Editorial

Commencement. Caps, gowns, speeches, degrees - end of college. Bright new faces, anxiety, potential - commencement of a new semester. We are at a point where we have said our farewell to the last batch and welcome the new batches to BPHC. In either case, a new phase of life has begun for the students. It is a fitting time to begin a brand new edition of PROBE. PROBE has always brought you the happenings in the department and wherever Pharma BITSIANSs have been making a difference.

To make the freshers feel at ease, we have a special column with tips and tricks to surviving in college. We also congratulate and bid adieu to those who have graduated and are making their mark now in corporate, research and academia. In this issue, we have an interesting article on transhumanism. In the article, Ms Reshma talks about the human transformation to cyborgs and if that is a dangerous idea. We also have a motivating article about what does it mean by ‘success’. This issue also brings to you alumni articles. Learn about how BITS + Pharma is unique and ways to make the most of it. The regular PROBE columns – the fun page, research highlights and photo gallery await your eyes in this brand new PROBE issue.

We would be delighted to include articles from the freshers for the next PROBE issues. We encourage you to share your experiences as BITS newbies.

Wish you all an exciting semester!

Contents

<table>
<thead>
<tr>
<th>Skin Riddled with Cancer Mutations</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>How To Survive The First Few Weeks In College</td>
<td>3</td>
</tr>
<tr>
<td>LIST OF PUBLICATIONS FOR THE YEAR 2015</td>
<td>5</td>
</tr>
<tr>
<td>‘BITsian’ Tales</td>
<td>7</td>
</tr>
<tr>
<td>The Good Bacteria</td>
<td>9</td>
</tr>
<tr>
<td>3D PRINTING in the pharmaceutical industry</td>
<td>11</td>
</tr>
<tr>
<td>Evolution and the Brain</td>
<td>13</td>
</tr>
<tr>
<td>Department Highlights</td>
<td>14</td>
</tr>
<tr>
<td>Picture Gallery</td>
<td>15</td>
</tr>
<tr>
<td>PROBE Proverb</td>
<td>16</td>
</tr>
</tbody>
</table>
Skin Riddled with Cancer Mutations

-Preeti Kumari, PhD Scholar

Two-thirds of cancer cases are due to random mutations and not hereditary factors or risky behaviors, according to a new study. DNA mutations were mostly to blame for 22 of 31 cancer types that Johns Hopkins researchers studied, including leukemia, pancreatic, ovarian and bone cancer. It's unfortunately a matter of having bad luck, they said.

When someone gets cancer, people immediately want to know why? "They like to believe there's a reason. And the real reason in many cases is not because you didn't behave well or were exposed to some bad environmental influence, it's just because that person was unlucky. It's losing the lottery."

The other nine cancers studied — including colorectal, basal cell carcinoma and lung cancer related to smoking — were more due to heredity, carcinogens in the environment and behaviours. The scientists concluded that 65% of all cancers are because of random genetic mutations that happen when cells divide, and that more needs to be done about catching cancer "at early, curable stages," according to co-author Cristian Tomasetti, a bio-mathematician at Johns Hopkins.

Billions of skin cells carry dormant but corrupted DNA with the potential to turn into aggressive tumours. Until now it has been well documented that excessive sunlight can increase the risk of developing skin cancer including the lethal melanoma. But now scientists claim millions of people could be unwittingly harbouring deadly mutations left from exposure to UV rays years before.

The research from the UK's Wellcome Trust Sanger Institute has led scientists to warn human skin is potentially "riddled with cancer mutations". Professor Mel Greaves of London's Institute of Cancer Research said: "It is a vivid illustration of the silent mutational chaos from which cancer occasionally gets distilled and an insight into the very early development of cancer."

The research led by Philip Jones of the University of Cambridge, and Peter Campbell of the Welcome Trust Sanger Institute found a quarter of skin taken from healthy over 55-year-olds contained "thousands of cancer-causing mutations". They concluded this stemmed from exposure to UV sunlight with each cell containing the potential to turn dangerous. It suggests cancer cells can remain dormant in the body for decades after sunburn before erupting without any warning.

