

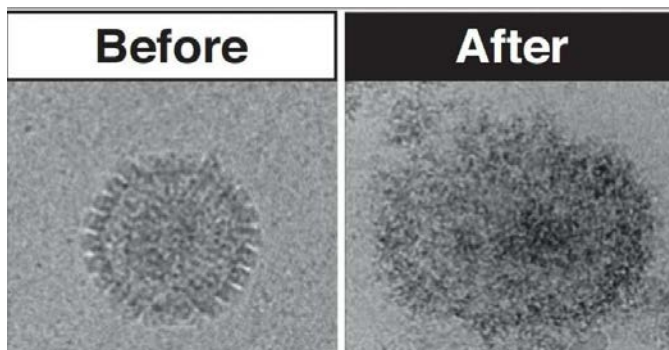
BUPS 'Share to Care'- Winter Item Distribution



Brac University Pharma Society (BUPS) distributed winter clothing and blankets on 4th January 2020, at Laldighi Pirpal College of Badarganj village of Rangpur district to support the underprivileged people to help them combat the bitterness of cold weather. The tagline for the aiding event was “Share to Care”. A team of ten BUPS members along with one faculty member of the Department of Pharmacy, Brac University went to Rangpur to distribute the winter aids. The underprivileged people were provided tokens around a week prior to the event for the collection of the winter aids. A total of 600 winter aids, including 250 blankets and 195 shawls were contributed by an anonymous donor. Other winter items collected by the members of BUPS were also distributed. The honorable principal of Laldighi Pirpal College was also present during the distribution and supported the entire event. The hard work and the active participation of the team made the event successful. With the course of time BUPS hopes to help the community with such events to bring about a change in our society.

Source: Brac University Pharma Society (BUPS)

A New Attempt in Antiviral Drug Development

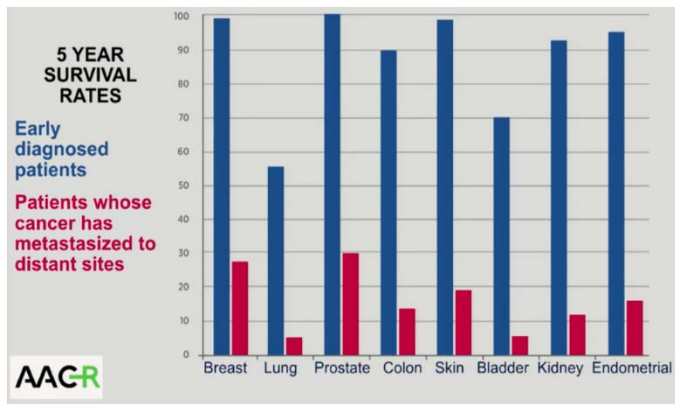


The deadly viral outbreaks emerging periodically in different regions of the world and affecting countless lives have become a concern for the whole world. Development of safe antiviral drugs that are highly effective is a necessity. Most of the currently used antiviral drugs only inhibit virus growth but are not virucidal. Viruses can grow resistance to these drugs by means of mutation. Moreover, most existing antivirals have limitations with permeability and toxicity. One research shows antiviral materials engineered from sugar destroy viruses on contact. The research recently published in the journal *Science Advances*, was conducted by scientists from the University of Manchester, the University of Geneva and the EPFL in Switzerland. They have engineered molecules from natural glucose derivatives called cyclodextrins.

Cyclodextrins (CDs) are glucose derivatives having rigid cyclic structure comprising of α (1-4)-linked glucopyranoside units. Earlier these scientists had developed virucidal gold nanoparticles. However, gold nanoparticles have drawbacks because of unknown clearance mechanism and possible long-term toxicity. They are now developing cyclodextrins modified with mercaptoundecane sulfonic acids which show nontoxic virucidal action. The resultant macromolecules are found to be broad-spectrum, virucidal and biocompatible at micromolar concentrations in vitro. Upon contact, the outer layer of viruses are disintegrated and consequently viruses are destroyed rather than inhibition of virus growth only. CD1 has been shown to elicit broad-spectrum activity against a wide range of viruses of different families. It is active against HSV-1, acyclovir-resistant HSV-2, viruses of Pneumoviridae family: respiratory syncytial virus type A and B, human metapneumovirus, Paramyxoviridae family: human parainfluenzavirus 3, Flaviviridae family: dengue virus type 2, ZIKV and hepatitis C virus. Dr. Samuel Jones stated that antiviral mechanism is virucidal thus viruses struggle to develop resistance. Although it is in an early stage of development, such discovery and development of potential antiviral drugs are crucial to battle different viral infections.

