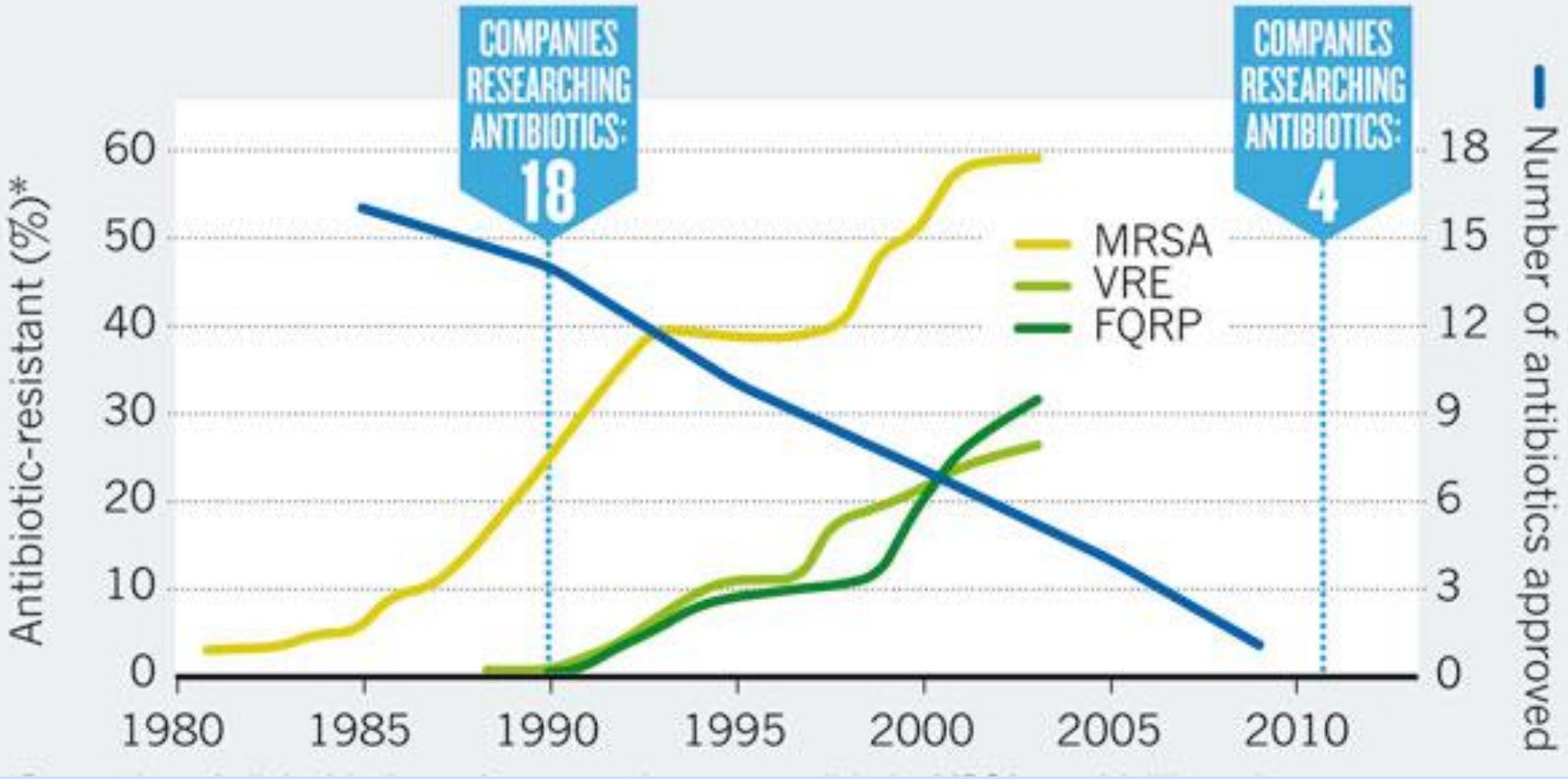
One of these mutations may happen, by chance, to make one bacterium in a person's body less vulnerable to a drug.

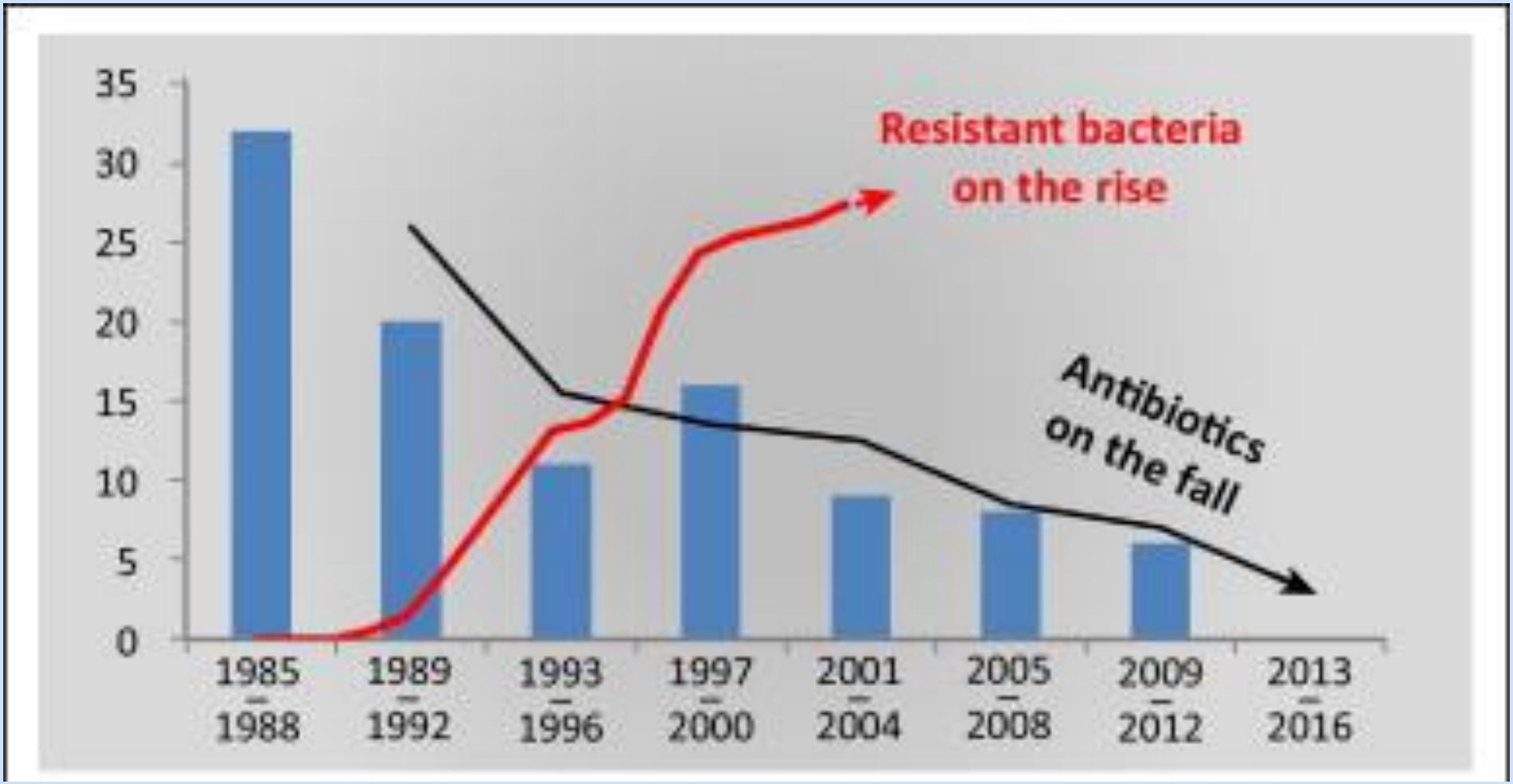
This bacterium multiples along with other bacteria.

While other bacteria are killed off by the drug, the mutated—or resistant—bacterium thrives, and eventually spreads from person to person.

A PERFECT STORM

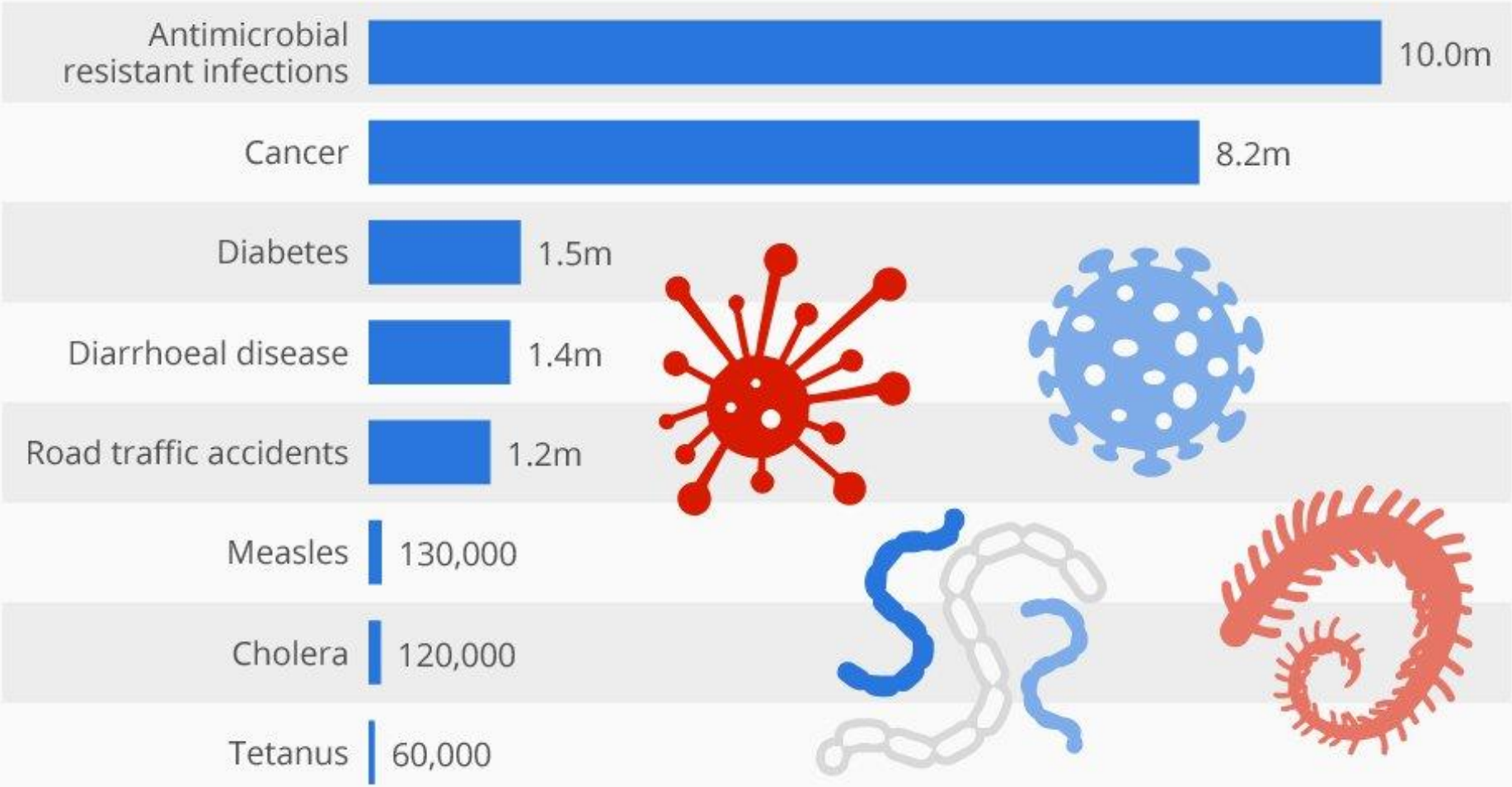
As bacterial infections grow more resistant to antibiotics, companies are pulling out of antibiotics research and fewer new antibiotics are being approved.




35
30
25
20
15
10
5
0
Resistant bacteria
on the rise
Antibiotics
on the fall
1985
1988
1989
1992
1993
1996
1997
2000
2001
2004
2005
2008
2009
2012
2013
2016

Deaths From Drug-Resistant Infections Set To Skyrocket

Deaths from antimicrobial resistant infections and other causes in 2050



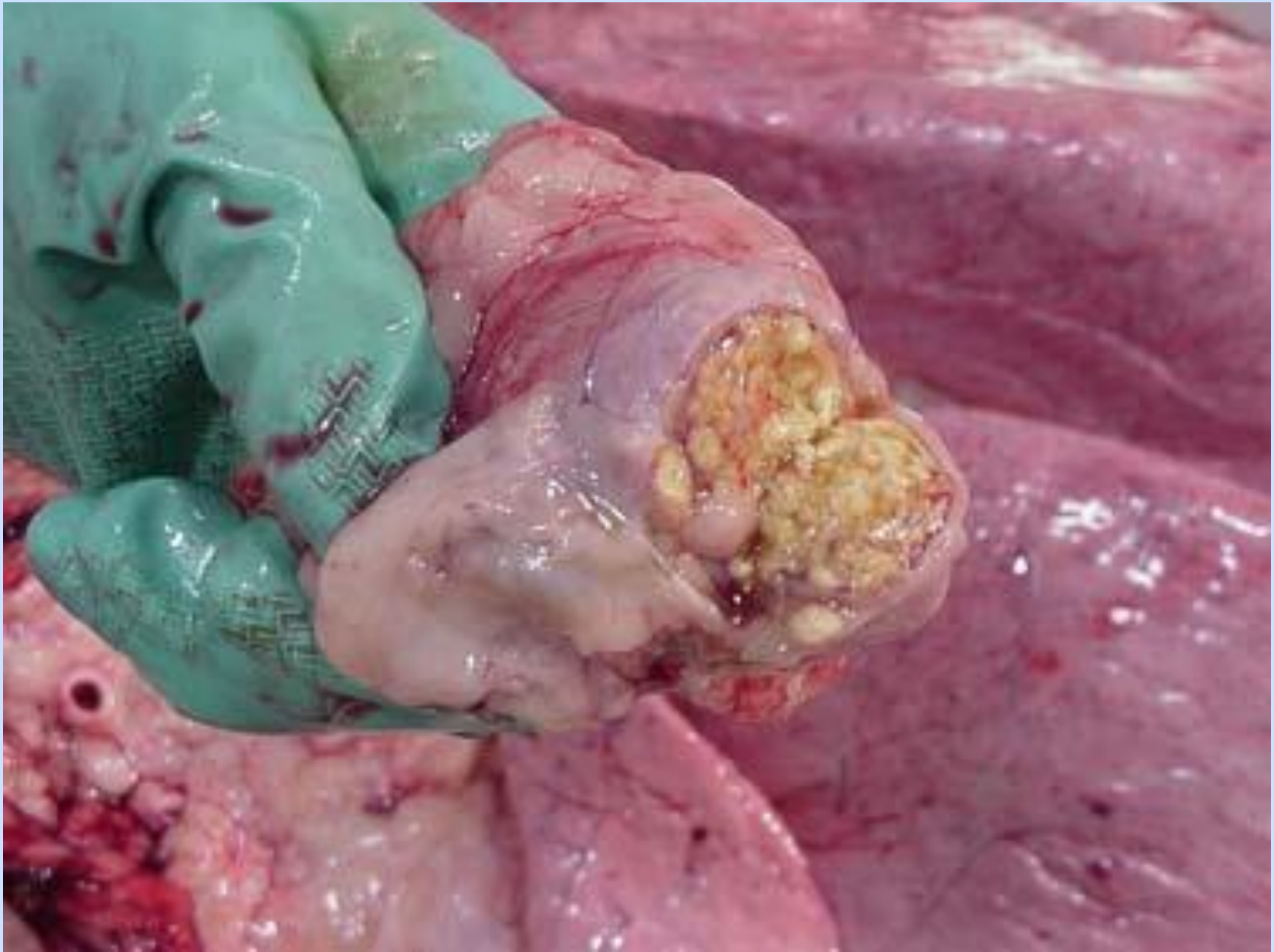
Source: Review on Antimicrobial Resistance

Lets look at some of the more severe endemics and pandemics caused by bacteria.