Dr Campbell explained that after initial genetic damage, cells divide to form rogue clusters which can then mutate further. These first cancer-associated mutations give cells a boost compared to their normal neighbours.

They have a burst of growth that increases the pool of cells waiting for the next mutation to push them even further.

We can even see some cells in normal skin that have taken two or three such steps towards cancer, "How many of these steps are needed to become fully cancerous? Maybe five, maybe 10, we don't know yet," Doctors and skin specialists have long warned of the dangers of excessive exposure to sunlight and the risk of cancer. Though not all cancers are life-threatening some can develop into malignant melanoma which is responsible for thousands of deaths.

With the long summer this year, many people will be thinking of topping up their tan by baking outside in the sunshine. But Dr Ross Perry, medical director of Cosmetics Skin Clinics, urged sun worshippers to be cautious in the outdoors. He warned to avoid long spells in the sun even when using protection creams which claim to have a high SPF value. He said: "The most common advice is not to get burned and be sensible in the sun with whatever sun cream you have used. Getting burnt is the problem and this can lead to skin cancer even when sun cream has been used. The SPF is only a guide and not an exact science so again the common sense approach is best, apply sun creams frequently and liberally and don't stay in the sun for prolonged lengths of time. Researchers said the findings reveal skin which otherwise appears and functions normally can contain billions of pre-cancer cells. It raises questions as to how they accumulate in the body and whether this happens more as we get older. Dr Jones and his team hope by finding and targeting mutations in these otherwise normal cells they will be able to come up with new treatments. They plan to extend the research to look at the differences in cells from people who have experienced high and low exposure to sunlight. Dr Jones said: "It seems we are well defended against these frequent mutations progressing to skin cancer and the odds of a clone turning into a tumor are low, but the most interesting question for future research is what is it that stops these growth advantaged clones from transforming [into cancer]?"
If life is a waste of time and time is a waste of life
Then let's get wasted and have the time of our lives

Welcome to college! Welcome to BITS Pilani. Confused where to begin?
How to begin? What to do and what not to do?

Here are some heart-to-heart tips on how to make the most of your first few weeks at BITS. Follow this until you get a next bigger dose at the Department Freshers’ meet.

1. **Keep your hostel room door open.**
   Not to be taken literally. Trust me, there are mosquitoes. And flies. And all sorts of weird looking insects you might not even have seen on Nat Geo Wild. An open door policy is the quickest way to get people to introduce themselves. Open door = friendly resident who wants to chat. People say “hi” as they move in and around the hostel. Don’t ignore them.

2. **Forget your BITSAT score ASAP**
   You are here. You will be here for a while. If you let yourself be defined by your BITSAT score, you are not getting anywhere. Every single person around you has qualified the BITSAT. The score holds no value now. It is just a number. It serves no purpose. Forget it. You will not even be putting it on your resume later in life. Nobody cares about it here beyond idle curiosity.

3. **The world is bigger than you think**
   There are going to be a variety of people, people from all parts of the country, different religions, social and economic conditions. You will be living together. You cannot escape them nor can they escape you. Grow up and be nice to everyone. You will learn more about parts of India in the hostel than you will in touring the country. Mingle. Talk to different people. It is always easier to befriend “your kind” of people. Don’t get caught in that. This is a chance to know new things and new people. Take it.
First Few Weeks In College

-Shubhmita, PhD Scholar

For the North Indians: Everybody from south of the Vindhyan is not a Madrasi. Telugu, Tamil, Malayalam, and Kannada are different languages.

For the South Indians: Not all North Indians have a superiority complex. North India is a very huge area. It is just wrong to generalize.

You, but mostly your parents, will have exceptional number of concerns. Your mom will be frantic about the laundry and while your dad will not stop talking about the importance of grades in the first semester. Listen to everyone. Be calm. Don’t panic. Understand the surroundings. Everything is manageable. Yes, you will be home-sick. That is why you need to talk to people around. You will hate the food. But with time, you will love to hate it. Everything else from books to exams to CGPA will get clearer with time. The BITS system is the most easy and flexible there is (you might want to rule out the registration process here; May the force be with you DTC folks). You will not be left out if you don’t buy the books as soon as possible or if you don’t memorize your time-table or if you don’t have a laptop yet. Give it time. You will learn more.

