de novo

2010

Editorial Board

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From the Editor's Desk

The year 2009-2010 was quite eventful for the Nirma University, in general, due to the impending visit of NAAC members and for the Institute of Science, in particular. The advent of monsoon of 2009 marked a new beginning for the institute as it shifted to its own new building in the Nirma Campus. This was also the time when Prof. G. Naresh Kumar, Head, Department of Biochemistry, M.S. University, Baroda, took charge of the institute as its director with which a new era dawned in its history.

The introduction of the new course of M.Sc. (Microbiology) and an increase in the number of student intake to twenty in all the three M.Sc. courses, viz. Biotechnology, Biochemistry and Microbiology, reflected in the population of newcomer students of semester I and clearly indicated the imminent and rightly chosen time for the relocation of the institute.

The year 2009 shall also be remembered in the history of our country as this was the year in which Dr. Venkatraman Ramakrishnan, a scientist of Indian origin, received the Nobel Prize in Chemistry for his study on the structure and function of the ribosome. An article on the life and journey of Dr. Ramakrishnan, by Ms. Gayatri Iyer, is the highlight of this issue and I hope shall make an interesting reading. The front cover page of the magazine, designed by Ms. Neha Trivedi and Ms. Suhani Palkhiwala, is a tribute to several Nobel laureates in the field of science. They can be identified clockwise from right as Elizabeth Blackburn (Physiology/Medicine), Jack W. Szostak (Physiology/Medicine), Willard S. Boyle (Physics), Carol W. Greider (Physiology/Medicine), Ada E. Yonath (Chemistry), Charles K. Kao (Physics), George E. Smith (Physics), and Thomas A. Seitz (Chemistry). The centre of the collage is occupied by Dr. Venkatraman Ramakrishnan (Chemistry).

A slight delay in the second issue of De Novo 2010 has given me the opportunity to introduce three of our new faculty members who joined the institute in May-June 2010, viz. Dr. Sonal Bakshi, who is a Ph.D. from Gujarat University and was working as a scientist in the Gujarat Cancer and Research Institute, Ahmedabad, for the last 23 years; Dr. Mili Das, who is a Ph.D. from The Saha Institute of Nuclear Physics, Kolkata and was a DBT postdoctoral fellow for five years at the Indian Institute of Science, Bangalore; Dr. Amee Nair, who is a Ph.D. from Cochin University of Science & Technology.

I hope the readers will enjoy the second issue of the magazine and are requested to give suggestions, which they feel, can lead to a further improvement in De Novo.

DR. SARIKA SINHA

Assistant Professor

Institute of Science

Message from the Director

I am glad that the second issue of *De novo* of Institute of Science has come with newer format. This is in resonance with the spirit and dynamism gaining in the recent time. The new course of M.Sc. Microbiology brought new flavors to the academic and cultural environment. The Institute of Science Advisory Committee has initiated a mentoring by the recommendations. This year had seen the vibrancy of different academic activities with the talks by several eminent scientists from national and international research and academic organizations. Foundation Day Programs, Immunology Lecture series and seminar on "Frontiers of Modern Biology" have not only enthused the young students but also made an impact on the academic activity in the state.

Biological systems rejuvenate the aesthetic, intellectual and philosophical emotions with their enigma and beauty. *De novo* is an outcome of the diversity of feelings evoked in the environs of the young students and faculty. I congratulate all young minds for their enthusiastic contributions to this issue and hope you all enjoy reading the issue.

PROF. G. NARESH KUMAR

Director,

Institute of Science

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Foundation Day celebrations
September 4, 2009

Neha Trivedi, M.Sc. Biotechnology,
Semester II, (2009-11 batch)

The Institute of Science celebrated its foundation day on 4th September, 2009. On this auspicious occasion, two eminent research scientists, viz. Prof. K.K. Rao from I.I.T. Bombay and Prof. B.J. Rao from TIFR, Mumbai, were invited for special lectures. Other guests included Dr. Pankaj Shah, Director, Gujarat Cancer & Research Institute, the chief guest and Sri Ambubhai Patel, Vice-President, Nirma University.

The programme commenced with the prayer followed by a welcome speech by the director of ISNU, Prof. G. Naresh Kumar who gave an overview of the institute and the newly constructed premises. This was followed by addresses from the invited guests, Sri Ambubhai Patel and Dr. Pankaj Shah.

After a short tea break, the programme continued. The pre-lunch session included presentations from Prof. K. K. Rao and Prof. B. J. Rao which were fascinating. The topic of Prof. K. K. Rao's presentation was "**Epr and Swarming Motility in *Bacillus subtilis*"**. Prof. B.J. Rao's presentation explored an innovation in the world of luminescence and was entitled "**Molecular mechanism of the Ultraviolet light mediated apoptosis-like process in *Chlamydomonas reinhardtii*".**

A second lecture was delivered by Prof. B. J. Rao in the post lunch session. He also discussed some aspects of genetics and biotechnology about which there is little knowledge, viz. telomeres.

The lectures were followed by interaction between the scientists and the students.

“Attitude and Right Thinking”- that makes all the difference..

Suhani Palkhiwala, M.Sc. Biotechnology,
Semester II (2009-11 batch)

As Napoleon Hill said in his book: (Think and Grow Rich) "A burning desire will mow down all obstacles" If you desire something strongly enough, you will find a way to obtain it. The trouble with most people is they don’t know what they want.

When I was a child, I would take a magnifying glass and hold it over an object, while the sun was shinning. It would burn a whole in almost any material. However, if we kept moving the glass it would not burn anything. The same rule can be applied to our lives. We must decide what we want and apply all of our effort to achieving it.

Success comes to those who are success conscious. If you think successful thoughts you will attract success and if you think defeat and poverty that is exactly what you will attract. See, our thoughts are like magnets. We become what we think about most of the time. So, one can see why success has nothing to do with anything outside of us. It has everything to do with our thoughts.

And that’s exactly what I have tried to explain. Let’s take an example:

What does a great car on the road make you think? Envy at the guy behind the wheel and the disparaging thought that it must have been bought with ill-gotten wealth? Or, perhaps it’s great, but is far beyond me? Or, perhaps, I will drive a beauty like that one of the days.

If you are thinking like the first guy, then you are just yet another person who only can crib and be unhappy about things. If you are thinking like the second guy, you do not have self confidence and are not sure about your abilities. But, if you are thinking like the last guy, you are aiming and willing to work towards it. Indeed only such people are likely to get that kind of chance. The focus of others is elsewhere and they are bound to pound the pavements for the rest of their live, without ever courting success.

The entire advertising industry knows for certain that the public behaves based on their thoughts. So if they can manipulate our thoughts, they can sell whatever product they are advertising. You can avoid all these by knowing how to think right. The people deserve to know the truth and it is your duty to spread the truth. If you own a business you can use the truth and still be successful at the same time without resorting to manipulation.

People may try to control their emotions or change them as they see fit. But behind the emotion lies a thought pattern. You may want to change your thinking if you want to change your emotions. If you want your business to improve, you should change your emotions and way of thinking in order to be able to think right. You can have success through right thinking in business or in everything that you do.

Right thinking is different with positive thinking and negative thinking in a way that right thinking represents the truth and the reality. Positive thinking involves a state of mind where everything is always achievable and possible while negative thinking involves always failing in goals. Positive and negative thinking are like optimism and pessimism, respectively. Both are extreme opposites. Right thinking however is the reality between the two. It is better to have right thinking in your goals since you become flexible when the outcome is good or bad. Right thinking is perfect when you have a business. You bring truth to your customers and you accept the reality of the success or failure of your product. But ultimately, you reap success through right thinking by fulfilling your moral obligation of not fooling the public.

Everyone knows the children's song "If you are happy and you know it...? One verse says "If you are happy and you know it then your face will surely show it." As odd as it may appear, capitalizing on happy thoughts in your everyday dealings is a most promising way to represent yourself.

Consider the presentation that features a less than apt speaker who will drone on for hours on end about a research paper or even a topic only to see a mass exodus heading for the exit doors as soon as it is polite and proper to do so. Similarly, a complete novice may give the same presentation but does it with an infectious gusto, a winning smile, a few jokes to lighten things up, and in the end one can see people discussing about the topic and not leaving the room with dull and drooped faces. People understood what you had to say only because your attitude towards presenting was what made the difference.

In many ways it is your personal attitude that sets the tone for your interactions and knowing this fact will communicate to you the urgency to be watchful how you present yourself.

Capitalizing on happy thoughts will obviously not only help you during the presentation of your career as a student but it will also help you in your day to day interactions. Whether you are dealing with a vendor, client, consumer, or potential distributor, your ability to keep negative thoughts, bad attitudes, and overall destructive habits at bay will go a long way to ensuring that your business is attractive to all who take a look at it. Knowing of the importance that a positive thought and good attitude has on your different relationships provides the incentive needed to pull your self together.

Dreaming to succeed is the beginning of an adventurous journey. A positive attitude is the spark which sets vehicle moving in the right direction. Nowadays, the right kind of attitude is one of the most vital components of job requirements of the top notch employers. They have belief that they can train the new incumbents the way they crave but the pre-requisite is the right kind of attitude. The aspirant has to possess learning and optimistic attitude. He has to have a big dream, conviction and courage to do efforts to realize his dream with conviction.

Someone has rightly said, there are two types of people, some who bring happiness WHEREVER they go, and some bring happiness WHENEVER they go!
With the right kind of attitude one should belong to the first category and unwittingly would work as magnets attracting many friends, well wishers and off course employer. Imbibe this secret of success and attract everyone with your charm of optimism, visionary spirit, and courageous endeavors. Make yourself employable forever with the enriched spirit of right attitude and outshine with your grandeur wherever you go.

There is a proverb 'It's your Attitude and not your Aptitude that determines your altitude'

And so from now on have a right attitude and the world will definitely be an easier place to live in...

ಔ "A strong, positive self-image is the best possible preparation for success."

-- Joyce Brothers

Need for thoughtful use of resources in science laboratories

Mr. Vijay Kothari,
Assistant Professor, Institute of Science

Science is a costly affair. Scientific research requires considerable investment for building fine laboratories, purchase of sophisticated instruments, chemicals, hiring skilled persons, etc. This article discusses the need for cultivation of a habit among science people of thoughtful use of available resources.

Most countries in the world hold their scientists in high regard. Governments release considerable portion of budget for scientific research and development. Therefore it becomes duty of every person working in the field of science to make fair use of the public money. Often students in laboratories are found to make wasteful use of resources like electricity, gas, water, etc. They need to remember that once wasted –be it electricity or chemical– things can not be gained back. As it happens no person is to pay from his personal pocket for laboratory losses, so few of the laboratory people develop the sinful habit of wasteful use of chemicals. As everybody's property is taken care of by nobody, though it is used by everybody, soon the costly laboratory apparatus begin to deteriorate.

Things as trivial as- closing the bottle of a chemical after use, cleaning of lab apparatus after their use is over- are not taken care of, which creates problems for the next user, and diminishes the overall performance of the lab. Students must be trained in a way so that they consider water or gas not merely as a commodity, but as a national property. They must be made to develop a sense of belongingness to their lab or institute, and then only they will make sensible use of laboratory property. It is also essential to punish them who are found to be careless in their attitude towards laboratory resources, which will set example for others. When the need for thoughtful use of resources in science laboratories will be understood well, it will certainly help in converting students into responsible citizens as well as responsible scientists of future.

#This article is a reproduction of author's own work published earlier on articlesgratuits.com.

ॐ "Most people who succeed in the face of seemingly impossible conditions are people who simply don't know how to quit."

-- Robert Schuller

Childhood Memories

Abhishek Mandal, M.Sc. Microbiology,
Semester II (2009-11 batch)

Days of childhood, essence of my life
The longer I grow, the larger my strife
Standing on a beach, remembering my past
Trying to recollect, those memories I've lost
When life meant nothing but too much fun
I spent whole days with my dear ones
Not silver, jewels, neither gems nor gold
I want nothing but my childhood to hold
Those were the days when world looks bright
And everything for me on the height of delight
Naughty feelings, care-free life and bath in rain
Were the chief activities of what I contained
Those days certainly prized possession of mine
When moon smiled at me and stars used to shine
Give me my childhood and take my adult
And I won't care about the religious cult.

Some Thoughts From Books

Dhara Hathiwala, M.Sc.Biochemistry,
Semester II (2009-11 batch)

The funniest characteristic of human beings is contradictoriness. We are in such a hurry to grow up, and then we long for our lost childhood. We make ourselves ill earning money, and then spend all our money on getting well again. We think so much about the future that we neglect present, and thus experience neither the present nor the future. We live as if we were never going to die and die as if we had never lived.

- From Paulo Coelho's *Like the flowing river*

Rarely do we realize that we are in the midst of the extraordinary. Miracles occur all around us, signs from God show us he way, angels plead to be heard, but we pay little attention to them because we have been taught that we must follow certain formulas and rules if we want to find God. We do not recognise that God is wherever we allow Him/Her to enter.

- Paulo Coelho

One doesn't love in order to do what is good or to help or to protect someone. If we act that way, we are pursuing the other as a simple object, and we are seeing ourselves as wise and generous persons. This has nothing to do with love. To love is to be in communion with the other and to discover in that other THE SPARK OF GOD.