Tuberculosis

Called consumption disease, because people with TB tended to waste away as if their lungs were being slowly consumed from the inside.

Granuloma in lung tissue.



TB can move through the blood and settle in almost any other part of the body, including the urinary tract, brain, lymph nodes, bones, joints, peritoneum, and heart. In 2016, it was estimated to cause about 8 million new cases of illness and about 2 million deaths, on top of 16 million existing cases of illness.

Lyme Disease

An infection that is passed to humans by the bite of tiny ticks.

LYME DISEASE SYMPTOMS

EARLY LYME* -vs- CHRONIC LYME**

EARLY LYME*		CHRONIC LYME**	
Fatigue	76%	Fatigue	79%
Headache	70%	Joint Pain	70%
Rash	<70%	Muscle Pain	69%
Fever	60%	Other Pain	66%
Sweats	60%	Sleep Issues	66%
Chills	60%	Cognitive	66%
Muscle Pain	54%	Neuropathy	61%
Joint Pain	48%	Depression	62%
Neck Pain	46%	Heart Related	31%
Sleep Issues	41%	Headaches	50%

Ticks that cause Lyme Disease

Early Stages

The ticks that most commonly become infected with these bacteria often feed and mate on deer during the adult part of the tick's life cycle.

One of three types of **plague** caused by bacterium Yersinia pestis. One to seven days after exposure to the bacteria, flu-like symptoms develop. These symptoms include fever, headaches, and vomiting. Swollen and painful lymph nodes occur in the area closest to where the bacteria entered the skin.

Bubonic plague 1347-1351

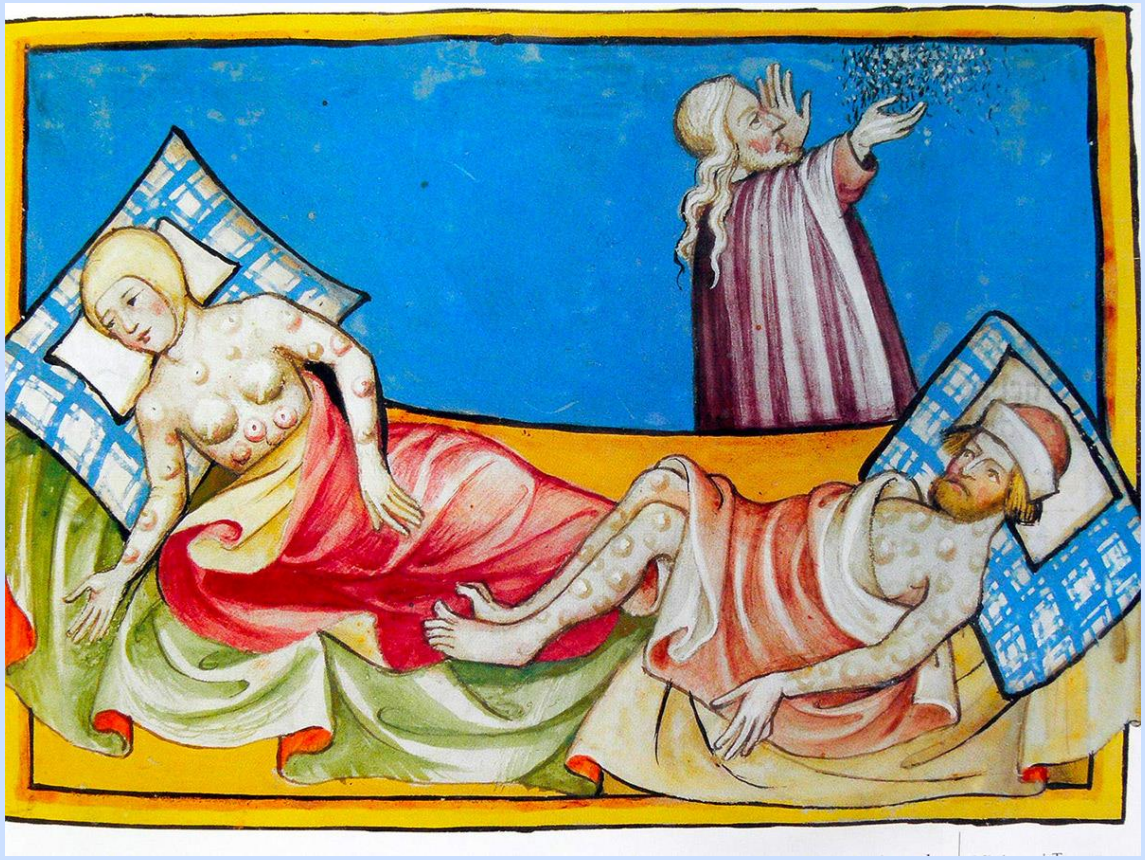
The bacteria multiply inside the flea, sticking together to form a plug that blocks its stomach and causes it to begin to starve. The flea then bites a host and continues to feed, even though it is unable to satisfy its hunger. During the feeding process, blood cannot flow into the blocked stomach, and consequently the flea vomits blood tainted with the bacteria back into the bite wound.

Bubonic plague if untreated, the rate of mortality for bubonic plague is 50-90%.

In septicemic plague, there is bleeding into the skin and other organs, which creates black patches on the skin. Untreated septicemic plague is fatal, but early treatment with antibiotics reduces the mortality rate to between 4 and 15 percent. People who die from this form of plague often die on the same day symptoms first appear.

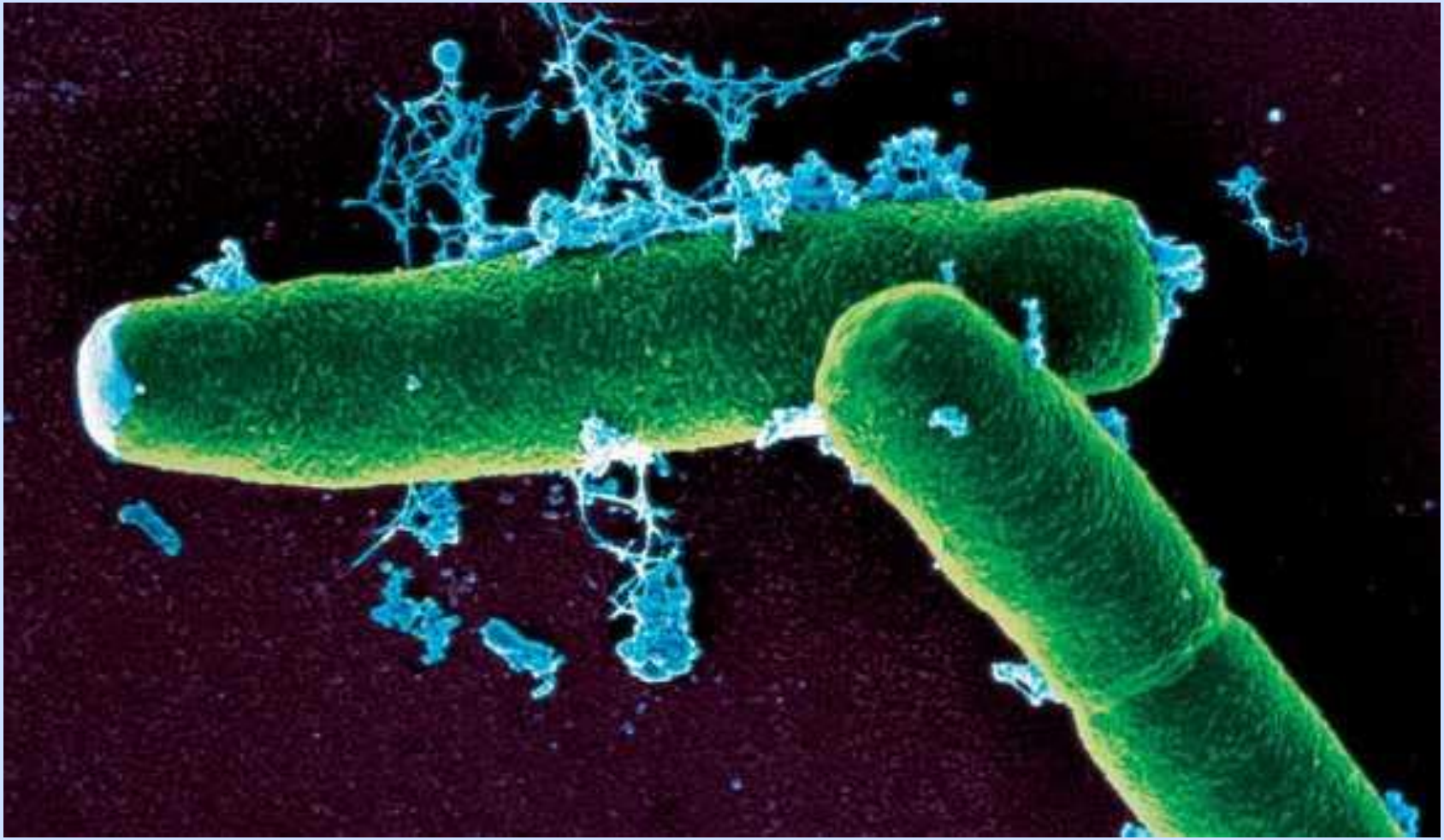
The **Plague of Justinian** in A.D. 541–542 is the first known pandemic on record. The huge city of Constantinople imported massive amounts of grain. At its peak the plague was killing 10,000 people in Constantinople every day and ultimately destroyed 40 percent of the city's inhabitants. It went on to destroy up to a quarter of the human population of the eastern Mediterranean.

During the mid- 14th century, from about 1347 to 1350, **Black Death**, a massive deadly pandemic, swept through Eurasia, killing one third of the population. It is estimated that anywhere from a quarter to two-thirds of Europe's population became victims to the plague, making the Black Death the largest death toll from any known non-viral epidemic.



Anthrax

An acute infectious disease caused by the spore-forming bacterium *Bacillus anthracis*.



Anthrax infection can occur in three forms: cuts in the skin, inhalation, and gastrointestinal.


Department of Dermatology

Skin infected with anthrax.

Once anthrax spores have lodged in the lung and caused an infection, 90% of patients die.

Gonorrhea

“The Clap”

A sexually transmitted infection (STI). It also can be transmitted from an infected mother to a baby during childbirth. If untreated, gonorrhea may result in infertility in women, among other problems.

Gonorrhea may be spread by genital, anal, or oral sex. Symptoms may include:

- a burning sensation when urinating
- frequent urination
- pus-like discharge from the vagina or penis
- tenderness or pain in the genital area or abdomen
- for women, bleeding between menstrual cycles

Gonorrhea can be treated with antibiotics.