5. Don’t forget to live
Not just for the first few weeks. Enjoy the next 4-5 years. If you haven’t had the best first day or week in college, don’t worry about it! Just think, you’ll meet even more people tomorrow, and one of those people could be your new best friend! Go crazy once in a while. Date. Travel. Play. Have the best time of your lives.

THE TRICK IS TO
ENJOY LIFE. DON’T
WISH AWAY YOUR
DAYS, WAITING
FOR BETTER
ONES AHEAD.”

- MARJORIE PAY HINCKLEY
Research is also progressing towards integrating neural circuits with computer to fight many neurological diseases and to halt aging. Brain computer interface has several applications like environmental control, navigation in virtual mode, communication, grasp restoration and many more.

Transhumanism has its own pros and cons. In 'Inevitable Transhumanism', Prof. Al-Rodhan wrote: "The use of technologies to modify our emotions, our bodies and our neurochemical balances, is bound to undermine and alter the instincts that have developed over millions of years in the process of human evolution and was pivotal to our survival thus far. " Scientists state that this is against Darwin's natural theory of evolution as man engineers his own evolution which can lead to imbalance in ecosystem and exploitation of nature. Francis Fukuyama describes transhumanism as world's dangerous idea. There are countless other arguments surrounding transhumanism. These stretch from the belief that one should not play God, to the prediction that a transhumanist future would result in such enhancements only being available to the wealthy, whilst the poor would be left behind.

References:
Silicon Valley Is Trying to Make Humans Immortal—and Finding Some Success; BY BETSY ISAACSON

Brain–Computer Interfaces: A Gentle Introduction; Bernd Brajman, Brendan Allison, and Gert Pfurtscheller.
‘BITSian’ Tales
- Ashiff Shaik, BITS Alumni (2008-2012)

After hours of gazing at my laptop, I’m convinced that I’m better positioned to inform current batches about the importance of BITSian culture and learning. I completed my B.Pharm & M.Pharm from BPHC and I’m currently pursuing my M.B.A at IIM Calcutta. Pride swells in me as I pen this column because the “Pharma+BITSian” tag has given me a springboard advantage as compared to the rest. When others are busy crunching numbers & data, I’ve carved for myself a forte to advise CXO’s on healthcare issues globally. I wouldn’t hold it against anyone for not yet realizing the importance; trust me if you patiently read the article, you will have gained food for thought & it’s likely that you will end up choosing a career in Pharmacy.

‘India’—Land of new opportunities

Globally, businesses are rapidly evolving to become more connected & integrated, and India is poised to embrace new perspectives and challenge the status-quo-ante. In healthcare especially, there are new inroads to be laid both in Research & Industry. Witness the catapulting rise of Dilip Shanghvi (Founder: Sun Pharma) as India’s richest man after Ranbaxy’s successful acquisition. And for others who closely follow the stock market, witness the Biotech Bubble looming large over surging Biotech industry stock price & valuation. Recently, I had the opportunity to meet the founder of Dial Health, India’s first Health Exchange. Dial Health introduces technological convenience to India’s nascent healthcare services. Disruptive business models such as these are the brainchild of young entrepreneurs who have identified gaps in existing healthcare infrastructure & delivery system. On the research front, BITS’ research scholars push the knowledge frontier every moment to devise/develop better and affordable healthcare. It is recommended to take some time during weekends or post-classes to understand & witness few groundbreaking discoveries @ labs. One of our distinguished BITS’ faculties has recently co-founded a company dedicated to high throughput Drug Discovery. The emerging healthcare landscape in India rings a clarion call to the sharpest eyes and agile minds of the country, and in my opinion a “Pharma+BITSian” is in a better position to harness this global wave.

Leverage “Pharma+BITS-ian” advantage

The advantages accrued by virtue of the BITSian tag is well understood. Corporates in the industry value our talent and hard work. But what makes us truly BITSian; more importantly what makes a Pharma+BITSian so valuable….?