- Thomas Merton

Social Work Camp

Organized by the Institute of Science,

Nirma University

Donna Elizabeth Sunny, M.Sc.Biotechnology,

Semester IV (2008-10 batch)

A social work camp was organized by the Institute of Science on 1st April, 2009 by a team comprising of 8 students (Ms. Donna Elizabeth, Ms. Dolly Gajaria, Ms.Rekha Yadav, Ms. Sonal Mundhra, Mr. Omkar Panchal, Mr. Mitul Vakani, Mr. Bandish Kapadia and Mr. Ankit Jain) and two faculty members (Prof. L. J. Parekh and Dr. Sarika Sinha).

The camp was organized with the help of Shri Kanak Dave, Chief Coordinator, Students' Welfare, Nirma University, at **Manthan Apang Kanya Seva Sankul, Hajipur village, Distt. Gandhinagar, Gujarat.**

Manthan is located in the village Hajipur, which is situated at a distance of about 35 kms from Ahmedabad and is well connected with road.

It is a multi-faceted organization, a home away from house, created to care for and meet the needs of physically, mentally, socially and spiritually challenged girls, who are deprived of the family love & care.

The main goal of **Manthan,** amongst many; is to provide such physically and /or mentally challenged girls the opportunity to acquire education, self respect; and develop themselves in a nurturing environment slated to provide family love.

The founder of Manthan, Ms. Niruben Raval, established this independent rehabilitation centre for girls and provided them the HOME away from their house.

This institution is able to give these girls not only mothers love and opportunities to enjoy their childhood days but also provides relief from the mental and physical pressure which is experienced by any handicapped person from their families, society and public in general, especially in schools from the co-students, and more so in case of girls.

Survey done by the team at Manthan during the social work camp

In this camp a clinical **survey of hemoglobin level and blood group identification** was done covering a total of 125 inmates of the institution.

The inmates belonging to the age group of 8 to 40 years were examined.

Only 2 of the examined individuals were found to have rare blood group. However, the percentage of anemic individuals was considerable in every age group with the minimum of 42% in the age group of 11-15 years.

Conclusion

It was indeed a knowledge gaining event and a very touching experience for the entire team, especially the students.

The staff members and the inmates of **Manthan Apang Kaniya Seva Sankul** were very cooperative and helpful.

The Team would like to express its gratitude to the university for providing it with all the facilities for successfully undertaking this social work task.

A Billion & Still Counting....

Kriti Shah, M.Sc. Biochemistry,
Semester II (2009-11 batch)

India today has well over a billion people who account for about 20% of the World's population and considering that we have in those 1 billion, the Tamil Heroines, we also account for about 30 % of the World's weight. Take a look at these figures:

Every 1.2 seconds a Child is born in India, the fastest in the world.

Every year we add about 25 million people i.e. a complete Australia and Malaysia.

We have only about 2.5 % of the World's available land area and even lesser of the available water resources.

It does not take complicated maths to do the sums. We have a ministry for Information and Broadcasting, which supervises the working of Doordarshan, whose outstanding levels of tedium play a direct role in increasing the fertility of couples, Couples, who are so bored that for entertainment they actually read the Software license agreements which pop up while installing pirated software and have a hearty laugh together thereafter ("Ha..Ha", it goes). We have a ministry for Sport and Youth headed by a 78 year old person whose own youth has served time for anti national activities i.e. sporting ridiculous haircuts in the 1990s movies like "Saajan" and "Thanedar" .But we do not have a Ministry for Family Planning (it is clubbed together with the Ministry of Health) for an issue that is clearly a more grave emergency than Doordarshan (though it is debatable)

India was the world's first country to institute a government sponsored program for family planning.

As usual, the 'democratic' approach was and still is a bit too conciliatory. A bit like Sushma Swaraj, preaching the virtues of abstinence to control AIDS. Abstinence is something Vishwamitra's mom also tried telling him, when Menaka was doing an item number under Indra's direction. I could imagine the dialogue

“Vishu!!!, come back here. How many times have I told you to abstain?”

“But Mooo..m, she is Menaka. Miss Urdhwaloka 5000 BC. Can’t I at least just talk to her?”

“No... at your age you must focus on Tapasyas, Yagnas and funny hairdos”

But Vishu obviously did not listen and the world got a sneak peek into the creature that man is. i.e. the World with the exception of Sushma Swaraj. For, Ms Swaraj was convinced that rather than sex education and mandatory HIV testing for marriages, a billion Indians could easily achieve what Vishwamitra could not.

Moral of the story: Purely conciliatory approaches do not and will not work in India. The same hypocritical naiveté has characterized the family planning program. While conciliatory approach is obviously ‘democratic’, no such planning works without a carrot and stick approach i.e. Incentive for limiting family size smaller than 4 and penalties for going beyond. The penalties need not be jail terms, Kumar Gaurav movies would do just fine. But penalties are needed...may be in terms of a higher income tax, or less preference in recruitment or promotions. Before the communists and rent-a-cause socialists come out with daggers drawn that this is non-democratic and unconstitutional, let us take a look at the spectacular underperformance of the democratic approach. Even if right now, every couple restricts itself to 2 children, we would still overtake China in another 15 years with even lesser resources to handle so. If these conciliatory approaches would have really worked, then we need not have any penalties even for tax avoidance, drug trafficking, etc. Sushma Swaraj would suit fine.

Solution to this problem itself directly would ease some of the related problems if not solve them altogether, some of these being urban overcrowding and squalor, environmental degradation, unemployment etc but no political party deems it fit to enforce population control. I guess “control” and “politics” do not really go together. If the right to education, right to employment and the right to mention Mother Teresa in beauty contests are constitutionally enforced, why not population control. The citizen also has a duty towards the country, which the nation has every right to enforce.

Population control is no longer a debate topic. It is a desperate emergency that calls for desperate measures. If the government could get time from rewriting history books, announcing free electricity and handing out reservations like Paans after a wedding, there could yet be a solution. If not, then the citizens have to do what is the Government’s responsibility, i.e. self governance. I bet even Vishwamitra would have said, “Tathastu”.

Nature & Friends..

Dhara Hathiwala, M.Sc.Biochemistry, Semester II (2009-11 batch)

Nature and man are still befriend,
Whoever say 'no', shall think again,
No perfect boundaries in nature,
everything is shared,
Even the friendship, also the friends,
Why should we fight, why should we depart?
Close to God, close to life are friends...

Sun and clouds are friends,
Together colorful, beautiful dream-mates.
Moon and stars are friends,
Together they come, together descends.
Trees and rain are friends,
Bountiful when together, apart repents.
Green and ground are friends,
Blooming together, perishing frequents.
Butterflies and flowers are friends,
"Wonder what they chat!" some comments.
Close to God, close to life are friends.

Mother

Kanika Varandani, M.Sc. Biochemistry, Semester IV, (2008-10 batch)

The tenderness of a blooming bud,
The magnificence of the setting sun,

The calm of a quiet sea,

The sternness of a coconut tree,

The depth of a blue sea,

The patience of a hanging birch tree,

The hazy darkness of twilight,

The grace of a swan,

The melody of a song,

The pleasantness of a flower,

The lustre of a pearl,

The gentle care of an angel,

The leafy light of woods,

The shine of the stars and

The freedom of a bird flying free,

And from these God created a masterpiece

like no other,

And he simply called it **MOTHER**

Red Tacton

Yena Shah, M.Sc. Biotechnology,
Semester II (2009-11 batch)

Red Tacton is a new **HUMAN AREA NETWORKING TECHNOLOGY** developed by **JAPANESE COMPANY NIPPON TELEGRAPH AND TELEPHONE CORPORATION (NTT)**. It uses the surface of the human body as a safe, high speed network transmission path.

Red Tacton uses the minute electric field emitted on the surface of the human body. Communication is possible using the body surfaces like hands, fingers, arms, feet, legs, and torso. And the amazing fact is that red tacton works through shoes and clothing as well.

In red Tacton, unlike wireless technologies, the transmission speed does not deteriorate even in the presence of large crowd of people all communicating at the same time in meeting rooms, auditorium or stores. Because the body surface is transmission pathway, increasing the number of connected users directly increases the available number of individual communication channels.

Red tacton can achieve duplex transmission over the human body at a maximum speed of 10 Mbps. Using red tacton, communication starts when terminals carried by the user or embedded in devices are linked in various combinations according to user's natural and physical movements.

The main feature of red tacton is that it has high bandwidth and it can work with many transmission media common in human life. Red tacton has many potential applications in the field of medicine, security devices, personalization of phones and mobiles and automobiles etc.

Thus, this technology is just like **magic!!!!!**

"God gave us two ends. One to sit on and one to think with. Success depends on which one you use; head you win -- tails, you lose."

-- Anonymous

Some Interesting Facts About Birds

Gayatri Iyer, M.Sc. Bioctechnology,
Semester IV (2008-10 batch)

≈ The oldest bird was known as an Archaeopteryx and lived about 150 million years ago. It was the size of a raven, was covered with feathers, and had wings.

≈ The most yolks ever found in a single chicken's egg is nine.

≈ An ostrich egg needs to be boiled for 2 hours to get a hard-boiled egg.

≈ The Royal Albatross' eggs take 79 days to hatch.

≈ The egg of the hummingbird is the world's smallest bird's egg; the egg of the ostrich, the world's largest.

≈ The now-extinct elephant bird of Madagascar laid an egg that weighed 27 pounds.

≈ Precocial birds like chickens, ostriches, ducks, and seagulls hatch ready to move around. They come from eggs with bigger yolks than altricial birds like owls, woodpeckers, and most small songbirds that need a lot of care from parents in order to survive.

≈ Air sacs may make up 1/5 of the body volume of a bird.

≈ A bird's normal body temperature is usually 7-8 degrees hotter than a human's. Up to three-quarters of the air a bird breathes is used just for cooling down since they are unable to sweat.

≈ A bird's heart beats 400 times per minute while resting and up to 1000 beats per minute while flying.

≈ The world's only wingless bird is the kiwi of New Zealand.

≈ Migrating ducks and geese often fly in V-shape formations. Each bird flies in the upwash of its neighbour’s beating wings and this extra bit of supporting wind increases lift, thereby saving energy.

≈ Pigeons can reach speeds up to 100 mph.

≈ Swifts, doves, falcons, and sandpipers can approach 200 mph.

≈ Penguins, ostriches, and dodo birds are all birds that do not fly.

≈ Hummingbirds eat about every ten minutes, slurping down twice their body weight in nectar every day.

≈ The homing pigeon, Cher Ami, lost an eye and a leg while carrying a message in World War I. Cher Ami won the Distinguished Service Cross. Its leg was replaced with a wooden leg.

≈ The only known poisonous bird in the world is the hooded pitohui of Papua, New Guinea. The poison is found in its skin and feathers.

≈ The smallest bird in the world is the Humming Bird. It weighs less than 1 oz (or 1g).

≈ 75% of wild birds die before they are 6 months old.

≈ Measured in straight flight, the spine-tailed swift is the fastest bird. It flies 170 km/h (106 mph). Second fastest is the Frigate, which reaches 150 km/h (94 mph).

≈ Some bird species, usually flightless birds, have only a lower eyelid, whereas pigeons use upper and lower lids to blink.

≈ The eyes of the chameleon can move independently & can see in two different directions at the same time.

≈ The chameleon snatches up its insect prey in a fraction of a second. It waits for an insect to land within range, and then it shoots out its long tongue. The insect is caught on the sticky tip of the tongue.

≈ The Chameleon can focus its eyes separately to watch two objects at once.

≈ The Chameleon's tongue is as long as its body.

≈ When danger threatens, an owl makes itself look as large and fierce as possible, by fluffing out its feathers, spreading its wings and opening its eyes wide.

≈ The African ostrich makes up for not being able to fly by running faster than any other bird. Its strong thighs and long legs enable it to run at 50 km/hr for as long as half an hour, and it can reach 70 km/hr for a short burst.

≈ An ostrich's eye is bigger than its brain.

≈ Social weaver birds live in Africa. In the breeding season, many pairs come together to build their nests. They build one huge domed roof of grass and straw. Then each pair builds its own nest under the roof, each with its own entrance.

- ≈ The greater honey guide leads the ratel or honey badger, to a bee's nest by calling out and flying in front of it. The ratel eats the honey, and then the bird eats the honeycomb wax.
- ≈ Most birds sit on their eggs to incubate them, but not this common scrub hen. Instead, it uses the heat from volcanoes to keep its eggs warm. It buries its eggs in the side of a volcano on the pacific island where it lives.
- ≈ Hummingbirds are the only birds that can fly backwards
- ≈ Roadrunners are large (about two feet long) crested birds that prefer to run rather than fly. They eat rattlesnakes whole, and they can sprint 15 miles per hour.
- ≈ A Woodpecker can peck 20 times per second.
- ≈ Woodpeckers don't get headaches from all that pecking. Their skulls have air pockets to cushion the brain.
- ≈ Flamingos are pink because shrimp is one of their main sources of food.
- ≈ Flamingos eat with their heads upside down to strain the water out of their food.
- ≈ An ostrich can run up to 70 km/h (43mph).
- ≈ A group of geese on the ground is a gaggle - a group of geese in the air is a skein.