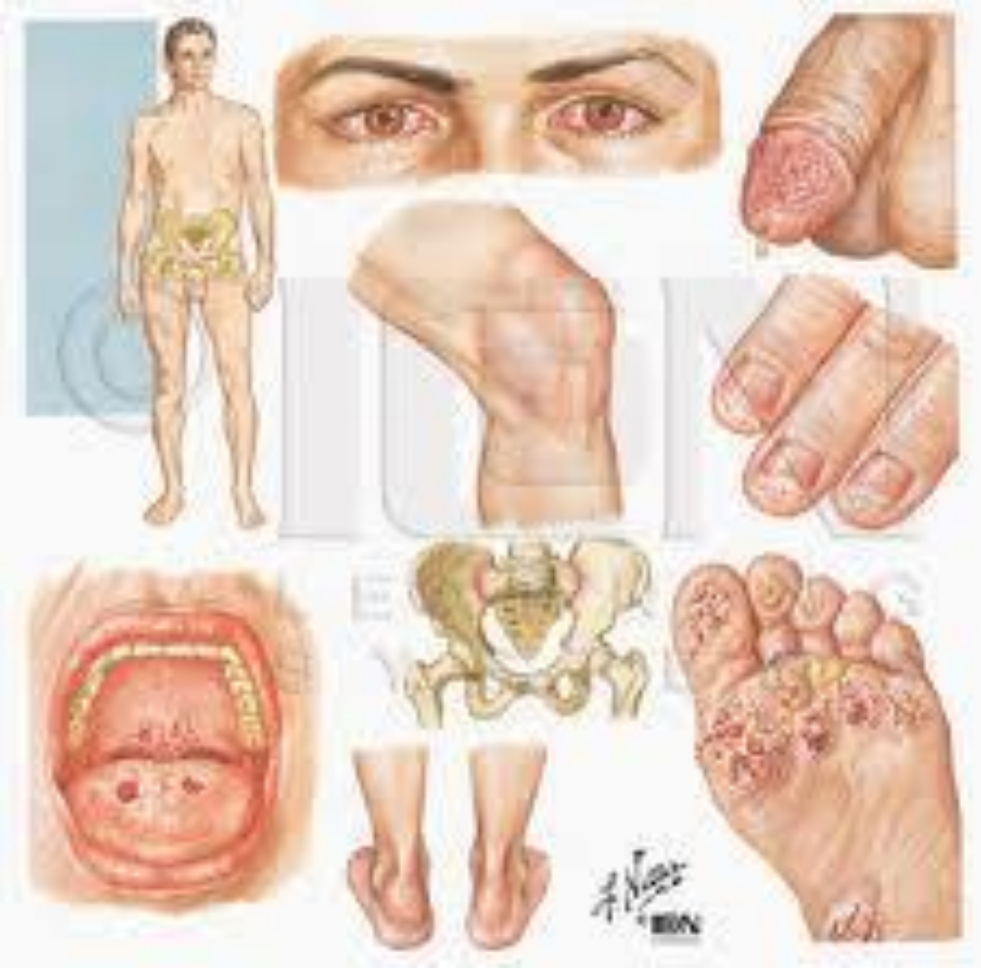
Non-genital sites include the rectum, the throat , and the eyes. Doctors apply silver nitrate or other antibiotics to the eyes of all newborn infants to prevent the possible transmission from mother to baby during delivery.

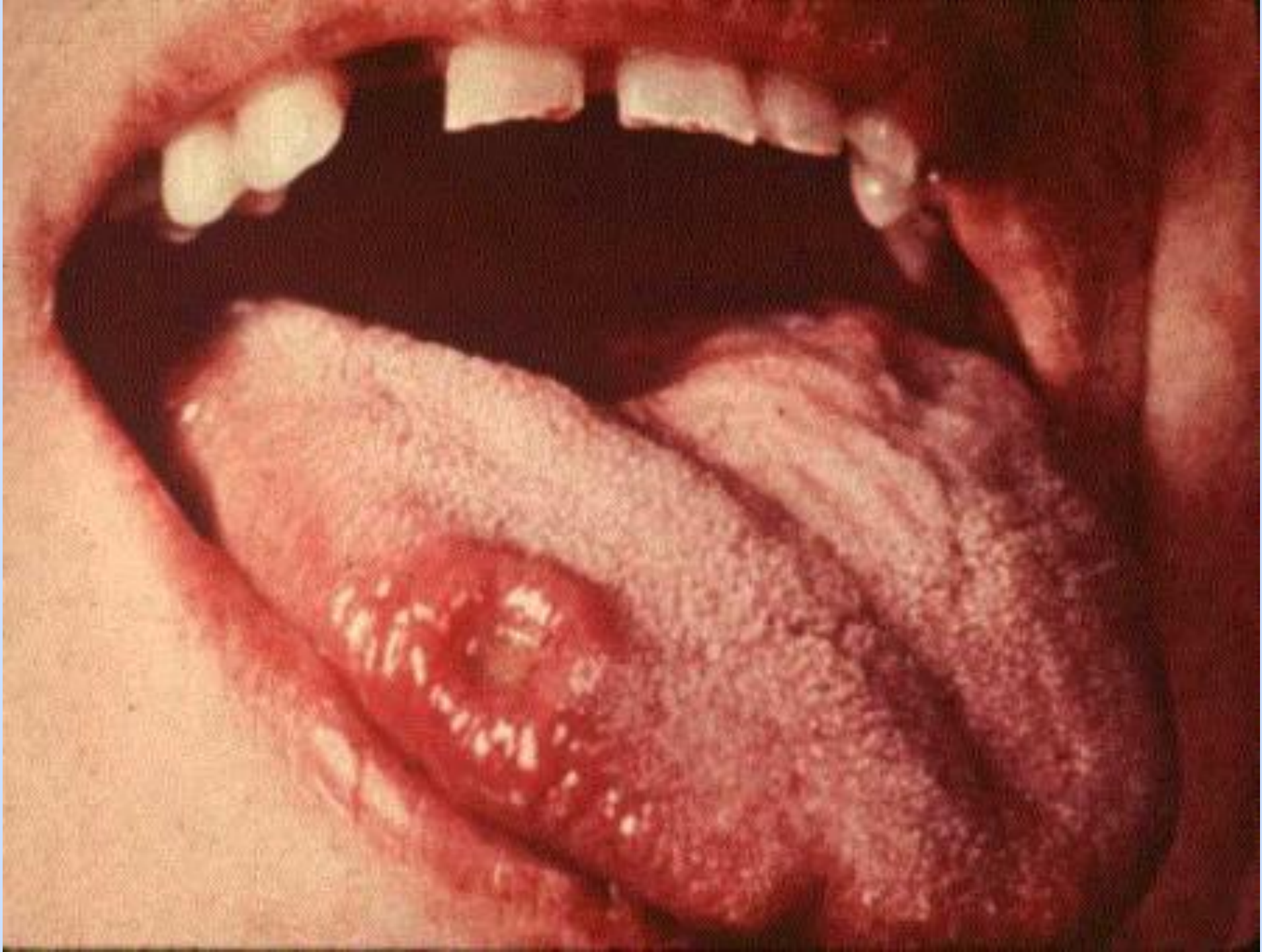
Secondary Non-Genital Infection

Chlamydia

Caused by Chlamydia trachomatis can cause eye or lung infections and can also infect the urinary and genital areas of both men and women. Chlamydia pneumoniae causes infections of the respiratory tract, and parrot fever, that is similar to the flu.

Chlamydia can spread from the genitals to the eyes, joints, soles of feet, mouth and finger tips





In Canada *Chlamydia* is responsible for more cases of sexually transmitted infections (STIs) than any other organism. The most common symptom is a burning sensation during urination.

Syphilis

Syphilis is caused by Treponema pallidum, a bacteria that spreads throughout the body and can infect almost any organ.

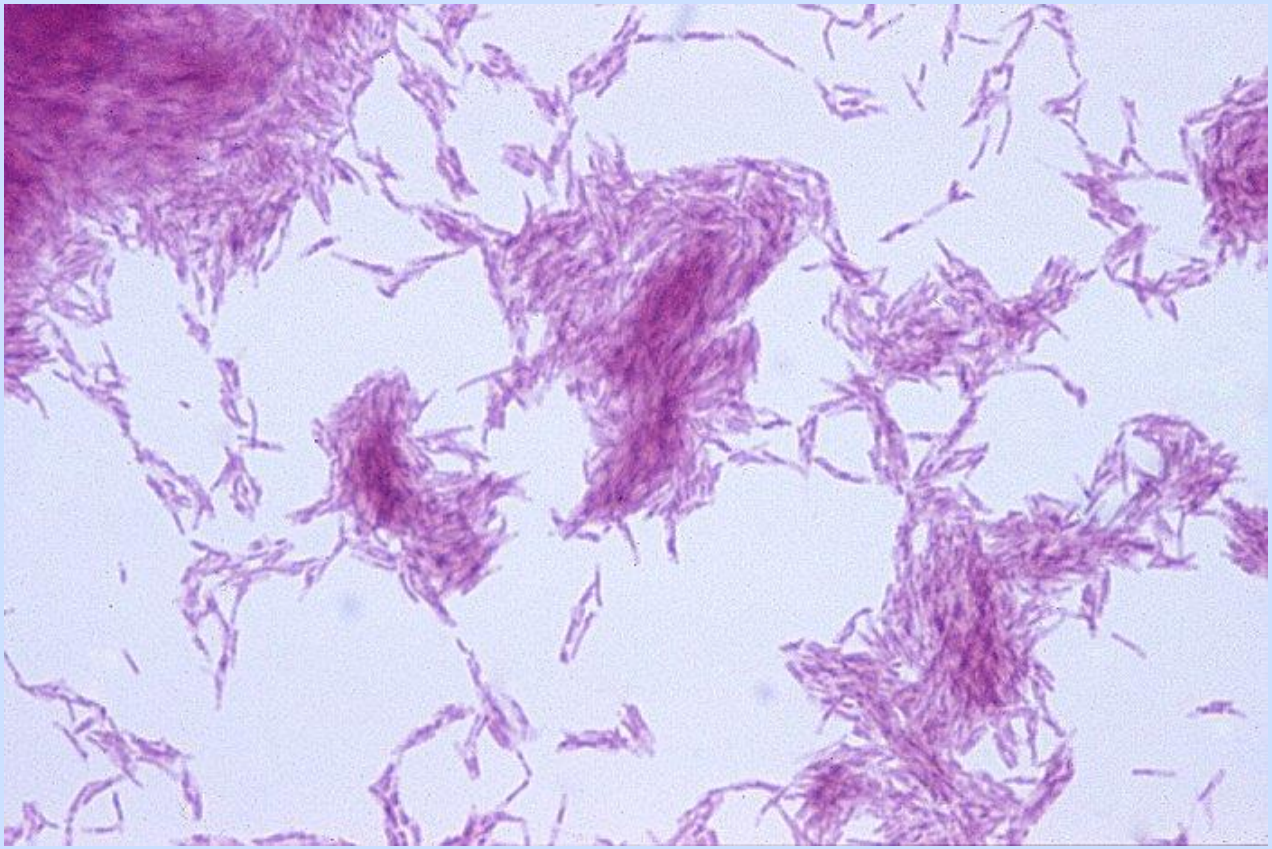
The symptoms of syphilis appear in stages. The first stage, called primary syphilis, usually occurs about three weeks after infection when a sore called a chancre (SHANG-ker) appears on the body, usually in the genital area.

Secondary syphilis

The secondary stage, usually starts about six weeks after infection. People feel achy, tired, and feverish. They usually have a rash that may be prominent on the palms of the hand and soles of the feet. They often lose patches of hair, giving their head a moth-eaten appearance.

Leprosy

Leprosy damages the nerves, skin, and mucous membranes. It is caused by the Mycobacterium leprae.

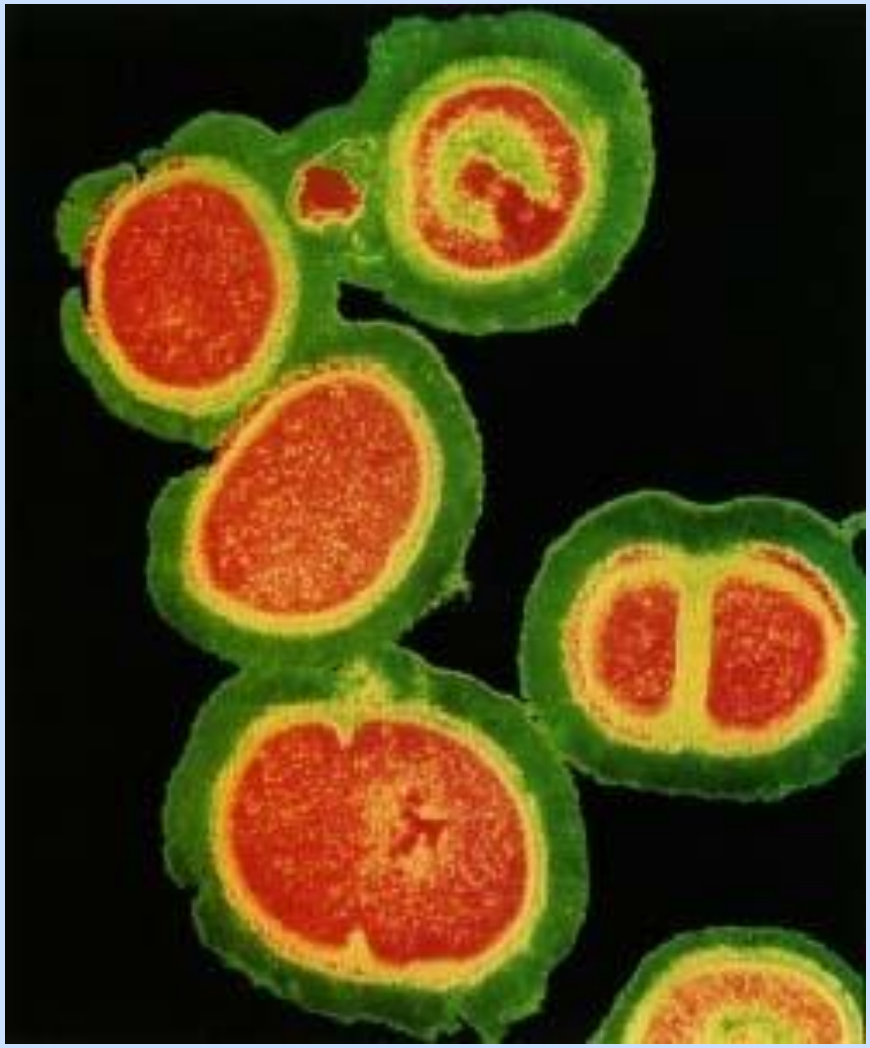



NEBOUT/IMTSSA

Only close contact for a long period of time with a person whose disease is in an advanced stage is likely to cause infection.

Treatment of leprosy today is with a prescription drug that kills the bacteria. Other drugs have lately been added to treatment because of the growing resistance of the bacteria to the original drug in recent years.

Staph



Staphylococcus can live harmlessly on many skin surfaces, especially around the nose, mouth, genitals, and anus. But when the skin is punctured or broken for any reason, staph bacteria can enter the wound and cause an infection.

People can get staph infections from contaminated objects, but staph bacteria often spread through skin-to-skin contact.

Usually this happens when people with skin infections share things like bed linens, towels, or clothing. Warm, humid environments can contribute to staph infections.

Staph Infection

Botulism

Botulism is a rare but serious kind of food poisoning. Most outbreaks are caused by improperly preserved home-canned foods, but some are caused by improperly cooked foods.

