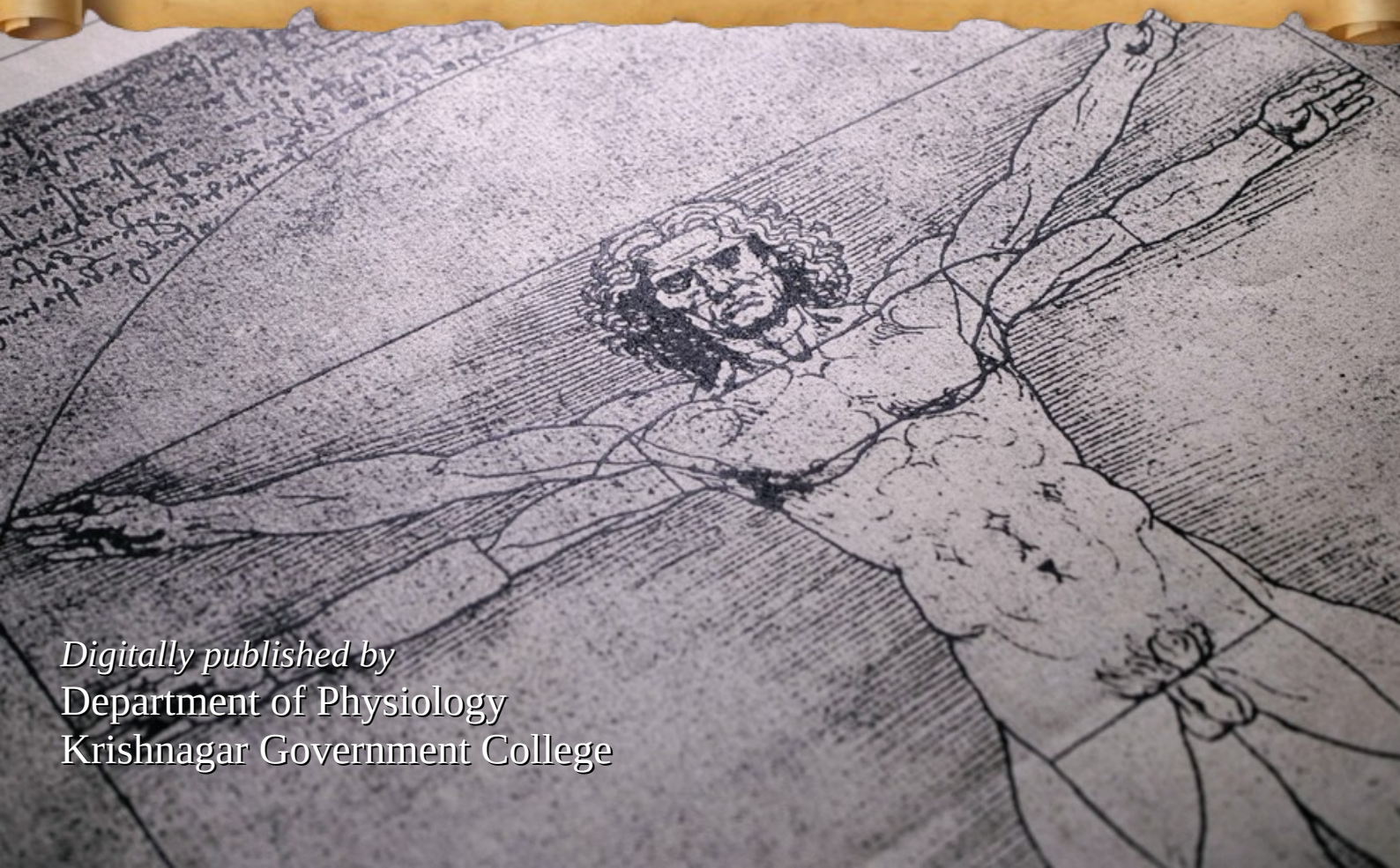


Vol. 2



BIOSPARK

July 2022



Digitally published by
Department of Physiology
Krishnagar Government College

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First published in digital format by:

Department of Physiology

Krishnagar Government College

Krishnagar, Nadia, India – 741101

August 2022

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Editorial



Dr. Maitrayee Banerjee Mukherjee
Head, Department of Physiology
Krishnagar Government College

Dear friends,

I feel extremely privileged and honoured to announce that the students of Department of Physiology, Krishnagar Government College are publishing the July, 2022 issue of **Biospark**, the departmental magazine.

Our current issue is an exclusive edition of scientific contributions, literature and artworks by the present students and outgoing batch. I would like to take this opportunity to extend my heartfelt gratitude to our entire team of editorial board who have strived the period for giving shape to the digital issue of the magazine. Our student editors deserve special thanks for their effort and enthusiasm in learning the tools of creation of e-magazine under the supervision of Dr. Krishnendu Sarkar.

We are deeply saddened by the ultimately demise of our beloved student Shreya Biswas (Semester II, Physiology Honours), who lost her life in a street accident on 2nd July, 2022. Departmental students who stand beside the bereaved family during the crisis needs special mention. Her last contributions to the department are also portrayed in the magazine.

I hope readers will enjoy flipping through the pages of the magazine.