God's Gift

Dhara Hathiwala

M.Sc.Biochemistry, Semester II, (2009-11 batch)

Threshold of golden days,
the days of holidays,
together all day, with giggles and plays,
with friends and families together we share,
our entire world, now will glare.
Smiles like rainbows, smiles everywhere.

Then came a call from books afar,
yours from Pune and me from Ahmedabad.
With tears in eyes, went back to books.
But still all rainbows and giggle continues,
in longing for you, memories of you,
it is still fun waiting for you.
We'll still meet with our bright futures,
Thank God books called to understand glory of each other.

Do You Know What Is Time?

Dhara Hathiwala

M.Sc.Biochemistry,

Semester II

(2009-11 batch)

Do you know what is time?
Sometimes shadows, sometimes shine,
Sometimes despair, but hopes despite.
But ever changing and never altering is time...

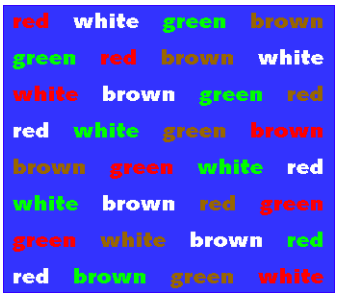
But one phase of time is "*waiting*".
With alphabets seven, but feelings varying.
After long day, hidden moon is waiting,
After sparkling nights, stars are waiting,
After lonely autumn, the trees are waiting,
After long summers, birds are waiting,
After the ebbs, tides are waiting,
All the oceans, for rivers are waiting.

All are waiting but never complains
Because they know the role time plays.
For events to occur at perfect time,
God uses the Angel called TIME.
Whether it frames meeting or waiting,
Hence Time can aptly be called God's wish or blessing.

Brain Teasers..Go For It!!!

Neha Trivedi, M.Sc. Biotechnology, Semester II(2009-11 batch)

1.



Say aloud the color you see in every word and not the word you read....

Explanation : The Stroop test is used in neuropsychological evaluations to measure mental vitality and flexibility, since performing well requires strong attention and self-regulation capability

2. **A blind beggar had a brother who died. What relation was the blind beggar to the brother who died? "Brother" is not the answer.**

3. Try Solving this..

Simple..yet tricky..

Look beyond for the

2	3	4	15	12
3	4	5	28	20
4	5	6	45	30
5	6	7	66	42
6	7	8	**???**	56

answers....

"Success is getting what you want. Happiness is wanting what you get."
-- B. R. Hayden

Wonders of Nanotechnology

Anand Nakhava, M.Sc. Biochemistry,

Semester II (2009-11 batch)

FUTURE TRENDS

Unprecedented opportunities are arising for re-engineering existing products. For example, cluster of atoms (nanodots, macromolecules); nanocrystalline structured materials (grain size less than 100 nm), fibres less than 100 nm in diameter (nanorods and nanotubes), films less than 100 nm in thickness provide a good base to develop further new nanocomponents and materials.

The buckyball (C_{60}) has opened up an excellent field of chemistry and material science with many exciting applications because of its ability to accept electrons. Carbon nanotubes have shown a promising potential in the safe, effective and risk free storage of hydrogen gas in fuel cells, increasing the prospects of wide uses of fuel cells and replacement of internal combustion engine. The potential of nanotubes can be further exploited in oil and gas industry. The nanotube market is likely to hit 1.35 billion dollars in 2005. Nanotechnology offers a myriad of applications for production of new gas sensors, optical sensors, chemical sensors, and other energy conversion devices to bio implants.

Solar Cells

Nanoporous oxide films such as TiO_2 are being used to enhance photo voltaic cell technology. Nanoparticles are perfect to absorb solar energy and they can be used in very thin layers on conventional metals to absorb incident solar energy. New solar cells are based on nanoparticles of semi conductors, nanofilms and nanotubes by embedding in a charge transfer medium. Films formed by sintering of nanometric particles of TiO_2 (diameter 10-20 nm) combine high surface area, transparency, excellent stability and good electrical conductivity and are ideal for photovoltaic applications. Non porous oxide films are highly promising material for photovoltaic applications. Nanotechnology opens the opportunity to produce cheaper and friendlier solar cells.

Nanofibres

In China and U.K., nanocarbon fibres have been produced. The production of nanofibres offers the potential of using the woven reinforcement as body armour. The future soldier's uniform would incorporate soft woven ultra strong fabric with capabilities to become rigid when a soldier breaks his legs and would protect him against pollution, poisoning and enemy hazards.

Sensors

Nanotechnology offers unlimited opportunities to produce new generation pressure, chemical, magneto resistive and anti-collision automobile sensors. Many of the novel applications such as new sensors, better photovoltaic cells, lighter and strong materials for defence, aerospace and automotives are already in use, and applications such as anti-corrosion coating, tougher and harder cutting tools, and medical implants and chips with 1 nm features may be developed in another 5-15 years. Nanostructured materials for nanoelectronic components, ultra fast processors, nanorobots for body parts are still in the state of infancy.

Ultra Light Materials

Nanotechnology is viewed as a key technology for the development of ultra light materials which would result in energy, fuel and materials savings and development of spectacular materials with complete control over structure and properties at a subatomic level not hitherto known to scientists and engineers. With the future development of nanocatalyst, diesel oxidant using nanoscale layers of Pt, Pd, the major environmental killers smog, pollution and toxic pesticide would be eliminated and humans will be able to breathe in healthy air. Improvement in nanofilters would enable bacteria less than 30 nm to be filtered and achieve water purity of 99.999997. The future avalanche of nano-age involves replacement of existing chips by super chips, plastic semiconductors, stronger and lighter jet fighters, amazingly invisible clothing for soldiers, super fuel cells and super batteries. The next twenty years would unleash a new era of nanotechnology when a fullerene molecule (C6) would be described in a high school

chemistry book and all materials science textbooks would contain chapters on nanomaterials...

Spending and Investment

Despite the hype surrounding nanotechnology, the progress achieved in the last five years is remarkable as shown by dramatic public spending in recent years. The total global investment in nanotechnology is currently around 5 billion Euros, two billion of which comes from the private sector.

Answers to the brain teasers:

2. The blind beggar was the sister *of her brother, who died.*

3. 91

Alzheimer's → Reality, Proteopathy and the Controversy.....

Neha Trivedi, M.Sc. Biotechnology,
Semester II (2009-11 batch)

Alzheimer's is a neurological disorder of significant loss of memory. It is the most common cause of dementia. It is the sixth leading cause of death in the U.S. And every year over 30 million people worldwide are affected by this disease and this no. will increase to 1 million for U.S. by 2050 if the situation remains as such. 10 million baby boomers will develop this disease in their lifetime & every 7 seconds someone gets affected. Every year the direct or indirect cost behind this disease is about $148 billion.

The reason for its persistence is that it ant be diagnosed in its early stages as is the case with many others. Diagnostic tests mainly involve psychiatric assessments, blood tests and brain imaging using MRI, CT, and PET etc. The awareness about this disease in India is very less, even though it is highly prevalent in the entire world.

Molecular Mechanisms and Proteopathy...

From the day the first visualization of Alzheimer's disease has been seen till today, an immeasurable quantity of research has been carried out on the causes, symptoms, diagnosis as well as the cure of this disease. Still, there has been no perfect one stop cure for

this disease and neither one merticular cause, but a combination.

Various hypotheses like the Proteopathic hypothesis, entangling of tau protein, mutation in ApoE, Presenilin 1&2 genes as well as APP result in in the disease. Also neurotransmitters like acetylcholine and certain cytokines are believed to be indirect causes of Alzheimer's disease.

The Proteopathic Hypothesis

The main event leading to AD appears to be the formation of a peptide known as amyloid beta, Aβ which clusters into amyloid plaques on the blood vessels and the periphery of the neurons of the brain, ultimately leading to killing of neurons.

The peptide is formed by enzyme clipping of the normal neuron membrane protein known as Amyloid Precursor Protein APP. APP is actually thought to be a natural neuroprotective agent induced by neuronal stress or injury, which reduces Ca^{++} concentration and protects neurons from glutamate exotoxicity.

Enzymes can clip APP in ways that do not result in amyloid beta formation. $A\beta_{42}$ is more hydrophobic and sticky and aggregates more readily than the 40 amino acid peptide $A\beta_{40}$. Both are formed intracellularly, but exert damaging effects when transported outside the cells. The former is most highly concentrated in the neuritic plaques, while the latter is more concentrated in cerebrovascular plaques. APP undergoes proteolysis by an α-secretase that cleaves between Lys_{687} and Leu_{688} to form a large soluble ectodomain. The C-terminal fragment can then be cleaved by γ secretase at residues 711 or 713 within the APP transmembrane domain thereby releasing the p3 peptide. Alternatively, the uncleaved cell surface APP can be internalized by endocytosis in coated vesicles in the distal cytoplasmic domain. The full length APP can then be trafficked to later endosomes and lysosomes for degradation or transferred to early endosomes for generation of Aβ peptides. In the early endosomes, APP is cleaved by β secretase after Met_{671} creating a membrane retained C-terminal fragment. Cleavage by β-secretase exhibits relatively rigid primary amino acid sequence requirements. At the membrane surface, the 12kDa C-terminal fragment can then be further cleaved by γ secretase within the hydrophobic transmembrane domain at either Val_{711} or Ile_{713} thus releasing the Aβ peptide, either Aβ40 or Aβ42.Thus only cleavage by β & γ secretase can lead to the formation of Aβ42 plaques, not α secretase.

Tau Protein

Tau Protein is one of the likely causes of Alzheimer's disease resulting into Neurofibrillary Tangles in the brain (NFTs). NFTs mainly contain hyperphosphorylated tau. Tau is a microtubule stabilizing protein. When it is hyperphosphorylated, it dissociates form microtubules causing their dissembly. The disintegration of

microtubules leads to disruption of axonal transport and eventually neuronal cell death. It also leads to aggregate and prevent additional Tau from binding microtubules. The aggregated Tau continues to form Paired Helical Filaments (PHF) and straight filaments approximately 10 and 15 nm in diameter respectively.

The Controversy

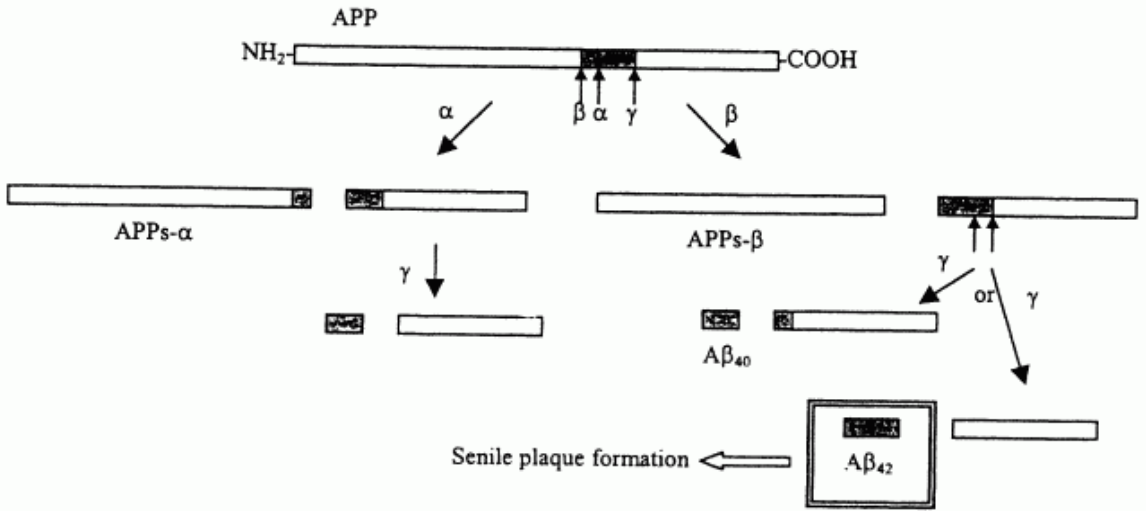
Out of all the causes that have been mentioned previously, the Proteopathic hypothesis, i.e., the one depicting and relying on the existence of amyloidβ plaques in the brain is the dominant one in the field of science. But the dominance of this hypothesis is so high that even if it does not provide a cure for the disease, about 70% of the research is focused on proteopathy.

Scientists say that despite many unexplained aspects, there is a disproportionate amount of attention paid to the amyloid hypothesis that has prevented other ideas from flourishing. With such a complex disease, they warn, it is foolhardy, perhaps even dangerous, to focus exclusively on one theory.

Every aspect of the field of science reveals the dominance of this theory, the tests being carried out for diagnosis, the most cited papers, the most funded researches and even the animal model focuses. The 42 amino acid amyloid β protein has itself got in the lead anywhere and everywhere which is strictly opposed by scientists as actually no one knows the actual 'single' cause of Alzheimer's and it does differ from one victim to another.

AMYLOID DOESN'T CAUSE ALZHEIMER'S DISEASE BECAUSE...

- Amyloid-beta is beneficial, and is produced as a compensatory response to the disease
- Even helping in Oxidative stress, inflammation, long-term response to injury or infection and defects in normal brain maintenance—such as the clearance of defective proteins are other alternatives supporting the fact that Alzheimer's disease is caused mainly by some other reason and not by amyloid β.
- Monomeric Aβ is said to be acting as antioxidant acting against the



damages caused by metal activation.

