

ESSAY COMPETITION-2021



**SHRI B. V. PATEL EDUCATION TRUST
AHMEDABAD, GUJARAT**



Shri Bhupendra V. Patel
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As a visionary and an educationist acclaimed as the father of Drugs Legislation in India, Shri Bhupendra V. Patel made everlasting contributions to the field of pharmacy at national and international level. He was the first Director of the Drugs Control Administration of Gujarat State. He served as the Vice President of the Commonwealth Pharmaceutical Association. Shri B. V. Patel's life and career continue to be a source of inspiration to the pharmacy fraternity.

SHRI B. V. PATEL EDUCATION TRUST

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AHMEDABAD, GUJARAT

ESSAY COMPETITION-2021

ON

**“ROLE OF PHARMACEUTICAL RESEARCH
SCIENTIST AND INDUSTRY IN PANDEMIC”**

ESSAY COMPETITION - 2021

Subject

“ROLE OF PHARMACEUTICAL RESEARCH SCIENTIST AND INDUSTRY IN PANDEMIC”

Number of Entries
13 from all over India

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FIRST PRIZE (GOLD MEDAL) - 2021



Abu Sufiyan Chhipa

Abu Sufiyan Chhipa is currently pursuing his doctoral research from the Institute of Pharmacy, Nirma University. His research is focused on cancer immunotherapeutics and their application in reducing stemness in triple negative breast cancer. He has been recently awarded with the prestigious DST-INSPIRE fellowship from the department of science and technology, Govt. of India for his doctoral studies. Abu has previously also worked as the junior research fellow under a project sponsored by the Board of Research in Nuclear Sciences (BRNS), Govt. of India, for the evaluation of safety and efficacy of cold atmospheric plasma (CAP) for sterilization. He also previously worked as a research assistant at the Institute of Advanced Research, Gandhinagar. Abu completed his M. Pharm in Pharmacology from Bhupal Nobles' College of Pharmacy, Udaipur and B.V. Patel PERD Centre, Ahmedabad, and is a recipient of AICTE-GPAT Scholarship (2017-2019). His master's dissertation was focused on the evaluation of anti-cancer potential of an herbal extract in lung cancer. Abu has also contributed to multiple publications published in well reputed scientific journals. These include 2 research articles, 3 book chapters, and 9 review articles, till date. Apart from research, Abu is an avid reader and loves reading fiction.

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SECOND PRIZE (SILVER MEDAL) - 2021



Dr. Kalyani Barve

Dr. Kalyani Barve has completed her Masters in Pharmacology from M.S. University, Baroda in 2002 and PhD from Institute of Chemical Technology, Mumbai University in the year 2008. She is currently working as Associate Professor in Pharmacology at SPP SPTM, SVKMs NMIMS Mumbai. She has 13 years of teaching experience. Her research experience is reflected in her publications of 39 research and review papers, 2 books, 7 book chapters published in various national and international journals of repute. She has participated in various national and international conferences and has 18 oral and poster presentations in her name. She has been one of the inventor for a patent entitled "Safed musli compositions and process for preparations thereof" during her PhD work. She has guided more than 40 M. Pharm students and has executed research projects in areas of inflammation, neuropharmacology, cardiovascular pharmacology, diabetes & diabetic complications, toxicology pharmacokinetics and bioavailability and bioequivalence studies. She has expertise in preclinical evaluation of therapeutic agents using various animal models such as those of diabetes and diabetic complication, hemostasis, hypertension, myocardial infarction, atherosclerosis, hyperlipidemia, cardiotoxicity, depression, anxiety, epilepsy, rheumatoid arthritis and osteoporosis. She also has experience in isolation of phytoconstituents and pharmacological evaluation of phytomedicines/phytoconstituent. She is a member of many professional bodies and is a reviewer for many journals of high impact.

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FIRST PRIZE (GOLD MEDAL) - 2021

“ROLE OF PHARMACEUTICAL RESEARCH SCIENTIST AND INDUSTRY IN PANDEMIC”

SYNOPSIS

Pandemics come as threats to mankind. They shatter people's lives and turn their world upside down. The recent experience with Covid-19 pandemic is the best example of the worst scenario that a pandemic can bring. When the Covid-19 pandemic emerged, no one thought that the outbreak will result in one of the most devastating pandemics that the world has ever seen. Within weeks, the pandemic started to propagate across the borders. Economic activities were forced to shut and people were compelled to remain confined in their homes. The pandemic has left its witnesses with the memories that still haunt them. When the lockdowns were hesitatingly imposed, social connections were kept on hold with a hope to fraternize again once the crisis is gone. Unfortunately, for many the day never came!