স্মৃতি



শ্রেয়া বিশ্বাস
(২৭ শে এপ্রিল, ২০০৩ -
২ রা জুলাই, ২০২২)

একটা মৃত্যু অনেক কথা বলে দিয়ে যায়,
একটা মৃত্যু চেতনার গভীরে ডুব দেওয়ায়,
একটা মৃত্যু নির্জন পথের একাকী কেউ।

আমাদের কোনো কিছু বলার ভাষা নেই। এক
অপূরণীয় ক্ষতি।

আসলে এ মৃত্যু অত্যন্ত দুঃখজনক, বেদনাদায়ক।

আসলে শ্রেয়া আমাদের মধ্যেই আছে,

হয়তো পোশাক বদলে ফেলেছে কিংবা নিশ্চয়ই

কোথাও লুকিয়ে আছে। তাই আমাদের মনের মধ্যে

ওকে খুঁজতে হবে বারংবার। হয়তো সবকিছুর

উত্তর আমরা পাবো না, কিন্তু তাও আমাদের

খুঁজতে হবে। ওকে খুঁজে বের করতেই হবে। এই

আমাদের একমাত্র কাজ।

ভালো থেকে শ্রেয়া। ওর পরিবারের সকলের প্রতি

আমরা সমবেদনা জানাই।

- কৃষ্ণনগর সরকারি মহাবিদ্যালয়ের শারীরবিদ্যা বিভাগের অধ্যাপক-অধ্যাপিকা,
ছাত্র-ছাত্রীবৃন্দ এবং শিক্ষাকর্মীবৃন্দ।

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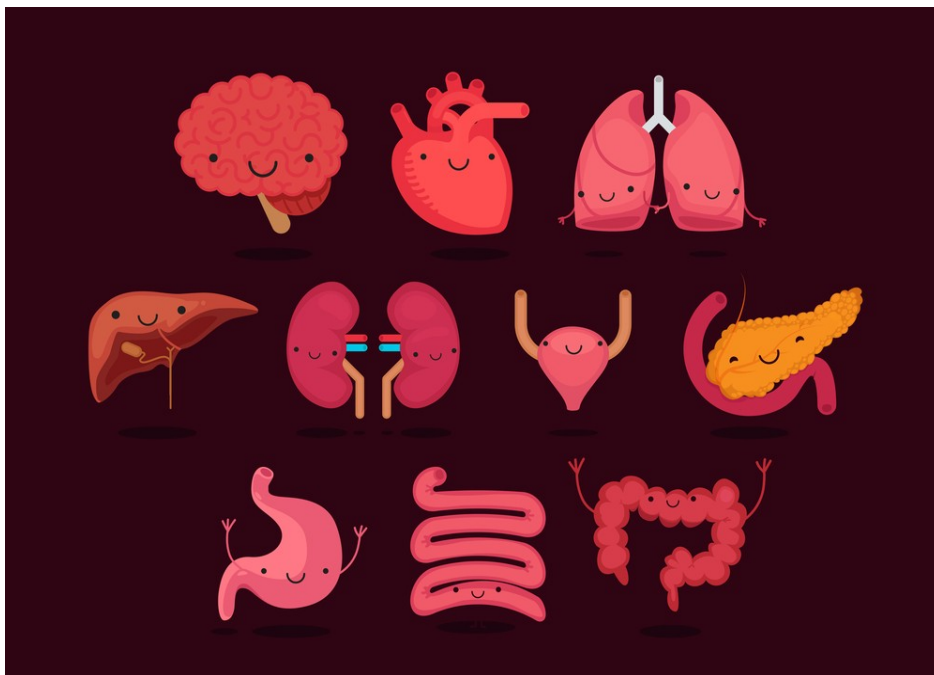
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History of Physiology

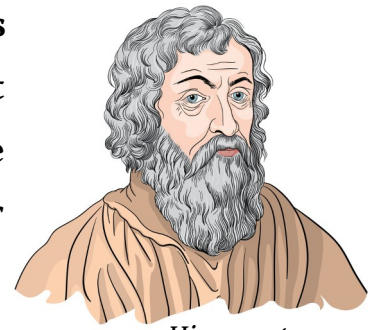
Soumi Biswas, semester IV

We study the subject physiology, we do various researches related to this subject, but do you know the history of Physiology? The subject physiology is the scientific study of functions and mechanisms in a living system. As a sub-discipline of biology, physiology focuses on how organisms, organ systems, individual organs, cells, and biomolecules carry out the chemical and physical functions in a living system. According to the classes of organisms, the field can be divided into medical physiology, plant physiology, cell physiology, and comparative physiology.



The modern-day field of physiology has its roots in ancient cultures such as those of India, Egypt, and Greece. As a medical discipline, it goes back at least as far as the time of **Hippocrates**, the famous “**Father of Medicine**”- around 420 BC. Hippocrates coined the theory of the bodily fluids which are involved in the

maintenance of system of our body. Then **Claudius Galenus**, also known as Galen, modified it and was the first to use experimentation to derive information about the systems of the body. He is widely referred to as the founder of experimental physiology.



