



KISHINCHAND CHELLARAM COLLEGE



BIOTECHCINE









DEPARTMENT OF BIOTECHNOLOGY

MAY 2020

VOLUME 16



A PEEK INTO THIS ISSUE

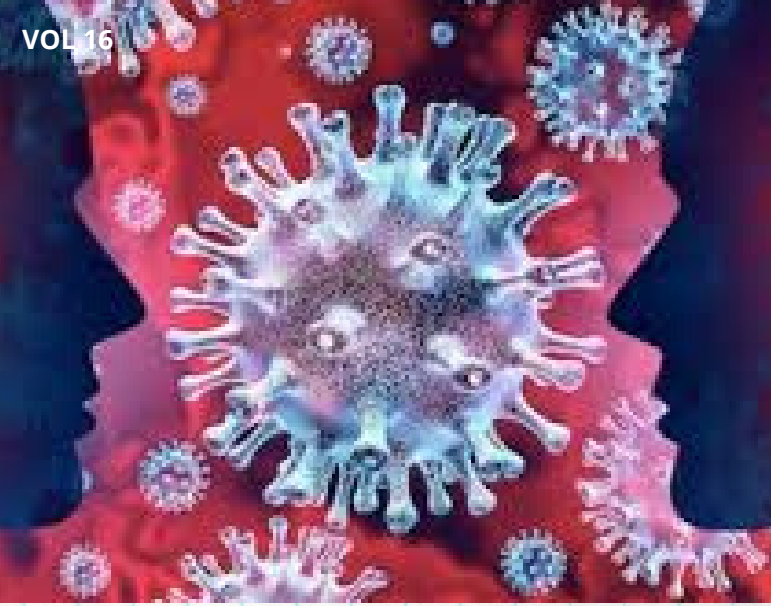
-  An Introduction to Biotechnology
-  What are Vaccines
-  Vaccine Technology
-  Modern Vaccine Research
-  An insight to our department
-  Quarantine
-  Puzzle
-  Acknowledgement

K.C. COLLEGE, CHURCHGATE

MUMBAI- 400020

Presents the yearly issue of The Science Honours Program Department wise newsletter entitled "BIOTECHCINE" by The Department of Biotechnology.

The term "Biotechnology" was coined in 1919 by Karl Ereky. Therefore, Biotechnology is the area of biology that uses living processes, organisms or systems to manufacture products or technology intended to improve the quality of human life.



What is Biotechnology?

Biotechnology is the integrated use of biochemistry, microbiology, and engineering sciences in order to achieve technological (industrial) application of the capabilities of micro-organisms, cultured tissue cells. It is the use of living things especially cells and bacteria for production of various products for benefiting human beings.

It is a combination of various technologies, applied together to living cells. Its application ranges from Agriculture to Industry (food, pharmaceutical, chemical, by products, textiles etc.), Medicine, Nutrition, Environmental conservation, Cell Biology, making it one of the fastest growing fields. Biotechnology is to modify genetic structure in animals and plants to improve them in desired way for getting beneficial products.

- Biotechnology is helping to heal the world by harnessing nature's own toolbox and using our own genetic makeup.
- Biotech uses genetic modification and genome mapping to improve crops.
- It works with chemical processes, genetic engineering, etc.
- Exploits and controls the potential of micro-organisms and living systems for the benefit of mankind.
- It finds new ways to design and use antibiotics and pesticides.

The use of biotechnology dates as far back as 1919. Roughly 50 years later, researchers used bacterial genes to perform the first successful recombinant-DNA experiment.



Vaccine, suspension of weakened, killed, or fragmented microorganisms or of toxins or of antibodies or lymphocytes that is administered primarily to prevent disease.

A vaccine can confer active immunity against a specific harmful agent by stimulating the immune system to attack the agent. Once stimulated by a vaccine, the antibody-producing cells, called B cells (or B lymphocytes), remain sensitized and ready to respond to the agent should it ever gain entry to the body. A vaccine may also confer passive immunity by providing antibodies or lymphocytes already made by an animal or human donor. Vaccines applied to mucosal surfaces, such as those lining the gut or nasal passages, seem to stimulate a greater antibody response and may be the most effective route of administration.