During a pandemic war, pharmaceutical scientists and industries play the most indispensable roles. From studying the virus to finding strategies for disease containment, biologists and pharmaceutical scientists worked extensively. During the tussle

with coronavirus, scientists and industries worked collaboratively. Industrial collaborations not only helped in the discovery of vaccine at an unprecedented speed, but also enabled the mass dissemination of the vaccines worldwide. The inevitable need to produce bulk of vaccines was fulfilled by the large production houses of pharmaceutical companies. Not just the industries helped to find the novel vaccine in limited time; they also ensured that the developed vaccine is produced in surplus quantity sufficient for the distribution in the whole world.

Altogether, during a pandemic outbreak like Covid-19, scientists and pharmaceutical industries serve as the backbone to ensure the safe and effective containment of the pandemic. As a result, the under-appreciated roles of pharmaceutical scientists and industries deserve better recognition.

“ROLE OF PHARMACEUTICAL RESEARCH SCIENTIST AND INDUSTRY IN PANDEMIC”

Pandemics appear as sudden curse to humanity. The recent Covid-19 crisis is the best example of the upheaval that a pandemic can cause. The year 2020 marks the unanticipated arrival of the Covid era that halted the Earth in a blink of eye. Who can forget the orphaned dead bodies that left unclaimed by their families in the fear of meeting the same fate? Who can forget the excruciating scenes at crematoriums deluged with cadavers? Millions suffered, thousands died and those who survived were left with the haunting memories one would seldom want to discuss. The first case of coronavirus was reported in the Wuhan city of China in the year 2019. Within days the virus crossed the borders and showed its presence in almost every country.

Every pandemic tends to have composite effects on people's lives. The impact of Covid-19 pandemic was also multifaceted. Nationwide lockdowns to curb the chaos caused by the infection affected the people economically and emotionally. For many, the doors to their day to day livelihood suddenly slammed shut during and post-lockdown. For those who survived by confining into their homes, their miserability caused a remarkable impact on their mental and physical health. Also, the fight for the so called "corona warriors" wasn't an easy one. Owing to the unavailability of beds and oxygen cylinders, many lost their lives at the doors of hospitals, waiting till the last moment to get the necessary treatment.

Pandemics are pretty much similar in nature. They come in waves, claim lives of thousands (sometimes millions), and affect adversely to those who "fortunately" survive. Pandemics have condescending propensity to make the world realize that while the advancement in technologies foster the world, the lack of care for the basic health-care systems can result in losses that no amount of wealth can restore. In pursuit of making ourselves economically self-sufficient, and in an inexplicable longing to become the "world leaders", we lost the game on a basic necessity i.e. the handicapped health-care system, and on our pathetic performance in research. The scenario was no different in case of the "titular" developed nations. Italy, France, UK or even the USA failed to anticipate such a disastrous event that was patiently peeping through the cracked walls of the impaired public health-care setups. A major reason behind the corona catastrophe was our "taken for granted" approach for research, undoubtedly as a result of which, we failed considerably to improvise when it was needed the most to keep contagion at the bay.

"There is a silver lining in every dark cloud." The emergence of Covid-19 pandemic issued a clarion call to policymakers for promoting and expanding the scientific culture. The crisis has raised an ineluctable need to re-consider the existing strategies for making a healthy and resistant society. In the words of Larry Brilliant, a prominent epidemiologist who played critical roles in the eradication of small pox, "It is not the question of whether; it is

rather a matter of when we will face such a pandemic." On the positive side, corona crisis has been successful in alarming the world to be no stranger to an adversity of this scale.

Pandemics drive the world to be at war with an invisible enemy. A foe that may silently sit on your coffee cup, your writing desk or simply on your fingers swiping the mobile screen; just looking for an opportunity to enter the "comforting" human body where it can find its final resort to prosper, multiply and then kill its host consequently. When such a war is fought, the health-care workers serve as the warriors, and the scientists as the strategists; while the pharmaceutical industries become the arsenals. A pharmaceutical scientist plays indispensable roles during a pandemic. From disease understanding, recognizing its transmission patterns, to devising tactics for enervating the causative organism, scientists work at every step of pandemic management to ensure that a permanent solution to the calamity is delivered in the shortest time possible. On the other hand, pharmaceutical industries serve as the most important source of weaponry to tackle a pandemic war. While the scientists find a ways to erode the cause, it is the industries that make the global circulation of the devised strategies possible in order to control the rampant spread of a pandemic.