Hippocrates

Jean Fernel (1497-1558), a French physician, who first

introduced the term '**Physiology**', from ancient Greek, meaning the "study of nature, origins". He was also the first to describe the spinal canal (the space in the spine where the spinal cord passes through). In 1628, **William Harvey**'s book '**An Anatomical Dissertation Upon the Movement Of The Heart And Blood in Animals**' is usually identified as the beginning of modern experimental physiology. In 17th century despite increased knowledge in physics and chemistry, physiology remained closely tied to anatomy and medicine.



Jean Fernel

Physiology as a distinct discipline, utilization of chemical, physical and anatomical methods began to develop in the 19th century. **Claude Bernard** in France; **Johannes Muller**, **Justus von Liebig**, and **Carl Ludwig** in Germany; and **Sir Michael Foster** in England may be numbered among the founders of physiology as it is now known. In this century, **Joseph Lister** studied the case of blood coagulation and inflammation that resulted after the previous injuries and surgical wounds. In 1838, physiological knowledge began to accumulate at a rapid rate, in particular with the appearance of the Cell Theory of **Matthias Schleiden** and **Theodor Schwann**. **Claude Bernard**'s discoveries led to his concept *milieu interieur* (internal environment), which was later taken up and championed as *homeostasis* by an American Physiologist **Walter B. Cannon** in 1929. **Carl Ludwig**, a scientist of Germany during his medical studies, applied his new ideas of physical sciences to physiology. In 1847, he invented the *kymograph*, a cylindrical drum used to record muscular motion, changes in blood pressure, and other

physiological phenomena. He also made significant contribution in the topic of urine secretion. In 1869 at Leipzig, **Ludwig** founded the **Physiological Institute** which served as a model for research institutes in medical schools worldwide. The chemical approach to physiological problems, developed first in France by **Lavoisier**, was expanded in Germany by **Justus von Liebig**. In 1869, **Sir Michael Foster** became the Professor of **Practical Physiology at University College** in London. In 1877, Foster wrote a major book (**Textbook of Physiology**), which passed through seven editions. In 1876, partly in responses to increased opposition in England against experimentation with animals, Foster was instrumental in founding the **Physiological Society**, the first organization of professional physiologists. In 1878, largely due to Foster's activities, **The Journal of Physiology**, which was the first journal devoted exclusively to the publication of research results in Physiology, was initiated. **S. Weir Mitchell**, who studied under **Claude Bernard**, and **Henry P. Bowditch**, who worked with **Carl Ludwig**, joined **Martin** to organize the **American Physiological Society** in 1887, and in 1898, the society sponsored publication of the American Journal of Physiology. In 1891, Ivan Pavlov performed research on "*conditional reflexes*" that involved dogs' saliva production in response to a plethora of sound and visual stimuli.



Physiology in the 20th century was a mature science; during a century of growth, physiology became the parent of a number of related disciplines, of which biochemistry, biophysics, general physiology, and molecular biology are the most vigorous examples. Physiology, however retains an important position among the functional sciences that are closely related to the field of medicine. The importance of physiology was reflected in Nobel Prize, which began to be offered in the category of Physiology or Medicine in 1901. **The first Nobel Prize in**

Physiology or Medicine was awarded to Emil von Behring, who performed pioneering research on treating diphtheria and tetanus. In 1920, August **Krogh** won the Nobel Prize for discovering how blood flow is regulated in capillaries. **Gerty Theresa Cori**, along with husband **Carl Cori** received the Nobel Prize in Physiology or Medicine in 1947 for their discovery of the phosphate containing form of glucose known as glycogen, as well as its function within eukaryotic metabolic mechanisms for energy production. Moreover, they discovered the *Cori Cycle*, also known as the Lactic acid cycle, which describes how muscle tissue converts glycogen into lactic acid via lactic acid fermentation. In 1954, **Andrew Huxley** and **Hugh Huxley**, alongside their research team, discovered the sliding filaments in skeletal muscle, known today as the sliding filament theory.

Growth of Physiology in India

- In ancient India, **Sushruta** who was a 600 B.C. physician, explained physiological importance of exercise to prevent disease.
- **Autar Singh Paintal** was a medical scientist who made pioneering discovery in the area of neurosciences and respiratory sciences.
- **Har Gobind Khorana** was an Indian-American scientist who shared the 1968 Nobel Prize for Physiology or Medicine with **Marshall W. Nirenberg** and **Robert W. Holley** for research that showed how the order of nucleotides in nucleic acids, which carry the genetic code of the cell, control the cell's synthesis of proteins.
- **Professor Bal Krishna Anand**, was a famous Indian Physiologist and Pharmacologist. He was credited for the discovery of feeding centre in Hypothalamus in 1951. He is considered as the *founder of modern Neurophysiology in India*.

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MedicalNewsToday, Wikipedia, Britannica

Importance of Biotechnology in Agriculture

Arghya Biswas, semester VI

Biototechnology is the application of scientific techniques to modify and improve plants, animals and microorganisms to enhance their value. Agricultural biotechnology is the area of biotechnology involving applications of agriculture. Agricultural biotechnology has been practised for a long time, as people have sought to improve agriculturally important organisms by selection and breeding. An example of traditional agricultural biotechnology is the development of disease-resistant wheat varieties by cross-breeding different wheat types until the desired disease resistance was present in a resulting new variety.