The first vaccine was introduced by British physician Edward Jenner, who in 1796 used the cowpox virus (vaccine) to confer protection against smallpox, a related virus, in humans



**Edward Jenner
vaccinating his child
against smallpox;
coloured engraving.**

When a sufficient number of individuals in a population are immune to a disease, as would occur if a large proportion of a population were vaccinated, herd immunity is achieved. That means that if there is random mixing of individuals within the population, then the pathogen cannot be spread throughout the population. Herd immunity acts by breaking the transmission of infection or by diminishing the chances of susceptible individuals coming in contact with a person who is infectious.

Herd immunity provides a measure of protection to individuals who are not personally immune to the disease.

Herd immunity played an important role in the successful eradication of smallpox, and it is vital in preventing the spread of diseases such as polio and measles.



FACTS and MYTHS

Anti-vaccination myths are almost certainly contributing to this trend.

Why do we use vaccines when disease rates are low?

The risk of contracting vaccine-preventable diseases is low.

Immunization has caused Vaccine-preventable disease rates to drop .

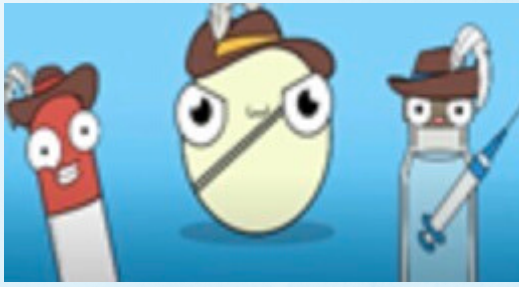
Research has found that children who do not undergo immunization are a contributing factor to this troubling trend.

It is mandatory for childrens to be vaccinated.

Do vaccines contain unsafe toxins?

Vaccines contain toxins. Although it is true that some vaccines contain substances such as mercury, formaldehyde, which are believed to be harmful.

About 99.9% of human DNA is the same. It is the other 0.1% that codes for all of the differences that make each person unique.



KNOW ABOUT VACCINE TECHNOLOGY!

Conjugate vaccines

LIVE ATTENUATED VACCINE

It contains a version of living microbe that has been weakened in the lab, so it cannot cause the disease and it closely reproduces natural stimulus to immune system and cytokines are secreted. The pathogen is grown in foreign host such as animals, embryonated egg, or tissue culture under conditions that make it less virulent. These vaccines are usually very effective, and a single dose is often enough to induce long-lasting immunity. But the principal danger with this vaccine is that the organism, is still alive, can sometimes recover its virulence and cause disease in the vaccine.

Eg: Measles, Mumps, Rubella and Varicella Vaccines.

In this case, a conjugate vaccine is used in order to invoke an immune system response against the polysaccharide. In a conjugate vaccine, the weak antigen is covalently attached to a strong antigen, thereby eliciting a stronger immunological response to the weak antigen. Most commonly, the weak antigen is a polysaccharide that is attached to strong protein antigen.

Eg: Vaccine for Neisseria meningitides.



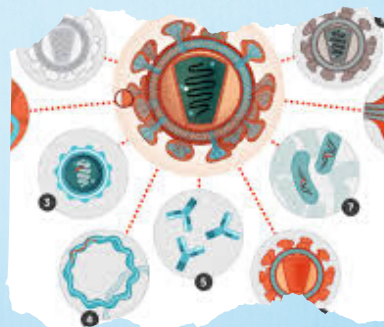
Recombinant vaccines

Recombinant vaccines are made using bacterial or yeast cells to manufacture the vaccine. A small piece of DNA is taken from the virus or bacterium against which we want to protect. This is inserted into other cells to make them produce large quantities of active ingredient for the vaccine (usually just a single protein or sugar). For example, to make the hepatitis B vaccine, part of the DNA from the hepatitis B virus is inserted into the DNA of yeast cells. These yeast cells are then able to produce one of the surface proteins from the hepatitis B virus, and this is purified and used as the active ingredient in the vaccine.

Eg: Adenovirus



Vaccines prevent more than 2.5 million deaths each year.



Vaccine use a variety of different substances ranging from dead microorganisms to genetically engineered antigens to defend the body against harmful microbes

MODERN VACCINE RESEARCH



SARS CoV- 2

In December 2019, an outbreak of pneumonia of an unknown cause was reported in Wuhan, in Hubei province, China.

It was speculated that the first patient caught the infection from a seafood market that also traded wild animals. The causing agent was quickly identified as a Novel Coronavirus (CoV).