Scientists: The unsung heroes of pandemic wars

When wars are won, the kings garner all the honors, their ministers get all applauses, while the soldiers become least celebrated. In the contemporary world, when a pandemic war is instigated, the world reluctantly enters. The world leaders become the kings and the policymakers serve as the ministers. The militia comprises of the health-care workers and scientists. While the physicians fight on the front-line, the scientists struggle behind the curtains to find ways that can undermine the imperceptible foe. Whether it is the 13th century Black Death, the 19th century plague, the 20th century Spanish flu or the recent Covid-19 outbreak; from understanding the disease to finding targets, and then ultimately devising an efficient treatment, scientists work extensively on every step to ensure the delivery of an effective strategy to counter a pandemic. In the case of recent Covid-19 pandemic, multiple vaccines were delivered as the result of hard staking work accomplished by the scientists. The nations were applauded; their leaders were cheered, while the scientists remained the true unsung heroes of the war.

Understanding the enemy

Disease understanding is the first step in the drug discovery process for successful deployment of strategies to subvert the disease actions. In case of pandemics, knowledge of causative agent is equally important. A contagious outbreak usually involves a

microbe that spreads from the infected person to the healthy individuals. The infectious organism can belong to any class of the inconspicuous microbes; and physiological understanding of each of these microbes is vital for the disease management. Pandemic management includes discovering either the agents that are anti-microbial in nature or finding ways that boost the host immunity. In either case, scientists spend considerable time and efforts to find the potential components of the causative agent that can be targeted for its direct killing or to prepare the host's body to deal with the invasion.

In the recent Covid-19 pandemic, development of an effective vaccine was the need of hour to rock-bottom the outbreak's escalation rates. With the enemy now confirmed, the first challenge for the scientists was to understand the virus. To decipher the structural features of the current coronavirus that makes it different and unfortunately more lethal than its predecessor, biologists initially worked on its genetic makeup. Soon, it was revealed that the virus belongs to the enveloped and single-stranded RNA group of coronaviruses. The findings revealing structural features of the virus served as the backbone for vaccine development. One lethal characteristic of Covid-19 infection was its capability to cause severe lung damage. It was later discovered that the SARS-CoV-2 harbors spike proteins that bind to the lung tissues and facilitate the entry of virus into the host cells. The same

protein later served as the most efficient viral antigen in eliciting an immune response in host organism when administered as vaccine.

How gregarious is the enemy?

For any pandemic to reach its peak, its transmission patterns play critical roles. The rate at which the infection spreads entirely depends on how the causative agent communicates with host. Any infection that has an easily exposed route can grow exponentially among the communities. Immediate knowledge of transmission patterns is the primary necessity during a pandemic management. Epidemiologists (scientists specialized in understanding the spread patterns of any disease) are key people involved in the understanding of dissemination patterns of the causative organism.

The case of Covid-19 pandemic was no different. Knowing the structural features of the virus was one story; understanding its transmission patterns was another. The rapidly rising rates of infection were insinuate that the virus transmits through commonly exposed routes and a mere touch or breath from infected person could transfer the virus to healthy individuals. Physicians and scientists across the world appealed to use the face masks and sanitizers. Social distancing was made mandatory. There was no room for an unattended route of transmission that could continue to disseminate the virus regardless of all the precautionary measures taken. Any such possibility could have potentially

jeopardized the attempts to contain the spread. To prevent this, epidemiologists performed studies to figure out any alternate transmission source. As luck would have it, no alternate cardinal route of transmission was discovered and norms for social distancing turned out to be the most effective way to manage the outbreak.

Meanwhile, studies were performed to incapacitate the virus. Years of research paved ways for the scientists to set appropriate base for the drug repurposing. Drug remodeling worked as an effective first in line approach to combat the infection until the vaccines surfaced the markets. Who can forget the overwhelming demands of Remdesivir and Favipiravir during the brutal second wave of Covid-19 infection? Although, not lifesaving per se, the two drugs gave a sigh of relief to many, as it helped the moderate to severe patients to recover faster. In the list is another immunosuppressive monoclonal antibody, widely known as the Tocilizumab that reportedly saved lives of many severe patients who were deluged by massive cytokine storm in the second week of infection. Dexamethasone, an anti-asthmatic steroidal drug was the most effective and affordable medicine that reduced the deaths in hospitalized Covid patients by almost one third.