The United States is the leader in both research and commercial applications, biotechnology research is also conducted by many European and Asian research institutions and industry, as well as in more advanced developing countries and

by the **International Agricultural Research Centers (IARCs)**. The private sector dominates agricultural biotechnology, funding over 50% of the research and development in the United States. The strength of private over the public sector introduces important issues that must be addressed when considering the needs of developing countries.

Goals of agricultural biotechnology are essentially the same as those of conventional plant breeding, with one or two exceptions. In general terms, the goals fall into two major categories: improving crop performance in the field (so-called input traits) and developing new products with enhanced value (Output-traits).

So far, most commercially grown transgenic crops feature input traits, but in the next few years the commercial release of many more crops with output traits is anticipated.

Losses of agricultural crops to pests and disease can be very high, particularly in developing countries. Genetic transformation with genes that confer resistance to pests and disease has the potential to reduce crop loss and to reduce or eliminate the application of agrochemical pesticides both.

Plant viruses of varying kinds often destroy up to 80 percent of many crops. Fragments of DNA from plant viruses can be genetically engineered into crops to give natural protection against viral disease. Example - **Hawaiian Papaya** that is genetically resistant to the devastating papaya ringspot virus. Developed by **Cornell University**, the **University of Hawaii** and the **Pharmacia Upjohn company**, this virus-resistant papaya is now widely grown.

The most common approach used to increase plant resistance to insect pests is the '**Bt**' strategy. The gene for a protein toxic to many insect pests and naturally present in the soil bacterium *Bacillus thuringiensis* - is inserted into plants. Varieties of Bt insect-resistant corn, cotton and potatoes are now in commercial production and sunflower, soybeans, canola, wheat and tomatoes are expected soon.

Transgenic solutions to other types of plant pest and disease are now being addressed and the search for disease-resistance genes in many plant species is now underway. For example, genes which produce antifungal proteins have been inserted into various plants, including banana, giving protection against the damaging Sigatoka disease caused by the fungus *Mycosphaella fijiensis*. Developing transgenic plants with resistance to herbicide may seem a non likely goal, but this particular genetic modification accounted for 70% of all transgenic crops grown worldwide in 1998. The modification permits the use of simplified weed management strategies attractive to farmers. Herbicide resistant varieties of soybeans, cotton, corn, canola and rice are now in commercial production. Herbicide-resistant wheat and sugar beet are anticipated soon. Research is ongoing on many other crops.

GMO (Genetically modified organisms)

Genetically modified crops are the latest advancement in the agricultural field. These crops result from the alteration in the genetic makeup of the crops. This modification leads to a number of advantages in the crops which include:

- There is less loss after harvest.
- The crops can be modified to have additional nutrients value for human welfare.
- These crops are modified to be highly efficient, i.e., the high yield with less usage of minerals.
- The decrease in the use of insecticides and pesticides which lead to pollution in the environment.

More tolerance to the natural stresses like natural calamities, extreme temperature and weather conditions, lack of water and minerals.

Some Transgenic Crops

Bt Brinjal - Bt Brinjal is a transgenic brinjal created by inserting a gene *cry1Ac* from the soil bacterium *Bacillus thuringiensis* into Brinjal. This genetically modified brinjal gives resistance against insects such as the Brinjal Fruit and Shoot Borer (*Leucinodes orbonalis*). Bt Brinjal was developed by **Maharashtra Hybrid Seeds Company (Mahyco)**.

Bt Cotton - Bt cotton has been genetically modified by the insertion of one or more genes from a common soil bacterium, *Bacillus thuringiensis*. These genes encode for the production of insecticidal proteins, and thus, genetically transformed plants produce one or more toxins as they grow. The genes that have been inserted into cotton produce toxins that are limited in activity almost exclusively to caterpillar pests (Lepidoptera). However, other strains of *Bacillus thuringiensis* have genes that encode for toxins with insecticidal activity on some beetles (Coleoptera) and flies (Diptera). Some of these genes are being used to control pests in other crops, such as corn.

Bt Potatoes - A genetically modified potato is a potato that has had its genes modified, using genetic engineering. Goals of modification include introducing pest resistance, tweaking the amounts of certain chemicals produced by the plant, and to prevent browning or bruising of the tubers. Varieties modified to produce large amounts of starches may be approved for industrial use only, not for food.

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[PubMed](#), [ScienceDirect](#)

Advancements of Medical Sciences in Ancient Egypt

Ratnodip Saha & Swarnali Biswas, semester VI

The ancient Egyptian civilization lasted from 3300 to 525 BCE. Egypt is well known for its history, which is decorated with incredible pyramids, bizarre paintings, mummies and many more.



Illustrated by Swarnali Biswas

Egyptians had a firm belief in afterlife. To them, death was just an ending of a part of a longer journey of life. Soul does not die. Besides all of these supernatural concepts, ancient Egyptians have some valuable contributions to the present mankind. I am sure that you are thinking of 'Papyrus', an ancient form of paper, a gift from the Egyptians. But no. That is not the end of the list. Some historical records suggest that medical care originated from ancient Egypt.