- AMYLOID CAN CAUSE ALZHEIMER'S DISEASE BECAUSE….

- Early appearance of Aβ in the initial stages of the disease

- Essentiality of Aβ in each and every victim of the disease

- Positive drug responses & model responses to the ones targeting amyloidβ.

- The strongest evidence for amyloid being a cause—and not just a consequence—of the disease comes from genetics. In familial or early-onset forms of Alzheimer disease, mutations in the amyloid precursor protein, and the enzymes that clip it to form amyloid-beta, lead to a massive overproduction of amyloid-beta and a swift descent into disease…

Lone Target & Open War...

There are controversies in every scientific arena, but the Alzheimer field is a rare instance in which scientists openly accuse each other of bias.

If you don't endorse the amyloid hypothesis and actively work on some aspect related to it, some say, it's difficult to win funds, publish papers or present at conferences. To have any credibility, people have to prove that their idea has some merit. But without funds and some element of receptiveness, that's hard to do, notes Larry Goldstein, professor of molecular medicine at the University of California in San Diego.

It usually happens in the field of science that scientists usually happen to gather and work with those people possessing similar ideas and hence it is difficult for people going against the Proteopathy to cope up as they form the minority.

Even drug companies have set the major target as amyloid β. But it is not avoiding the production, or blocking a particular enzyme, but clearing up the plaques of Aβ. Dale Schenk, chief scientific officer of Elan, says the series of molecular steps that lead to amyloid-beta, such as the enzymes that cleave the precursor protein, yield clear targets for drug development. At the same time, developing therapies has been far from easy because the main target is in the brain, one of the key enzymes has a difficult structure and another is likely to have wide-ranging effects in the body.

Companies are increasingly also looking for therapies based on tau—which binds and supports the microtubules that enable molecular transport down neurons—such as microtubule-stabilizing agents.

A group of people are unison of proteopathy and taupathy. They have merged their ideas into a central 'Unitarian' premise, according to which amyloid beta appears in the initial stage producing tau through a series of reactions resulting in the plaques, tangles and memory loss.

Looking Forward...

The world of science is looking forward to make those things possible which seem to show a great ray of hope, like finding a cure for Alzheimer's disease.

It has been potentially suggested that a combination of drugs targeting amyloid Beta, tau and genetic factors like presenilin can lead to a cure for Alzheimer's disease. Such drugs can also be thought to be used in combination which could increase the acetylcholine production as is deficiency leads to memory loss.

Also development of new immunotherapy vaccines which lead to the production of antibodies that helps in the clearance of plaques & tangles. Such antibodies can be manufactured on a large scale with stem cells.

"Success is a journey, not a destination."
-- Ben Sweetland

India…

Kriti Shah, M.Sc. Biochemistry,
Semester II (2009-11 batch)

India, my country, my motherland,
India, is really difficult to understand.

India, of the Qutub, India of the Taj,

India of the freedom struggle, and of the British Raj.

India rising and India shining,

India with its misery, suffering and whining.

India with its poverty and hunger crises,

India with its bungalows and lavish high rises.

India with it's farmers, India with green fields,

India with farmer suicides and diminishing yields.

India with its youth and India with its old,

India of folks with hearts of gold.

India with irony in all its starkness,

India with light and India in darkness

India with rivers and fertile lands,

India in all its glory, stands.

India of missionaries, mullahs and pirs,

India of priests, of sadhus and seers.

India of culture, history and folk lore,

India with scholars and mystics galore.

India with its glories, and problems too,

India, I'm proud of, how about you?

Brown Fat In Adults

Manghani Jitesh, M.Sc. Biotechnology,
Semester II (2009-11 batch)

When you're struggling to button your pants around your ever expanding waistline, it probably doesn't occur to you to wonder whether your body fat is brown or white. But perhaps you should. Researchers have long known that brown fat, so called because it is packed with dark-hued mitochondria (the engines that feed cells with energy), actively breaks down sugar into heat and consumes a lot more energy than white fat does. In other words, brown fat burns energy instead of storing it. However, researchers also known that while brown fat is abundant in rodents and newborns, who need it to keep warm right out of the womb, those brown-fat stores shrink and white fat emerges as people age. But now it seems that adults retain more brown fat than previously thought, in deposits in the front and back of the neck, according to a study by Swedish researchers, published in the *New England Journal of Medicine* in April. Two other studies published in the same journal found that lean people tend to have more of these deposits than obese folks and that brown-fat cells are more active in the cold. Could a fat-based fat fighter be far behind?

Thoughts on Real Life.....

Neha Trivedi, M.Sc. Biotcechnology,
Semester II (2009-11 batch)

- No one will manufacture a lock without a key..similarly God won't give problems without solutions.
- Life laughs at you when you're unhappy..Life smiles at you when you're happy.Life salutes you when you make others happy..
- Easy is to judge the mistakes of others. Difficult is to recognize our own mistakes.
- It is easier to protect your feet with slippers than to cover the earth with a carpet.
- No one can go back and change a bad beginning, but anyone can start now and create a successful ending.
- If a problem can be solved, no need to worry about it. If a problem cannot be solved, what is the use of worrying?
- "Changing the Face" can change nothing. But "facing the change" can change everything. Don't complain about others, change yourself if you want peace.
- Every successful person has a painful story. Every painful story has a successful ending. Accept the pain and get ready for success.

  -Anonymous

- Your work is to discover your world and then with all your heart give yourself to it. –Buddha

The Positive Use of Gases Responsible For Global Warming

Hardik Patel, M.Sc. Biochemistry,
Semester II (2009-11 batch)

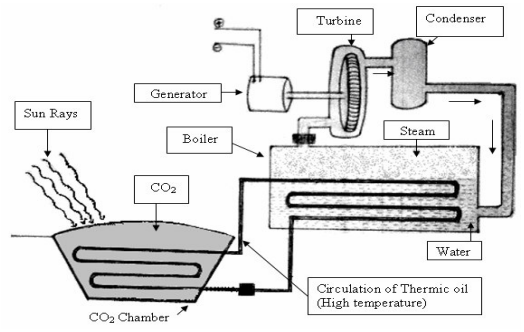
Normally electricity is generated by using the coal or radioactive elements to boil water and convert into steam. And this steam is used to rotate the turbine. And ultimately this turbine rotates the associated generator and generates electricity.

The same mechanism can be performed by using the global warming gases; the thing that differs is that water is boiled by **CO_2**.

HOW?

CO_2 can trap heat and raise the temperature upto **180°C**. So if we design the chamber in which the inner surface is coated with material that reflects the sun rays. And container is completely filled with CO_2 and sealed with that type of plastic or glass which allows the sun rays to enter but can't exit.

So temperature will increase which ultimately raise the temperature of the thermic oil (Oil having higher boiling point), that is circulating from the CO_2 chamber to the boiler through pipes. And this thermic oil will boil the water into boiler. Therefore steam will generate and is used to generate electricity.



We can also use the **SO_2** and **CFC** instead of CO_2 as they can raise the temperature upto **300°C** and **1000°C** respectively.

> "The secret of success in life is for a man to be ready for his opportunity when it comes.
>
> - Benjamin Disraeli

Arrogance in Science

Mr. Vijay Kothari
Assistant Professor, Institute of Science

Take a look at these names: C. V. Raman, M. Beijerinck, Homi Bhabha, S. Chandrasekhar, and Meghnad Saha, what is common among all of them except being scientists of high repute? The surprising common thing among them is the fact that all of them have been alleged to be arrogant at times. This article discusses why it happens so that many of the people who are regarded as great scientists are labeled as *rude* or *arrogant*. Does this alleged *rudeness* or *arrogance* have something to do with excellence in science?

Meaningful research in science demands a highly disciplined and committed effort by the researcher. It requires long hours of hard work in one's laboratory, and constantly forces the researcher to stretch his/her working hours. As it happens in most other walks of life, in science too, majority belong to the ordinary or average category. This majority is happy while practicing ordinary science. But conflicts arise when such mundane people happen to work under a scientific genius. As the genius himself will work hard all the times, he surely will expect all his colleagues and subordinates to do the same. Now constant hard work over a considerable period of time with a stern discipline, is something not liked by many. This simply irritates any scientific manager for whom serious science is the only priority. And when this irritation gets expressed the answer comes in form of allegations of being *rude* and *rough*.

Few examples will make it clearer. S. Chandrasekhar, an eminent astronomer was once told by a student – most people think you are an ogre. Actually Chandrasekhar loved hard-working students, but he could be rough, even insulting to students who were not sincere. Some students therefore kept away from him and even avoided him if he was seen in the corridor. However, those found to be sincere by him were able to get his help in securing jobs and fellowships.

Indian physicist Homi J Bhabha was also a perfectionist (as most noteworthy scientists are) and disliked shoddy or mediocre work. Although a strict disciplinarian and hard task master, Bhabha was always open for discussions. He would easily forgive an honest mistake but would not suffer stupidity. He appeared aloof from a distance but was basically warm and kind.

Another Indian physicist, Meghnad Saha, who led a life of discipline and commitment, at times appeared harsh and rough because he did not tolerate irresponsibility but he would always guide a student till he had not learnt the ropes. Even Nobel laureate C. V. Raman couldn't escape the allegations of *rudeness* and

arrogance. One of all time great microbiologists, M. Beijerinck was also known for his strict attitude. Not a large number of students were able to survive in his laboratory for long. But those who did themselves reached great heights.

These examples make it clear that in most cases when good scientists are labeled as *arrogant*, it is simply because of their habit of not tolerating stupidity and shoddy work. As they are prone to reject any work which doesn't fall under 'good science', there are little possibilities of them being popular (exceptions are always there). However, the true scientist never cares for such *popularity*, as he knows that strict discipline and total dedication are essential for practicing good and meaningful science. It is only that sometimes due to heavy managerial responsibilities the scientific stalwarts become isolated from their staff or students.

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Probiotics As Vaccines

Ankita Vora, M.Sc. Biotechnology,
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Probiotics are defined as "live micro organisms that when administered properly confer a health benefit to the host. The word 'Probriotic' means "For life"
The effect of lactobacilli in the yogurt is attributed to the long life of Bulgarian peasant. A Japanese medical microbiologist proposed that many diseases could be prevented if an optimal gut microflora was maintained.

In the last few years the concept of probiotics are applied to many proposed areas like prevention and treatment of diarrhea in adult and children, prevention of vaginilis and urinary tract infection in adults, food allergy prevention, antitumor action in the gut ,bladder cervix.

Reason for using probiotics as vaccine:

Probiotics are live bacteria that resist the growth of pathogens in the digestive system by competing for survival.

Many vaccines do not elect a maximal immunological response, therefore, adjuvants are required to enhance the immunity. This problem can be solved by probiotics. Sometimes live attenuated vaccine may get reversed and prove fatal due to which Probiotics are the best alternative.

Probiotics provide "oral vaccine"so that 'ouch' factor can be eliminated Probiotics serve as vectors for delivery of many pathogens which than elicit

immune response. By using probiotics in women the risk of HIV can be reduced.

Probiotics have a wide application in vaccine development and prevention of sexually transmitted diseases.

Probiotics reduce the risk of HIV in women. The absence or depletion of lactobacilli in the vagina is associated with the overgrowth of anaerobic pathogens, which elevates vaginal pH and creates an environment within which pathogens including HIV can survive and infect the host. The concept of modifying the vaginal microflora as a means to prevent HIV is therefore being explored.

Probiotic bacteria have been shown to have great potential in displacing organisms responsible for vaginal infection and sexually transmitted diseases, which leads to reduction of HIV risk.

Two strains of bacteria *Lactobacillus rrhamnou*GR1 and *Lactobacillus reuteri*RC14, administered intravaginally, colonize the vagina, kill viruses and reduce the risk of infection including bacterial vaginosis.

Probiotics are available in in capsular form for vaginal instillation or have to be taken orally to improve vaginal health and to reduce the risk associated with STD and HIV acquisition.

PROBIOTICS AS ORAL VACCINE

A researcher developed a new oral vaccine using probiotics, taking healthy bacteria that are found in dairy product like yogurt and cheese.

The new generation vaccine is delivered into the gut instead of the muscle.

When a person swallows the vaccine and the bacteria colonize in intestine and start to produce the vaccine in gut, activating the immune system in gut, In this way a much more powerful immune response is elicited than by injecting it and due to this the pathogenic bacteria will be eliminated faster.

Most vaccines consist of protein and will not maintain their effectiveness after being digested in the stomach. However, lactobacilli protect the vaccine until it is in the small intestine.

ADVANTAGE OF NEW ORAL VACCINE

Probiotics are natural immune stimulators; they eliminate the need for a chemical in traditional vaccine that inflames the immune system and triggers a local immune response.

An adjuvant may cause side effects such as dizziness, arm swelling and vomiting.

Probiotics vaccines are also inexpensive to produce.

Specially engineered vaccines give more immune response than injected ones because they induce both a local and systemic immune responses.

The vaccine targets the first line of gut immune cells called dendrite cells, they engulf the vaccine and it instructs

the killer T cell and B cell to destroy cell in the body which infected by virus or bacteria.