Repurposing however also gave an additional challenge to the scientists. On one hand while the repositioning allowed the immediate use of drugs (as the step for safety evaluation in drug

discovery process could simply be bypassed), incorrect or incomplete knowledge during the drug remodeling was found to be rather life threatening. Ivermectin and hydroxychloroquine are the prime examples of it. The two drugs were so widely popularized as the effective "anti-Covid" drugs that it gave no time to the practitioners to table a discussion on their safety profiles or atleast test whether the drugs really produce the effects that they proclaim to. The much celebrated hydroxychloroquine during the Covid era was found to be devastatingly ineffective in exerting its antiviral actions against the SARS-CoV-2 when large clinical trials were initiated. Apparently, the witnessed effects in some of the cases was due to a bodily phenomenon termed as "phospholipidosis" that somehow affects the cellular processes through the accumulation of fatty molecules outside the cell membrane. The process however could not be taken as an anti-viral mechanism as it may severely affect human lungs and liver. More distressing was the case of Ivermectin, a Nobel winning drug that was erroneously advertised as anti-Covid on the basis of initial studies that came out from an Australian lab. The results were already dubious as the studies suggested the use of drug at a much higher dose. The claims were further confirmed to be falsified a few months later when a much cited paper advocating the beneficial effects of Ivermectin in Covid infection was withdrawn. The drug was fraudulently endorsed based on a study that included dead subjects, had compromised statistical analysis and duplicated patient records. As expected, the large trials performed on the drug later revealed that the drug is

ineffective in Covid. Though some cases of drug based mortalities were reported globally, the continuing research by the pharmaceutical scientists averted the adverse results that could have further worsened the pandemic.

Dealing with the situation, once and for all!

For any pandemic to end, a permanent solution is warranted. Though the preventive measures proved effective, these were not the ultimate remedies that one could find solace in. The terminal expectations were from the biologists to put the final nail in the coffin of the imperceptible enemy. Home detainment and long shutdown periods severely affected the economy. Attainment of antiviral immunity was the only promising approach that could be surmised lucrative to bring the day to day lives of people back to normalcy.

Vaccines were the most efficient artillery deployed to sabotage the coronavirus. More adorable were the efforts to successfully deliver the vaccine in the shortest time possible. Typically, the lethargic drug discovery process takes years of testing and trials to drag a molecule from laboratory to the market for human use. Undoubtedly, the pace of Covid vaccine development was unprecedented. Despite that, the events of vaccine discovery were so meticulously handled by the scientists that it hardly compromised with the integrity of the vaccines under development. Luckily, researchers did not have to start literally from scratch. The two previous relatives had structural similarities to the current

virus. This gave a leg up to expedite the vaccine development. The previous similar outbreaks caused by the SARS-CoV-1 and MERS-CoV were fortunately confined to the geographical boundaries of the affected nations, and could be contained much before the actual vaccine could become available. Following the outbreaks, developments in the vaccine research were initiated; but, were halted as the spread curbed in time. The available information of the "never introduced" vaccine served as the starting point in the vaccine design against the current SARS-CoV-2. Once the genetic sequence of the virus was known, the identified antigens (a cellular component capable of inducing an immune response) or attenuated virus were incorporated into pre-validated delivery systems to develop a vaccine candidate. The process of antigen identification and validation typically takes 4-5 years; however, collaborations and open knowledge sharing accelerated the process. The SARS-CoV-2 genome made public by the scientists allowed the quick genomic mapping such that the first antigen rolled out in few hours. Parallel trials, ease in finding Covid-19 subjects, hastened regulatory approval processes and global prioritization further favored the rapid vaccine development. In all the events, the pharmaceutical scientists undoubtedly worked in close association to ensure that a safe and effective vaccine is delivered quickly.

Pharmaceutical Industries: The arsenals

United we stand, divided we ...!

Overcoming a pandemic requires collaborations among the researchers and industries. Covid-19 era marks the period of scientific collaborations that breached all boundaries in the way of science. The concerted communication between academia and industries was extraordinary. Any finding that could potentially advance the understanding of the ongoing pandemic was immediately made available. Knowledge was made free and collaborative research was welcomed worldwide. For instance, AbbVie, an American bio-pharmaceutical company joined hands with Harvard University for the disease understanding, development of antibody therapeutics and other small molecules effective against the SARS-CoV-2. Johnson and Johnson (J&J) also collaborated for its vaccine development with Biomedical Advanced Research and Development Authority (BARDA). In parallel, J&J also extended its collaborative hands with the Rega institute for medical research to search for novel compounds against Covid-19. ChAdOx1-S or the Covishield, the most widely administered vaccine till date, is produced by Oxford University partnered with the AstraZeneca. The same pharmaceutical giant also collaborated with the National Institute of Health Research (NIHR) to develop a monoclonal Covid antibody. GlaxoSmithKline (GSK) and Vir biotechnology also jointly developed a recently FDA authorized covid antibody. In joint collaboration, the National Institute of Virology (NIV) and Bharat Biotech also developed Covaxin, India's

first indigenous Covid vaccine. In no doubt, it is the result of boundless collaborations among the researchers and industries that controlled the overwhelming disturbance caused by the pandemic in a short span of time.