Struggling to make my mark amidst some of the brightest at IIM Calcutta, I have realized that classroom lectures & exploring my interest in cutting edge research at BITS and extensive reading have proven invaluable to differentiate myself and standout among the crowd. Deep reading equipped me with sufficient knowledge in healthcare domain to form/suggest ideas. While classroom learning & projects strengthen technical expertise; extensive reading about healthcare sector gives perspectives to reflect upon and ideas to improve. The diverse courses taught at BITS converge as business ideas in the real world. Illustration: Genetics+Biotechnology are the backbone of personalized medicine (PMx); Statistics is a critical aspect of Big Data Analytics and Business Intelligence which are employed in Clinical Data Monitoring & Predictive Genomics (thereby throwing open predictive therapy business model); Chemistry+Microbiology+Pharmacology is the backbone of Drug Discovery; Forensic Pharmacy is an integral subject in Healthcare Policy, Trade and Intellectual Property dialogue, globally & facilitates draft regulatory standards. It should suffice to say that every Pharmacy course has positive business relevance.

I suggest the current batches to take up these courses with interest and ideate extensively in private/virtual discussion forums. Such discussions often result in path-breaking ideas (imagine the creation of Google, Facebook), while also strengthening concepts. The open & experimental learning culture at BITS is unparalleled in India, which helps an individual develop in his strong areas while also provides opportunities to improve in his weak areas. Trust me when I say that not every student in India is privileged to experience the “BITSian advantage” and it is only the hard working & diligent BITSians who make the cut and rise above challenges to make history.
Few Interesting Reads to beef-up your knowledge bank!

The Politics of the Pharmaceutical Industry & Access to Medicines: World Pharmacy & India — Lofgren H
Freakonomics: A Roogues Economist Explores the Hidden Side of Everything — Steven D. Levitt & Stephen J. Dubner
Novartis v/s Union of India & Others — Internet articles
Indian Patent Act — Section 3(d); Section 84(1)

About Ashiff:

Ashiff Shaik is one of the students of the first B. Pharm. batch at BPHC. He continued into M. Pharm at BPHC after which he went on to join IIM Calcutta for his MBA. Currently a second-year student at IIM-C, Ashiff has been actively involved in placement activities being the student placement coordinator. Ashiff has closely worked with Ministry of Skill Development & Entrepreneurship (MSDE), Govt of India during his summer internship this year at Accenture Strategy Consulting.

The Good Bacteria

Did you eat your bacteria today? Yes, you read it right. Every individual needs to consume at least few billions of bacteria to maintain their digestive tract. There are two types of bacteria present in the nature: commensal bacteria and pathogenic bacteria. Commensal bacteria are bacteria which humans have a mutual relationship with. Pathogenic bacteria are bacteria which are harmful to human health. In the human body, the digestive tract is a hub for both commercial bacteria and as well as pathogenic bacteria. Commensal bacteria, also called as micobiomes (Probiotics), fight against the pathogenic bacteria, toxins and helps in digesting the food materials. Commensal bacteria like lactobacillus, bifidobacterium and other genus of bacteria reside in the digestive tract. The word Probiotics is coined from Latin where pro means ("for") and in Greek ("biotic") means life. This term is well-known in the western countries than the Asian countries.

With the increasing improper food habits among people, and the resulting loss of such bacteria in the gut is causing various digestive disorders. According to WHO, majority of the world population is facing digestive disorders among which IBS and diarrhea are more prevalent. Recent statistics from the International Foundation for Functional Gastrointestinal disorders show that IBS worldwide prevalence rates range from 9–23%.

Many clinical trials have proved the efficacy of probiotics in treating various disease conditions in digestive, respiratory, immune and Oral Care. Probiotics are more beneficial and also gaining popularity as they don’t have any side effects like chemical medications. Recently, few researches in the Europe also proved that probiotics also have effects on improving cognitive functions. Probiotics are being regulated as Food supplements in various geographies like US and in some parts of Europe. In Japan, probiotics are classified under FOSHU food category which include peptides and proteins, n-3 and n-6 fats, and oils, sugar alcohols, oligosaccharides, and lactic acid bacteria.