Symptoms of botulism include blurred vision, difficulty swallowing, body weakness, dry mouth, abdominal pain, vomiting, shortness of breath, and muscle paralysis. When death occurs, it is usually caused by paralysis of the respiratory muscles.

Streptococcus

Strep throat, an infection of the throat common in children, is caused by bacteria in the Streptococcus family. Its main symptoms are sore throat and fever.

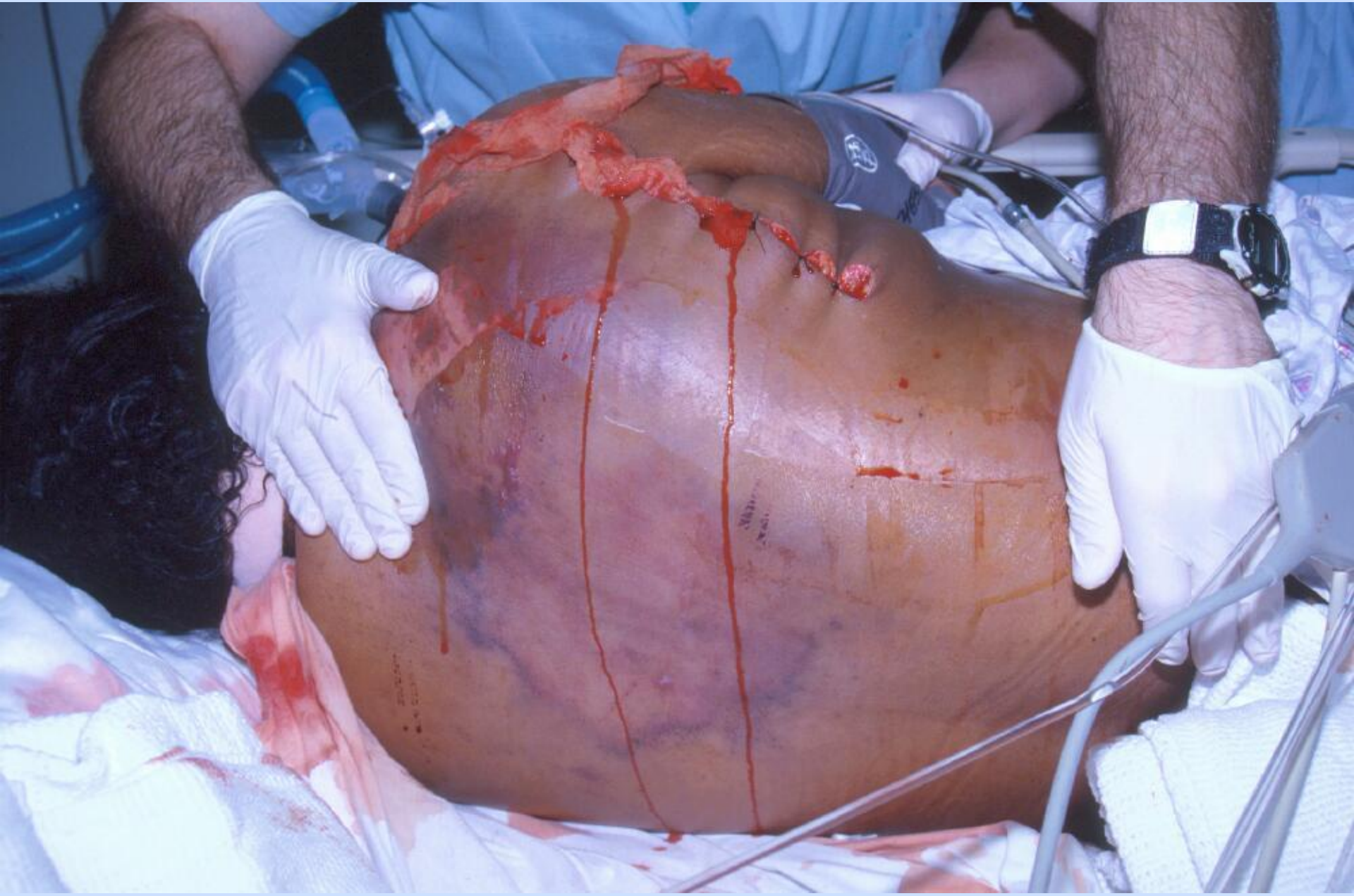
If a streptococcal infection does not go away on its own or respond to treatment, there are a number of possible serious complications.
Nephritis - an inflammation of the kidneys
Rheumatic fever - a condition involving the heart, joints and other parts of the body, which can cause permanent damage to heart valves.

Flesh-Eating Disease (necrotizing fasciitis)

Caused by a group A streptococcus.

Occurs in the tissues below the skin, affecting the fat, fascia (coverings of the muscles and tendons) and muscles. The tissues can quickly die because of poor blood supply, possibly leading to the death of the patient.

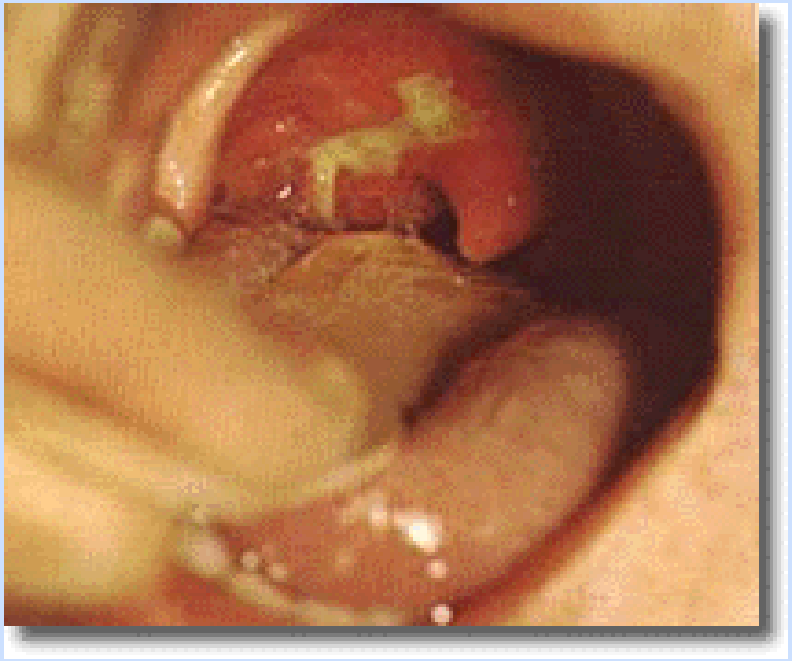
- **Efforts are made to keep the skin intact.**
- **Skin that is allowed to slide off opens “windows” for more oxygen to get in, fueling the spread of the infection.**



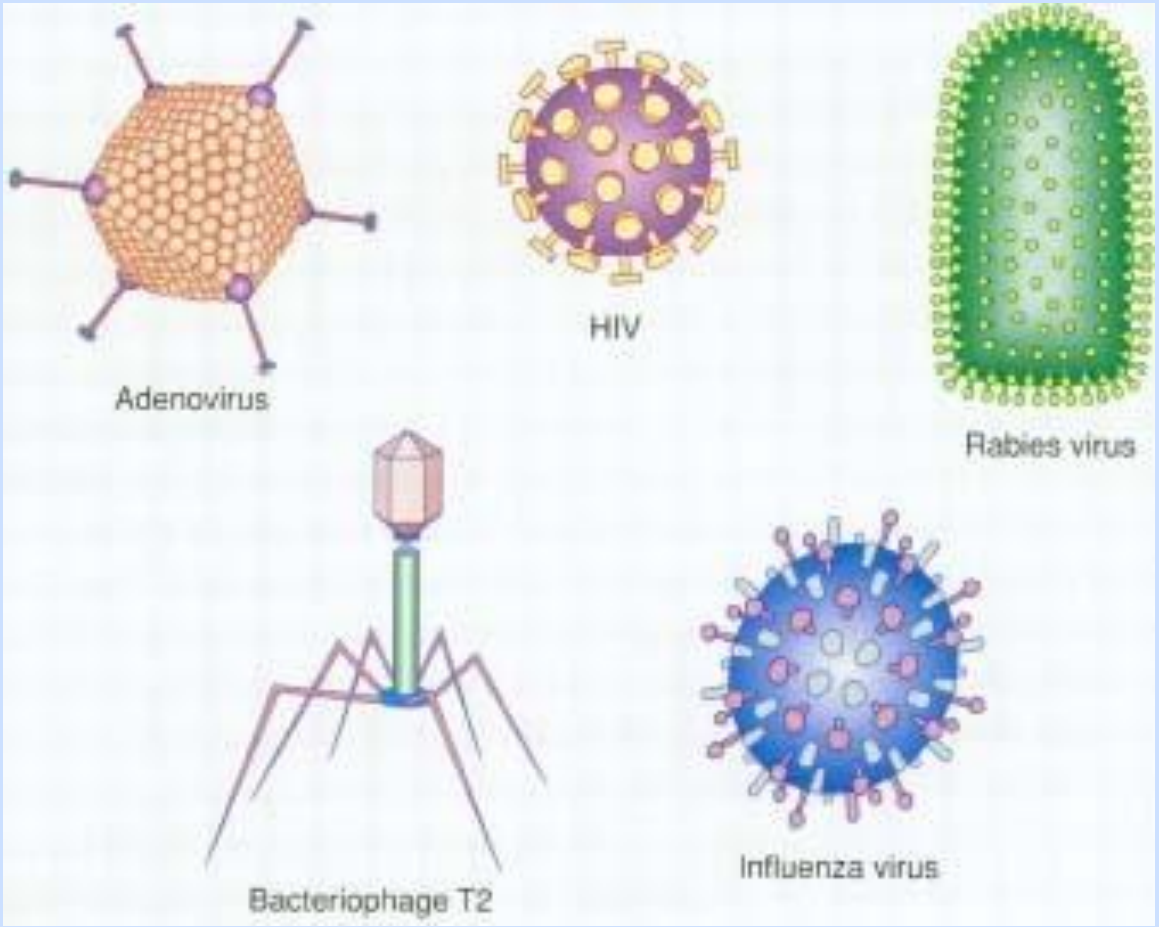
Diphtheria

A highly contagious throat infection. Although it is now rare in the United States and Europe, it was a leading cause of death in infants and children until the twentieth century.

Diphtheria is spread into the air when sneezing or even talking. At first, the infection feels like a bad sore throat. A person may also have a mild fever and swollen glands. Children frequently have nausea, vomiting, chills, headache, and fever. The thick coating that forms in the nose, throat, or airway can make it hard to breathe or to swallow.



Viral Infections

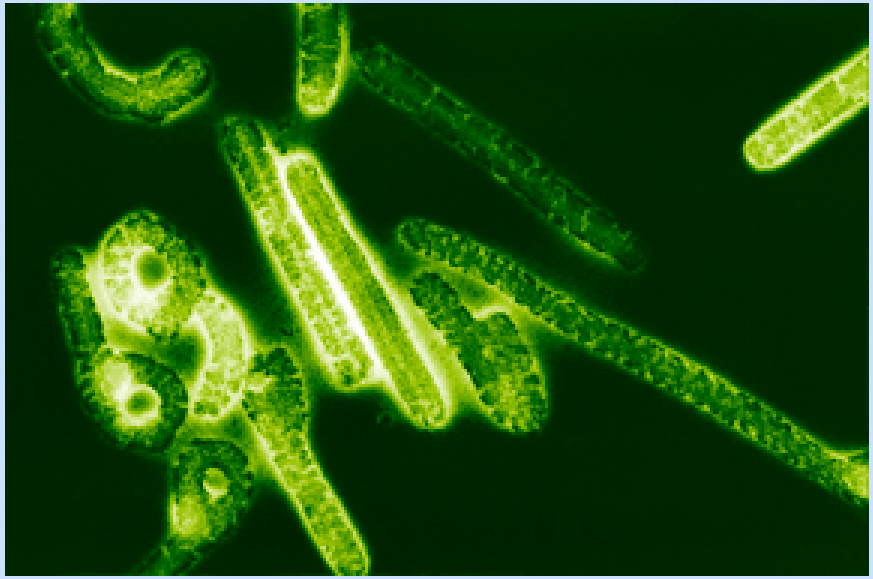


Viruses are about a thousand times smaller than bacteria. Viruses are so small that most cannot be seen with a light microscope, but must be observed with an electron microscope.

How Do Viruses Infect the Body?

- They enter through any body opening typically mucus membranes
- Nose and mouth
- Respiratory and digestive tract
- Sexual organs
- Once inside, the virus attaches itself to the outside of the kind of cell it attacks, called a host cell.
- After entering the cell, the virus uses the cells machinery to make new viruses.

Ebola

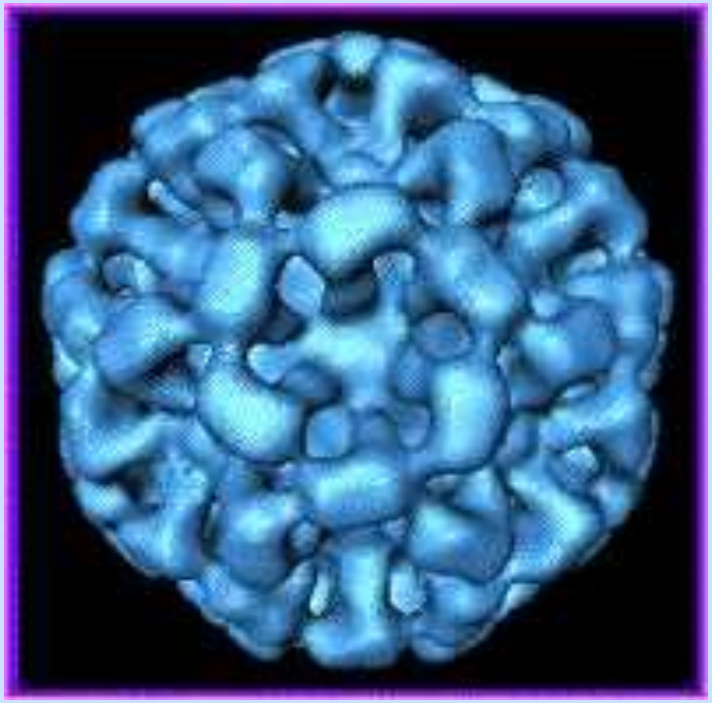


A highly contagious virus, which is very easily spread through body fluids such as mucus, saliva or blood. It displays itself with flu like symptoms, vomiting and bloody diarrhea up to 10 days after contact with the virus. After 10-15 days, bleeding occurs through the mouth, nose and eyes.