We shall prevail!

Covid-19 vaccine was introduced at a point when the virus pervaded in almost every corner of the globe. With the pandemic moving at a rapid pace, mass vaccination was the only resort to subdue the spread. When the collaborations were initiated for the vaccine development, the makers not only ensured that the industries helped in the discovery; but also that when the time comes, the world should not be faced with vaccine scarcity. For the Oxford/ AstraZeneca vaccine, the company collaborated with 20 partner companies across 15 nations for scaling up the vaccine production. This also included the contributions from the Serum Institute of India (SII), the world's largest facility for the vaccine manufacturing. Pfizer on the other hand, joined hands with BioNtech to ensure the consistent supply of vaccine at affordable prices. GSK also announced its collaboration for Novavax vaccine manufacturing. Similarly, Johnson & Johnson partnered with Merck for its vaccine production in US.

Pharmaceutical companies also extended their philanthropic support to the frontline workers. AstraZeneca donated around nine million face masks to the health-care workers working worldwide. Boehringer Ingelheim donated around EUR 5.8 million for the production and distribution of sanitizers, masks, protective kits and essential

medicines. The company also gave opportunity to its employees to take 10 days paid leaves to volunteer in the Covid-19 relief programs. Multiple donations were also made by Johnson and Johnson. These include the distribution of around 30,000 toiletries and hand creams of EUR 250,000 to the healthcare workers. A donation of EUR 100,000 was also given by Takeda for the supplies of essentials including medicines, groceries and meals to those in need. An exceptional work was exhibited by Novo Nordisk for the diabetic patients during the Covid-19 crisis in England. The company worked with the National Health Service (NHS) to establish support for the diabetes patients in need of insulin. The company also deployed its diabetes specialist nurses for the adequate management of the condition. Undoubtedly, pharmaceutical industries worked selflessly during the Covid-19 era with the mutual aim of making a Covid-free world, keeping aside the corporate motives and competitions.

The take home lessons

Pharmaceuticals scientists play indispensable roles when a pandemic hits. From understanding the disease to finally delivering an effective remedy, scientists fight tirelessly in wars against the pandemics. On the other hand, pharmaceutical industries serve as the working arsenals for the mass delivery of the remedies to effectively combat such calamities. Regardless of the challenges, the unity shown by the scientific fraternity during the Covid-19 pandemic was remarkable. The interaction between the academia

and industries that worked together in the development as well as the distribution of vaccines worldwide was unprecedented. Also, the humanitarian efforts made by the industries were appreciable. Multiple donations, distribution of health care supplies, and helping the underprivileged and diseased patients; pharmaceutical companies served in their finest form for the welfare of humanity.

In conclusion, the recent experience with the Covid-19 pandemic has indicated our negligence towards the handicapped health-care system and our failure to properly appreciate the research in the field of pharmaceutical sciences. The confrontation with the recent pandemic has warned the policymakers to reconsider their strategies for making a resilient society. Further, recognitions should be extended to the vigorous tasks that are handled by the pharmaceutical scientists and industries during a pandemic.

SECOND PRIZE (SILVER MEDAL) - 2021

“ROLE OF PHARMACEUTICAL RESEARCH SCIENTIST AND INDUSTRY IN PANDEMIC”

SYNOPSIS

Somewhere between the end of year 2019 and beginning of 2020, the entire world faced a never before situation of a devastating pandemic. As everyone was new to tackle the situation, the initial few days were chaotic and led to losses of life and emergence of physical and mental health problems.

These times demanded support and solutions from the healthcare sector including Pharmaceutical companies and research scientists, who lived up to the expectations of the world. Pharmaceutical companies in collaboration with the research scientists from universities helped in developing vaccines, treatments and diagnostics for COVID-19. International companies have formed various consortia, in India such a consortium is established between the government and various companies to find possible solutions to deal with the pandemic. Indian pharmaceutical companies have played a very important role in this pandemic by supplying COVID - 19 vaccines and medicines globally. Pharmaceutical companies

have also helped in providing monetary funds to overcome another aspect of COVID-19 i.e. malnourishment. In order to deal with such pandemics and other disastrous conditions, innovation ecosystem should be nurtured in educational campuses as well as the companies.

This essay reflects the tireless efforts made by them to pull out the entire human race out of the clutches of the deadly infectious corona virus.