The CoV responsible for the outbreak is now called SARS-CoV-2. The respiratory illness caused by SARS-CoV-2 is called COVID-19. The symptoms of the SARS-CoV-2 infection range from asymptomatic to mild to severe to death.

It soon became clear that person-to-person transmission was also occurring, as was the case with the previous human CoV.

Different hosts of the SARS-CoV-2 are proposed, including snails, bats, and pangolins.

They are single-stranded enveloped positive RNA viruses and stand out because of their rather large genome. SARS-CoV-2 is generally less pathogenic than SARS-CoV, much less pathogenic than the Middle East respiratory syndrome MERS-CoV,

However, the transmission rate (TR) (number of newly infected people per infected person) of 2.5 to 3 is high and accounts for the danger of the current pandemic.

What are the issues and chances for a rapid approval of a new medicine to treat COVID-19?

There are several potential strategies to pharmacologically fight COVID-19: vaccines, monoclonal antibodies, oligonucleotide-based therapies, peptides, interferon therapies, small-molecule drugs, or natural medicines (e.g., traditional Chinese medicine [TCM]). The timelines for de novo development of a small-molecule drug are historically >6-7 years, and in the best case less than 2 years. Vaccines can be developed much faster, but rapid development in the range of 1-2 years is very challenging. Antibodies to support the body's immune system are also a strategy to combat viral diseases.

SARS CoV- 2 Vaccine

Vaccines protect both the person who's vaccinated and the community. Viruses can't infect people who are vaccinated, which means vaccinated people can't pass the virus to others. This is known as herd immunity.

Many groups are working on potential vaccines for SARS-CoV-2, with several backed by the nonprofit Coalition for Epidemic Preparedness Innovations (CEPI). As of May 11, eight candidate vaccines were being tested in clinical trials in people. An official at the National Institutes of Health said in mid-May that large-scale testing could begin in July with a vaccine potentially available by January. Other experts say the more likely timeline is summer or fall of 2021

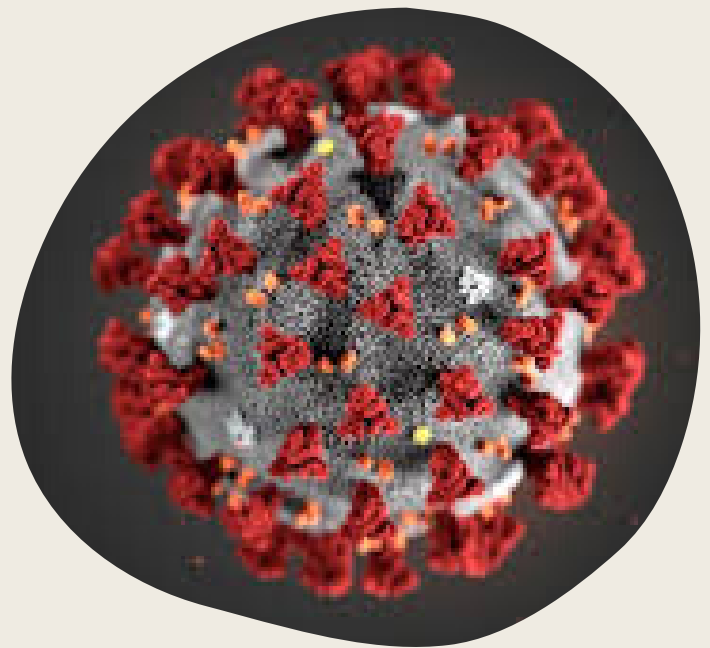
SOME OF THE PROJECTS:

University of Queensland in Australia:

Researchers are developing a vaccine by growing viral proteins in cell cultures. They began preclinical testing stages in early April.

Pharmaceutical companies: Johnson & Johnson and Sanofi are both working on a vaccine of their own. Pfizer has also teamed up with a German company to develop a vaccine. Their initial clinical trial with 200 participants was given the green light in late April. The two companies began human testing in the United States in early May.

Moderna: In March, the company began testing its messenger RNA (mRNA) vaccine in a phase I clinical trial in Seattle, Washington. In mid-May, the company announced the vaccine had produced antibodies in all 45 trial participants in this initial clinical phase. In early May, the company received permission from the FDA to start a phase II study of its vaccine. The company expects to begin a phase III clinical trial in July. The FDA also agreed to fast-track regulatory review of this vaccine if it succeeds in a phase III clinical trial.