PROBIOTICS FOR MUCOSAL VACCINES AND IMMUNO DULATION FOR HIV AND PAPILOMA VIRUSES

In future lacto acid bacilli may used as vector for oral immunization. This approach is possible on the basis of their safety, ability to persist with in the indigenous flora, adjuvant properties and low intrinsic immunogenicity.

Recently developed a genetic system for the expression of heterologous antigen form human papiloma virus and HIV type 1 in the surface of the human commensal Streptococcus gordoonii and lactobacilli caser.

Local and systemic immune response was detected in BALB/C mice and cynomolgus monkey after vaginal colonization with the aforementioned recombinant strains.

Both macrophages activation and IL-12/Y IFN pathway stimulation are promising areas of research with regard to resistance to intracellular pathogen by enhancement of mucosal and systemic immunity.

ROLE OF PROBIOTICS AS VACCINE ADJUVANT

Many vaccines do not elicit a maximal immunological response. There for there is a need for adjuvant that enhance immunity.

Lactobacilli rhamnosum strain is tested as an adjuvant to an oral vaccine against rota virus in children.

The researcher noted an increase of rotavirus specific IgM secreting cells in the grout receiving LGG compared to group given place eight days post vaccination.

LGG also increased IgA and IgM.

PROBIOTICS USED TO EXPRESS DENDRITIC CELL TARGETING OF *Bacillus anthrasis*

Vaccines which potentially increase antibody avidity and T cell longevity confer protection against microbial lethal challenges.

A vaccine strategy was established by using lactobacillus acidophilus to deliver bacillus anthracis protective antigen via specific dendritic cell targeting peptides to dendritic cells which reside in the periphery and mucosal surface thus directing and regulating acquired immunity.

The efficiency of oral delivery of l. acidophilus expressing a PA-DC peptide fusion was evaluated in mice challenged with lethal *B. anthracis*.

"I don't know the key to success, but the key to failure is trying to please everybody."
-- Bill Cosby

IF THERE BE A GENE FOR HAPPINESS!

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Semester II (2009-11 batch)

This is 21st century, the age of Biotechnology. In past few years various advances have been made in the field of *genetic engineering*. We are able to *isolate, incorporate and express* genes of desired characteristics from one species to another. Thus we have achieved:

High beer production by incorporating the genes coding for amylase from yeast to bacteria.

- Human Insulin
- Vaccines
- Hormones

And many such important products have been obtained in significant amounts applying the technology.

For development of such useful products, genes must be identified. It was therefore become essential to know how our genes located in genome. Human Genome Project (HGP) aimed at sequencing complete human genome was started in 1990. 13 years of joint effort of scientists from 18 countries and an expense of huge money ($3billion) ultimately lead to success.

Today it is known:

Nearly 3 billion bases makes up the whole genome.

There are 20,000 to 30,000 genes present in whole genome.

Majority of DNA do not code for genes (Junk DNA).

A Gene is the basis of life. Its four alphabets “A”, “T”, “G” and “C” that codes for everything. All biological processes are due to and controlled by genes. It has a unique property to carry the information encoded in it to its next generations. Every character or property, even tiniest of information is stored in genes.

Hence, there's

- A gene for eye color,
- A gene for height,
- A gene for fairness,
- A gene for sense and signaling (hormones),
- A gene for movement and transport (proteins),
- A gene for energy generation (enzymes),
- A gene for growth,
- A gene for death (ageing),

But hold on!!!

Where is the GENE FOR HAPPINESS???

No gene! If there be a gene for happiness, what I would have done is-

Isolate it,

Insert it into a vector,

And enjoy its expression

By doing so over expression could be obtained. If there is excess of happiness then there would be deficiency of hatred (same as if there is light, darkness disappears). So if there is no gene for happiness then how do we feel happy?? There might be another cause for it.

Yes, I got it!!!! Answer must be present in region what we call as “JUNK DNA”. Because junk DNA is a part of DNA, it will inherit in children from parents. This is how nature of parents remains semi-conserved in their sons/daughters. Did you see NON-SENSE is not really non-sense? And Junk is no more junk. Take care of every useless thing. Read the history of Newton and Edison. They will reveal everything to you. No one can say when it may bring you Noble prize.

Note: *Science is not boring; Search for hidden treasures in it.*

ঔ "The secret of success is to be in harmony with existence, to be always calm, to let each wave of life wash us a little farther up the shore."

-- Cyril Connolly

Apoptosis

Superna Thakur, M.Sc. Biochemistry,
Semester II (2009-11 batch)

Introduction:

Philosophers have spent many centuries searching for the meaning of life. But in recent decades cell biologists have become even more fascinated by the meaning of death.

Cell death plays a crucially important part in animal and plant development and it usually continues into adulthood. It is a biochemically regulated process. The existence of various forms of cell death involving tissues and cells was recognized in the 19th century, although it never received primary attention. Programmed forms of cell death have also been recognized in field of botany but it has been labeled mostly as "Senescence". In a healthy adult human, billions of cells die in the bone marrow and intestine every hour. Our tissues do not shrink because, by unknown regulatory mechanisms, cell division exactly balances the cell death. We now know that these "normal" cell deaths are suicides, in which the cell activate an intracellular death programmed and kill themselves in a controlled way – a process known as **Programmed Cell Death.**

The idea that animal cells have a built-in death program was proposed in the 1970's but its general acceptance took another 20 years and depended on genetic studies in the nematode: - *C. elegans* that identified the first genes dedicated to programmed cell death and its control.

In 1970, **Wyllie and Kerr** formalized the existence of a human form of cell death distinct from necrosis that they termed as ***Apoptosis.*** Programmed cell death in animals, usually, but not exclusively occurs by apoptosis (from the Greek word meaning: "falling off", as leaves from a tree).

Apoptosis has been one of the hottest areas of Cell Biology. It received its primary boost with the identification of inter-nucleosomal DNA breakdown during apoptosis and not necrosis. Because this form of DNA breakdown suggested the action of an endonuclease. This singular finding may have convinced many investigators that apoptosis is the manifestation or outcome of biochemical process.

Today, apoptosis is implicated in biological processes ranging from embryogenesis to ageing, from normal tissue homeostasis to many human diseases and it has become one of the hottest fields of biomedical research.

Why cells die:

The amount of programmed cell death that occurs in developing and adult animal tissues can be astonishing. For example : in the developing vertebrate nervous system, more than half of many types of nerve cells normally die soon after they are formed. It seems remarkably wasteful for so many cells to die, especially; as the vast majorities are perfectly healthy at the time they kill themselves. The purpose is to eliminate the unwanted cells.

Cell death is important for embryonic development, maintenance of tissue homoeostasis, establishment of immune self tolerance, killing by immune effector cells, and regulation of cell viability by hormones and growth factors.

In development biology, programmed cell death is responsible for eliminating super focus or redundant precursor or mature cells.

In immunobiology, apoptosis accounts for the elimination of self reacting lymphocytes.

It also appears to play an important role in tissue remodeling and reaction to environment whereby unnecessary cells may undergo cell death to allow the growth and differentiation of cells that are better geared to deal with the changing environmental demands.

Apoptosis and Necrosis: The Spectrum of cell death

Although cells die in many ways, it is useful to focus on the 2 poles of this spectrum : **Apoptosis** and **Necrosis.**

Apoptosis is the most commonly described pathway for programmed cell death. It is now recognized as a mechanistically driven form of cell death that is either developmentally regulated, launched in response to specific stimuli (such as cytokines, tumor necrosis factor α or fas ligand) or activated in response to various forms of cell injury or stress. Often, the cells undergoing apoptosis appear completely healthy prior to committing suicide.

At the other end of spectrum, is necrosis also called as **"accidental-cell death"**, which occurs when cells receive a structural or chemical insult that kills them. Examples of such insults include extremes of temperature and physical trauma.

What is Apoptosis?

Apoptosis describes the orchestrated collapse of a characterized by membrane blebbing, cell shrinkage, condensation of chromatin and fragmentation of DNA followed by rapid engulfment of the corpse by the

neighboring cells. It is distinguished from death by necrosis by the absence of an associated inflammatory response. These observations were made by John-Kerr in year 1972. But their importance was underestimated for many years.

It is a distinct mode of cell death that is responsible for deletion of cells in normal tissues. It also occurs in special pathologic context.

Apoptosis is a distinct, intrinsic cell death program that occurs in various physiological and pathological situations. (Hengartner, 2000)

Apoptosis is a key regulator of tissue homeostasis which critically depends on the balance between proliferation and cell death. (Evan and Vousden, 2001)

Apoptosis is a gene directed program which implies that it can be disrupted by genetic mutations. (Johnstone et al, 2002)

Hallmarks of Apoptosis:

Cells undergoing apoptosis shows both morphological as well as biochemical hallmarks during the process.

Morphologically, it involves rapid condensation and budding of the cell with the formation of membrane enclosed apoptotic bodies containing well preserved organelles, which are phagocytosed and digested by nearby resident cells.

Activation of cysteine proteases called **Caspases** plays a major role in execution of apoptosis. These proteases selectively cleave vital cellular substrates, which results in apoptotic morphology and inter nucleosomal fragmentation of DNA by selectively activated DNases. In response to several pro-apoptotic signals, mitochondria releases caspase activating factors, which initiate an escalating caspase cascade and commit the cell to die. Members of Bcl-2 oncoprotein family controls mitochondrial events and are able to prevent or induce both apoptotic and non-apoptotic types of cell death. This suggests that different types of cell death share common mechanism in early phases, whereas activation of caspases determines the phenotypes of cell death.

Cells undergoing apoptosis not only have a characteristic morphology but also display characteristic biochemical changes, which can be used to identify apoptotic cells.

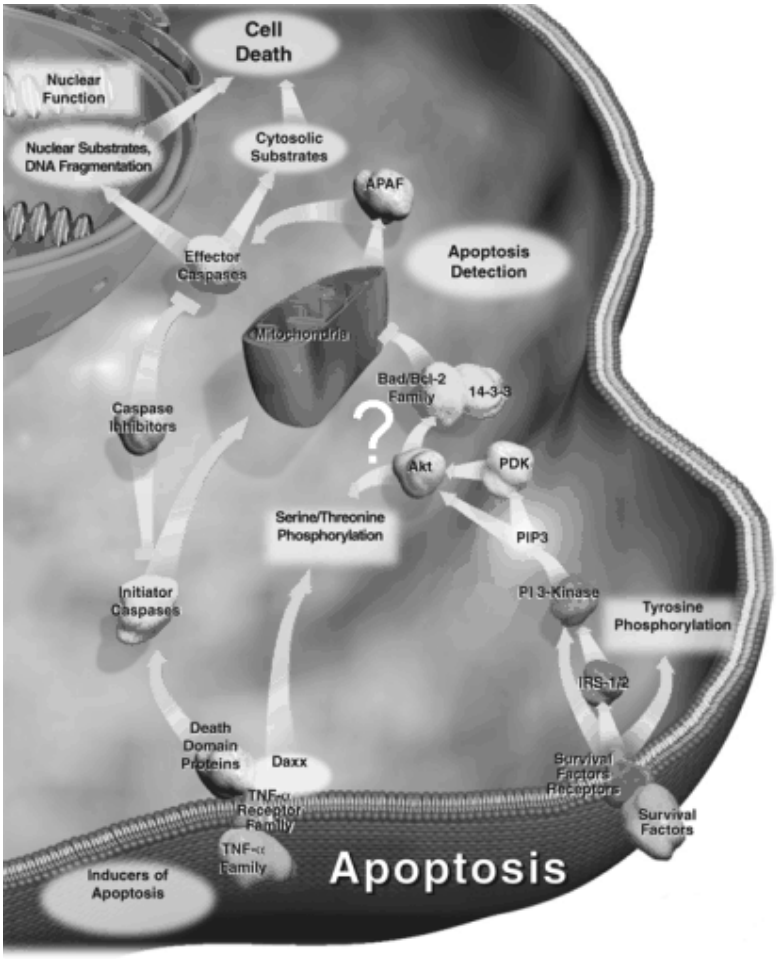
A characteristic **biochemical** feature of the process is double strand cleavage of nuclear DNA at the linker

region between nucleosomes leading to production of oligonucleosomal fragments. Because the cleavages occur in the linker regions between nucleosomes, the fragments separate into a characteristic ladder pattern when analyzed by gel electrophoresis.

An especially important change occurs in the plasma membrane of apoptotic cells. The negatively charged phospholipids phosphatidylserine is normally exclusively located in the inner leaflet of the lipid bilayer of the plasma membrane, but it flips to the outer leaflet in apoptotic cells, where it can serve as a **marker** of these cells. The phosphatidylserine on the surface of apoptotic cells can be visualized with a labeled form of the Annexin V protein, which specifically binds to these phospholipids. The cell surface phosphatidylserine is more than a convenient marker of apoptosis for biologists; it helps signal to neighboring cells and macrophages to phagocytose the dying cell. In addition, to serve as and "eat me" signal, it also blocks the inflammation often associated with phagocytosis: the phosphatidylserine - dependent engulfment of apoptotic cells inhibits the production of inflammation – inducing signal proteins (cytokines) by the phagocytic cells.

Cells undergoing apoptosis often lose the electrical potential that normally exists across the inner membrane of their mitochondria. This membrane potential can be measured by the use of positively charged fluorescent dyes that accumulate in mitochondria, driven by the negative charge on the inside of the inner membrane. A decrease in the labeling of mitochondria with these dyes helps to identify cells that are undergoing apoptosis.