To supplement the probiotics, there are now prebiotics. Prebiotics are the non-digestible food ingredients that beneficially effect the host by selectively stimulating the growth or activities of bacteria in the digestive tract. Inulin, Fructo-Oligosaccharides (FOS), Galacto-Oligosaccharides (GOS) are few which fall into the category. Combination of probiotics and prebiotics are called as Symbiotics. Symbiotics show synergetic effect than the individual probiotics and prebiotics, by increasing the bacterial cells count in digestive tract and also supporting the bacterial cells which are already in the digestive tract.

Keep your tummy healthy, gorge on probiotic foods!
LIST OF PUBLICATIONS FOR THE YEAR 2015


32. Sajel Begum Ahil, Senthil Mahbuban, Shani Ameer Basha, Rameesh Babu and Katregadda Suresh Babu "Comparative pharmacogentic evaluation and HPTLC analysis of petals of sphylo and non-sphylo saltwater cultiva" Internation Journal of Food Properties, 2015, 18 (11), 2561-2570. DOI: 10.1080/10942912.2014.988722


3D PRINTING in the pharmaceutical industry

- Shubhmita, PhD Scholar

If 3D printing doesn’t excite you, you are not thinking bigger. It is the next BIG thing. 3D printing might help us live longer. With bio-printed organs, the dream of an immortal man is not far-fetched. Jack Uldrich, a technology trend expert says “We’re already printing skin, kidneys, a replica of a beating human heart. If a person loses a limb, we’ll be able to print, layer by layer, a replacement. It’s theoretically possible.”

The Pharmaceutical industry is not untouched by this new technology. With the shift from mass manufacturing to personalized medication, techniques like 3D printing will have to be exploited. And the work has already begun. Researchers at the UCL School of Pharmacy, University College London have developed a technique using 3D printing referred to as “hot melt extrusion” (a technique already used in the pharmaceutical industry to make polymer blends of drugs that are not very soluble) to produce many odd shaped medications which are quite difficult to manufacture using standard production techniques. The true advantage of hot melt extrusion is that such odd shaped medications demonstrate improved kinetics for drug release. The trouble with this technology is finding the right materials, says Mohamed Albed Alhnan, a pharmaceutical scientist at the University of Central Lancashire in Preston, UK, who is looking at a similar approach. So far Alhnan has printed the steroid prednisolone in differing doses and an anti-asthmatic drug theophylline.

Since we know that some patients require medications that are faster acting, while others need medications to be released more gradually over a longer period of time, 3D printing offers one the ability to customize medications for individual patient needs.

The versatility of 3D printers is already being used to give some drug creators unprecedented control over their product’s shape and structure. One innovator in this field is Aprecia, which recently became the first pharmaceutical company to release a 3D printed product. Its ZipDose oro-dispersible tablets are built up from structured layers of powdered medication, printed and bound together with an aqueous fluid. The result is a porous matrix that dissolves completely within seconds of contacting liquid, even when the format is used for high-dose products.

Researchers are also keen to develop ways of fabricating active pharmaceutical ingredients (APIs) using printers. Scientists working with the Howard Hughes Medical Institute have developed a new 3D printer that can synthesise 14 different classes of small molecule using a set of chemical building blocks. While it is currently more suited to producing rare molecules for use in drug discovery, the technology could be used to produce a wide range of APIs on demand for use in medicine.

As 3D printing capabilities advance further, cost of the technology falls, quality, safety and regulatory issues are addressed, the contract manufacturers and pharmaceutical companies that experiment with these 3D printing innovations are likely to gain a competitive edge. Drug printing at home may not be available soon, but a revolution in drug manufacturing is definitely around the corner.
What is Success?
- Shubham Dwivedi, PhD Scholar

We relate success with the achievement of a particular aim. A lot of us would believe that being a billionaire would be the same as being successful. But, success is continuous process which never ends. Every person in this world is successful in one or the other way. The definition of success changes from time to time. If we look at our past, we will find that we have achieved a lot but we don’t count it as being successful. At school, getting good grades was a success, after which admission into well-known university was a success, after which a well-paying job could be a success and the list goes on. Overall, what is the need of time becomes the definition of success for us. We all are successful in some manner, the problem is we don’t believe so, for we don’t understand that success is not an end-point. Once we believe that we are being successful nothing can stop us from achieving ‘success’ with changing definition and demands of time. You see, success is a very personal thing. What drives one person may be radically different for another. And understanding how others measure success can help you better understand your own definition.