Advances in genetic sequencing and other technological developments have speed up some of the earlier laboratory work for vaccine development.

Speeding up vaccine development :

Some scientists argue that a “human challenge trial” could speed up the vaccine clinical trials — potentially shaving months off the timeline.

In this type of trial, healthy volunteers are given a potential vaccine and then intentionally infected with the coronavirus.

A human challenge trial raises many ethical questions. One is that there is still a lot we don't know about the coronavirus, including who will get qualmish or may die from COVID-19. That means people can't really know the risks of participating in the study, so they wouldn't be able to give high-quality informed consent. This is an essential part of modern clinical trials. In preparation for this, the World Health Organization recently released ethical guidelines to navigate these tricky waters.

Meanwhile, some clinical trials are underway in the Netherlands and Australia to see whether existing vaccines for tuberculosis might also protect against SARS-CoV-2. The polio vaccine is another possible option. Scientists think these vaccines might boost the immune system just enough to fight off the new coronavirus, although there's no evidence yet to confirm this theory.

Hope the best and that the world again becomes a safe place to live in, till then stay safe

PPE KIT


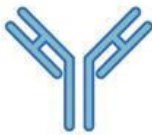

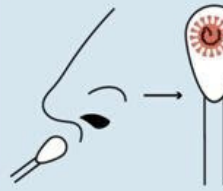

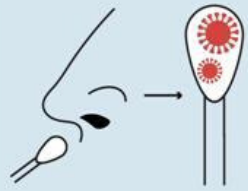
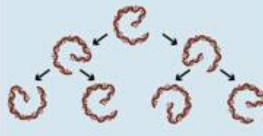
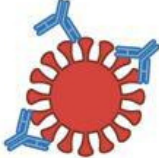
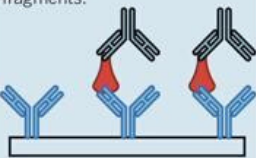
The Protective equipment consists of garments placed to protect the health care workers or any other persons to get infected.

These usually consist of standard precautions: gloves, mask, gown. If it is blood or airborne high infections, it will include: Face protection, goggles and mask or faceshield, gloves, gown or coverall, head cover, rubber boots.

Due to the urgency of the Covid-19 pandemic, WHO is providing technical information on appropriate available essential medical devices which are indispensable for treatment centres, community-based units and other preventive activities, in affected and neighbouring countries.

Personal Protective Equipment (PPE) is most important in preventing transmission of the Ebola virus not only in treatment centres but also various activities, e.g. cleaning, waste management and safe burials, and community care related to the outbreak.

TYPES OF COVID-19 TESTS

Type of test	Molecular test	Antibody test	Antigen test
	<p>Molecular tests detect genetic material from the virus.</p> 	<p>These tests detect antibodies: Y-shaped molecules made by the immune response to disable a virus or mark it for destruction.</p> 	<p>This is the newest of the three testing types. These tests detect antigens: pieces of a virus that the immune system recognizes. A single virus has many antigens.</p> 
Sample collection	<p>A nasal or throat swab collects infected cells.</p> 	<p>A blood draw collects antibodies produced by immune cells.</p> 	<p>A nasal swab collects infected cells.</p> 
Detection	<p>A series of chemical reactions copies viral genetic material. If you're not infected there won't be any viral material to copy.</p> 	<p>The test measures whether these antibodies bind to the novel coronavirus.</p> 	<p>Chemicals fragment the virus, and then antibodies attached to a plate detect these fragments.</p> 
What the test tells you	If you are infected now.	If you were infected in the past.	If you are infected now.
Why it's helpful	Used to isolate those infected so treatment can be provided and other potential cases of infection can be traced.	Identifies people who may have immunity and whose antibodies could be used to treat COVID-19 patients.	Provides the same information as a molecular test in 15 minutes and can be done in a doctor's office.
Limitations	A negative result doesn't guarantee immunity in the future.	Unclear if antibodies provide protection, how long immunity lasts, or what level and kind of antibody response is protective.	A negative result doesn't guarantee immunity in the future. Molecular tests are more accurate.
Some local test makers	<ul style="list-style-type: none"> •Mesa Biotech •Hologic 	<ul style="list-style-type: none"> •Diazyme •Genalyte 	<ul style="list-style-type: none"> •Quidel received FDA emergency authorization for the first antigen test.
Where can you get a test?	State and county testing sites, hospitals, community clinics.	Community clinics; also commercially available. Genalyte has partnered with the San Diego Blood Bank to do broad-based antibody testing.	Antigen testing for the coronavirus is still new, but tests would likely be administered in hospitals and doctors' offices.