Ancient Egyptians believed that, gods, demons, and evil spirits had roles in causing diseases. Priests thought that evil spirits blocked the channels in the body and disrupted the normal functioning. As remedies, they used prayers as well as natural treatments or medicines. Thus, worship of gods were an important step before initiation of treatment. **Sekhmet**, the goddess of healing was one of them.

There are some reasons behind the success of ancient Egyptians in the field of medical practices. As Egyptians had number and letter systems, they could calculate and record their findings and ideas. Besides these, organised economic system and government, settled civilization, contributed to the stability of medical researches. Moreover a great number of wealthy individuals in the ancient Egyptian society, could make the medical procedures affordable for themselves.

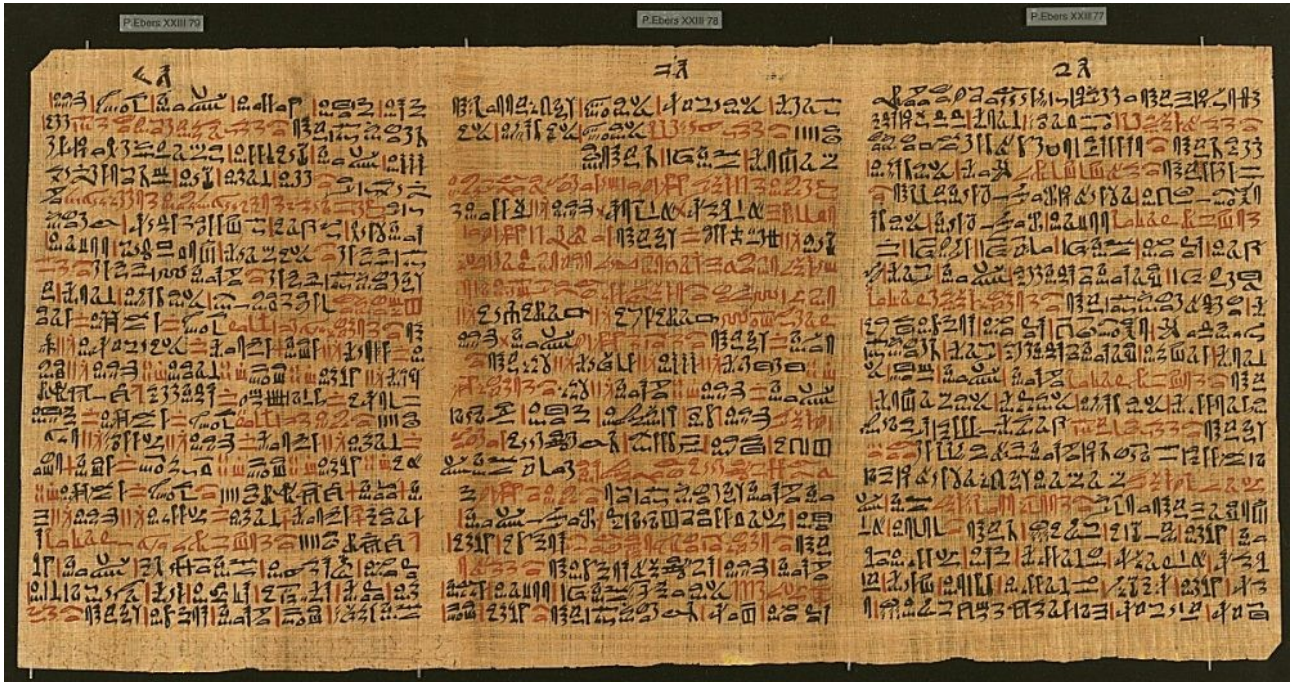


Sekhmet, goddess of healing

To guide the spirits of the deceased to the afterlife, Egyptians mummified the bodies to preserve them as the home for the soul, so that the body can be used again in afterlife. While mummifying the bodies, they came to know about the internal organs of the body, and how they work. Archaeologists have found several records that describe ancient magical practices of Egypt. A number of ancient Egyptian medical papyri hold several details about medical procedures. The remedies were consisted of herbal medications, surgeries and magical spells. Remains of more than 40 papyri, describing ways to treat various illnesses have been explored.

The Ebers papyrus, written in around 1550 BCE with 328 different components (among them most are herbal) gives an idea of 876 prescriptions. Those include ophthalmology, dermatology, gynaecology, dentistry, surgery etc., which suggests the presence of specialized treatments during that time.

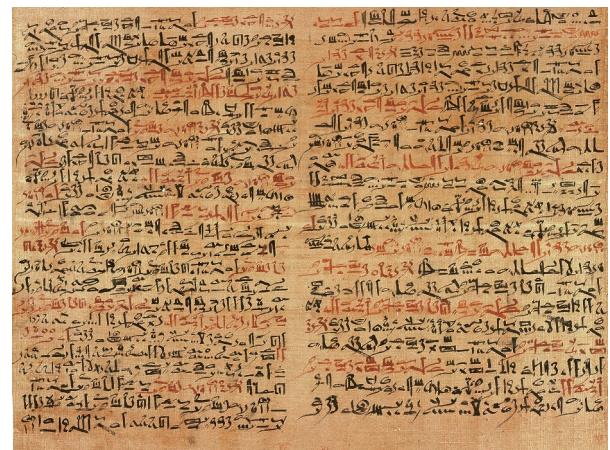
The papyrus included a '*Treatise on the Heart*', which describes the heart as the focal point of blood supply with vessels attached to all the limbs. But as a misconception, they believed the heart to be the centre for every fluid circulating within the body, like urine, semen etc.