Proteins such as **Cytochrome c** are usually released from the space between the inner and outer membrane (the intermembrane space) of mitochondria during apoptosis, and the relocation of cytochrome c from mitochondria to the cytosol can be used as another marker of apoptosis.



Apoptosis: a response to stress

Further complicating the analysis of cell death is the fact that apoptosis is a common response to cell stress. Cells monitor many aspects of their physiology. Any drug or agent that is capable of killing a cell will cause physiological changes when given at sub-lethal doses or in the period before the cell is biochemically inert. When detected by the cell, these changes often elicit some kind of stress response. Some responses, such as production of **Heat shock proteins,** may serve to protect the cell, whereas others, such as activation of the apoptotic pathway, may hasten its demise. The ability of drugs and toxins with known lethal biochemical activities to nevertheless provoke an apoptotic death response has caused a great deal of confusion in the field.

Apoptosis and tissue homeostasis:

The maintenance of tissue homeostasis is finely tuned between cell proliferation and cell death i.e. apoptosis. The maintenance of this balance is crucial to any multicellular organism. Too much proliferation leads to hyperplasia and to anatomical and

physiological problems that are associated with it. The worst-case scenario is a total loss of homeostatic control and development of cancer (reviewed in Lyons & Clarke 1997). If apoptosis supersedes proliferation, the result is a reduction of the tissue mass. If the process runs rampant, it eventually reaches a point where physiological function is no longer possible (Thompson 1995). Apoptosis has been shown to function as a limiting factor of tumour growth in early stages, when the angiogenesis is limiting the tumour progression (Naik *et al.* 1996, O"Reilly *et al.* 1996). Furthermore, a tumour's resistance to chemotherapeutic agents has often been suggested to be dependent on expression of anti-apoptotic genes, such as members of the Bcl-2 family, or loss of apoptosis-inducing genes, such as *TP53* (Minn *et al.* 1996, Lowe *et al.* 1993).

Tissues that have constant cellular proliferation, such as haematopoietic cells, epithelium lining the intestinal crypts and male germ cells, also have a high rate of apoptosis (Wyllie 1987, Billig *et al.* 1995). Similarly, tissues that have a minimal rate of cell proliferation, such as the nervous system, heart, liver and kidney, exhibit only a very little apoptosis (Benedetti *et al.* 1988). The ovary is an exception to this rule. While a high level of granulosa cell proliferation is matched by a high rate of apoptosis, the oocytes increase their number through mitosis only during the early fetal life, where after the oocyte population is only reduced through the mechanism of apoptosis. Eventually, the pool of resting follicles, i.e. oocytes, is depleted and menopause ensues (reviewed in Morita & Tilly 1999).

Key Biochemical events in Apoptosis:

Apoptosis depends on an Intracellular Proteolytic Cascade that is mediated by Caspases:

The intracellular machinery responsible for apoptosis is similar in all animal cells. It depends on a family of proteases that have a cysteine at their active site and cleave their target proteins at specific aspartic acids. They are therefore called as **"Caspases"** (c for cysteine and asp for aspartic acid). Caspases are synthesized in the cell as inactive precursors or procaspases, which are typically activated by proteolytic cleavage. Procaspase cleavage occurs at one or two specific aspartic acids and is catalyzed by other already active caspases; the procaspase is split into a large and a small subunit that form a heterodimer, and two such dimmers assemble to form the active tetramer.

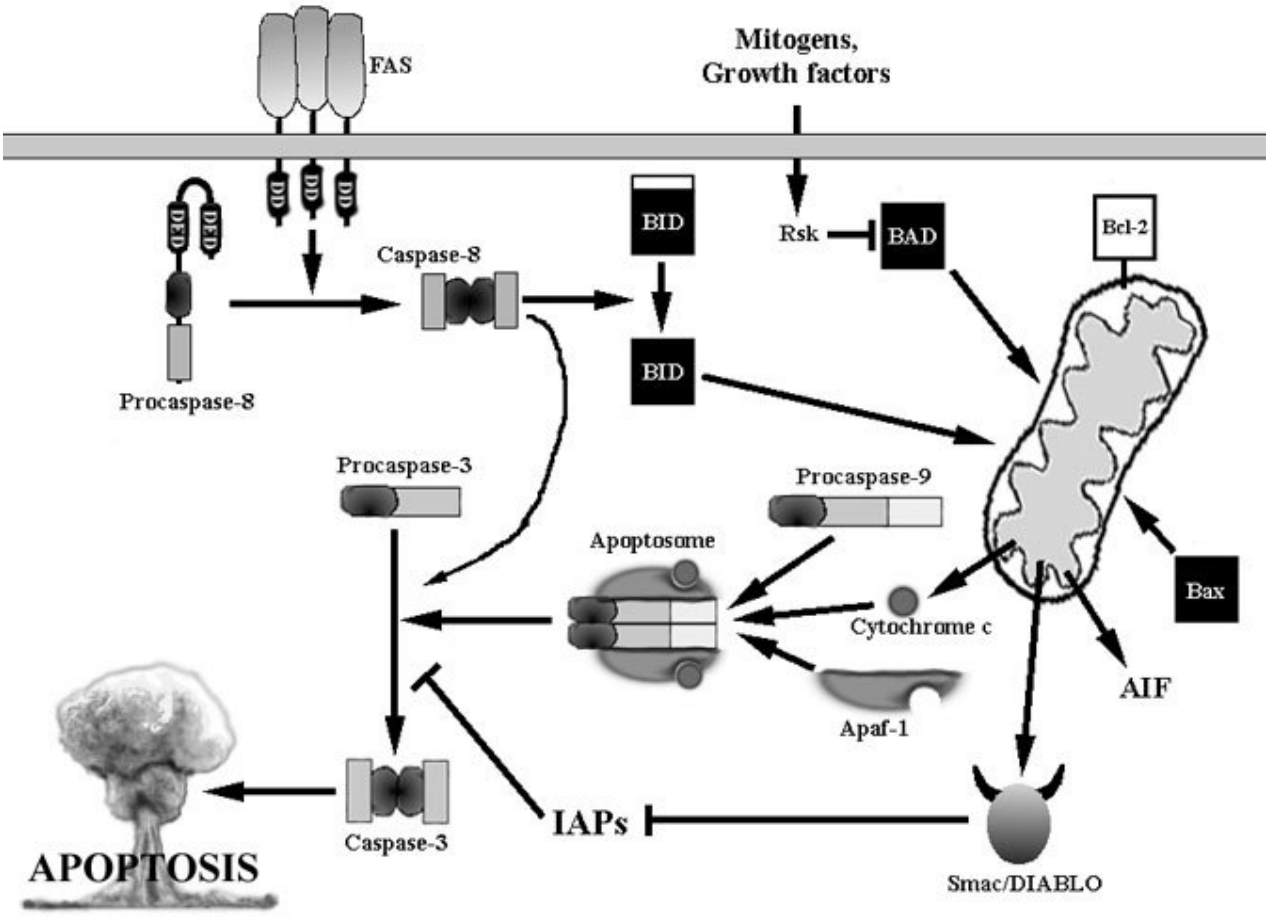


Figure . Activation of apoptosis through mitochondrial pathway. Extracellular signals can have an effect on the relationship of Bcl-2 family members at the surface of mitochondria. Pro-apoptotic Bcl-2 proteins can release a variety of molecules from the mitochondrial compartment. Cytochrome c is considered to be the primary mitochondrial factor in caspase-mediated apoptosis. Together with Apaf-1 and procaspase-9, cytochrome c forms the apoptosome, which is a potent activator of caspase-3. Smac/Diablo is a mitochondrial factor that can inhibit the action of IAP proteins, which themselves can prevent caspase-3 activation and action. AIF is also released from mitochondria and it can activate apoptosis via unknown, caspase-independent pathway

Evidence:

Not all caspases mediate apoptosis. Indeed, the first caspase identified was a human protein called **Interleukin-1 (IL1)-converting enzyme,** which is concerned with inflammatory responses rather than with cell death; ICE cut out the inflammation inducing cytokine interleukin-1 from a larger precursor protein. Subsequent to the discovery of ICE, a gene required for

apoptosis in *C. elegans* was shown to encode a protein that is structurally and functionally similar to ICE, providing the first evidence that proteolysis and caspases are involved in apoptosis. It is now clear that, whereas several human caspases are involved in inflammatory and immune responses, most are involved in apoptosis.

The caspases required for apoptosis vary depending on the cell type and stimulus.

Initiator procaspases have long prodomain, which contains a **caspase recruitment domain** (CARD) that enables them to assemble with adaptor proteins into activation complexes when the cell receives a signal to undergo apoptosis. Once incorporated into such a complex, the initiator procaspases are brought into close proximity, which is sufficient to activate them; they then cleave each other to make the process irreversible. The activated initiator caspases then cleave and activate executioner procaspases, thereby initiating a proteolytic caspase cascade, which amplifies the death signal and spreads it throughout the cell.

The two best understood pathways that can activate a caspase cascade leading to apoptosis in mammalian cells are:

Extrinsic pathway

Intrinsic pathway

The extrinsic pathway is initiated through the stimulation of the transmembrane death receptors, such as the fas receptors, located on the cell membrane.

In contrast, the intrinsic pathway is initiated through the release of signal factors by mitochondria within the cell.

<u>Apoptosis and Cancer Therapy</u>:

Introduction:

The understanding of apoptosis has provided the basis for novel targeted therapies, which can induce death in cancer cells or sensitize them to established cytotoxic agents and radiation therapy. These novel agents include those targeting intrinsic pathways such as **antisense bcl-2 oligonucleotides** and those targeting the extrinsic pathway such as **TNF-related apoptosis.** Apoptosis occurs spontaneously in malignant tumors, often markedly retarding their growth and it is increased in tumors responding to irradiation, cytotoxic therapy, heating and hormonal ablation implying that treatments that increased rate of apoptosis could be used to treat cancer. Many pathways and proteins control the apoptosis machinery; Examples include p-53, the

nuclear factor Kappa-B, the phosphotidylserine kinase pathway, and the ubiquitin/proteosome pathway. These can be targeted by specific modulators such as bortezomib, and the mammalian target of rapamycin inhibitors such as CCI-779 and KAD-001.

Role of failure of apoptosis in causing cancers was only recognized much later. This followed the discovery that bcl-2 gene which is often translocated in follicular lymphoma, encoded a cell death inhibitory protein. As the first component of the apoptotic mechanism, bcl-2 also helped in elucidation of other parts of apoptotic mechanism. When bcl-2 was expressed in cells in tissue culture, it only protected them from apoptosis due to removal of growth factors; it also prevented apoptosis following treatment with a diverse range of drugs and toxins, giving cells a multi drug resistance phenotype. This suggested that apoptosis inhibitory genes such as bcl-2 might not only play a role in development of malignancy but also determine the response to therapy. On its own,however,inhibitors of apoptosis does not rapidly transform cells or cause cancers.however,when inhibition of apoptosis by bcl-2 for example is combined with activation of a conventional growth stimulatory oncogene such as **c-myc** ,cancers can develop rapidly.

In p-53,negative tumor derived cell lines transfected with wild type p-53,induction of the gene ,in rare cases ,been found to cause extensive apoptosis, instead of growth arrest. Finally, the demonstration that antibodies against a cell surface protein designated APO-1 or fas can enhance apoptosis in some human lymphoid cell lines may have therapeutic implications.

Abstract:

Our somatic cells are born by mitosis and almost all cells will die by apoptosis, a physiological process of cellular suicide. Cancers can occur when this balance is disturbed, either by an increase in cell proliferation or a decrease in cell death. The **goal of cancer therapy** is to promote the death of cancer cells without causing too much damage to normal cells. Our knowledge of the mechanism of apoptosis ha enhanced our understanding of how some cancers originate and progress. It has also revealed that existing cancer therapies can work in two ways, by induction of apoptosis as well as by direct toxicity. In some cases, resistance to apoptosis may explain why cancer therapies fail. Novel treatments designed to exploit our knowledge of apoptotic mechanism are under development to promote apoptosis of cancer cells and limit concurrent death of normal cells.

Chemotherapeutic Agents kill susceptible cells by Apoptosis:

in a landmark study investigating the mechanism of action of **etoposide (**an inhibitor of topoisomerase II) and other chemotherapeutic agents, it was found that etoposide, early on, induced

internucleosomal DNA fragmentation. This observation raised the possibility that etoposide, caused apoptotic cell death. Since then, the spectrum of chemotherapeutic agents causing apoptosis has expanded progressively and the evidence supporting the role of apoptosis in chemotherapy action continues to include etoposide:

VM-26

m-AMSA

Dexamethasone

Vincristine

Cis-Pt

Cyclophosphamids

Paclitaxel

5'-flourodeoxyuridine

5'-flourouracil

Adriamycin

These apoptotic effects have been observed in several cell lines in tissue culture including normal thymocytes, lymphoma cells, ovarian epithelial tumors, leukemia cells, adenocarcinoma cells and others. In addition, tumor hypoxia, ionizing radiations and hormone withdrawal in hormone dependent tumors have been shown to cause apoptosis.