“ROLE OF PHARMACEUTICAL RESEARCH SCIENTIST AND INDUSTRY IN PANDEMIC”

Just few days back, India crossed the 100 crore mark for COVID vaccination and WHO director general Tedros Adhanom, congratulated PM Narendra Modi and the entire healthcare team of India for this achievement in a short span of time. However, until the year 2019, no one would have ever imagined the state in which we are living during COVID 19 pandemic. The crippling lockdowns, mental problems like fear and anxiety, health issues, financial problems and loss of loved ones would have not have had a place in our wildest dreams but sorry to say those dreams have come to life these days.

Since the causative virus was new, there were no known therapies or vaccines available and only way to save our health was to go for persistent and enduring lockdown. These lockdowns meant export restrictions. Thus, COVID 19 pandemic posed a great challenge to public health. At this stage the pharmaceutical companies came together to fight against this monster. These companies helped by donating money to health systems and ensuring safe supply of medicines to the patients in spite of the export restrictions in place. Most importantly, the research scientist in these companies worked round the clock to find new diagnostics, treatments and vaccines to fight the disease. Innovation and collaboration was the key to fight against this pandemic. The Pharmaceutical industry established collaborations with Academicians, supply chain agencies, start-ups

and vaccine manufacturers in order to establish preventive strategies against the corona virus infection. Medical innovation has played an important role in addressing this health challenge. Vaccines were one of the preventive measures to deal with this pandemic without affecting people's lives.

We have seen researchers working at an unprecedented speed to come up with COVID-9 vaccine, together with the pharmaceutical companies without comprising on patient safety and under the constant pressure of media scrutiny. Without collaborations with researchers at universities, Astra Zeneca, Moderna, Pfizer would not have been able to come up with their vaccines. [1][2]

However, the story to stop this pandemic did not end with the development of vaccines. We did hear about the vaccine crisis and unavailability of doses. To keep up to the demand of required doses, companies had to expand their manufacturing capacities. To date 36.4% of people have been vaccinated globally and 20.3% in India. In spite of the humongous efforts taken by researchers and pharmaceutical companies, there is a significant inequity in the rates of vaccination.

The reason for this inequity is not just limitation of vaccine manufacturing capacity but also the ignorance and inhibition of people toward vaccination. As a part of the Pharma fraternity, Pharmaceutical companies /Academician/Research scientist should convey the true information about efficacy of these vaccines

in tackling COVID pandemic, since people have trust in them and are more likely to accept the facts put by them.[3]

Various treatments and preventive measures were put forth to control COVID-19, some of them were Off label use of Hydroxychloroquine and emergency authorization of Remdesivir. The common public did not understand these fast changing treatment modalities. Moreover, with the emergence of remedies that were not optimal/rational/science based, however provided temporary relief, a conflict developed in their minds. Pharmaceutical companies should have taken the lead and provided insights into the risk benefit evaluation of off label drugs and evidence-based medicines to enhance pharmaceutical literacy in the consumers. This would have helped in avoiding the distrust created in the pharmaceutical stakeholders. [4]

With the success of vaccine development Pharma companies and universities are collaborating to come up with treatment strategies too. Johnson & Johnson in partnership with the Rega Institute for Medical Research, University of Leuven (Belgium) is in a process of identifying new antiviral compounds against COVID-19, AstraZeneca is working with the National Institute of Health Research (NIHR) to develop monoclonal antibodies against COVID 19. Some other companies like Novartis, Eli Lilly, Roche, GSK are working on their own in developing drug molecules either anti-viral or monoclonal antibodies against corona virus.

Pharmaceutical companies have now diverted their vaccine synthesis from attenuated vaccines to mRNA and DNA vaccines to overcome safety, efficacy and scale up issues. ZyCov-D developed by Indian pharmaceutical company Zydus Cadila is the first DNA vaccine to get approval. GSK, Pfizer and BioNtech, Sanofi& Translate Bio are few other companies working in this area and we are most likely to see more vaccines coming up.

Pharmaceutical companies can and are helping to come out with novel and quick methods of detection of coronavirus. Diagnosis is the first step in preventing the spread. Companies like GSK, Astrazeneca and Takeda are collaborating with academic institutes to explore alternative methods to meet the rising demand and to help countries in establishing a national testing system.

