JOURNAL OF
HYGIENE SCIENCES
Committed to the advancement of Clinical & Industrial Disinfection & Microbiology
VOLUME - XVI ISSUE - II JUN - JUL 2023

Editorial

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Mini review section - Water is an important natural resource utilized for domestic, industrial, recreational, and agricultural purpose by human society. Quality of water is negatively affected by contamination of various pollutants. Various types of physical, chemical, and biological pollutants emerge from different sources, and they deteriorate respective qualities of water.

Current Trends section - Tuberculosis is caused by infections of the *Mycobacteriumtuberculosis* bacteria. Ten million people contract TB each year. Unfortunately, while the disease is curable with antibiotics, 1.5 million people who contract it will die. These statistics make TB the world's number one infectious killer. It is also the leading cause of death in people with HIV and significantly contributes to antimicrobial resistance.

In Profile Scientist - In 1947, Salk was appointed director of the Virus Research Laboratory at the University of Pittsburgh School of Medicine. At the time, the established paradigm of vaccine development was to first isolate a 'live' but weakened micro-organism. This attenuated virus or bacteria would then be administered to patients in order to create a low-grade, innocuous infection that would confer long-standing immunity. However, Salk had employed an alternative approach in his prior work on the influenza vaccine. He had used non-infectious killed viruses to induce protective immunity. Despite the discouragement of his peers and detractors, he decided to take the same approach in his polio research.

Bug of the month– ***Haemophilus influenzae*** (formerly called **Pfeiffer's bacillus** or ***Bacillus influenzae***) is a Gram-negative, non-motile, coccobacillary, facultatively anaerobic, capnophilic pathogenic bacterium of the family Pasteurellaceae. The bacteria are mesophilic and grow best at temperatures between 35 and 37°C.

Haemophilus influenzae,can cause many kinds of infections. These infections range from mild, like ear infections, to serious, like bloodstream infections.

Did You Know? - Researchers at the Francis Crick Institute have found that the body's process of removing old and damaged cell parts, is also an essential part of tackling infections that take hold within our cells, like TB.

If this natural process can be harnessed with new treatments, it could present an alternative to, or improve use of antibiotics, especially where bacteria have become resistant to existing drugs.

In their study, published in *Nature Microbiology* today, ahead of World TB Day on the 24th March, the team studied genes key to bacteria's ability to evade autophagy, a pathway that cells use to destroy themselves when they are under stress or infected.

Best Practices - Email viruses can compromise sensitive information, destroy data, harm hardware, and waste time, resources, and energy. User-downloaded viruses are responsible for 2,000,000 to 5,000,000 attacks per day with some notorious viruses resulting in billions of dollars worth of damages. An effective email security strategy is necessary for protecting your business from viruses, malware, and other malicious threats as the majority of computer viruses are email viruses.Have a light humour with some jokes in our Relaxed Mood section. So go on, enjoy reading !

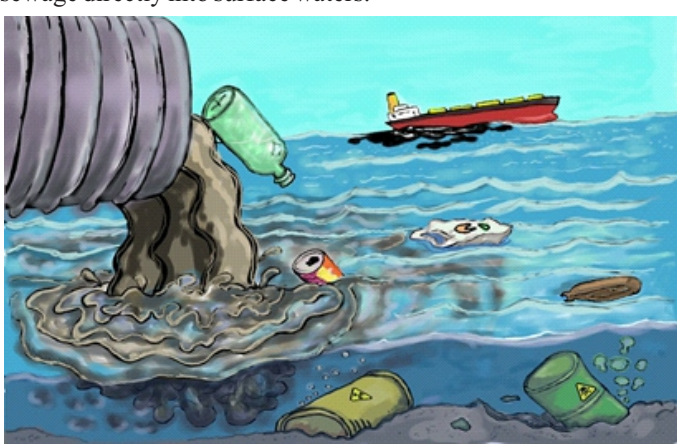
Water Contaminants

Water is an important natural resource utilized for domestic, industrial, recreational, and agricultural purpose by human society. Quality of water is negatively affected by contamination of various pollutants. Various types of physical, chemical, and biological pollutants emerge from different sources, and they deteriorate respective qualities of water.

Water pollution is the contamination of water by an excess amount of a substance that can cause harm to human beings and/or the ecosystem. The level of water pollution depends on the abundance of the pollutant, the ecological impact of the pollutant, and the use of the water.

Pollutants are derived from biological, chemical, or physical processes. Although natural processes such as volcanic eruptions or evaporation sometimes can cause water pollution, most pollution is derived from human, land-based activities. Water pollutants can move through different water reservoirs, as the water carrying them progresses through stages of the water cycle.