India, which was not manufacturing a single PPE kit has now achieved an almost unrealistic goal of producing 2.06 lakh PPE kits per day.



STATISTICS



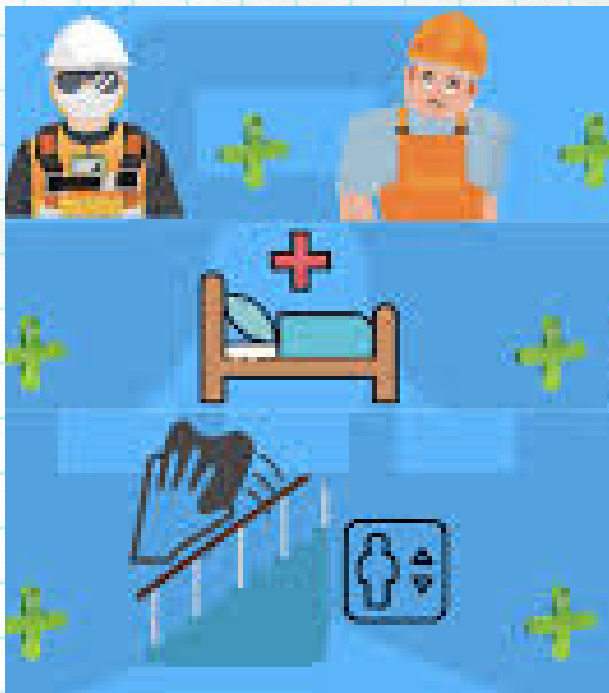
AS OF 24 MAY, 2020

India		
Confirmed	Recovered	Deaths
132K	54,441	3,867
+6,767		+147

Worldwide		
Confirmed	Recovered	Deaths
5.35M	2.14M	343K
+110K		+5,676

CASE OVERVIEW

PRECAUTIONS



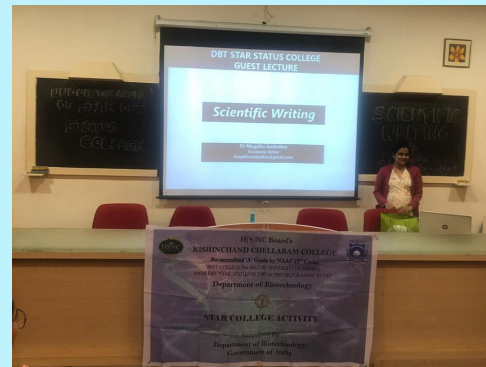
- Clean your hands often. Use soap and water, or an alcohol-based hand rub.
- Maintain a safe distance from anyone who is coughing or sneezing. Don't touch your eyes, nose or mouth.
- Cover your nose and mouth with your bent elbow or a tissue when you cough or sneeze.
- Stay home if you feel unwell.
- If you have a fever, cough and difficulty breathing, seek medical attention.

An Insight to our Department

The Department of Biotechnology enhances various skills of students ranging from being a good communicator to a great young scientist as well as an enthusiast learner. The Department of Biotechnology takes great pride in setting up co-curricular activities and learning beyond classroom walls...



AS STAR DBT STATUS THE CLASS OF SYBSC , HAD MADE POSTERS ON VARIOUS TOPICS AND TOOK A STEP TO TEACH THE BMC STUDENTS



GUEST LECTURE ON SCIENTIFIC WRITING



INSPIRUS 2019



AS A STAR PRACTICAL THE STUDENTS ARE BEING TAUGHT ABOUT UV VISIBLE SPECTROPHOTOMETER



A FIELD VIST BY STUDENTS OF TYBSC AND SYBSC TO CETP

The first gene-modified soybean was introduced in 1995, and now it accounts for half the U.S. crop.