Ebola causes death in 50-90% of all clinically ill cases. Bleeding of the infected area is a primary symptom.

Ebola Patient (Intensive Care)

Norwalk



Norwalk virus infection is an intestinal illness that often occurs in outbreaks. Symptoms Include:

- Nausea
- Vomiting
- Diarrhea
- Stomach cramps

Influenza

Influenza is a viral infection of the respiratory tract.

The flu virus spreads primarily through mucus droplets in the air.

Between 25,000 - 69,000 Americans die each year from the flu or its complications.

1918 Flu Pandemic (Spanish Flu)
8 million soldiers and 7 million civilians died during World War 1.
Approximately 50 million people died from 1918 Flu.
Symptoms - high fever, head, muscles, and whole body aches, chest congestion, sore throat, cough and sneeze.

Covid-19

Corona
Virus
Discovered in 2019

Covid-19

- the infectious disease caused by the coronavirus, SARS-CoV-2, which is a respiratory pathogen.
- WHO first learned of this new virus from cases in Wuhan, People's Republic of China on 31 December 2019

Most Common Symptoms

- Fever
- Dry cough
- Fatigue

Covid-19 Symptoms
https://www.youtube.com/watch?v=OOJqHPfG7pA&ab_channel=ScienceInsider

Less Common Symptoms

- Loss of taste or smell
- Nasal congestion
- Conjunctivitis (also known as red eyes)
- Sore throat
- Headache
- Muscle or joint pain
- Different types of skin rash
- Nausea or vomiting
- Diarrhea
- Chills or dizziness

Progression Of Disease

- About 75% recover from the disease without needing hospital treatment.
- About 20% of those who get COVID-19 become seriously ill and require oxygen, with 5% becoming critically ill and needing intensive care.

Progression Of Disease

- Complications leading to death may include respiratory failure, acute respiratory distress syndrome (ARDS), sepsis and septic shock, thromboembolism, and/or multi-organ failure, including injury of the heart, liver or kidneys.

Who is At Risk

- People aged 60 and over, and those with underlying medical problems like high blood pressure, heart and lung problems, diabetes, obesity or cancer, are at higher risk of developing serious illness.
- However, anyone can get sick with COVID-19 and become seriously ill or die at any age.

How long Does it Take to Show Symptoms?

- The time from exposure to COVID-19 to the moment when symptoms begin is, on average, 5-6 days and can range from 1-14 days. This is why people who have been exposed to the virus are advised to stay home, apart from others, for 14 days, in order to prevent the spread of the virus, especially where testing is not easily available.

The Lag Period

- This lag period (1-14 days) between when a person becomes infected and contagious and when they show signs is a bad combo. (Seasonal FLU 1-3 days Swine FLU 1-4 days)
- Add the high rate of transmission and high mortality rate and you have a serious pandemic (spread of an infectious disease on a global scale).

Treatments

- Optimal supportive care includes oxygen for severely ill patients and those who are at risk for severe disease and more advanced respiratory support such as ventilation for patients who are critically ill.

Can Antibiotics Help?

- Antibiotics do not work against viruses; they only work on bacterial infections. COVID-19 is caused by a virus, so antibiotics do not work. Antibiotics should not be used as a means of prevention or treatment of COVID-19.

Flu vs Covid-19 Hospitalization and Mortality Rates

- Hospitalization
- Flu 2% or 20 in 1000 cases
- Covid-19 25% or 250 in 1000 cases

- Mortality
- Flu 0.1% or 1 in 1000 cases
- Covid-19 2% or 20 in 1000 cases

Number of Cases and Deaths As Of April 2022

- Cases – 495,305,000
- Deaths – 6,190,000
- Recoveries – 430,172,000

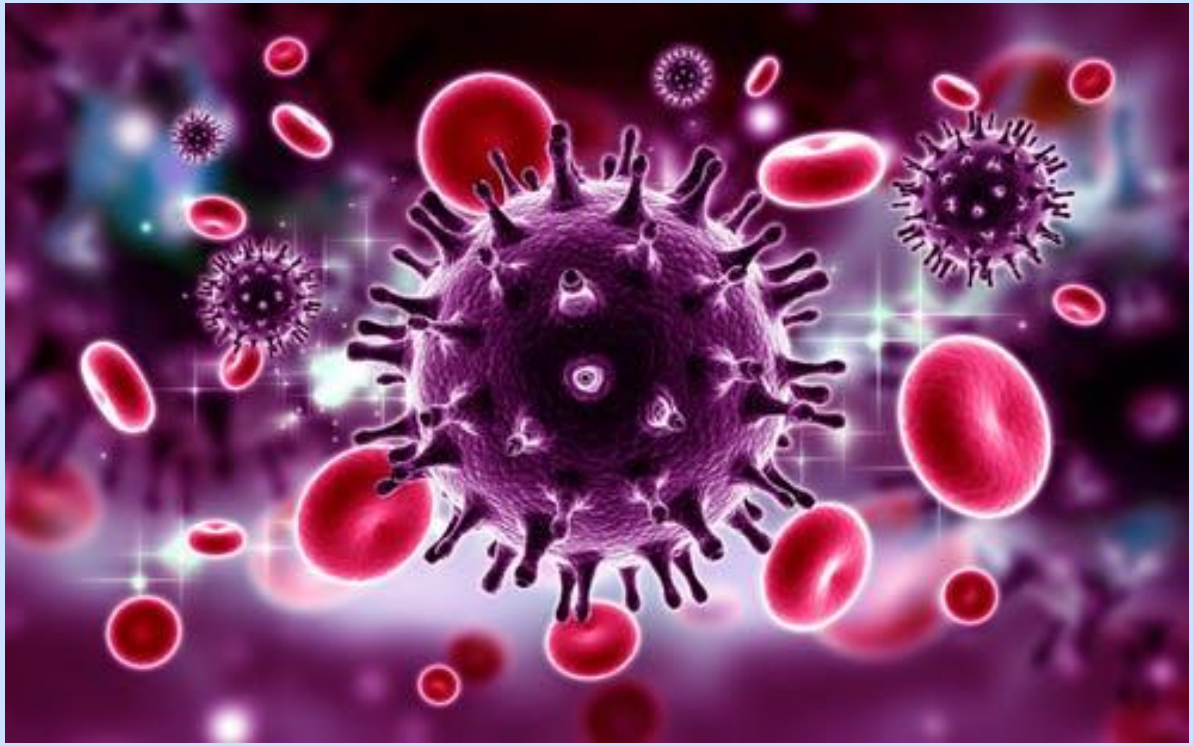
https://www.worldometers.info/coronavirus/?utm_campaign=homeAdvegas1?

Coronavirus In a Nutshell

- https://www.youtube.com/watch?v=BtN-goy9VOY&t=217s&ab_channel=Kurzgesagt%E2%80%93InaNutshell

HIV infection can spread only when an infected person's body fluid (blood, semen, vaginal fluid, breast milk, or any body fluid containing blood) enters the bloodstream or contacts the mucous membrane* of another person.

Since the beginning of the epidemic, more than **70 million people** have been infected with the HIV virus and **about 35 million people** have died of HIV. Globally, 36.9 million people were living with HIV at the end of 2017.



THE FIGHT AGAINST AIDS

THEN

Before treatments became available in the 1990s, life expectancy for HIV-positive people in the U.S. was **10 to 12 years** after diagnosis.

In the mid-1990s, people with HIV/AIDS took a complicated regimen of up to **20 pills per day** to treat the disease.

In 1995, **more than 48,000 people** died at the peak of the epidemic in the U.S., making it the leading cause of death among Americans ages 25 to 44.

In 1986, AZT, the first drug used to treat HIV/AIDS, **began clinical trials**.

In 1982, the Gay Men's Health Crisis, **the first provider** of HIV/AIDS prevention and treatment in the U.S.,opened in New York City.

Until recently, the only way to lower your risk of getting sexually transmitted HIV was to **practice safe sex** and use condoms consistently and correctly.

NOW

With improvements in treatment, life expectancy is now in the **early 70s** for some groups. It's lower for other groups, such as nonwhites and those with a history of drug use or a weaker immune system.

Medical advances made treatments more effective so that today, most people with HIV/AIDS take just **one pill per day.**

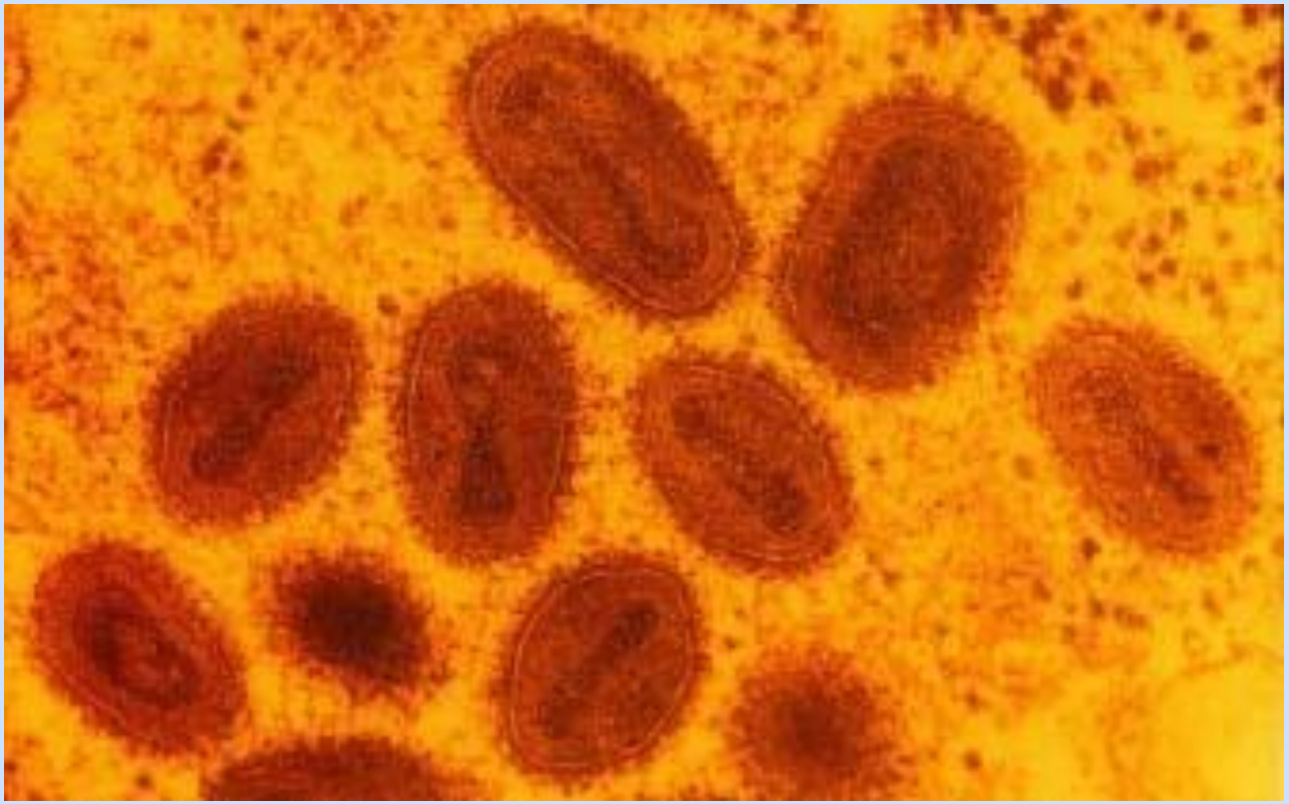
In 2014, **6,721 people** in the U.S. died from HIV/AIDS.

By 2015, **15.8 million people** worldwide were on antiretroviral treatment — medications that slow the progression of HIV.

Today, there are testing clinics and service providers across the U.S. Find one near you at **gettested.cdc.gov**.

In 2012, the FDA approved a medication called PrEP that helps **reduce the odds** of HIV infection in high-risk groups. You can reduce the risk of infection up to 72 hours after possible exposure by starting a medicine called PEP. It's still important to practice safe sex.

Small Pox

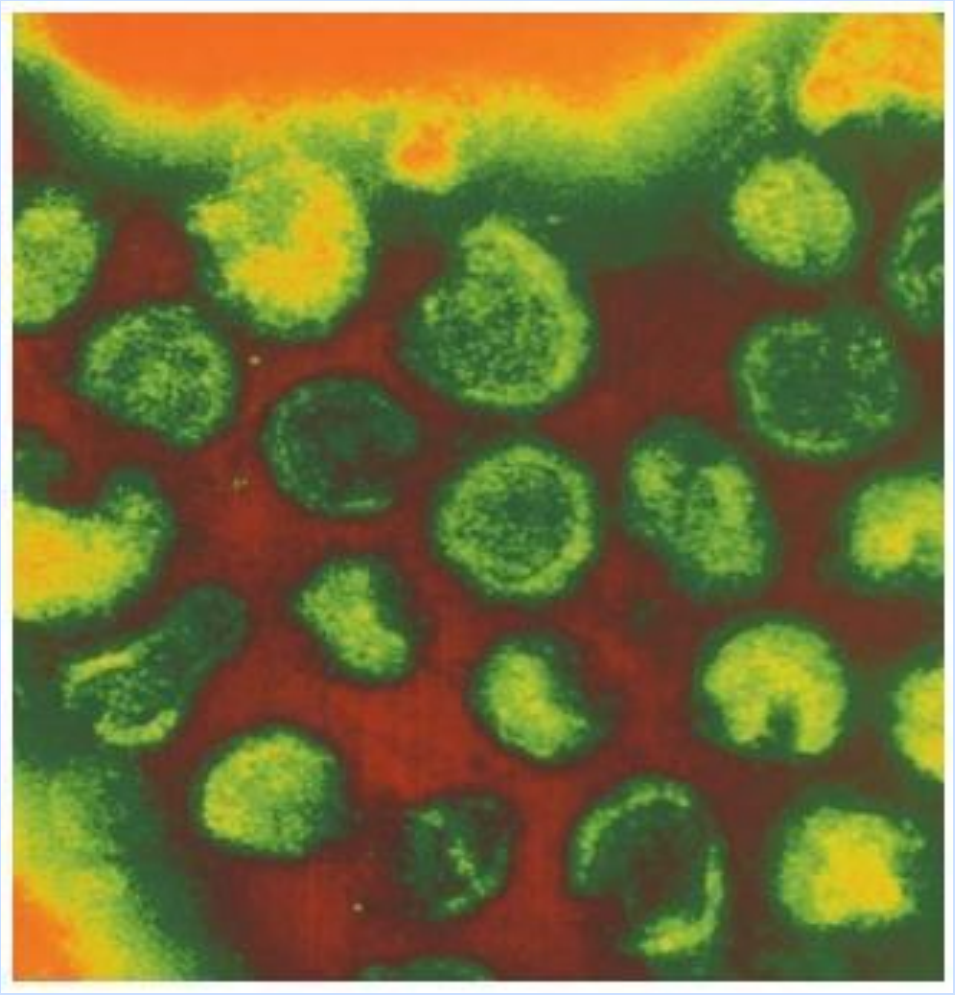


Smallpox is an infection caused by the variola virus. The virus was spread when one person breathed in droplets from the air that an infected person had breathed out, for instance by sneezing or coughing. It could also be spread by simply **touching** someone with the disease.