Is it effort, luck (which could be defined as part of fate), what you know, who you know, or fate that decides whether you succeed or fail? We do not know. Maybe luck exists, maybe it does not. Choosing to value effort over fate will serve you well throughout your life. When striving to obtain your dreams, the regret should never be failing to put in maximum effort.

To grow up a tree we need seeds, but the journey of seed to become a green tree loaded with fruits and leaves isn’t easy. The seed has to face the unbearable situations but yet it grows. After being buried into the soil, it pushes itself beyond limits to break-free, encounters heavy rains and scorching heat year after year. A seed bears everything to grow into a tree. But, that would not be possible without fertile land. Without fertile land no seed can become a tree. The dreams of a person are similar to seeds, those dreams (matter) in which one wants to be successful. The fertile land for these seeds (dreams) is your will power and faith. Heavy rainfall, frosty winter, blazing summer and the pain of being buried is quite similar to the problem we face in our life while moving towards becoming a tree (successful). There is a saying:

“Whatever human mind can conceive it can achieve.”

Fertile land is simply willpower and belief. If you believe you can do, you will definitely find out the way. Sadly, right from our childhood we are bound to boundaries, most of us being instructed about the things we can’t do. We are forced towards following the conventional ways because no one has tried the other ways. Being a child we have many dreams, but with age we assume those were just childish dreams and aspirations. The truth is, the people and our surroundings make our dreams ‘in-fertile’. Keeping that child alive within you is very necessary to bloom into a (successful) person you wished to be. Just like the circus calf Raja, who could not break the rope he was tied to and lost all the will, desire, and conviction that the rope could be broken even when Raja turned into muscular bull, we stop trying new things at a very early age because we have been demonstrated that it would not work.

Finally I would conclude my words by defining the key to success as willpower and self-belief. Make your land fertile, the world is waiting to witness new legends. Thinking is worthy job but must be merged with appropriate action, so that it may result in success. Live life in the only way you want to live in your dreams.

‘Dream is not that which you see while sleeping it is something that does not let you sleep.’ - Dr. A.P.J. Abdul Kalam

"How can a three-pound mass of jelly that you can hold in your palm imagine angels, contemplate the place in the cosmos? Especially awe-inspiring is the fact that any single brain, including yours, can be billions of stars billions of years ago. These particles drifted for eons and light-years until gravity and chance brought them together here, now. These atoms now form a conglomerate-your brain-that can not only ponder the very stars that gave it birth but can also think about its own ability to think and wonder about its own ability to wonder. With the arrival of humans, it has been said, the universe has suddenly become conscious of itself. This, truly, is the greatest mystery of all.

How has the brain evolved over the years from what it was in single-celled organisms to early mammals to what it is in human beings today? Because the brain does not fossilize, it has been difficult to trace its evolution. But there have been recent advances in technology which have enabled scientists to estimate the size of the brain in fossils using CT scans to look at brain cavities. This gives an estimate of the relative sizes of various parts of the brain.

Apart from this increase in size there was also an increase in interconnectivity, which allowed for increased control of mind and abstraction. The primates started living in groups and the resulting social interactions are considered to be a very 14 million years ago. Further expansion of the brain began approximately 2.5 million years ago, for reasons which are not food which may have facilitated brain growth. Therefore, a virtuous cycle involving our diet, culture, technology, social. One of the most interesting and complex feature of human beings is language. There are many interesting theories about "Human Consciousness". He begins with an experiment. Imagine that in front of you there is a bulbous ameba-like blob, and you have to decide which is which. 95-98 per cent of respondents picked the blob as boba and the jagged

What this shows us is that there is a pre-existing, non-arbitrary translation between the visual appearance of an object and the non-arbitrary cross-activation between the visual area in the fusiform and the Broca's area in the front of the brain. Evolution never stops. But recent studies have shown that in the past 10,000 to 15,000 years the average size of the human brain has remained stable. In our general mental abilities, and as of now there is no way of knowing for sure.