Pollutants enter water supplies from point sources, which are readily identifiable and relatively small locations, or nonpoint sources, which are large and more diffuse areas. Point sources of pollution include animal factory farms that raise a large number and high density of livestock such as cows, pigs, and chickens. Also, pipes included are pipes from a factories or sewage treatment plants. Combined sewer systems that have a single set of underground pipes to collect both sewage and rain water runoff from streets for wastewater treatment can be major point sources of pollutants. During heavy rain, rain water runoff may exceed sewer capacity, causing it to back up and spilling untreated sewage directly into surface waters.



Physical property of water includes electrical conductivity, total dissolved solids, and suspended solids. Chemical property is given by composition of various minerals, carbon content, dissolved oxygen, and nitrogen and phosphorus. Biological property refers to presence of various types of microbes and pathogens, especially viruses, bacteria, algae, protozoan, nematodes, insects, and their propagules. Waterborne diseases are sickness caused by drinking of water polluted with pathogenic microorganisms. There are a variety of pathogenic microorganisms which can cause various types of illness in humans.

Water Contaminants

Biological

Coliform bacteria: The most well-known type of coliform bacteria is E.coli. It is harmful bacteria that come from human and animal fecal waste.

Cryptosporidium and Giardia: These parasitic pathogens also come from human and animal fecal waste and may produce gastrointestinal symptoms. These contaminants are among the most-common forms of waterborne illness and may be found in rivers and lakes as well as groundwater. Some have shown resistance to elimination using chlorine or boiling.

Legionella: This bacteria is the cause of the respiratory illness legionnaire's disease Legionella are found naturally in the environment and infect individuals who breathe in tiny droplets containing the contaminant. It can also cause flu-like symptoms known as Pontiac Fever.

Viruses: Inadequately treated water can also contain enteric viruses, which could include rotavirus, norovirus, hepatitis A and E, as well as others. Most of these viruses are commonly associated with gastroenteritis.

Inorganic Compounds

Arsenic: This element occurs naturally in rocks and soil, but it can also be an industrial waste by product, particularly from mining and coal burning. It can enter the groundwater from both natural deposits and pollution, so it could be an issue with well water.

Chromium: There are two types of chromium – trivalent and hexavalent. Trivalent (chromium-3) occurs naturally and is actually an essential nutrient. Hexavalent (chromium-6) occurs naturally in the environment but can also be a toxic industrial by product.

Copper: Many residential plumbing systems include copper pipes. The metal can leach from the pipes into drinking water due to corrosion, especially if the water is highly acidic. Short-term exposure to elevated levels of copper in water may cause gastrointestinal issues. Long-term exposure could lead to liver and kidney problems.

Chlorine and Chloramine: These two substances are frequently used by municipalities to disinfect public water supplies, making water safe to consume. However, when chlorine and chloramine are present in excess of maximum levels, they can cause eye and nose irritation or stomach discomfort. These disinfectants are also responsible for drinking water that consumers often say "tastes like a swimming pool." Because chloramine contains ammonia, consumers may notice that smell in municipal water.

Fluoride: Like chlorine, this inorganic chemical may also be added to the public drinking supply. Some municipalities add fluoride to promote dental health, but there is debate over whether fluoride is good or bad. It is also a naturally-occurring form of the element fluorine, which is sometimes found in groundwater at levels that exceed government recommendations. Too much fluoride can cause pitting and staining of tooth enamel. Long-term exposure to high levels could lead to bone issues in adults.

Lead: Water contaminated with lead has received a significant amount of news coverage in recent years. Like copper, it can leach into the water supply from corrosion of metal pipes. Lead is a toxic chemical that can be harmful to human health at low levels. It is especially dangerous for children and babies, potentially causing serious development issues, from neurological damage to impaired formation of and function of blood cells.

Mercury: Inorganic mercury compounds form in the Earth's crust as mercury combines with other elements. It can enter groundwater through erosion of natural deposits, but it may also be discharged from refineries and factories or come from landfill runoff. Exposure to mercury in drinking water over many years could cause kidney damage. Excessive mercury exposure could also have negative effects on brain function, vision, and hearing.

Nitrate/Nitrite: Contamination from nitrites and nitrates are a problem homeowners with wells may encounter. It could occur because of the fertilization of nearby farm fields or septic tanks located too close to the well. These compounds aren't a serious health risk. But they are harmful to infants, causing what's known as blue baby syndrome, which can be fatal. High levels of nitrate may also indicate pesticides and herbicides are entering the water supply.