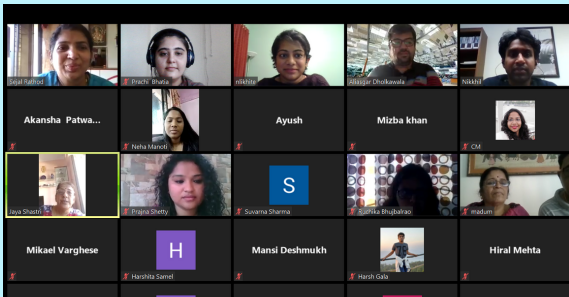
QUARANTINE

This pandemic has got everyone locked in homes. Yes, it is called quarantine.

Getting bored at home? What to do all day long? Take a peek to see what the students and teachers do to cut their day...

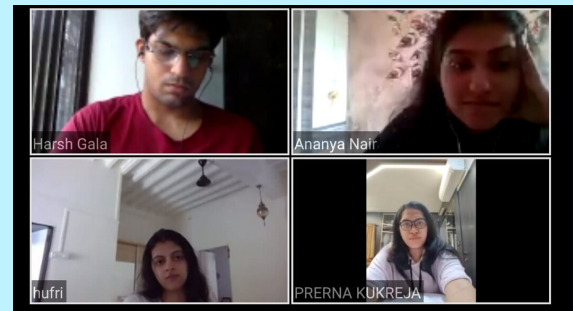


SESSION ON ALLERGY BY DR. RAVIKANT ZALA

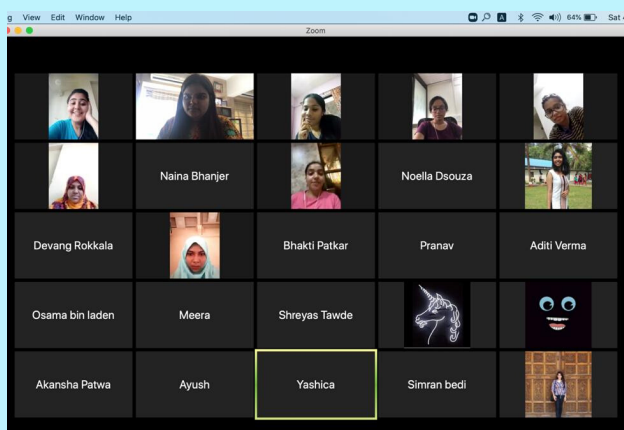


AN INTERACTIVE SESSION

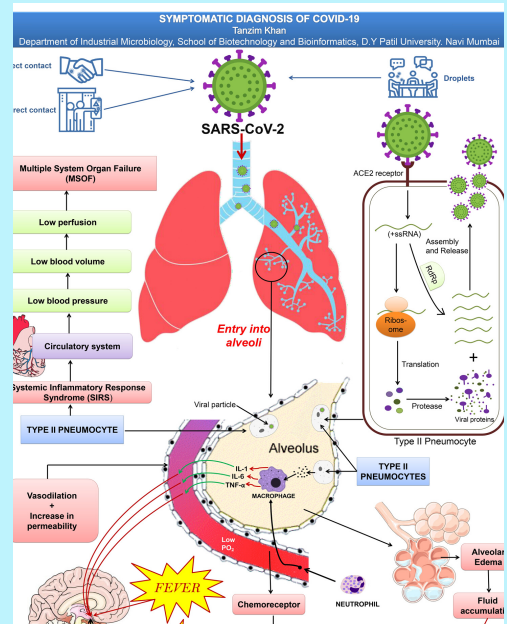
"CONNECTING THE PAST, LOADING THE FUTURE"