Once inside the body, the virus multiplies and spreads throughout the bloodstream, invading the various tissues of the body. It destroys the cells of the skin, and these dying cells form blisters. The eyes and internal organs such as the liver and spleen are also affected by the virus.

The last known outbreak of the disease, which killed 2 million people in 1967, was in Somalia in 1977. In 1980, the World Health Assembly declared the world free of smallpox. The remaining smallpox virus is stored at the CDC in Atlanta and in Moscow.

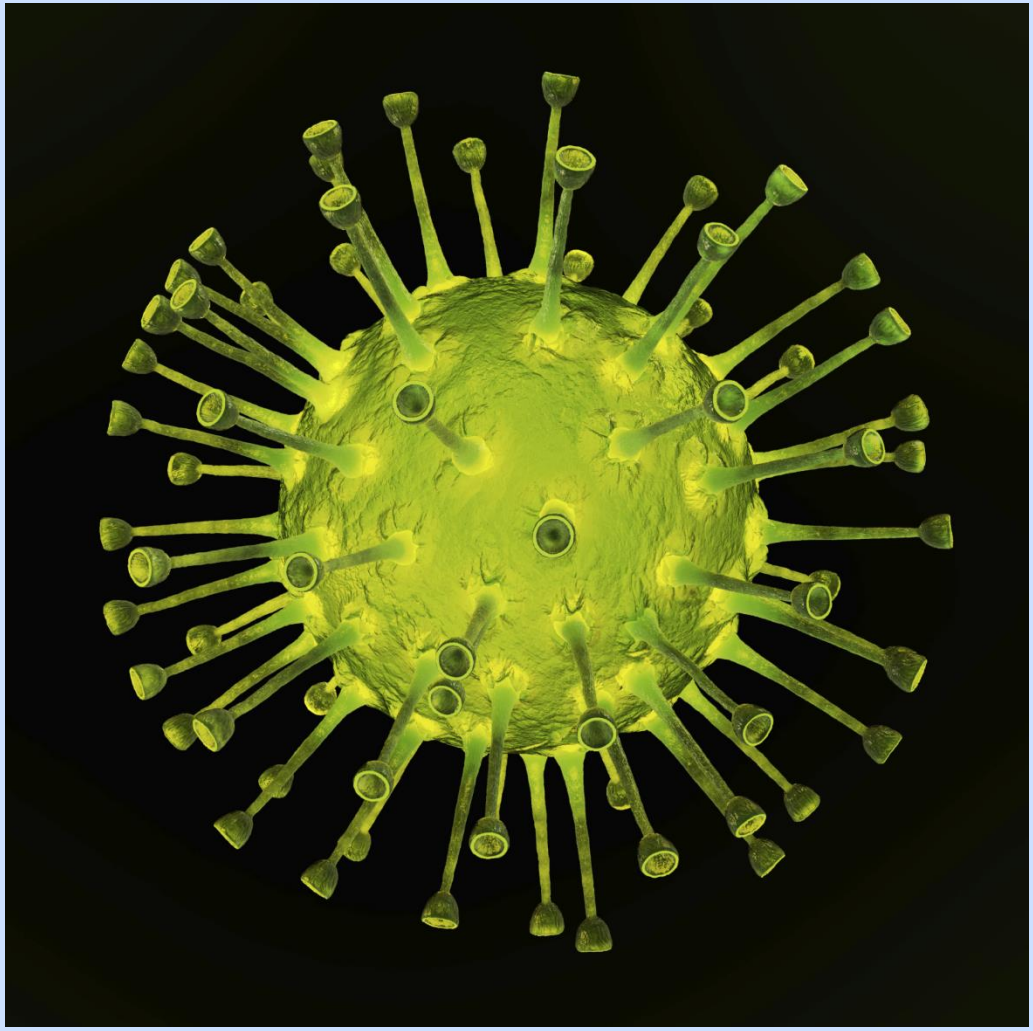
German Measles (Rubella virus)



It is spread through the air from an infected person to another person.

The main symptom of rubella is a rash that appears first on the face. It then spreads to a person's arms, legs, and body. The rash generally lasts for 2 to 3 days. Some people with rubella also develop a slight fever. Sometimes the lymph nodes at the back of the neck become swollen.

Chickenpox



With its rash and fever, chickenpox is common in children and usually mild. But it can be serious, especially in infants, adults, and people with weak immune systems. Chickenpox is caused by varicella a virus in the herpesvirus family.

The chickenpox virus spreads from person to person by contact with the fluid in chickenpox blisters or through droplets in the air. It is very contagious. About 4 million people in the United States get chickenpox each year; about 10,000 of these people get sick enough to go to the hospital, and about 100 die.

Polio Virus - Polio epidemics have crippled thousands of people, mostly young children; the disease has caused paralysis and death for much of human history.

In about 1% of cases the virus enters the central nervous system infecting and destroying motor neurons, leading to muscle weakness and acute paralysis.

Warts

Warts are small, hard bumps on the skin or inner linings of the body that are caused by a virus—too small to be seen with the naked eye—called human papillomavirus.

Warts can affect any part of the body, but most often they appear on the fingers, hands, arms…

… and feet…

Warts also may occur in the genital area. These can lead to cervical cancer.

Methods of treatment include:

Dissolving warts with non-prescription lotions available over the counter at drugstores
Dissolving warts with stronger lotions prescribed by doctors
Removing warts by laser surgery
Freezing warts with liquid nitrogen or other cold liquid
Burning warts with an electric needle.

HPV Vaccine

•HPV stands for human papillomavirus.

•Genital HPV is a very common sexually transmitted infection which usually has no symptoms and goes away by itself, but can sometimes cause serious illnesses.

•Almost all cases of genital warts and cervical cancer are due to HPV.

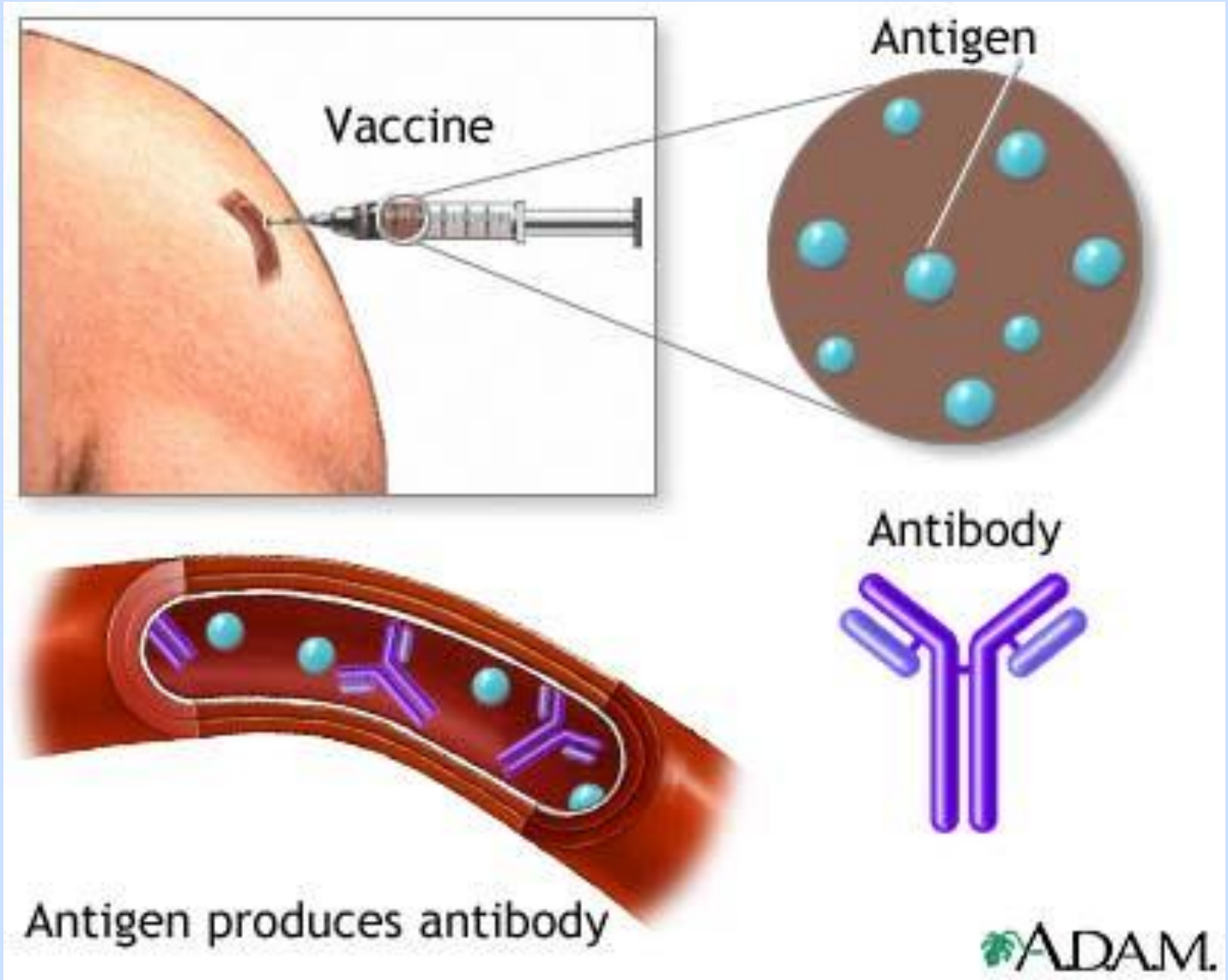
•HPV also causes some other genital cancers in women and men including vaginal, vulva, penile and anal.

The HPV vaccine

There is a vaccine that can stop girls and boys getting nine HPV types that cause:

- 90% of cervical cancers
- most genital HPV-related cancers in males
- 90% of genital warts.

Immunization is our Best Defence Against Viral Infections



Canada's Immunization Record

Vaccine Preventable Disease	Cases In Canada before Immunization Program	Cases in Canada in 2005
Diphtheria	9000	1
Influenza b	2000	68
Hepatitis B	3000	829
Measles	300,000	7
Mumps	52,000	32
Pertussis (Whooping Cough)	25,000	2712
Polio	20,000	0
Rubella	69,000	9
Total	**480,000**	**3658**

Vaccines

- https://www.youtube.com/watch?v=3aNhzLUL2ys&ab_channel=It%27sOkayToBeSmart
- https://www.youtube.com/watch?v=lXMc15dA-vw&ab_channel=PBS

Are you for or against Vaccinations?

- Edward Jenner is credited with coining the term “vaccine” in 1796.
- He created the a vaccine using cow pox to vaccinate against small pox.
- Prior to his vaccine small pox killed over 5 million people PER YEAR.

The Numbers Speak for Themselves

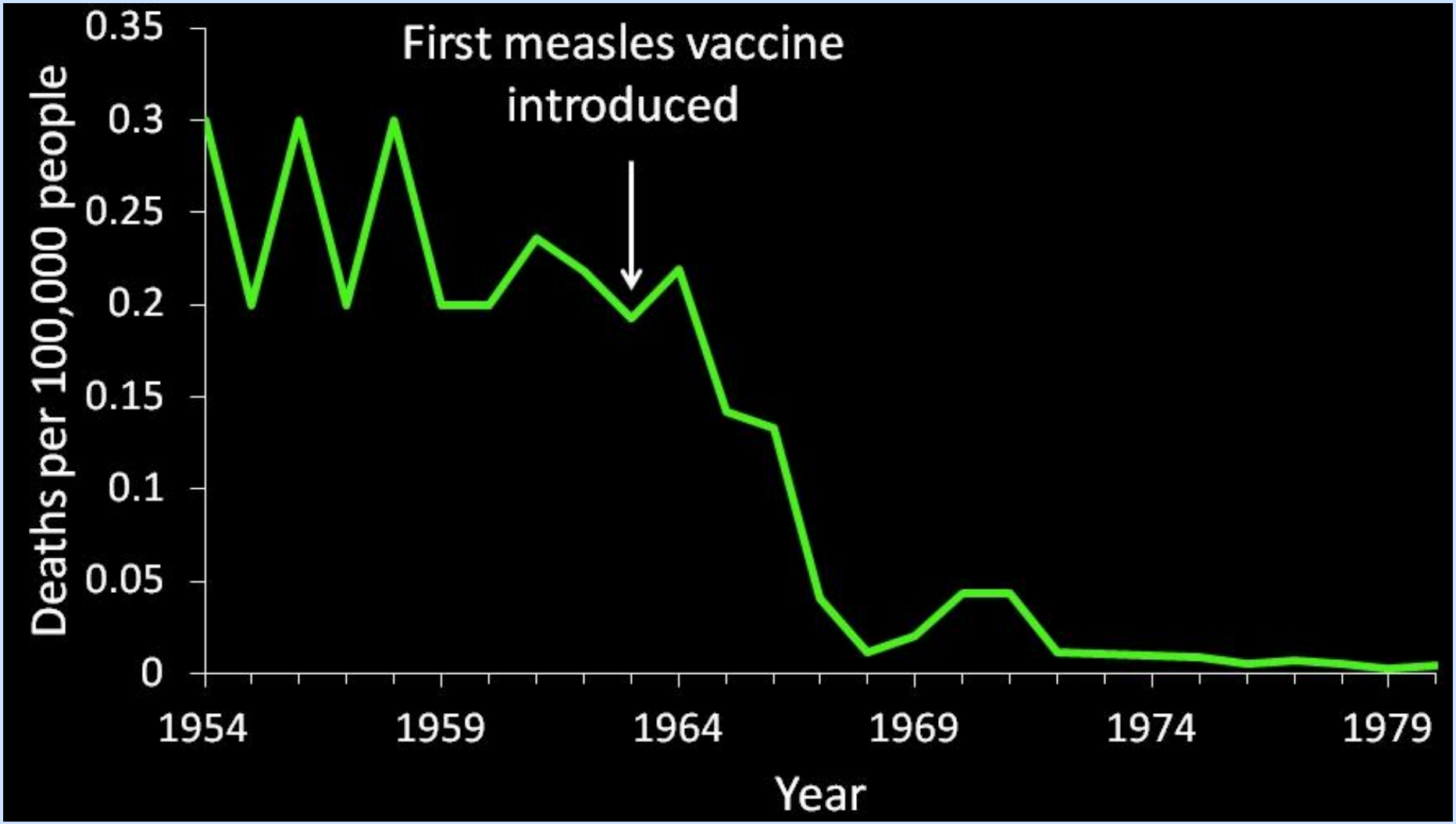
- The discovery of vaccines is WITHOUT DOUBT the single greatest discovery in the history of medical science.
- In the 224 years since vaccines have been used how many lives have been saved?
- Just over 2 BILLION!!!