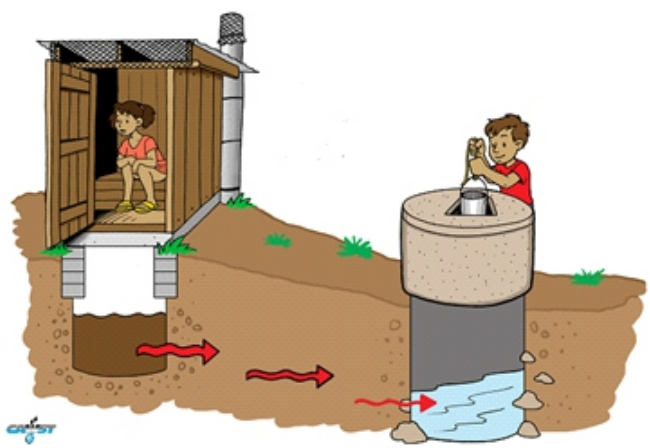
Biological Contaminants in Water:

Living organisms of a biological nature can be found in drinking water supplies provided from wells or municipal sources.

The three main classes of biological contaminants are:

- Bacteria
- Viruses
- Protozoan Cysts

Public health professionals refer to dangerous organisms in water as waterborne pathogen contamination. This contamination can enter water supplies through animal activity, agricultural runoff, sewage leaks, or natural disasters that compromise water sources. These biological contaminants are too small to be seen by the naked eye yet pose a serious health threat if ingested.



Bacteria in Water Supplies

Bacteria are tiny single-celled organisms that can be found nearly everywhere on Earth. Most bacteria pose little or no threat to health, yet certain organisms may cause severe illnesses if ingested through contaminated foods or water. Some of the most common bacteria contaminating water supplies include:

- Vibrio cholera
- Schistosoma
- Salmonella
- Clostridium
- Campylobacter
- Legionella
- *E. coli* (referred to as fecal coliform bacteria)

Drinking water contaminated with bacteria can cause a wide range of symptoms. Exposure to high levels of bacterial contamination, or delays in seeking treatment, can result in hospitalization or even death. Common symptoms associated with drinking water contaminated by waterborne bacterial pathogens include:

- Nausea
- Headaches
- Vomiting
- Diarrhea
- Cramps
- Fever
- Fatigue

Several of these bacteria cause known diseases such as cholera, Legionnaire's disease, or salmonella poisoning. While most people can fight a gastrointestinal infection from waterborne bacteria with medical assistance, others may not be so lucky. Children, the elderly, and those with weakened immune systems can become seriously ill or die from their infections.

Viruses in Contaminated Water

Viruses are tiny infectious agents that are the culprits behind many known diseases. Viruses infect a host by injecting genetic material into healthy cells; those cells then replicate the virus, causing illness to spread. What makes viruses in contaminated water so dangerous is their size; viral particles are hundreds of times smaller than bacterial cells, and many typical water filtration systems can allow these particles to pass through the filter element. Only a reverse osmosis system or submicron filter can trap viral contamination.

Common viruses found in contaminated drinking water supplies include:

- Hepatitis A and E
- Enteroviruses, such as those that cause polio or Coxsackie
- Astrovirus
- Rotavirus
- Norovirus

Common viruses that cause respiratory diseases, such as influenza or coronaviruses, may be found in contaminated water supplies but it is unclear if viral infections can be passed through water contact.

As with bacterial contamination, viruses in drinking water can lead to illnesses requiring medical intervention. Victims of viral contamination report nausea, vomiting, and gastrointestinal upsets. Severe infections may affect the function of internal organs and may result in death.

Protozoan Cysts

Although they are less common than bacteria or viruses in drinking water supplies, protozoan cysts still represent a significant health threat. Protozoan cysts are tiny parasitic organisms protected by a hard protein shell. They require passage through an animal's or human's digestive system to complete their life cycle. People or animals infected with a protozoan cyst shed the particles in fecal matter; if this matter finds its way into a water supply, the infection can spread rapidly.

Common protozoan parasites found in drinking water supplies include:

- Giardia
- Toxoplasma
- Entamoeba
- Isospora
- Cyclospora
- Blastocystis
- Sarcocystis
- Balantidium

Road to ending Tuberculosis

Tuberculosis is caused by infections of the *Mycobacterium tuberculosis* bacteria. Ten million people contract TB each year. Unfortunately, while the disease is curable with antibiotics, 1.5 million people who contract it will die. These statistics make TB the world's number one infectious killer. It is also the leading cause of death in people with HIV and significantly contributes to antimicrobial resistance.

The World Health Organization (WHO) developed the End TB Strategy to ultimately eliminate tuberculosis (TB) from the world. The strategy was endorsed in 2014 by the Sixty-seventh World Health Assembly . Unfortunately, the annual declines in TB incidence that are necessary to end are nowhere near being achieved. Yet in the 1950s, large declines in TB incidence, above the currently required rates, were being observed in high-income countries despite the lack of robust tools that we have. The important question therefore is why a higher decline in global TB incidence is not happening now.

What is Tuberculosis (TB)?