At an international forum, life science companies have formed a consortium and are collaborating towards development of diagnostics, vaccines and drugs as possible solutions to control the pandemic. Some of these companies include Novartis, Pfizer, Sanofi, MSD/Merck, Eli Lilly and Bristol Meyers Squibb.[5] In India, COVID 19 research consortium was formed by DBT-BIRAC. Cadila Healthcare Ltd, Bharat Biotech International Ltd and Serum Institute of India Private Limited were a part of this consortia to develop vaccine, Mylab Discovery Solutions Pvt Ltd, Huwel Lifesciences, Ubio Biotechnology Systems Pvt Ltd, Dhiti Life Sciences Pvt Ltd, MagGenome Technologies Pvt Ltd, Bigtec Pvt Ltd

and Yaathum Biotech Pvt were included in this consortia to develop diagnostics. Thus, Pharmaceutical companies should be on the lookout for collaborating in such consortia that can tackle COVID-19 health crisis globally.[6]

COVID 19 pandemic also affected our way of working/living. Failure to earn during the lockdown has disabled many people to even feed themselves, resulting into malnourishment or even deaths. [7] Pharmaceutical companies have helped to overcome this issue by releasing funds as a part of their corporate social responsibility (CSR) activities which have been utilised for disaster management, eradicating hunger and malnutrition. These companies should continue this humane act to overcome this aspect of the pandemic too.

India has emerged as Pharmacy of the world due to its ability to supply COVID-19 vaccines and medicines globally. India supplies over 40% generics in US, 25% prescription drugs in UK and 60% of vaccines globally. However, the pandemic has also revealed India's dependence on raw materials from China. In a process of creating Atmanirbhar Bharat, Production linked incentive scheme has been rolled out to expand India's manufacturing capability and export. In the budget for 2021-22, Govt of India has focused more on the health sector. Pharmaceutical/Biopharmaceutical companies can take advantage of this and give emphasis on infectious disease research and disease management, come out with innovations in pharmaceutical research and large-scale manufacturing of drugs

and vaccines. Innovation is the way for future growth of Indian Pharmaceutical companies.[8][9]

Another area that I would like to bring into light is digital health, which has seen a surge especially due to COVID-19. Digital health also known as telemedicine, eHealth and mHealth utilizes digital technologies for the overall well-being of patients and reduce the cost of services. Some surveys have predicted that adoption of digital health plans by the Pharmaceutical industry is expected to rise significantly. Thus, Pharmaceutical companies who aren't really prepared for this need to gear up. This can be done by means of changing their business models and most importantly their perspective about telemedicine.[10]

The lessons that we have learned from this crisis is we need to strengthen the healthcare system and make it so robust that no other pandemic episodes happen either in near future or after 100 years. This is possible only with the collaborative efforts of pharmaceutical companies, research scientist, governments and international organisation. Developing an Innovation ecosystem can further help to create diagnostics, vaccines and treatments to confront future pandemics. Together we have come out of this crisis, let us ensure to keep mental, physical and social well-being of all forever. Let us not allow any tiny organism to disturb our lives /way of living and let us strive for the happiness of everyone.

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B. V. Patel Essay Competition History at a Glance

The trust conducts an all India level Essay Competition every year as one of its activities. The selection of the subject depends on the importance and the current happenings in the Sector. Any one interested in drugs and pharmaceuticals, academically, industrially or otherwise, can participate in the competition. The entries are generally invited in the month of July/August. The essays are evaluated independently by a panel of judges comprising of the expert luminaries of industry and academy. The essays of the winners are printed and distributed during the IPC since 1977.

The year-wise subjects chosen for the Essay Competition :

Year	Subject
1977	- Good Manufacturing Practice in Parenterals
1978	- Indian Pharmacopoeia for the Future
1979	- Documentation and Record Keeping in Drug Manufacture
1980	- Drug Distribution
1981	- Review and Modification of Drugs Legislation in India
1982	- Industry Oriented Pharmacy Education - Its Means and Modifications
1983	- Role of Testing Laboratories in Assurance of Quality Drugs
1984	- Material Management in Pharmaceutical Industry
1985	- Status & Prospect Of Research and Development
1986	- Manufacture of Dosage Forms - Problems and Remedies
1987	- Advances in the Technology of Industrial Pharmacy
1988	- Role of Combination Products in Drug Therapy
1989	- 1. Continuing Education in Pharmacy 2. Trends in Pharmaceutical Research