TEST SERIES AND ONLINE LEARNING HOSTED BY OUR TEACHERS



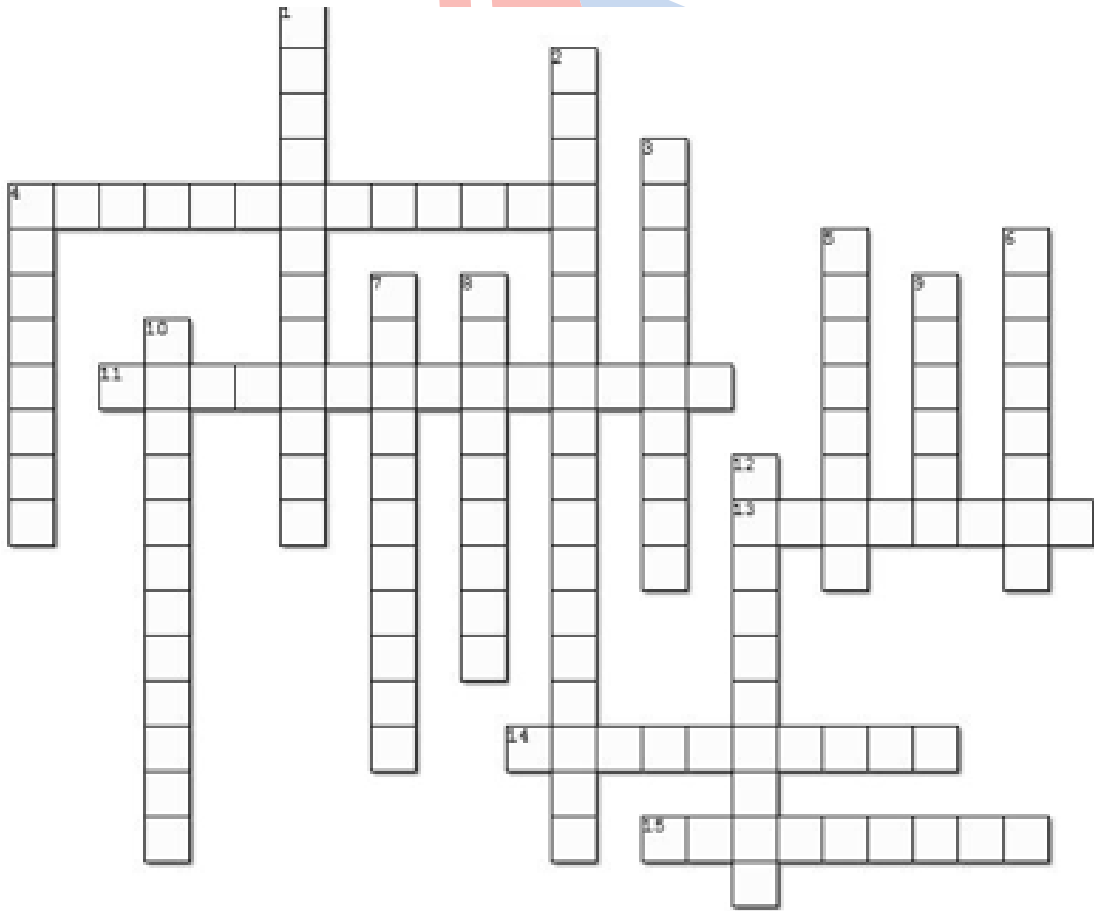
LEARNING NEVER STOPS, THIS IS ANOTHER ONE FROM HOW OUR TEACHERS KEEP US ENGAGED IN A FUN MANNER



POSTER MAKING COMPETITION

PUZZLE

Cross-words



Across

4. Person spreading a disease to unusually large number of people
11. Finding people who have come into direct contact with an infected person
13. Spreading of disease from person to person in a region where the disease was not prevalent
14. A common term for measures taken to slow down the spread of disease
15. Complete separation of a person suffering from infectious disease

Down

1. Not exhibiting any symptoms of disease
2. A drug against malaria but now used to treat COVID19
3. Strict isolation imposed to prevent the spread of disease
4. Abbreviated technical name of the virus causing COVID19
5. Disease prevalent throughout a country, continent or whole world
6. Disease of animals that is communicable to humans
7. 1st person infected with a communicable disease during an outbreak
8. Examining a person to check for presence of disease
9. State of being resistant to a disease
10. Capable of being easily spread or transmitted
12. Machine that helps a patient to breathe

Answers:

1. Asymptomatic, 2. Hydroxychloroquine, 3. Quarantine, 4. Sarscov2 (vertical) & Super spreader (horizontal), 5. Pandemic, 6. Zoonotic, 7. Patient zero, 8. Screening, 9. Immune, 10. Communicable, 11. Contact tracing, 12. Ventilator, 13. Epidemic, 14. Mitigation, 15. Isolation

ACKNOWLEDGEMENT

DIDHITI AGARWAL

DHEVANG ROKKALA

NAINA BHANJER

SERA FERNANDES

SHREYAS TAWDE

SONAM GUPTA

REETIKESH PATEL

We would also like to extend our thanks to the following members of the department

DR. SEJAL RATHOD

MS PRACHI BHATIA

MS HAJRA AS. GUPTA