Tuberculosis (TB) is a bacterial infection spread through inhaling tiny droplets from the coughs or sneezes of an infected person. Causative agent of TB Mycobacterium tuberculosis, belonging to the Mycobacteriaceae family.

Transmission: TB spreads from person to person through the air. When people with lung TB cough, sneeze or spit, they propel the TB pathogens into the air. In humans, TB most commonly affects the lungs (pulmonary TB), but it can also affect other organs (extra-pulmonary TB).

TB is a treatable and curable, there are guidelines for treating both active and latent TB infections. Currently, Bacille Calmette-Guérin (BCG) is the only licensed vaccine available for the prevention of TB. BCG works well in some geographic locations and not so well in others. It has a high efficacy in the UK, Norway, Sweden and Denmark; and little or no efficacy in countries on or near the equator like India, Kenya and Malawi, where the burden of TB is higher. Sometimes drug-resistant TB occurs when bacteria become resistant to the drugs used to treat TB. This means that the drug can no longer kill the TB bacteria.

WHO Global Tuberculosis Report 2022

Diagnosis and Mortality Globally: Around 10.6 million people across the world were diagnosed with tuberculosis (TB) in 2021, an increase of 4.5% from 2020, while 1.6 million patients died of the bacterial disease.

Of the total TB deaths, 187,000 patients were also positive for HIV (human immunodeficiency virus).

Nearly 82% of global TB deaths among HIV-negative people occurred in the African and South-East Asia regions.

India and TB: With 28% cases, India was among the eight countries accounting for more than two-third (68.3%) of the total TB patients' count.

India accounted for 36% of the global TB related deaths among HIV negative people.

India was among the three countries (along with Indonesia and the Philippines) that accounted for most of the reduction in 2020 (67% of the global) and made partial recoveries in 2021.

Underreporting of Cases: Underreporting is more of a problem in India; the country is among the top five contributors – India (24%), Indonesia (13%), the Philippines (10%), Pakistan (6.6%) and Nigeria (6.3%).

Rise in Drug-Resistant TB: The burden of drug-resistant TB (DR-TB) increased by 3% globally between 2020 and 2021, with 450,000 new cases of rifampicin-resistant TB (RR-TB) being reported in 2021.

Global Initiatives for TB

Global Fund: It is a worldwide movement to defeat HIV, TB and malaria.

Global Fund has become the single largest channel of additional money for global TB control.

Stop TB Partnership: It is a United Nations hosted organization that takes initiatives to serve the needs of the people, communities, and countries affected by TB.

It has 1500 partner organizations which include international, non-governmental and governmental organizations and patient groups.

Global Plan to End TB 2023-2030: It maps out how to end TB as a public health challenge by 2030.

It focuses on the need to invest in a new TB vaccine and approve it by 2025.

It shall mobilize a global investment of US$250 billion for diagnosis and treatment of 50 million people with TB.

SDG Goal: Ending the TB epidemic by 2030 is among the health targets of the United Nations Sustainable Development Goals (SDGs).

India's Initiatives for TB

Pradhan Mantri TB Mukt Bharat Abhiyaan: The Ministry of Health and Family Welfare (MoHFW) is implementing this campaign.

Objectives:

Provide additional patient support to improve treatment outcomes of TB patients.

Augment community involvement in meeting India's commitment to end TB by 2025.

Leverage Corporate Social Responsibility (CSR) activities.

Components:

Ni-kshay Mitra Initiative: It is to ensure additional diagnostic, nutritional, and vocational support to those on TB treatment.

Ni-kshay Digital Portal: It will provide a platform for community support for persons with TB.

Ni-kshya Poshak Yojana: It is centrally sponsored scheme under National Health Mission (NHM), where financial incentive of Rs 500/- per month is provided for nutritional support to each

notified TB patient for duration for which the patient is on anti-TB treatment.

National TB Elimination Programme (NTEP): It aims to strategically reduce TB burden in India by 2025, five years ahead of the Sustainable Development Goals.

National Strategic Plans for TB: It was launched to achieve the target of ending TB by 2025 in a mission mode.

The requirements for moving towards TB elimination in India have been arranged in four strategic areas of Detect, Treat, Prevent & Build.

TB Harega Desh Jeetega Campaign: It has three strong pillars which include clinical approach, public health component and active community participation.

India's Role in Ending TB by 2030

Development of Adult TB Vaccine: The current vaccine, delivered at birth and useful particularly for children, is 100 years old. India should make efforts for a new vaccine like it did for the COVID 19.

Anti-TB Drugs: There are only a few new anti-TB drugs available that have high costs. There is a dire need to move to an injection-free and shorter duration of oral pills for TB.

Diagnostics: AI-assisted handheld radiology with 90-second reporting and 95% plus accuracy for diagnosing TB should be made available universally.