Other studies are also beginning to provide evidence that chemotherapeutic agents induce apoptotic tumor cell death in vivo:

A retinoic acid treated T-cell lymphoma was shown to undergo apoptosis in vivo. In a study of esophageal squamous cell carcinoma it was shown that both radiation and chemotherapy (5-flourouracil, cis-platinum and bleomycin) induced apoptotic cell death in vivo, as determined by examination of biopsy specimens.

In an experimental study in murine tumor, evidence was also provides that cis-pt,cyclophosphamids and other chemotherapeutic agents caused apoptosis in several in vivo tumors, including adenocarcinoma,lymphomss,sarcomas and squamous cell-carcinomas.

Similarly, in a study of murine mammary adenocarcinoma and ovarian carcinoma, it was showed that cyclophosphamids treatment increases apoptosis in these tumors.

Antileukemic therapy (including etoposide, m-AMSA and cytosine-arabinoside)caused apoptotic cell death in patients undergoing chemotherapy for acute leukemia.

Harnessing our understanding of apoptosis in treatment of cancer:

A new understanding of radiation, chemotherapy and steroids

Most of the anticancer agents, we use today were developed well before apoptosis became a fashionable subject or its mechanism started to be

unraveled and most advanced novel therapies, based on our understanding of apoptosis are still only at the clinical trial stage:

Death Receptor Ligands: Although TNF is not a useful anti-neoplastic agent, in certain animal models, it can cause death of tumor cells. It is now clear that it does not act directly on the cancer cells, but acts on the host endothelial cells required feed the tumor. It might, therefore, be possible to use apoptosis to treat cancers indirectly, by interfering with vasculogenesis.

Bcl-2 antagonists: Several approaches are being used to promote apoptosis of cancer cells by antagonizing Bcl-2 family members or by reducing their levels. A drug based on an antisense nucleotide to bcl-2 is being trialed in a wide range of different cancers.Bcl-2/Bcl-x antagonists designed to mimic BH-3 only peptides are being developed by a number of groups. These agents could be used to treat follicular lymphoma, in which elevated Bcl-2 levels contribute to causing the disease but also in combination with conventional chemotherapeutic agents to test whether lowering Bcl-2 or Bcl-x will increase the proportion of tumor cells of a variety of types to undergo apoptosis.

Recent researches in field of Cancer Therapy in context to Apoptosis:

One of the most important recent advances in cancer research is the recognition that apoptosis plays a major role in both tumor formation and treatment response.

(John stone et al, 2002; Lowe and **Lin, 2000; Reed, 1999; Herr** and **Debatin, 2001; Kaufmann** and **Gares, 2000)**

Some oncogenic mutations block apoptosis, leading to tumor initiation and progression.(**El-Dierry,1997)** failures in apoptotic pathways may create a permissive environment for genetic instability and accumulation of gene mutations ,promote resistance to immune-based destruction ,facilitate growth factor or hormone independent survival during metastasis**.(Igney** and **Krammer,2002)**

Oncogenic changes such as the myc oncogene can promote apoptosis, herby producing selective pressure on tumor cells to override apoptosis during multistage carcinogenesis.(**Evan** and **Vousden,2001**)

Killing of tumor cells by diverse cytoxic approaches, such as anticancer drugs. Gamma –irradiation, suicide genes or immunotherapy, has been shown to mediated through induction of apoptosis in target cells.(**Kaufmann** and **Earnshaw,2000;Herr** and **Debatin,2001)**

Conclusion:

It is now clear that frustration of the normal cell suicide process is an

important and frequent contribution factor in development of cancer. However, the significance of induction of apoptosis in cancer treatment remains uncertain. Although apoptosis of cancer cells is desirable and many established and novel cancer therapies cause apoptosis

Both in vivo and in vitro, we still do not know how important apoptosis is compared with direct toxicity. We also do not know to what extent expression of apoptotic inhibitory genes contribute to resistance to cancer therapy. However rapid progress in the field of apoptosis and novel agents at all stages of development are grounds for optimism.

ঔ "Dictionary is the only place that success comes before work. Hard work is the price we must pay for success. I think you can accomplish anything if you're willing to pay the price."

-- Vince Lombardi

The Life and Journey of a Nobel Laureate: Dr. Venkatraman Ramakrishnan

Gayatri Iyer, M.Sc. Biotechnology,
Semester IV (2008-10 batch)

Dr. Venkatraman Ramakrishnan, fondly known as 'Venky', is a structural biologist at the MRC Laboratory of Molecular Biology at Cambridge, England. He received the 2009 Nobel Prize in Chemistry for his studies on the structure and function of the Ribosome.

A study of the life and time of Dr. Ramakrishnan is not only interesting but also provides a useful insight into the way a Nobel Laureate chalked out his life with passion and determination, which finally culminated in receiving the coveted Nobel Prize. This is especially important for us students who often find it difficult to select and pursue a course amongst the plethora of fields of study available to us.

"Venky" was born in 1952 in Chidambaram in Cuddalore district of Tamil Nadu, India. He moved to Baroda at the age of three when his parents took up job in the Biochemistry Department of M.S. University, Baroda. He completed his schooling in Baroda. Typical of the lower middle class families in India (as told by his father, Prof. CV Ramakrishnan) - the belief was that a good career meant to be either an Engineer or a Doctor and without that children would not have a decent life, nor would they earn enough. This thought used to be influenced more by economics more than anything else; his 83-year old father was quoted to say. Unfortunately for "Venky" (and fortunately for Science..!!), he failed to get a seat at any of the Indian Institutes of Technology and Christian Medical College, Vellore, Tamil Nadu. He therefore joined M.S. University and enrolled himself in undergraduate studies in Physics. "Venky" was thus exposed to the wonders of Science at an early stage of his career. One of the most fortunate occurrences of "Venky's"life was that his parents did not compel him to pursue medicine, but rather supported him in his decision to study Physics. Had "Venky" not been eager enough to enter the field of scientific research, I would not have been writing this article…!!

On completion of his undergraduate studies in Physics in Baroda in 1971, "Venky" went to the US, where he obtained his Ph.D. in Physics from Ohio University in 1976. He then made the ultimate transition from the physical world to the biological world – "Venky" worked for about two years (1976-78) as a graduate student at the University of California, San Diego. Here, he worked for two years with Dr.

Mauricio Montal, a membrane biochemist, and this really triggered his neurons to continue his work in this field!

Later, he joined Yale University as a post-doctoral fellow, where he worked on a neutron-scattering map of the small ribosomal subunit of *E.Coli*. During this period of study/work, "Venky" decided to continue studying the structure of the ribosome for the rest of his career. And so, it came as no surprise to the scientific community when "Venky" was awarded the Nobel Prize in Chemistry for his pioneering work on ribosomes..!

Later he served at various varsities including University of Utah and MRC Laboratory of Molecular Biology, Cambridge, England. Since 2008, he has been a fellow at Trinity College, Cambridge. In an interview, "Venky" was quoted to say that it was in high school that he really gained interest in science and realized that he was ideally suited for a career in this field.

"Venky" started working on ribosomes since 1978 along with his two co-Nobel Laureates - Thomas Stein of Yale University and Ada E. Yonath of the Weizmann Institute of Science in Israel. They worked out the different angles and ultimately elucidated the complete structure of the ribosome. None of the three researchers worked in collaboration but had occasional meetings to discuss what they were doing in their respective fields. In an interview, "Venky" said that one of the first things that the researchers did was to try and determine the structure with antibiotics, with known ones that binds ribosome. That gave them a very good idea of how they interacted with ribosomes and a good idea of why certain mutation would cause resistance and how you might design better antibiotics.

Venky's career in scientific research had taken many unexpected turns. Even after he chose to study science, perhaps he would not have been where he is to day but for a decision that he took soon after his Ph.D. He started as a theoretical physicist, and decided to switch over to Biology when he found that many more interesting things were happening outside of physics. He found that some wonderful discoveries happening in Biology and noted that number of physician had gone into Biology and been successful. And that brought him in to the world of Ribosome Structure and functions.

Venky does not own a car and goes to work on a bicycle. He keeps low profile. He is very helpful to people - especially young people and will help them whether it is in terms of giving advice for their studies or to provide them guidance. Above all he is very friendly with people.

Apart from being into research Venky is fond of bicycles and love trekking.

Venky goes up to 25 miles bicycling and is very much interested in nature. Venky and his sister have a benevolent streak. They both donate money to UNICEF, Ramakrishna Mission and doctors without borders. Though he is not a spiritually oriented person, he just likes to help people. He is a pure vegetarian and loves to eat vegetarian food cooked by his American wife.

ঌ "All of us are born for a reason, but all of us don't discover why. Success in life has nothing to do with what you gain in life or accomplish for yourself. It's what you do for others."

-- Danny Thomas

Rejoice, Lord is Here.

Dhara Hathiwala, M.Sc. Biochemistry,
Semester II (2009-11 batch)

This is His world, I bow down to Him;
Finding Him in world and world in Him.
His art of teaching,
Expressions of care.
Few would deny, but yes, He cares.
The day of sorrow, full of Pains,
You think of Him and complain.
but Troubles are strong weapons of Him.
to teach us, to mould us, in shape of Him.
It is the Truth, the Truth for all.
Facing more Pains, gives lustre, You adore!
Do not regret at absence of Lord.
Yes, happiness comes with blessings of Lord.
but the very presence of Pain, is very striking presence of Lord.

Honour Our Military

Abhishek Mandal, M.Sc. Microbiology,
Semester II (2009-11 batch)

Let's honour our military,
The men and women who serve,
Whose dedication to our country
Does not falter, halt or swerve.

Let's respect them for their courage;
They're ready to do what's right
To keep India safe,
So we can sleep better at night.

Let's support and defend our soldiers,
Whose hardships are brutal and cruel,
Whose discipline we can't imagine,
Who follow each order and rule.

Here's to those who choose to be warriors
And their helpers good and true;
They're fighting for Indian values;
They're fighting for me and you.

Einstein's Paradoxes of Time & Space

Suhani Palkhiwala, M.Sc. Biotechnology,
Semester II (2009-11 batch)

Even in his teens, Albert Einstein had been curious about the speed at which light travels. 'What would the world look like if I rode on a beam of light?' he wrote.

In his Special Theory Of Relativity, he maintained that all the motion in the universe was relative because far out in the space there is nothing to measure it against. He also maintained that the speed of light about 300,000km per second-is always the same relative to an observer, regardless of the observer's motion. He was saying that light from a star behind, even though the earth was travelling towards one star and away from the other at 18,000mph.

He concluded that the speed of light was the only constant physical property in the universe. And if it was always the same, regardless of the movement of the observer, other physical properties must be different for people traveling in different directions and at different speeds.

He calculated that time would pass more slowly in a space ship traveling at near the speed of light, compared to the time as measured by a person who was stationary in relation to the craft. The space ship would also appear shorter to the stationary person. And it would increase in mass. At the speed of light, its mass would be infinite so no object could reach that speed because to do so would require an infinite force. The special theory leads to the paradox of the twins. If one twin travels in space at close to the speed of light, he will not feel any different from his twin on earth. However, time aboard the spacecraft will pass about half as quickly as it does on Earth. So, if the astronaut is away from the Earth for, say ten years, he will return only five years older-while his twin will have aged ten years.

Einstein's time theory was proved in July 1977, when extremely accurate atomic clocks were placed aboard a United States satellite and sent into orbit. On their return, the clocks were compared with a similar clock at the Naval Research Laboratory in Washington DC and it was seen that the satellite's clocks had slowed down by a tiny amount. Time had therefore passed more slowly aboard the satellite.

Einstein's formula $E=mc^2$ means that the mass of an object can actually be converted into energy. He arrived at the equation from his statement that the mass of an object increases with its speed. The extra energy equals the increase in mass multiplied by the square of the speed of light.

In his general theory, he maintained that a beam of light would be bent by gravity as it passed a star. The gravitational field of the star would cause the light beam to curve inwards and in a sense cause space itself to be curved. So the shortest distance between two points was a curved line.

In 1919, Einstein became famous when the theory was verified by a British team of astronomers who photographed a total eclipse of the sun-when it is possible to take pictures of stars shining near the sun. The photographs were compared with photographs of the same stars when the sun was not near them. The different positions of the stars on the two photographs showed how the starlight was deflected by the sun.

This year the Institute of Science organized its cultural programme, Renaissance 2010 on March 22 and 23, 2010, with great pomp and vigour and it was a grand success.

After the initial screening and practice sessions, the actual competitions commenced on 22nd march at 9.30am in the Moot Court classroom of the Institute of Law, starting with the much awaited Debate Competition. Initially, the participants were allowed to speak individually for a few minutes and then the two groups (for and against) debated for about 15 minutes. The topic of the debate was 'Foreign University Bill, A Boon or Bane?' It ended with logical comments from both the sides and in the end Prof. Naresh Kumar, director, Institute of Science, expressed his views on the topic. The group speaking in favour of the topic was declared as the winner group.

The debate competition was immediately followed by quiz, which was basically a general knowledge quiz, with six teams, including four from students and one from the faculty and research scholars each. One of the teams of semester IV students became to be the winner eventually.

This was followed by one of the most fun loving and entertaining events of the cult-fest, extempore, which had truly unexpected and mostly funny on-the-spot topics. It gave a good reflection of the imagination of the participants. Even the teachers expressed their views on some of the topics.