References
http://www.scientificamerican.com/article/how-has-human-brain-evolved/
and the Brain

Shreya Jain, B. Pharm

beautifully about the complexity of the functions that the brain performs, and even question its own existence. It is made up of atoms that were forged in the hearts of stars billions of years ago.

Recent studies have shown that even 850 million years ago, the cells within early animals had the potential to communicate with each other using electrical impulses and chemical signals. Some cells then became specialized for carrying messages and developed axons to carry messages over long distances and deliver them at synapses. In other animals, groups of neurons began to appear and gave rise to a primitive brain-like structure and a central nervous system. How this happened is still not very clear to researchers, but it was an important landmark in the evolution of the brain as we see it today. This brain-like structure was found in primitive fish-like creatures which resemble the lancelet, a jawless filter-feeder. The brain of the lancelet barely stands out from the rest of the spinal cord, but specialized regions are apparent: the hindbrain controls its swimming movements, for instance, while the forebrain is involved in vision. Various "genetic accidents" paved the way for the evolution of more complex brains and enabled different brain regions to express different types of neurotransmitters, which then allowed more innovative behaviors to emerge. The first mammals that appeared approximately 200 million years ago already had a small neocortex which allowed for a more complex and flexible mammalian behavior. Studies of fossil scans have revealed that further evolution happened with an increase in size of the olfactory bulb, followed by regions of the neocortex that map tactile sensations, which was then followed by visual regions.

movements based on inputs to the brain. This also helped in developing processing skills, reasoning, overall intelligence and important contributing factor to the enlargement of the frontal cortex. These are characteristics of the apes that lived not yet clear to researchers, Some say that as the primates began butchering animals, they had access to more nutritious relationships and genes led to the modern human brain coming into existence in Africa about 200,000 years ago. About how it evolved, but I will mention one here proposed by V.S. Ramachandran and explained in his book 'A Brief Od Jk' shape and right next to it is a jagged shape (as shown in the figure). One of these shapes is boubu and the other is shape as kiki.

(represented in the fusiform gyrus) and the auditory representation (in the auditory cortex). Now similarly there is also at generates programs which control how we move our lips, tongue and mouth. Also, there is a pre-existing cross-activation, S. Ramachandran illustrates this with an example from Charles Darwin wherein he noticed that when people cut some- of the fingers. These three types of cross-activation acting together produced a synergistic effect, which finally led to, but to talk about that requires a lot more space than one article here.

man brain has shrunk by 3 or 4 per cent. This could either mean that our brain's wiring is more efficient now or it could
# Department Highlights

## Thesis Submissions

<table>
<thead>
<tr>
<th>Scholar</th>
<th>Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Mahibalan S</td>
<td>Prof. A. Sajeli Begum</td>
</tr>
<tr>
<td>Ms. Khan Rukaiyya Sirajuddin</td>
<td>Prof. A. Sajeli Begum</td>
</tr>
<tr>
<td>Ms. Reshna Chowdary Aloakam</td>
<td>Prof. P. Yogeeswari</td>
</tr>
<tr>
<td>Mr. Manoj C</td>
<td>Prof. D. Sriram</td>
</tr>
<tr>
<td>Mr. Praveen Kumar Mandapalli</td>
<td>Dr. Vamsi Krishna Venuganti</td>
</tr>
<tr>
<td>Mr. Venkat Koushik Pulla</td>
<td>Prof. P. Yogeeswari</td>
</tr>
<tr>
<td>Mr. Vijay Soni</td>
<td>Prof. D. Sriram</td>
</tr>
</tbody>
</table>