Ebers papyrus (1550 BCE)

The ancient Egyptians also had ideas about mental disorders. A chapter named '*The Book of Heart*' in the papyrus discussed about mental disorders like dementia and depression. Other chapters included diagnosing pregnancy, contraception, dentistry, skin and eye problems, broken bone treatments etc.

The **Edwin Smith papyrus**, written in 1600 BCE, is about surgical trauma which discusses about 62 diseases and surgery cases. Among them, 14 cases with known treatments were mentioned. The treatments mentioned in this book included closure of wounds using sutures, preventing infection with honey and



Edwin Smith Papyrus (1501 BCE)

stopping bleeding using raw meat. The papyrus also mentioned about the immobilization of head and neck if detailed anatomical observations were needed for treatment.

Another notable papyrus is **Kahun gynaecological papyrus**, which discusses about different gynaecological problems, diagnosis and treatments. All the treatments in this papyrus are non-surgical. An interesting point in this papyrus is: as prevention of pregnancy, excrement of crocodile, dispersed in honey and sour milk with a pinch of *natron* (dehydrated sodium carbonate) should be injected into vagina. Other medical papyri are **Hearst papyrus**, **Erman papyrus**, **Berlin papyrus** etc.



Ancient Egyptian medical instruments

As the papyri suggest, the ancient Egyptians had a good knowledge of anatomy as well as medical physiology. Numerous diseases of alimentary, respiratory, circulatory, genital, muscular, nervous, ocular, auditory, olfactory and osseous (bone related) systems were described in details. Cerebrospinal fluid was also known to them.

Use of various surgical instruments like scalpel, forceps, scissors, splints, which are still used in modern medical procedures today, suggests the advancement of surgical techniques in ancient Egypt. Uses of anesthetics and painkillers are also mentioned in the Ebers papyrus. **Prosthetic limbs**, made of wood are also found in ancient Egypt (eg. *The Greville Chester toe*).

In the ancient times, Egyptian priests were the first people, allowed to practice medical procedures or spells. Later physicians studied at schools that were



The Greville Chester toe made of cartonnage

called '**The House of Life**'. Individuals, who studied for becoming physicians, were dedicated to one specific disease or a specific part of body systems. Within the hierarchy of physicians, there were, regular doctors, senior doctors and ministers of health.



Imhotep (2667-2600 BCE)

Among early physicians, **Imhotep** (2780 BCE) was the most famous, who was the chief vizier of pharaoh Zoser. He was also the engineer of pyramid of Sakkara. After two thousand years of his death, his status rose to that of '**God of medicine and healing**'.

Beside males, history tells us about some female physicians of that era. Participation of females in the medical profession in Egypt was not a fact of surprise, as women were highly respected in the ancient Egyptian civilization. Presence of female deities like **Sekhmet**, **Isis** may be considered as a proof of the

previous statement. A popular female physician was **Pesehet** (around 2500 BCE) was known as '**Lady overseer of female physicians**'. Her name is mentioned as the first female doctor, but this is not vivid, whether she was famous as a practicing physician or as a teacher. Though from the informations, obtained from her stela at Giza, it is certain that, Pesehet was a medical practitioner and a supervisor or a trainer of other female physicians.



Pesehet

Egyptian physicians of ancient time and their medical procedures were popular among the king, and nobility of other Nations. The Egyptian medical practices were greatly admired by the Greeks, and they adopted a large portion of their beliefs and practices. The Egyptian texts and symbols were studied and passed forward by famous physicians of Rome and Greece, like **Galen**, **Hippocrates** etc.

Finally, thanks to the skills of Egyptians in writing down all the things, because that is the most vital reason behind my ability to write a little piece of their endless story.



Illustrated by Swarnali Biswas

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- [Traditional ancient Egyptian medicine: A review](#) by Ahmed M. Metwaly et al.
 - [What was ancient Egyptian medicine like?](#) by Yvette Brazier
 - [Egyptian Medicine](#) by Joshua J. Mark

Stress management

Piyali Das, semester IV

Stress is a state produced by a change in the environment that is perceived as challenging, threatening or damaging to the person's dynamic balance or equilibrium. The person feels unable to meet the demands of the new situation.



Factors affecting stress

Internal factors:

- age
- attitude
- hardness
- genetic background
- health status

- nutritional status
- optimistic outlook
- personality
- resilience
- sleep status

External factors:

- cultural and ethnic influences
- number of stressors
- religious or spiritual influences
- social support
- socioeconomic status
- timing of stressors

Physiological responses to stress

The nervous, endocrine and immune systems are primarily involved in the stress response.