The Numbers Speak for Themselves

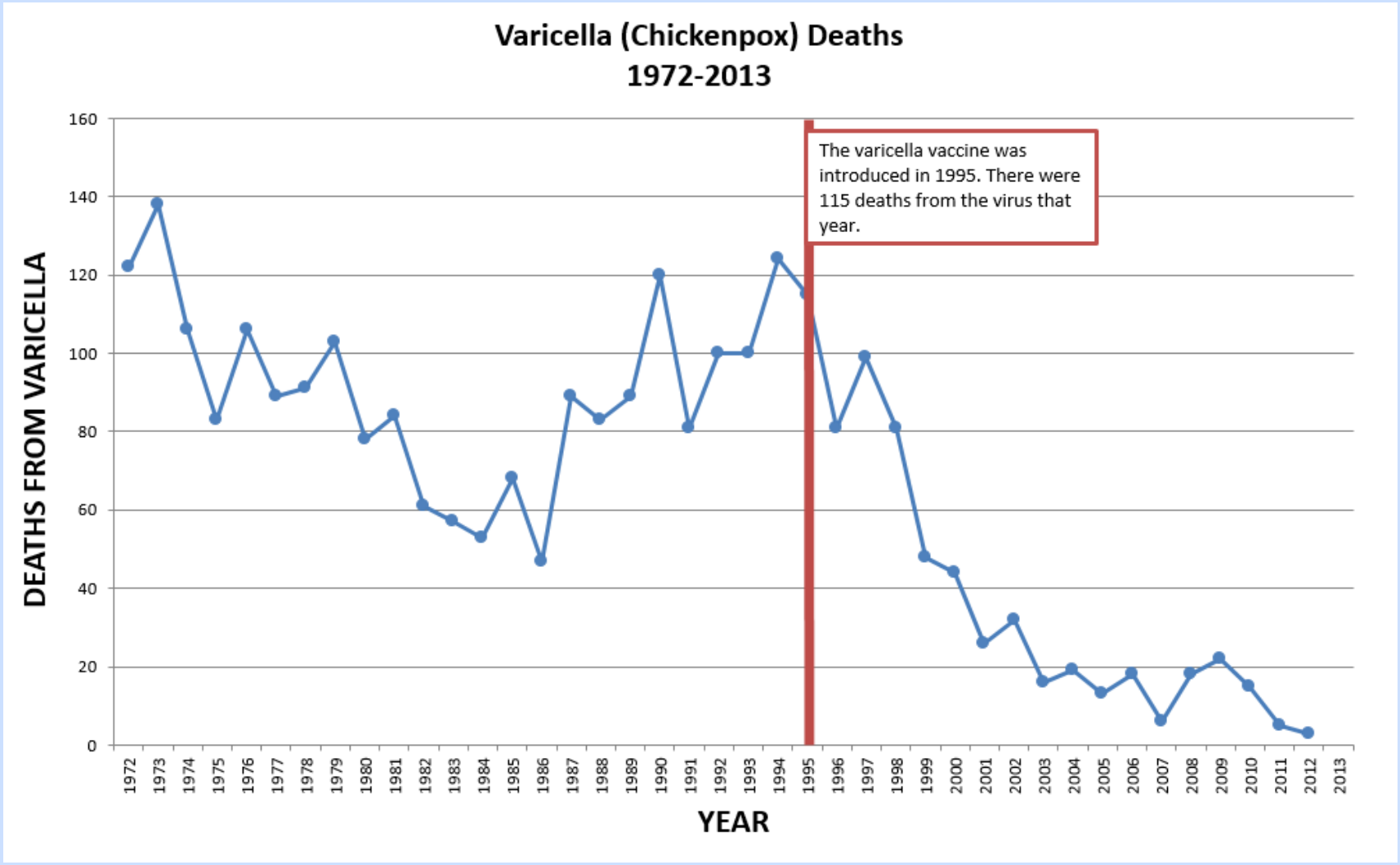
- If every person on earth was vaccinated with all availably vaccines how many ADDITIONAL lives could have been saved over that 224 year period (in addition to those 2 billion)?
- Just over 3.6 BILLION!!!
- Combined vaccines could have saved 5.6 billion lives since its discovery in 1796.

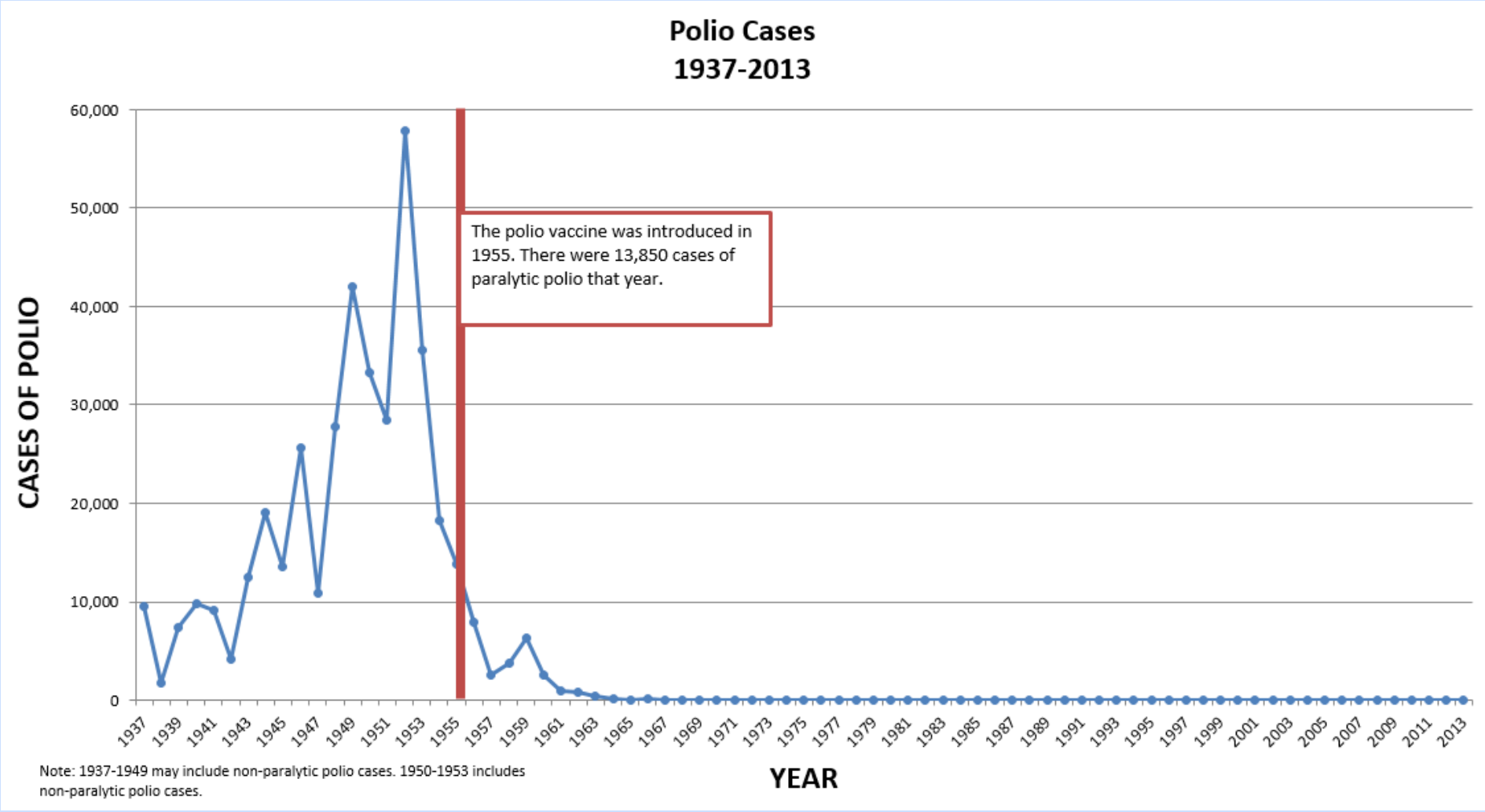
Other Facts

- Before vaccines Measles killed on average 1.1 million people per year, mainly children.
- Some years it was as high as 2.6 million lives lost.
- In 1963 the global vaccination program began.
- By 2014 global **vaccination** programs had reduced the number of deaths from **measles** to 73,000


First measles vaccine introduced
Deaths per 100,000 people
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1954
1959
1964
1969
1974
1979
Year

Immunization of children with the chickenpox vaccine now available.




Polio Cases
1937-2013
CASES OF POLIO
60,000
50,000
40,000
30,000
20,000
10,000
0
The polio vaccine was introduced in 1955. There were 13,850 cases of paralytic polio that year.
1937
1939
1941
1943
1945
1947
1949
1951
1953
1955
1957
1959
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
YEAR
Note: 1937-1949 may include non-paralytic polio cases. 1950-1953 includes non-paralytic polio cases.

Other Facts

- Before the Small Pox vaccination how many people died PER YEAR globally from the disease?
- 5 Million!!!
- How many die from small pox SINCE the vaccination discovery and program success?
- ZERO!!!!!

Other Facts

- The mumps is highly contagious, and can lead to complications including meningitis, pancreatitis, and inflammation of the heart and ovarian/testicular swelling, to name just a few.
- In some cases sterility, deafness, and even risk of death from kidney and pancreatic complications.
- Canada alone averaged 52,000 cases per year PRE vaccination program.
- Canada POST vaccination program = 32 average cases per year .

So why are there so many people who are against vaccines?

- Consider these statements.
- “Society’s well-being depends on how well public-health officials and average internet users combat misinformation”
- “Generationally speaking vaccines are too effective for their own good”

So Why are there so many people who are against vaccines?

- Ignorance of the facts.
- Misinformation.
- False information spread on social media and various other platforms.
- A Scientific Journal contributed to the anti-vaccination movement by publishing misleading information.

The science facts about

AUTISM AND VACCINES

WHAT STARTED THE RUMORS?

1998

Lancet published a paper by Dr. Andrew Wakefield, a dramatic study that found a connection between autism and vaccines