Jonas Salk

Jonas Salk was born in New York City, New York, United States (US), to an Orthodox Polish-Jewish immigrant family on 28 October 1914. His parents lacked the benefits of a formal education, so they actively encouraged Jonas and his siblings to focus on their studies. After completing high school, Jonas matriculated at the City College of New York, and became the first member in the family to obtain a college education. However, it was law, not science, that initially kindled his academic interest. While growing up, Salk showed little affinity for the didactic aspects of the natural sciences, but his words belied a deep-rooted respect for human biology.

Salk was deterred from a career in law when his mother insisted, he could never succeed in a courtroom if he could not even win an argument with her. He later found himself impressed with the combination of science and the humanities, and switched his academic focus from pre-law to pre-med. He studied medicine at the New York University School of Medicine and dabbled in research involving the influenza virus as a medical student. Upon graduation, Salk obtained a prestigious research fellowship at the University of Michigan, Michigan, under the direction of Dr Thomas Francis. The pair worked towards the development and implementation of an effective influenza vaccine for the US military, which was entrenched in World War II at the time. Following the completion of his fellowship, Salk turned his attention to the poliovirus in a similar search for an effective and safe vaccine. He began his work at the University of Pittsburgh, Pennsylvania, and there set the stage for one of the most heralded medical breakthroughs in the history of medicine.

In 1947, Salk was appointed director of the Virus Research Laboratory at the University of Pittsburgh School of Medicine. At the time, the established paradigm of vaccine development was to first isolate a 'live' but weakened micro-organism. This attenuated virus or bacteria would then be administered to patients in order to create a low-grade, innocuous infection that would confer long-standing immunity. However, Salk had employed an alternative approach in his prior work on the influenza vaccine. He had used non-infectious killed viruses to induce protective immunity. Despite the discouragement of his peers and detractors, he decided to take the same approach in his polio research. Salk had written several scientific and theoretical articles regarding polio and the merits of a killed virus vaccine. His publications eventually captured the attention of the National Foundation for Infantile Paralysis, a charitable organisation first established by US President Franklin D Roosevelt to raise money for poliomyelitis research. This foundation, now widely known as the March of Dimes, provided ample financial support for Salk's research, and helped to jump-start his efforts towards a vaccine goal.

Salk and his team used formaldehyde to kill the poliovirus without destroying its antigenic properties. After establishing both safety and efficacy, they administered the vaccine to scores of volunteers, including himself, his wife and their children. In 1954, Salk undertook a large-scale national study, enrolling over one million paediatric subjects. The next year, on 12 April 1955, he announced the results: the vaccine was both safe and efficacious. Subsequent data showed that in 1955, there were approximately 29,000 cases of poliomyelitis in the US. Just two years after mass production and implementation of the newly developed vaccine, the infection rate plummeted to less than 6,000. The Salk vaccine was quickly adopted nationwide, and by 1959, had reached about 90 countries.

Despite his momentous work, Salk was conspicuously snubbed for membership in the American Academy of Sciences and was never awarded a Nobel Prize. He is said to have trivialised the contributions of other scientists that preceded him and even downplayed the efforts of his own research team. For example, in 1948, Dr John Enders and his colleagues Dr Thomas H Weller and Dr Frederick Robbins successfully cultivated the poliovirus in human tissue in the laboratory, for which they won the Nobel Prize in 1954. This development greatly facilitated vaccine research and ultimately allowed for the development of vaccines against polio. Another important advance that led to the development of polio vaccines was the identification of three different poliovirus serotypes.

Shortly after mass polio vaccination began in the US, some subjects developed paralysis in the limb where the vaccine had been administered. Preparations from Cutter Laboratories and, to a lesser extent, Wyeth Laboratories were implicated, and the vaccine was recalled after 250 cases of paralytic illness had occurred. There were also reports of paralysis and death in several children. Investigations showed that improperly inactivated vaccine had released live virus into more than 100,000 doses of the vaccine.

At around this time, Dr Albert Sabin and Dr Hilary Koprowski were working on an attenuated live poliovirus vaccine. In 1955, they presented their preliminary work at a meeting in Stockholm, Sweden, and conducted trials outside the US, such as in Mexico and the Soviet Union, because the US had committed itself to the Salk vaccine. In 1957, Dr Sabin developed a trivalent oral vaccine consisting of attenuated strains of all three types of the poliovirus, which was then given to ten million children in the Soviet Union. For this work, Dr Sabin, who was originally from Polish Russia, was awarded the Soviets' highest civilian honour, the medal of the Order of Friendship Among Peoples, even though he had become an American citizen during the height of the Cold War. Their oral vaccine came into commercial use in 1961 and quickly replaced Salk's injected vaccine, which had suffered a loss of public confidence as a result of the Cutter-Wyeth debacle.