The **nervous system** or the areas of cerebral cortex, involved in the control of cognition, affect and movement influence how we perceive stressors. The motor areas also send signals to the adrenal medulla that directly relate to how stressors are managed. The Hypothalamus plays a primary role in the stress response by regulating the function of both sympathetic and parasympathetic branches of the autonomic nervous system .

The **limbic system** is the part of brain involved in our behavioural and emotional responses, especially when it comes to behaviours we need for survival.

The **reticular formation** has projections to the thalamus and cerebral cortex that allow it to exert some control over which sensory signals reach the cerebrum and come to our conscious attention. It plays a central role in states of consciousness like alertness and sleep.

Once the body is activated in response to Stress, the **endocrine system** becomes involved. The SNS stimulates the adrenal medulla to release epinephrine and norepinephrine (catecholamines). The effect of catecholamines and the activation of SNS, including the response of the adrenal medulla, is referred to as the sympathoadrenal response.

Nerve fibres extend from the nervous system and synapse on cells and tissues of the **immune system**. In turn the cells of the immune system have receptors for many neuropeptides and hormones. This allow them to respond to nervous and neuroendocrine signals. As a result the meditation of stress by the central nervous system leads to corresponding changes in immune cell activity.

Effect of stress on health

When we have been stressed out for a short period of time, then we may start to notice some of these physical signs:

- Headache
- Fatigue
- Difficulty sleeping
- Difficulty concentrating
- Upset stomach
- Irritability

When stress becomes long-term and is not properly addressed, it can lead to a number of more serious health conditions, including:

- Depression
- High blood pressure
- Abnormal heartbeat-arrhythmia
- Heart disease
- Heart attack
- Weight gain or loss
- Changes in sex drive

- Arthritis
- Fertility problems

Coping strategies:

Coping is a person's efforts to manage stressors. Coping Strategies are broadly classified as of two types:

Emotion-focused coping, which involves managing the emotions that a person feels when a stressful event occurs. When a situation is unchangeable or uncontrollable, emotion-focused coping may predominate. *Examples include discussing feeling with a friend or taking a hot bath.*

Problem-focused coping involves attempts to resolve the problems causing the stress. If we can change or control a problem, this strategy is the most helpful. Problem focused coping strategies allow a person to look at a challenge objectively, act to address the problem and thereby reduce the Stress. *Setting priorities, collecting information and seeking advice are examples of problem-focused coping.*

Relaxation strategies:

Common relaxation strategies are:

- Biofeedback
- Imagery
- Massage
- Meditation
- Muscle relaxation
- Music
- Qigong
- Relaxing breathing
- Tai chi



Personal tips for handling stress

- Do not try to be superhuman
- Exercise regularly
- Share your feelings
- Live a healthy lifestyle
- Meditate or pray
- Try to look at change as a positive challenge, not as a threat
- Learn acceptance of yourself
- Get adequate sleep
- Learn relaxing breathing
- Solve the little problems
- If needed, get professional counselling

Conclusion

Stress is an unavoidable reality of life in today's world. Managing Stress can help reduce the stress and help us to feel healthier. We have to remember that we can not change the view of others but prepare ourselves to prove our point. Always try to practice out for different relaxation techniques. Always think positively and keep a positive attitude.

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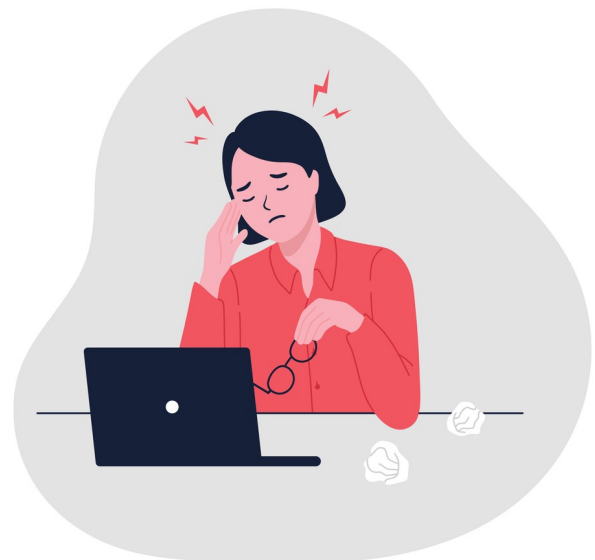
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Reproductive Hazards affecting Working Women

Snehankana Mitra, semester VI

Modernization has uplifted women in every possible way. Proper education, the sense of necessity for financial independence, modern technology and constant urge of uplifting lifestyle standards have primarily enhanced this matter as a result today men and women are working parallel in every sectors.

Recent researches depict that working women are at the risk of developing reproductive disorders. Many factors can affect a woman's reproductive health and her child bearing ability. We know the causes of several reproductive disorders but our knowledge and concern is very little about the workplace hazards that can affect a woman's reproductive health and her ability to become pregnant. This article focuses on the different workplace hazards that affect female reproductive health and their preventive measures.



What are reproductive hazards?

Substances or agents that affect the reproductive health of women or men or their ability to have healthy children are called reproductive hazards. Radiation,

some chemicals, certain drugs (legal and illegal), cigarettes, some viruses and alcohol are examples of reproductive hazards.