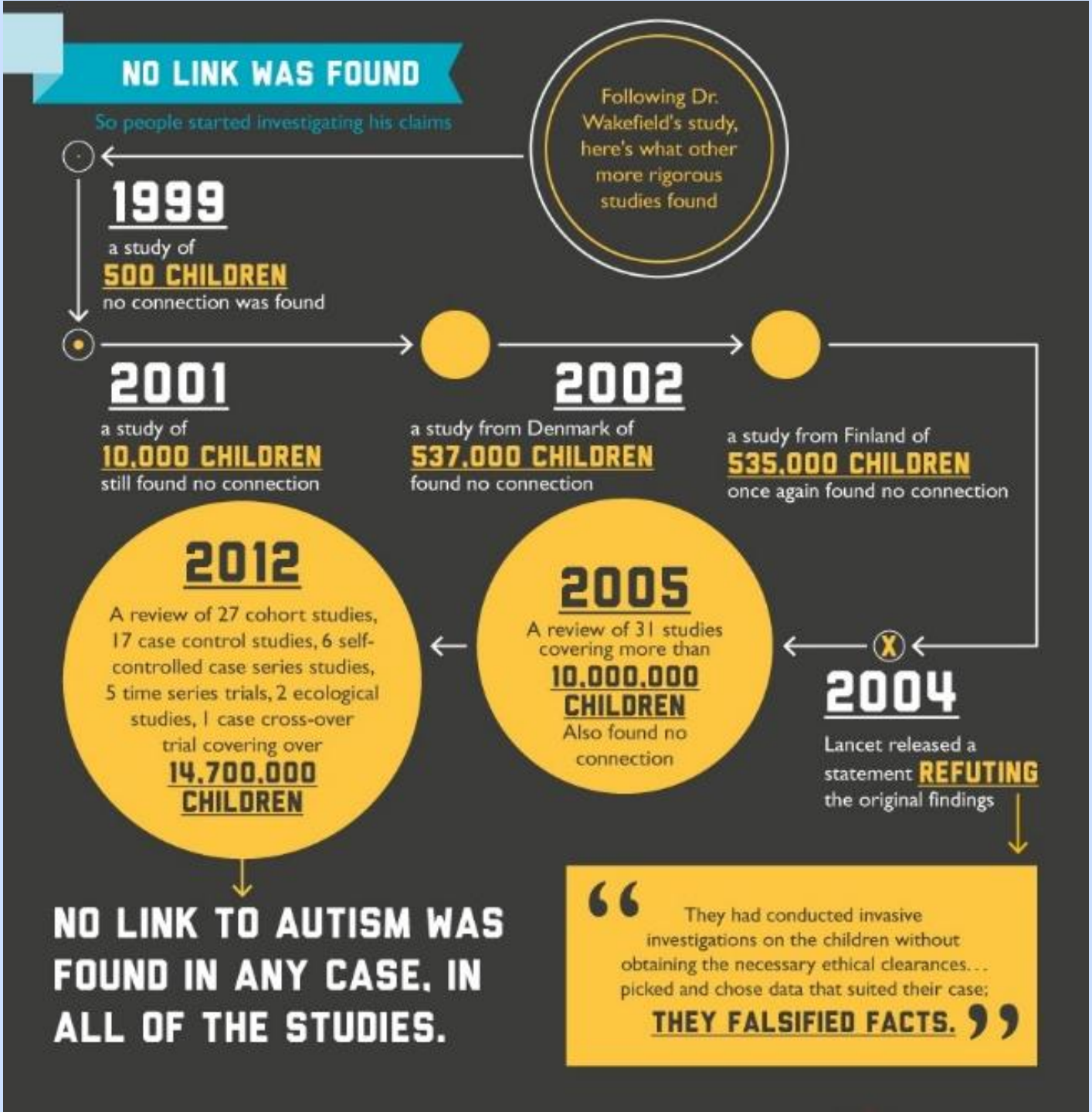
The Study Had Some Problems

Not based on statistics

No control group

It relied on people's memories

Made vague conclusions that weren't statistically valid


NO LINK WAS FOUND
So people started investigating his claims
Following Dr. Wakefield's study, here's what other more rigorous studies found
1999
a study of
500 CHILDREN
no connection was found
2001
a study of
10,000 CHILDREN
still found no connection
2002
a study from Denmark of
537,000 CHILDREN
found no connection
a study from Finland of
535,000 CHILDREN
once again found no connection
2004
Lancet released a statement REFUTING the original findings
2005
A review of 31 studies covering more than
10,000,000 CHILDREN
Also found no connection
2012
A review of 27 cohort studies, 17 case control studies, 6 self-controlled case series studies, 5 time series trials, 2 ecological studies, 1 case cross-over trial covering over
14,700,000 CHILDREN
NO LINK TO AUTISM WAS FOUND IN ANY CASE. IN ALL OF THE STUDIES.
"They had conducted invasive investigations on the children without obtaining the necessary ethical clearances... picked and chose data that suited their case;
THEY FALSIFIED FACTS."

VACCINE VILIFICATION SURVIVES

1/4 U.S. parents believe some vaccines cause autism in healthy children

There have been 0 credible studies linking vaccines to autism

1.8% of parents opt out of vaccines for religious or philosophical reasons

Recently an anti-vaccine religious community has seen measles outbreaks

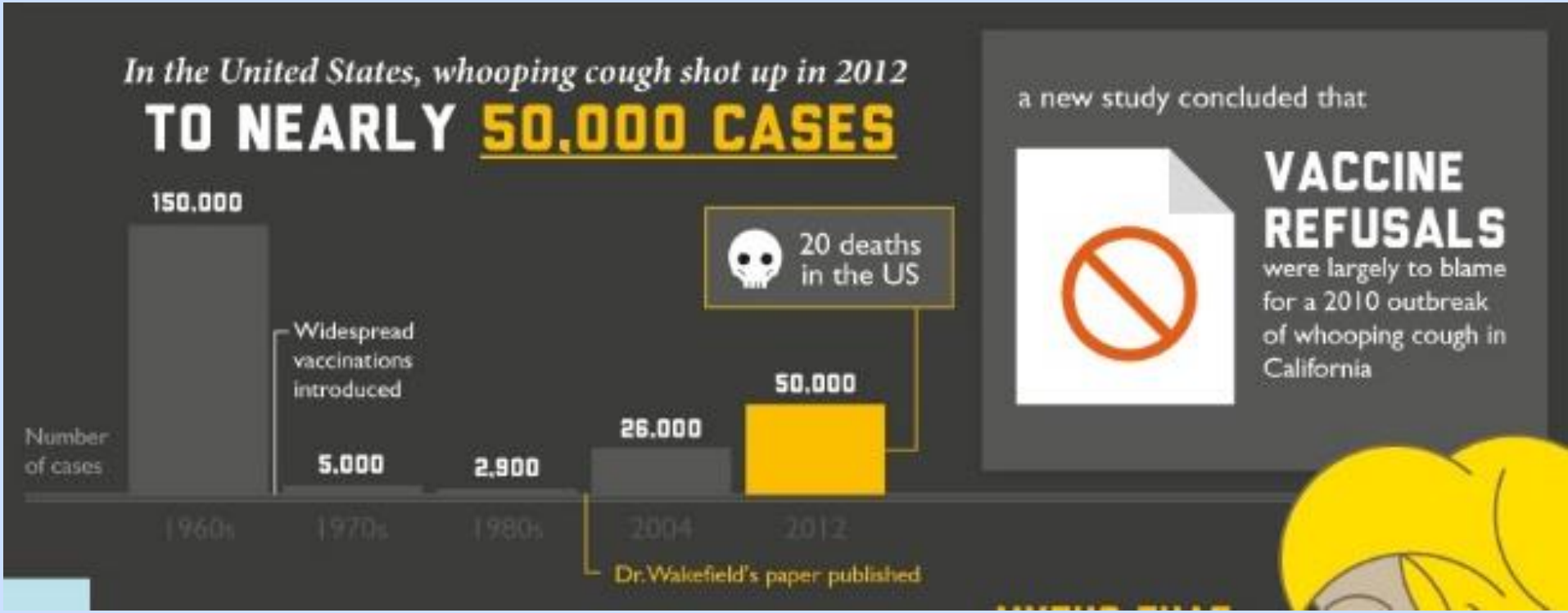
Although declared eradicated in 2000...

France reported a massive measles outbreak with nearly 15,000 cases in 2011

The U.K. reported more than 2,000 measles cases in 2012

Before widespread vaccinations of babies

in 1980	in 2000	in 2012
2.6 MILLION DEATHS from measles	**562,400 DEATHS** 72% of babies vaccinated	**122,000 DEATHS** 84% of babies vaccinated


In the United States, whooping cough shot up in 2012
TO NEARLY 50,000 CASES
150,000
Widespread vaccinations introduced
5,000
2,900
26,000
50,000
20 deaths in the US
Number of cases
1960s
1970s
1980s
2004
2012
Dr. Wakefield's paper published
a new study concluded that
VACCINE REFUSALS
were largely to blame for a 2010 outbreak of whooping cough in California

COMMON VACCINE MYTHS

MYTHS THAT STILL SCARE PARENTS

Vaccines are ridden with toxic chemicals that can harm children

Thimersol, the chemical being referenced, does contain mercury. However, thimersol has been removed from scheduled vaccines and only resides in the seasonal flu vaccine.

The decision to not vaccinate my child only affects my child

Un-vaccinated children who contract a disease can infect infants yet to be inoculated, the small percentage of people whose vaccines did not take, and people with compromised immune systems.

Receiving too many vaccines at once can override a baby's immune system

Baby's immune systems are strong enough to defend from the day to day viruses and bacteria with which they come in contact; they can also handle the vaccines. Remember, vaccines use deactivated viruses in their ingredients.

Drug companies just do it to make profits

According to the WHO, estimated 2013 global revenues for all vaccines is around $24 billion, which only accounts for approximately 2 - 3% of the total pharmaceuticals market.

VACCINES WORK!

Positive effects of vaccines

Helped eradicate Smallpox

Save about 8 million lives every year

Significantly reduce disease in the world

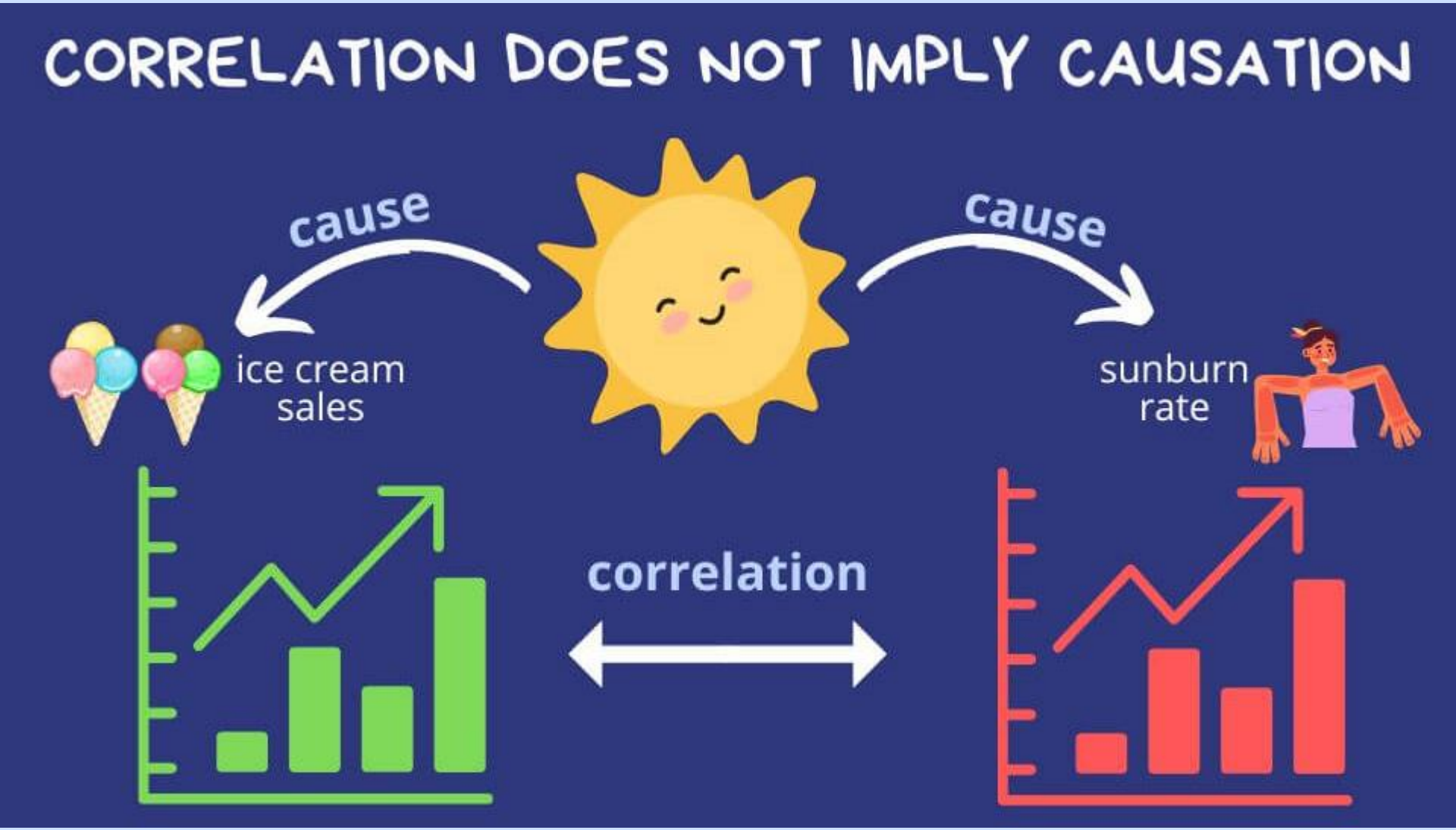
New and underutilized vaccines could avert nearly 4 million deaths of children under the age 5 by 2015

SOURCES

bit.ly/vaccine_fraud
bit.ly/vaccine_outbreak
bit.ly/vaccine_preventable
bit.ly/vaccine_facts
bit.ly/vaccine_lancet
bit.ly/vaccine_profit
bit.ly/vaccine_deniers
bit.ly/vaccine_parents
bit.ly/vaccine_controversy
bit.ly/vaccine_measles
bit.ly/vaccine_immunizations
bit.ly/vaccine_anti

HEALTHCARE-MANAGEMENT-DEGREE.NET

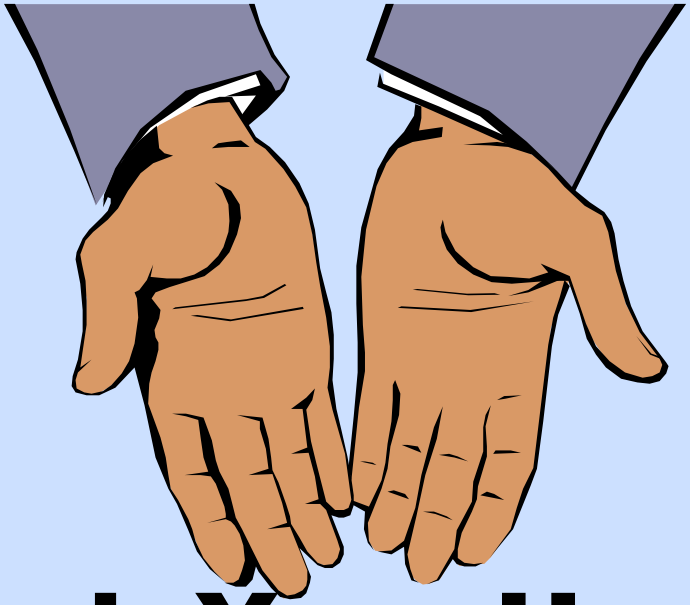
DEVELOPED BY NOWSOURCING


CORRELATION DOES NOT IMPLY CAUSATION
cause
cause
ice cream sales
sunburn rate
correlation

Vaccines In a Nutshell.

- https://www.youtube.com/watch?v=zBkVCpbNnkU&ab_channel=Kurzgesagt%E2%80%93InaNutshell

What are the 10 Most Common Causes of Infection?



Wash Your Hands!

Hand washing is the most effective way to stop the spread of illness.