Written by: Intizar Ahmed (3rd Year 1st Semester)

Real-Time Breast Cancer Screening for Early Diagnosis



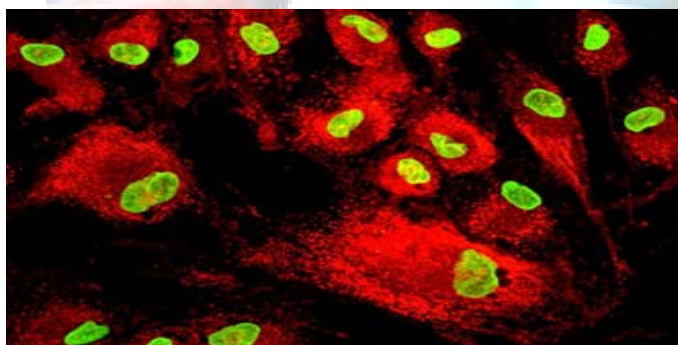
When Steve Jobs got cancer he shared his opinion on what he thought was the problem. He said that "This is a tools problem. This is a problem that we lack the tools to sufficiently understand". He believed that is the area where the medical world needs to improve. If we look at the statistics which answer, 'Who lives?' and 'How long they survive?'; we find that, one of the biggest issues is how quickly one is diagnosed with cancer ergo how quickly they are treated. There is this enormous gap

between 5-year survival rates of patients provided they get diagnosed early and the cancer is localized or they're diagnosed late and the cancer has spread throughout their bodies. This makes early diagnosis even more eminent. A new imaging technology for breast cancer screening that can scan the whole breast and find tumors within 15 seconds was developed by researchers at California Institute of Technology (Caltech). The method, called single-breath-hold photoacoustic computed tomography (SBH-PACT), emits a laser light on the breast detecting changes in ultrasonic vibrations. Their study reporting these findings, "Single-breath-hold photoacoustic computed tomography of the breast," was published in Nature Communications. Screening for breast cancer is important for an early diagnosis, which as we have established, increases overall survival of patients.

Cancer cells are masters at adaptation. But the silver lining- we are making progress even with all that we don't know. We're learning more at every instance. And each new information gives us an additional tool to add to our arsenal.

Written by: Amal Chowdhury (4th Year 1st Semester)

New Drug Delivery Method to Cancer Cells: Microcapsules

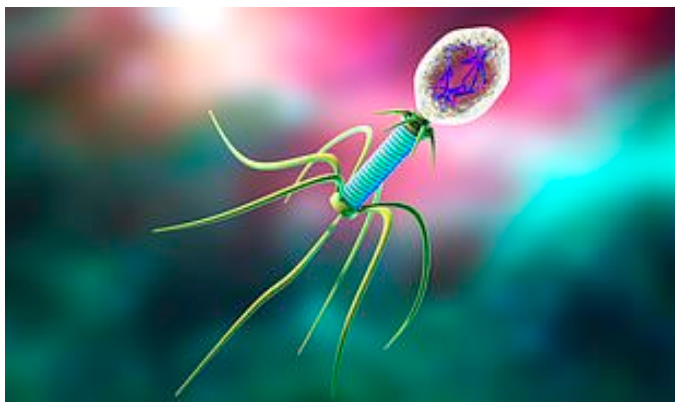


Scientists from Peter the Great St. Petersburg Polytechnic University have developed a method of targeted drug delivery to cancer cells using microcapsules that could transform chemotherapy. Scientists believe that in future this may improve specific treatment of tumors by preventing damage to healthy tissues. Researchers suggest this strategy allows the use of cell cultures that can react with tumors. Human mesenchymal stem cells (hMSCs) obtained from bone marrow of healthy donors are natural drug carriers that can reach near the tumor site and penetrate cancerous cells. MSCs have biomimetic features providing high therapeutic efficacy alongside minimum toxic side effects. Whereas synthetic carriers

possess limited targeting ability and constricted therapeutic activity. MSCs migrate and interact with tumors because of chemokines. MSC contains CXCR4 receptor that binds with SDF-1 chemokine causing the cells to move closer to the tumor. In this technology, microcapsules of biologically active substances like chemotherapeutic agents was transferred to MSC and then delivered to tumor sites. Vincristine was used as sample drug because it can be actively used in chemotherapy and it acts on several types of tumors. At first, vincristine was inserted into microcapsules- made of polymeric compounds and gold nanorods. Then microcapsules were phagocytized by MSC. Infrared light treatment was applied to cells which contained the capsules. This caused gold nanorods to heat and break down the polymeric structures of microcapsules. Vincristine was released into MSCs by disintegration of the microcapsules. When these MSCs were released to interact with a tumor, a part of vincristine was discharged into intracellular space. Vincristine then helps to kill the cancer cells, by stopping their growth.