Polio was eliminated from North America by 1994 and in most countries worldwide shortly thereafter. Still, unlike smallpox, polio has not been entirely wiped out. As recently as 2013, Syria witnessed an outbreak, and the disease has now spread to some ten countries in Africa, Asia, and the Middle East. Deep-seated distrust stemming from religious and racial origins has led to resistance towards vaccination programmes and even violent attacks on health workers. In 2011, the Central Intelligence Agency organised a fake vaccination programme in the search for Osama bin Laden. This tactic helped to fuel the misconception that the vaccine causes infertility in male children, which unfortunately prompted some parents to forgo vaccinating their children.

Jokes

A very serious fight was going on between Husband and Wife...

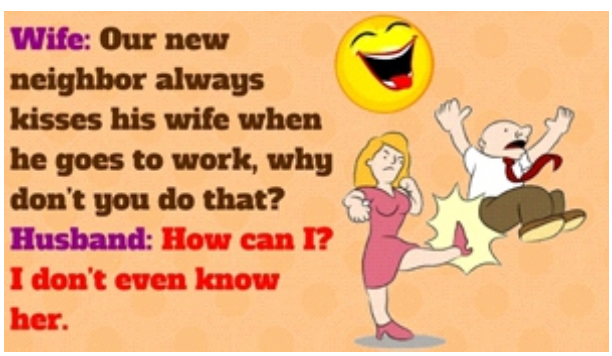
Husband said (In anger):
"I resign from the post of your Husband..."

Wife:
"Okay but,
You'll have to stay till
I don't get any other alternative...!"

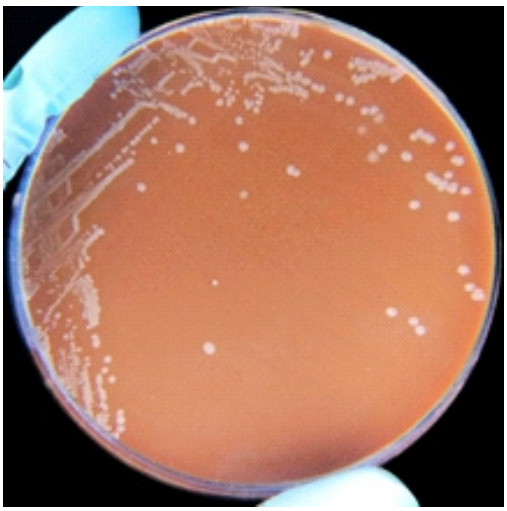
A guy in a mental hospital, placed two stones in his ears ..

The doctor asked him,
"What are you doing?"

he replied,
"I'm listening to ROCK music!"



Haemophilus influenzae



Haemophilus influenzae (formerly called **Pfeiffer's bacillus** or ***Bacillus influenzae***) is a Gram-negative, non-motile, coccobacillary, facultatively anaerobic, capnophilic pathogenic bacterium of the family Pasteurellaceae. The bacteria are mesophilic and grow best at temperatures between 35 and 37°C.
Haemophilus influenzae,can cause many kinds of infections. These infections range from mild, like ear infections, to serious, like bloodstream infections. Doctors consider some *H. influenzae* infections "invasive." Invasive disease happens when the bacteria invade parts of the body that are normally free from germs. For example, *H. influenzae* can invade the fluid around the spine and brain, causing meningitis, or bloodstream, causing bacteremia. Invasive disease is usually serious, requiring treatment in a hospital, and can sometimes result in death.
The most common types of invasive disease caused by *H. influenzae* are:

- Pneumonia* (lung infection)
- Bloodstream infection
- Meningitis (swelling of the lining of the brain and spinal cord)
- Epiglotittis (swelling in the throat)
- Cellulitis (skin infection)
- Infectious arthritis (inflammation of the joint)

H. influenzae can also be a common cause of ear infections in children and bronchitis in adults. Learn more about these illnesses.

Causes
Haemophilus influenzae disease is a name for any infection caused by bacteria called *H. influenzae.* There are 6 distinct types of *H. influenzae* (named a through f), as well as other *H. influenzae* that are classified as nontypeable. The one that people are most familiar with is *H. influenzae* type b or Hib.
These bacteria live in people's nose and throat, and usually cause no harm. However, the bacteria can sometimes move to other parts of the body and cause infection.

How it spreads
People spread *H. influenzae*, including Hib, to others through respiratory droplets. People who are infected spread the bacteria by coughing or sneezing, which creates small respiratory droplets that contain the bacteria. Other people can get sick if they breathe in those droplets. People who are not sick but have the bacteria in their noses and throats can still spread the bacteria. That is how H. *influenzae* spreads most of the time. The bacteria can also spread to people who have close or lengthy contact with a person with *H. influenzae* disease.