## PhD Degrees Awarded

<table>
<thead>
<tr>
<th>Scholar</th>
<th>Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Aditya N</td>
<td>Prof. Punn Rao Ravi</td>
</tr>
<tr>
<td>Ms. Therese Patrisha J</td>
<td>Prof. P. Yogeeswari</td>
</tr>
<tr>
<td>Mr. Pedgaonkar Ganesh Sitaram</td>
<td>Prof. D. Sriram</td>
</tr>
<tr>
<td>Mr. Madhu Babu Battu</td>
<td>Prof. P. Yogeeswari</td>
</tr>
<tr>
<td>Mr. Venkata Saketh Sriram D</td>
<td>Prof. P. Yogeeswari</td>
</tr>
<tr>
<td>Mr. Rahul Vats</td>
<td>Prof. Punn Rao Ravi</td>
</tr>
<tr>
<td>Ms. Shalini Saxena</td>
<td>Prof. D. Sriram</td>
</tr>
<tr>
<td>Mr. Jean Kumar</td>
<td>Prof. D. Sriram</td>
</tr>
</tbody>
</table>

## Congratulations!!

- **Mr. Ram Kumar Mishra** - Senior Associate, Capita Healthcare Pvt. Ltd., Mumbai
- **Mr. S Ganesh** - Post-doctoral fellow at IIT Bombay
- **Mr. Pedgaonkar Ganesh Sitaram** – Scientific writer II at Novartis
- **Mr. Venkat Koushik Pulla** - Post-Doc Research Associate, GVK Bio, Hyderabad
- **Mr. Madhu Babu Battu** - Research Associate, ChemVeda Pvt. Ltd., Hyderabad
- **Ms. Rukaiyya Khan** - Scientific writer II at Novartis
- **Ms. S Mahibalan** - Research Scientist, ROHA Dyechem Pvt. Ltd., Mumbai
- **Ms. P. Brindha Devi** - Assistant Professor at Vels University

## Welcome!!

**Name of Candidate:** Rimpy Diwan  
**Supervisor:** Prof. Punn Rao Ravi  
**Area of Research Work:** Design and Pharmacokinetic evaluation of Nanaocarriers for delivery of an anti-hypertensive drug  
**Education:**  
B. Pharm (2007-'11) Department of Pharmaceutical Sciences, Maharishi Dayanand University, Rohtak, Haryana  
M. Pharm (2011-'13) Pharmaceutics- College of Pharmacy, Pt.B.D.Sharma University of Health Sciences, Rohtak, Haryana

**Name of Candidate:** Mr. Himanshu Bhatt  
**Supervisor:** Dr. Swati Biswas  
**Area of Research Work:** Development for sustained release injectable formulations  
**Education:**  
B. Pharm (2006-'10) Poona College of Pharmacy, Pune, Maharashtra  
M. Pharm (2011-'13) Maliba Pharmacy College, Uka Tarsadia University, Bardoli, Gujarat
इंतजार

इंतजार हो, तेरा अब इंतजार हो
दिल की बुखारी, दिल बेकार हो
धाके के समय तुमसे यु रहे झुका
है अजीब आँख, ऐसी सुबह
बेकार नहीं, दिखे तू हर जगह
रौसनी की घमंड, आंखों में धक्का नहीं
बेकार हूँ, तेरे इंतजार में
अंजन सामने तुमसे मे कह सका
चाहे भी तुमसे भी अलवू है अंतर

अमरदीप सिंह

अंतर = INPERISHABLE
बेकार = SELFLESS
आलसि = 1° RAYS OF SUN
“Failure will never overtake me if my definition to succeed is strong enough” - Dr. A.P.J. Abdul Kalam

“Somewhere, something incredible is waiting to be known.”
- Carl Sagan

"Research is what I'm doing when I don't know what I'm doing"
- Wernher von Braun

“Highly organized research is guaranteed to produce nothing new.”
- Frank Herbert, Dune

“Science is the best way to satisfy your own curiosity for the governmental account.”
- Soviet physicist Lev Artsimovich

“A philosopher once said "It is necessary for the very existence of science that the same conditions always produce the same results." Well, they do not.”
- Richard Feynman