Written by: Sabrina Afrin (3rd Year 1st Semester)

Phage Therapy: Super Phages Against Superbugs

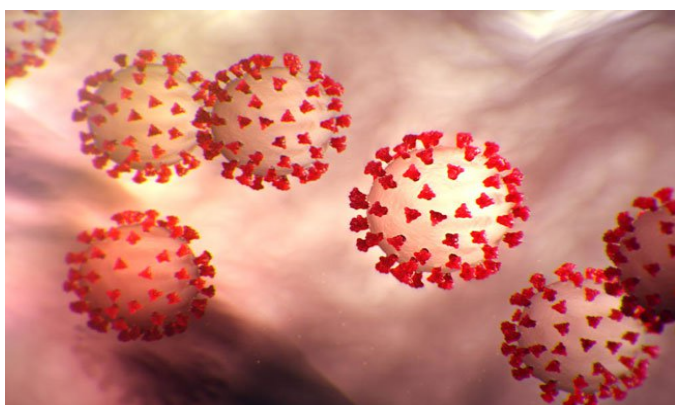


The emergence of multidrug resistant bacteria poses a major global public health threat in this Antibiotic Era. Felix d' Herella, in 1919 discovered bacteriophage almost a decade before the discovery of penicillin. His discovery led to the proposal of employing phage as therapeutic agents against bacterial infections whereby leading to its first usage in 1921 at the Hôpital des Enfants-Malades in Paris. However, the story did not gain traction due to the widespread adoption of antibiotic drugs. In present due to the continued use of antibiotics drugs many bacteria has developed resistance against antibiotics due to evolution. In contrast, bacteria and viruses co-evolve in ways that are either antagonistic or mutualistic, and henceforth comes forth the revival of interest in phage therapy as the alternative to superbugs. Presently, phage therapy has shown great potential due to their high host specificity. The right type of phage can be used to attack the bacterial infection, resulting in invasion of the superbug and hijacking its reproductive process to produce enough copies of themselves thus triggering lysis of the superbug.

Ever since the renewed interest in phage therapy, it has been implemented in multiple cases with success. In 2017, 17-year old Isabelle Carnell-Holdaway who had cystic fibrosis contracted bacterial infection after undertaking a lung transplant operation. Despite her treatment with antibiotics, the bacteria spread to her surgical wound site, her liver and more than 20 other locations on her skin. Her condition was so severe that doctor gave her less than a 1% chance of survival. But fortunately, it changed after she was treated with a cocktail of three viruses that specifically attacked *Mycobacterium abscessus*, the dangerous bacterium causing her infection. Two of the three viruses were genetically tweaked to help them better kill the bacteria, making Isabelle's case the first time that genetically modified viruses have been used to treat antibiotic resistance infections. After the phage treatment, Isabelle's condition began to improve and her surgical wound gradually healed, as did other areas of infected skin. Second case was in June 2018, doctors administered the cocktail of viruses to the patient via an intravenous twice daily with a billion phage particles in every dose. After six weeks, a liver scan revealed that the infection had essentially disappeared for those patients who had gotten resistant to antibiotics. In summary, viruses killing bacteria could be a tremendous success in the future of medicine, as it provides therapeutic effects. Due to the recent medical successes, many scientists are working extremely hard to develop phage treatment so as to make it available to combat antibiotic resistance infections which is the global health threat.

Written by: **Namanda Fred (4th Year 1st Semester)**

“2019 nCoV” How Far Are We?



In December 2019, many people began to report similar symptoms in different hospitals of Wuhan. Upon investigation, scientists concluded that there was an outbreak of a new virus originating from an animal market in Wuhan, China. This was a new type of coronavirus and so far no treatment has been available. Scientists claimed that this RNA virus was different from other coronaviruses and later it was named as “2019 novel coronavirus” (nCoV 2019). On January 25, 2020, The Lancet Press published an article titled “Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China”. They came up with some remarkable data and facts about the deadly virus. They performed

their study on 41 patients and results showed that 98% of them had fever, 76% of them had cough and 55% had shortness of breath.

So, where did it come from? Another article published in the Journal of Medical Virology claimed that like other coronaviruses (SARS & MERS) this virus also spread from animal to human. They believed that the virus was transmitted from snakes to human, although this is still unconfirmed. A scientist from Lancet presented data which shed some light about how the virus spread. The virus can be transmitted from not only animal to human but also human to human. They also said close contact could be the first reason for this outbreak. Close contact can be either with humans or animals or even eating animals. This 2019 nCoV can also spread through the air by sneezing, coughing and even inhaling air from an infected person. Further research by the virologists suggested that this 2019 nCoV can infect our lung, where it causes inflammation which helps the proteinaceous fluid to accumulate inside the alveoli especially in the infected people who are also suffering from pneumonia and the deadly Acute Respiratory Distress Syndrome

(ARDS). A physician can give only supportive treatment to the patients which means it only helps to provide symptomatic relief. For instance, if patients have a fever, then the physicians prescribes them an antipyretic or if patients have shortness of breath they are putting them patient on a ventilator. National Institute of Health (NIH) is working on developing a vaccine that needs about 3 months. Johnson and Johnson working to find a way by using their blockbuster drug Prezcobix which is currently used to treat HIV infected patients. According to John Hopkins University, as of February 6, 2020, the total number of confirmed cases are 24,648 with a death toll of 494.

28 countries have confirmed cases of this virus and only China (492), Hong Kong (01) and Philippine (01) had death cases. Fortunately, we still do not have any case of 2019 nCoV infection in our country but we need to be well prepared and make the majority of the public aware of the issue.

Written by: Bagdad Ahmed (3rd Year 2nd Semester)