People at increased risk
H. influenzae, including Hib, disease occurs mostly in children younger than 5 years old and adults 65 years or older. American Indian people, Alaska Native people, and people with certain medical conditions are also at increased risk. Those medical conditions include:

- Sickle cell disease
- Asplenia (no spleen)
- HIV infection
- Antibody and complement deficiency syndromes (rare conditions that affect the body's ability to fight infections)
- Cancer requiring treatment with chemotherapy, radiation therapy, or bone marrow stem cell transplant

Diagnosis
Doctors usually diagnose *Haemophilus influenzae* infection with one or more laboratory tests. The most common testing methods use a sample of blood or spinal fluid.

Treatment
People diagnosed with *H. influenzae* disease take antibiotics to treat the infection. Depending on how serious the infection is, people with H. influenzae disease may need care in a hospital. Other treatments may include:

- Breathing support
- Medication to treat low blood pressure
- Wound care for parts of the body with damaged skin
- When *H. influenzae* cause milder infections, like bronchitis or ear infections, doctors may give antibiotics to prevent complications. Learn more about using antibiotics for these infections.

Complications
Even with appropriate treatment, some *H. influenzae* infections can result in long-term problems or death. For example, bloodstream infections can result in loss of limbs. Meningitis can cause brain damage or hearing loss. Complications are rare and typically not severe for bronchitis and ear infections caused by *H. influenzae.*

Vaccine
Vaccines can prevent *Haemophilus influenzae* type b (Hib) disease. However, the Hib vaccine does not prevent disease caused by the other types of **H. influenzae.**
People can get *H. influenzae* more than once. A previous Hib infection might not protect you from future infection. Therefore, CDC recommends Hib vaccination even if someone has had Hib disease in the past. *H. influenzae* can spread to people who have close or lengthy contact with a person with *H. influenzae* disease. In certain cases, close contacts of someone with *H. influenzae* disease should receive antibiotics to prevent them from getting sick. A doctor or local health department will make recommendations for who should receive preventive antibiotics.

Harnessing power of immune system may lessen reliance on antibiotics for infections like TB

Researchers at the Francis Crick Institute have found that the body's process of removing old and damaged cell parts, is also an essential part of tackling infections that take hold within our cells, like TB.

If this natural process can be harnessed with new treatments, it could present an alternative to, or improve use of antibiotics, especially where bacteria have become resistant to existing drugs.

In their study, published in *Nature Microbiology* today, ahead of World TB Day on the 24th March, the team studied genes key to bacteria's ability to evade autophagy, a pathway that cells use to destroy themselves when they are under stress or infected.

They engineered human immune cells called macrophages from specialist stem cells called induced pluripotent stem cells, which have the ability to become any cell type in the body. They then used genome editing tools to manipulate the macrophages ability to perform autophagy. When genes key to autophagy were removed and the cells were infected with *Mycobacterium tuberculosis* (bacilli that cause TB), the bacterial infection took hold, replicating more within the engineered cells and causing mass host cell death.

These results are evidence for a strong role of autophagy in controlling intracellular infections like TB. If this pathway can be boosted or strengthened, it could be a new avenue for tackling antibiotic resistance, by making existing antibiotic drugs more effective or presenting an alternative to drugs in cases where bacteria have evolved resistance.

Max Gutierrez, head of the Host-Pathogen Interactions in Tuberculosis Laboratory at the Crick, said: "I first studied the role of autophagy in infection during my PhD, so it's incredible to see renewed interest in this field. Using the latest technologies, we've been able to show a key role for this pathway in controlling infection.

"As immunotherapies have harnessed the immune system to fight cancer, boosting this immune defence with a host-directed therapy, could be a valuable new tool in the fight against infections, particularly those becoming resistant to antibiotics."

The team also validated their results using macrophages isolated from blood samples, confirming the importance of autophagy in human defences.

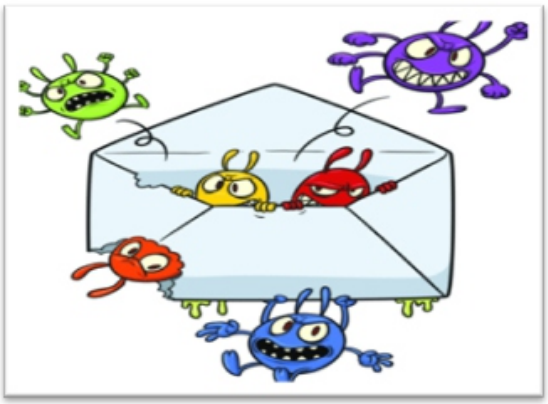
Beren Aylan, joint first author and PhD student at the Crick together with Elliott Bernard and Enrica Pellegrino, said: "Antibiotic resistance is a huge threat to our health so it's incredibly important to understand how our bodies fight infection and where there might be room for improvement.