After the lunch break, the talented ISNU students came up with a group dance. There was a huge diversity in the dances presented like western, rajasthani folk etc

The last event on the first day was a fun-filled antakshari. The rounds of antakshari were much complicated as compared to those conventional, easy to handle ones and the lyrics were given primary importance. Hence, it filled every on with even more enthusiasm. The semester II team was declared as the winner.

Prior to the debate competition, on Monday morning, the judging for the Rangoli competition was done and the 'rangolis' were made by the students on Saturday based on the theme 'seasons'.

The second day began with a show of artistic talent through face painting competition, followed by drama. The latter had heart touching themes as well as comic ones.

After the lunch break, the fashion show commenced, which had a variety of themes like elements of nature, different states, global warming, sculptures etc. The shows and their themes were all eye catching.

All the events were judged by different faculties from the other institutes of Nirma University, viz. Rangoli and Face Painting by Ms. Madhuri Parikh (ILNU), Debate by Mr. Debranjan Hota (ILNU), Group dance by Ms. Bhumika Patel (IPNU), Drama and Solo dance by Ms. Dhara Chotai (ILNU), Extempore and Solo song by Ms. Parna Mukherjee (ILNU) and Fashion Show by Ms. Shraddha Bhadada (IPNU).

The event was concluded by prize distribution to all the winners by Prof. G. Naresh kumar and Dr. Sarika Sinha.

The function was a grand success and has left behind nostalgic memories. All the students of the Institute of Science shall eagerly await the next year's cultural programme.

Institute of Science

Nirma University

List of Winners of Renaissance 2010

Sr. No.	Name of Event	Rank	Name of Winner
1	Rangoli	1	Mitul Vakani & Bhatt Arpan
		1	Chaudhary Chandrakala & Vaishnav Dipti
		2	Varandani Kanika & Rajput mahendra
		3	Hasarajani Vineeta & Pandya Khushboo
2	Debate	1	Sharma Anjali, Trivedi Neha & Solanki Priyanka
		2	Purandhar Kaveri, Varandani Kanika & Hasrajani Vinita
3	Quiz	1	Iyer Gayatri, Mundhra Sonal, Varandani Kanika
		2	Jena Prashant, Trivedi Disha, Chaudhary Chandrakala
4	Group Dance	1	Sanghvi Anusha & Group
		2	Shah Kriti & Group
5	Antakshari	1	Shah Yena, Biswas Debaashish, Bhagwat Geetika
		2	Yadav Ruchika, Yadav Rekha, Garg Nakita
6	Drama	1	Jog Rahul & Group
		2	Shaifali & Group
7	Fashion Show	1	Bhandawat Abhishek & Group
		2	Sanghvi Anusha & Group
8	Extempore	1	Iyer Gayatri.

		2	Jog Rahul.
9	Solo Song	1	Rawal Dewang
		2	Shah Yena
		3	Biniwale Sneha
10	Face Painting	1	Vaishnav Deepti & Panchal Omkar
		2	Gajaria Dolly & Pandya Khushboo
		3	Shaifali & Anusha
		3	Dhara & Abhishek
11	Solo Dance	1	Shah Kriti
		2	Gajaria Dolly
		3	Goyal Chinmay
		3	Sanghvi Anusha

Frontiers in Modern Biology (National Seminar)

Suhani Palkhiwala, M.Sc.Biotechnology,
Semester II (2009-11 batch)

Advances in modern Biology are influencing life styles as well as societal expectations. New areas of biology are developing as a consequence of the kind of questions and problems that require attention. The many manifestations of bio complexity, from fundamental science to socio-economic concerns, require approaches that transcend standard disciplinary lines in terms of research, funding, training and dissemination. Modern Biology, through the voyage of time and its application in agriculture, environment and medicine, has moved beyond the frontiers of traditional biology.

Keeping this in mind Institute of Science invited all the delegates across the state to the Frontiers in Modern Biology, FMB 2010 which was a two day seminar. It was organized by Department of Biochemistry and Biotechnology, Institute Of Science. The seminar focused on the frontiers in Modern Biology in the area of Investigation of Diseases, Cell Death and Apoptosis, Characterization of Proteins, drug design to genomic expression in Cancer Biology and Diabetic Research.

The Lectures commenced with Dr.H.M.Sonawat who was from the Dept.Of Chemical Engineering, TIFR, Mumbai. The lecture was followed by another eminent speaker Dr. S. K. Apte who was the Associate Director and Head of Molecular Biology Division, BARC, Mumbai. The same day Prof. Harish Padh Director, B.V. Patel PERD Centre, Ahmedabad and Prof. Anjana Desai who is the HOD of Microbiology Department, M. S. University, Vadodara. The day ended with a cultural function in which the students of Nirma Institute of Science performed with great enthusiasm.

The second day started off with a presentation on Curcumin conducted by Prof. Santosh K. Kar who hails from the Department Of Biotechnology, JNU, New Delhi.

This was followed by a presentation by Dr. Dhananjay Saranath Research Director, Reliance Life Science, Navi Mumbai. Prof. Sarita Gupta HOD Biochemistry, M. S. University, Vadodara imparted useful information. This presentation was followed by Presentations by Dr. Jayesh Sheth Director, FRIGE, Ahmedabad and Prof. P. Appa Rao from the Department Of Plant Sciences, University Of Hyderabad, Hyderabad. The Seminar ended on a high note by a lecture conducted by the highly reputed Prof. T.P.Singh from the Department Of Biophysics AIIMS, New Delhi. He gave insight on the topic High-throughput protein structure determination and structure-based rational drug-design: its infinite potential and current limitations.

Sports in ISNU....the true spirit of sportsmanship...

Neha Trivedi, M.Sc. Biotechnology,
Semester II (2009-11 batch)

This year's sports were an ultimate storehouse of entertainment, fun and sportsman spirit and included indoor and outdoor group events as well as the intra and inter institute athletic meets. However, the screening for the various events commenced long before.

The indoor and outdoor group events were held during the second half of January (17^{th} & 18^{th} January, 2010) while the annual sports athletic meet took place in the third week of February. The athletic meet was of two kinds, viz. the intra-institute meet which was held on 16^{th} and 17^{th} February, 2010 and the inter-institute meet, which was organized on 18^{th} February, 2010.

On the first day of the outdoor group events, we had girls' cricket, which was all fun. The semester IV team were the winners. After lunch, it was followed by football, and both the teams were equally good, the game ended in a draw. The next event, kho-kho for girls, was too exciting. Semester II girls turned out to be winners in that. Following evening tea, everyone gathered up for girls kabaddi where again semester IV girls were the winners. Last but not the least there was a basketball match for boys, in the twilight, and was the most enjoyable event of all....semester II team won the match.

The second day started with cricket for boys, a game for which most of the boys love to throw a challenge...and they proved that they're real good at it. The director of ISNU, Prof. G. Naresh Kumar and Dr. Sarika Sinha participated in this event as audience to boost the morale of the players. Dr. Sriram Seshadri encouraged the teams by agreeing to act as the referee. The team of semester IV students and Ph.D. scholars won the match. Cricket was followed by volleyball and semester II boys won it with flying colors.

The next event was boys' kabaddi, in which the semester II boys were victorious. Semester II girls showed their strength in tug of war, and they won the same. The day ended with girls' throwball match, which was won by the semester II team.

The ISNU students had also participated in the annual sports of the university which mainly comprised of the intra and inter institute athletic events and inter-institute events like table tennis, cricket, volleyball and football

ISNU students also shouldered the responsibility of the first aid committee during the university annual sports days.

Institute of Science, Nirma University

List of Winners of Intra-institute Indoor and Outdoor Events

Name of the event	1st Prize	2nd Prize
CARROM	PRASHANT JENA	RAHUL JOG
	SHAIFALI MAHNOT	HARSHITA CHAUDHARY
CHESS	TAPAN GUPTA	RAHUL JOG
	NAVITA RATHI	DOLLY GAJARIA
TABLE TENNIS	TAPAN GUPTA	NIHIT SHAH
	PRIYANKA SOLANKI	NAKITA GARG
	CHINMAY GOYAL & ANAND NAKHWA	TAPAN GUPTA & RAHUL JOG
	PRIYANKA SOLANKI & GEETIKA	NAKITA GARG & ANUSHA SANGHVI
THROW BALL	SONAL MUNDHRA	KRITI SHAH
	KAVERI PURANDER	GEETIKA BHAGWAT
	DEEPTI VAISHNAV	JINITHA VERGHESE
	CHANDRAKAL CHOUDHARY	ANJALI SHARMA
	NAKITA GARG	NOOPAR SHARMA

	RICHA BHARDWAJ	SUPARNA THAKUR
	DISHA DHADHANIYA	SNEHA BINIWALE
	REKHA YADAV	CHANDRA BHUVA
VOLLEY BALL	NIHIT SHAH	TAPAN GUPTA
	MANAN TRIVEDI	ARPAN BATT
	HARDIK PATEL	PRASHANT JEENA
	HARDIK GOSWAMI	MAHARSHI PANDYA
	MUKESH KUMAR JAT	MAHENDRA PAL SINGH
	CHINMAY GOYAL	PRANJAL RACHELWAR
	NIKUNJ GAVERIYA	
	JAYDEEP GUPTA	
CRICKET BOYS	RAHUL JOG	MANAN TRIVEDI
	ARPAN BHATT	NIHIT SHAH
	TAPAN GUPTA	MUKESH KUMAR JAT
	MAHARSHI PANDYA	RAJESH PARMAR
	MAHENDRA PAL SINGH	RAHUL SHARMA
	PRASHANT JEENA	JITESH MANGHANI
	UTKARSH PATEL	ABHISHEK MANDAL
	DEBASHISH BISWAS	SURESH KUMAR
	CHANDRAPRAKSH SHARMA	HARDIK GOSWAMI
	SACHIN PRAJAPATI	JAYDEEP GUPTA

	NARESH	ANAND NAKHWA
		ABHISHEK AGRAWAL
FOOTBALL	RAHUL JOG	SANJAY TRIVEDI
	MAHENDRA PAL SINGH	HARDIK PATEL
	MAHARSHI PANDYA	JAYDEEP GUPTA
	OMKAR PANCHAL	ANAND NAKHWA
	PRASHANT JEENA	HARDIK GOSWAMI
	TAPAN GUPTA	ANKIT GUPTA
	ABHISHEK BHANDAWAT	NIHIT SHAH
	SHREYANSH MEHTA	MANAN TRIVEDI
	SURESH KUMAR	RAJESH PARMAR
	UTKARSH PATEL	JITESH MANGHANI
		RAHUL SHARMA
		ABHISHEK MANDAL

Institute of Science, Nirma University

List of Winners of Intra-institute Athletic Events

Event	Rank	Name of Participant (Male)	Roll No.
100 Mts. Run	1	Abhishek Bhandawat	09MBT003
	2	Omkar Panchal	08MBT009
	3	Arpan bhatt	08MBC002
400 Mts. Run	1	Mukesh Jat	09MBC005
	2	Abhishek Bhandawat	09MBT003
	3	Arpan bhatt	08MBC002
800 Mts. Run	1	Nikunj Geveriya	09MBT006
	2	Mukesh Jat	09MBC005
	3	Arpan Bhatt	08MBC002
1500 Mts. Run	1	Nikunj Geveriya	09MBT006
	2	Rahul Sharma	09MBT016
	3	Hardik Patel	09MBC011
Long Jump	1	Nikunj Geveriya	09MBT006
	2	Mukesh Chaudhary	09MBC005
	3	Abhishek Bhandawat	09MBT003
High Jump	1	Hardik Patel	09MBC011
	2	Mukesh Jat	09MBC005
	3	Jaydeep Gupta	09MMB008
Shot Put	1	Abhishek Mandal	09MMB009
	2	Pushpendra Sahu	09MMB014
	3	Omkar Panchal	08MBT009
Discus Throw	1	Abhishek Mandal	09MMB009

	2	Mukesh Chaudhary	09MBC005
	3	-	-

Event	Rank	Name of Participant (Female)	Roll No.
100 Mts. Run	1	Mrigya Kapil	08MBT006
	2	Nakita Garg	08MBC006
	3	Shaifali Mahnot	08MBC015
400 Mts. Run	1	Nakita Garg	08MBC006
	2	Disha Dadhanya	08MBT002
	3	Jinitha Varghese	09MMB020
Long Jump	1	Disha Dadhanya	08MBT002
	2	Deepti Vaishnav	08MBT013
	3	Nakita Garg	08MBC006
High Jump	1	Geetika Bhagwat	09MMB002
	2	Superna Thakur	09MBC018
	3	Disha Dadhanya	08MBT002
Shot Put	1	Kriti Shah	09MBC015
	2	Rekha Yadhav	08MBT014
	3	Deepti Vaishnav	08MBT013
Discus Throw	1	Rekha Yadav	08MBT014
	2	Geetika Bhagwat	09MMB002
	3	Deepti Vaishnav	08MBT013

List of Winners of Inter-institute Athletic Events

Event	**Name & Roll No.**	**Rank**
High Jump (Boys)	Hardik Patel (09MBC011)	3rd
Table Tennis (Girls)	Nakita Garg (08MBC006), Priyanka Solanki (09MMB017), Jinitha Varghese (09MMB020)	Runner Up Team