1990	-	Restructuring of Pharmacy Education
1991	-	Biotechnology in Pharmacy
1992	-	Role of Pharmacists on Stability of Pharmaceuticals
1993	-	ISO 9000 and its Applicability to Pharmaceuticals-A Pharmacists Perception
1994	-	Challenges and Opportunities in Pharmaceutical Research
1995	-	New Drug Delivery Systems - Indian Scenario
1996	-	Traditional Medicines - Sources of New Drugs
1997	-	Clinical Pharmacy in India - Emerging Facet of the Pharmacy Profession
1998	-	Community Pharmacy
1999	-	Revision of Indian Patents Act 1970 And its Impact on Availability and Cost of New Pharamceuticals
2000	-	Information Technology-Revolutionary Impact on Pharmaceutical, Sciences
2001	-	Aesthetic Design of A Manufacturing Unit in Compliance with National Regulatory Requiriement and WHO - GMP
2002	-	Genomics and Proteomics: Treasure for Drug Discovery
2003	-	Pharmacy Education: Current Problems and Suggested Solutions
2004	-	Industrial Growth in Changing Scenario: Strategic Options for Small and Medium Enterprises (SMES)
2005	-	Roadmap to Globalization of Ayurveda as Recognized Healthcare System
2006	-	Prospects for CRO in next Five Years: Indian Capabilities
2007	-	Distribution of Pharmaceuticals and Drugs in India: Its Science, Commerce and Ethics
2008	-	Medical Devices: Opportunities For Indian Industry

- | | | |
|------|---|---|
| 2009 | - | Steps to Revitalize Pharmacy Profession in India |
| 2010 | - | Innovation: Driver for Growth of Indian Pharma ? |
| 2011 | - | Vaccines In Healthcare: Indian Perspective And Potential |
| 2012 | - | Drug Affordability in India - Post 2005 |
| 2013 | - | Patent - The Need for Efficient Handling of Disputes |
| 2014 | - | Pharmacists in a State of Mortification: Reasons, Responsibilities of Stakeholders and Remedy |
| 2015 | - | Pathway for Zero Defect Product and Production in Pharmaceutical Industry |
| 2016 | - | Clinical Trials in India and China: Advantages and Disadvantages |
| 2017 | - | Stem Cell Based Therapeutics: A Revolution Changing the Treatment Paradigm |
| 2018 | - | Advertising in Pharmaceuticals: Therapeutic or Toxic |

B.V. Patel Pharmaceutical Education & Research Development (PERD) Centre

.... in the spirit of progress



Services

Formulation Development
Toxicity Studies
Cell Based Assays
Impurity Profiling
Custom Synthesis
Herbal Drugs Standards
Stability Studies

Education

Ph. D Programme
Dissertations (M. Sc., M. Pharm)
Certificate Courses
Continuing Education Programme
Hands on Training

Training

Mammalian Cell Culture
PCR & qPCR
Molecular Biology
HPTLC & HPLC
Genetic Engineering
Molecular Marker
Analytical Instrumentation

Industrial Services

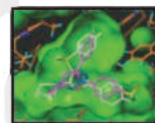
Formulation and Analytical Method Development

- ◆ Development of novel dosage form, transdermal drug delivery and iontophoretic system
- ◆ Preformulation studies and permeability assessment
- ◆ Cost-effective solutions for development of poorly soluble pharmaceutical ingredients
- ◆ Analytical method development and validation



Synthesis of APIs and NCEs

- ◆ Synthesis of compound libraries, APIs and drug metabolites
- ◆ Analytical method development and stress degradation studies of APIs and natural products
- ◆ 3D-QSAR and molecular docking facility
- ◆ Analysis of NCEs and purification



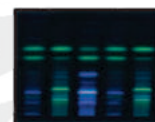
Pre-Clinical Studies

- ◆ Pharmacological studies
- ◆ Toxicity studies
- ◆ Pre-clinical pharmacokinetic studies
- ◆ In vitro cytotoxicity assay for various pharmaceutical drugs



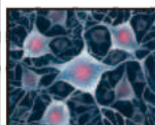
Quality Control and Quality Assurance of Herbals

- ◆ Identification, authentication and standardization of herbal drugs and polyherbal formulations
- ◆ Analysis of sterols from herbal drugs
- ◆ Development of phytochemical profiles (fingerprint) of medicinal plants
- ◆ Bioassay guided isolation of active marker compounds



Microbiology

- ◆ Custom based pharmacogenomic testing for different genes and drug metabolizing enzymes
- ◆ Evaluation of anti-bacterial, anti-fungal, anti-mycobacterial activity
- ◆ Microbial load testing
- ◆ Development of tissue cultures of medicinal and economically important plants



Bio-Incubator Facility

PERD Centre has established a fully functional bio-incubator facility to support 'start-up companies'. The ambient infrastructure and state-of-art instruments like FACS, Real time PCR, Fermentor etc. along with assistance from PERD will help them to commercialize their proof of concept.

Human Resource Development

Development of skilled personnel in various field of pharmacy and allied sciences. Hands-on-training workshops, summer training and dissertation programs, tailor made hands-on-training program for analytical instruments like HPLC, HPTLC, IR, LC-MS, PCR, Real-time PCR etc.



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