“TB is a great example of where targeting our own immune defences could be really effective, because it takes a very long course of different antibiotic treatments to effectively remove the infection. Anything that can be done to more effectively remove bacteria, could also make a huge difference to the cost and accessibility of treatments.”

The team are now planning to screen for drug compounds that could be used to boost autophagy in a targeted way.

“Boosting the autophagy pathway isn't as simple as it might seem," adds Max. This is because all parts of the body use autophagy as a way to recycle old and damaged cells. In order to safely increase autophagy in the location of infections, we need to target the pathway in macrophages alone."

Good Practices to avoid email viruses



Email viruses can compromise sensitive information, destroy data, harm hardware, and waste time, resources, and energy. User-downloaded viruses are responsible for 2,000,000 to 5,000,000 attacks per day with some notorious viruses resulting in billions of dollars worth of damages. An effective email security strategy is necessary for protecting your business from viruses, malware, and other malicious threats as the majority of computer viruses are email viruses.

Email Viruses

Email viruses constitute the majority of computer viruses, consist of malicious code that is distributed in email messages, and can be activated when a user clicks on a link in an email message, downloads an email attachment, or interacts in some other way with the body of an infected email.

Virus emails are usually programmed to be sent to everyone in the victim's address book once his or her computer has been infected, and tend to proliferate very quickly as a result.

There are three primary ways an email virus can infect a victim's email and computer:

1. via a phishing email
2. included in an attachment
3. embedded within the email body

Email viruses often look like executable files with extensions such as the following:

.exe .dll .bat .cmd .pif .scr .dot .xls .xlt .docm .pdf

Types of email viruses

There are several types of email viruses

Direct action virus : Direct action viruses act whenever you click on an infinite element of a phishing email. Cybercriminals use “direct action viruses” to conduct rapid actions. When someone opens a virus-infected email attachment, it quickly spreads to their storage device and infects the files inside it. But it does not contaminate the system files, so this virus can be easily removable from the infected device.

Resident virus :The resident virus is more dangerous than the direct-action virus, as it is swift in action. This virus can attack the file storage and create a copy in the system memory. Therefore, it is also known as the Memory-Resident virus. The resident virus is a bit tough to remove from any device. From memory, the resident viruses can affect any file in the storage (including any virus removal tool).

The boot sector : virus is another harmful virus that may be included in the email. After installation, this virus works silently and takes effect after the computer's next boot. Boot sector viruses can only affect computers.

Multipartite virus:A multipartite virus is a combination of the previous three types. Its attacking strategy depends on the computer's operating system and security software.

Keylogger :Cybercriminals often include keyloggers with an email when they want to track the target for a long time. A keylogger is a spyware virus. When an email receiver clicks a keylogger-infected email link or attachment, it keeps tracking the keyboard. Cybercriminals use this tool to get the victim's bank information, social account passwords, essential and private emails, user IDs, and their respective passwords.

Macro virus :A macro virus is another deadly email virus. Cybercriminals usually attach macro viruses to email attachments. The macro viruses are written in the macro language. Some popular software programs, such as Microsoft Excel or Word, also use this language. Therefore, this virus targets software rather than computer system or files. Cybercriminals use Microsoft Excel or Word files with Macro virus code and attach them via email. The virus infects the person's device immediately whenever a person opens an email containing macro viruses in the form of attached documents.

Practices to recognise email viruses and preventing infections

Knowing how to recognize an email virus is crucial for protecting yourself and your company from infection. Some tips for identifying viruses include:

- Avoid clicking through links embedded in email messages.
- Avoid opening potentially dangerous email attachments from unknown senders.
- Scan all attachments for malware.
- Keep an eye out for phishing emails.
- Keep your mail client, operating system, and web browser updated and patched.
- Do not open any executable files included as email attachments - attackers often name these files with two extensions in an effort to disguise them.
- Ensure that your mail program is set to not automatically download and open attachments or display HTML content.
- Verify the source of any suspicious email that you receive.
- Avoid forwarding emails unless you have verified that they are legitimate
- Be cautious when sharing your email address - if compromised, it can be used to send a convincing email containing a virus your way.
- Implement a comprehensive, fully-managed cloud email security solution that provides complete end-to-end control of your email.

Highlights of the coming issue

Published by D.G. Tripathi, Edited by Siddhika Bandekar for and on behalf of Tulip Diagnostics (P) Ltd., Tulip House, Dr. Antonio Do Rego Bagh, Alto Santacruz, Bambolim Complex, Post Office Goa- 403 202, India. Fax: 0832 2458544, **Website: www.tulipgroup.com.**