- The harmful effects of a few agents found in the workplace have been known for many years. For example,
- Lead was discovered to cause miscarriages, stillbirths, and infertility in female pottery workers almost 100 years ago.
- Rubella (German measles) was recognized as a major cause of birth defects in the 1940s.

A reproductive hazard can cause one or more health effects, depending on when the woman is exposed. For example,

- Exposure to harmful substances during the first 3 months of pregnancy might cause a birth defect or a miscarriage.
- During the last 6 months of pregnancy, exposure to reproductive hazards could slow the growth of the foetus, affect the development of its brain, or cause premature labour.



Reproductive hazards may not affect every worker or every pregnancy. Workers with immunity through vaccinations or earlier exposures are not generally at risk from diseases such as hepatitis B, human parvovirus B19, German

measles, or chicken pox. But pregnant workers without prior immunity should avoid contact with infected children or adults.

Only a few substances (some viruses, chemicals, and drugs) are known to cause reproductive health problems. Scientists are just beginning to discover how workplace exposures might cause reproductive problems. Following are some of them and their significance:

Chemical and physical agents that are reproductive hazards for women in the workplace		
Agent	Observed effects	Potentially exposed workers
Cancer treatment drugs (e.g., methotrexate)	Infertility, miscarriage, birth defects, low birth weight	Health care workers, pharmacists
Certain ethylene glycol ethers such as 2-ethoxyethanol (2EE) and 2-methoxyethanol (2ME)	Miscarriages	Electronic and semiconductor workers
Carbon disulfide (CS ₂)	Menstrual cycle changes	Viscose rayon workers
Lead	Infertility, miscarriage, low birth weight, developmental disorders	Battery makers, soldiers, welders, radiator repairers, bridge repairers, firing range workers, home remodelers
Ionizing radiation (e.g., X-rays and gamma rays)	Infertility, miscarriage, birth defects, low birth weight, developmental disorders, childhood cancers	Health care workers, dental personnel, atomic workers
Strenuous physical labor (e.g., prolonged standing, heavy lifting)	Miscarriage late in pregnancy, premature delivery	Many types of workers

Disease-causing agents that are reproductive hazards for women in the workplace

Agent	Observed effects	Potentially exposed workers	Preventive measures
Cytomegalo virus (CMV)	Birth defects, low birth weight, developmental disorders	Health care workers, workers in contact with infants and children	Good hygienic practices such as hand washing
Hepatitis B virus	Low birth weight	Health care workers	Vaccination
Human immunodeficiency virus (HIV)	Low birth weight, childhood cancer	Health care workers	Practice universal precautions
Human parvovirus B19	Miscarriage	Health care workers, workers in contact with infants and children	Good hygienic practices such as hand washing
Rubella (German measles)	Birth defects, low birth weight	Health care workers, workers in contact with infants and children	Vaccination before pregnancy if no prior immunity
Toxoplasmosis	Miscarriage, birth defects, developmental disorders	Animal care workers, veterinarians	Good hygiene practices such as hand washing
Varicella-zoster virus (chicken pox)	Birth defects, low birth weight	Health care workers, workers in contact with infants and children	Vaccination before pregnancy if no prior immunity

How the mothers and their babies are getting affected?

- Harmful substances can enter a woman's body through inhalation, contact with the skin or ingestion.
- Pregnant workers and those who are planning should be especially concerned about exposure to reproductive hazards. Like chemicals such as alcohol can circulate in the mother's blood, pass through the placenta, and reach the developing foetus and have adverse effects.
- Other hazardous agents can affect the overall health of the mother and reduce the delivery of nutrients to the foetus.
- Radiation can pass directly through the mother's body to harm her eggs or the foetus.
- Some drugs and chemicals can also pass through a mother's body into baby during breast feeding.
- Reproductive hazards do not affect every woman or every pregnancy. It depends on how much of the hazard they are exposed to, when they are exposed, how long they are exposed, and how they are exposed.

Prevention

Employers are responsible for training and protecting their workers and employees are responsible for learning about the hazards in their workplace. Since little is known about reproductive hazards in the workplace, workers should take the following steps to ensure their own safety:

- Store chemicals in sealed containers when they are not in use.
- Wash hands after contact with hazardous substances and before eating, drinking, or smoking.
- Avoid skin contact with chemicals. If chemicals contact the skin, follow the directions for washing in the material safety data sheet (MSDS).

- Employees should review all MSDSs to become familiar with any reproductive hazards used in their respective workplace and take preventive measures during work. They should participate in all safety and health education, training, and monitoring programs offered by the employer.
- All workers must learn about proper work practices and engineering controls (such as improved ventilation), use personal protective equipment (gloves, respirators, and personal protective clothing) to reduce exposures to workplace hazards.
- Home contamination should be prevented by the following steps:
 - ✓ *Changing of contaminated clothing and washing them with soap and water before going home.*
 - ✓ *Storing the street clothes in a separate area of the workplace to prevent contamination.*
 - ✓ *Washing the work clothing separately from other laundry.*
 - ✓ *Avoid bringing contaminated clothing or other objects home. If work clothes must be brought home, transport them in a sealed plastic bags.*

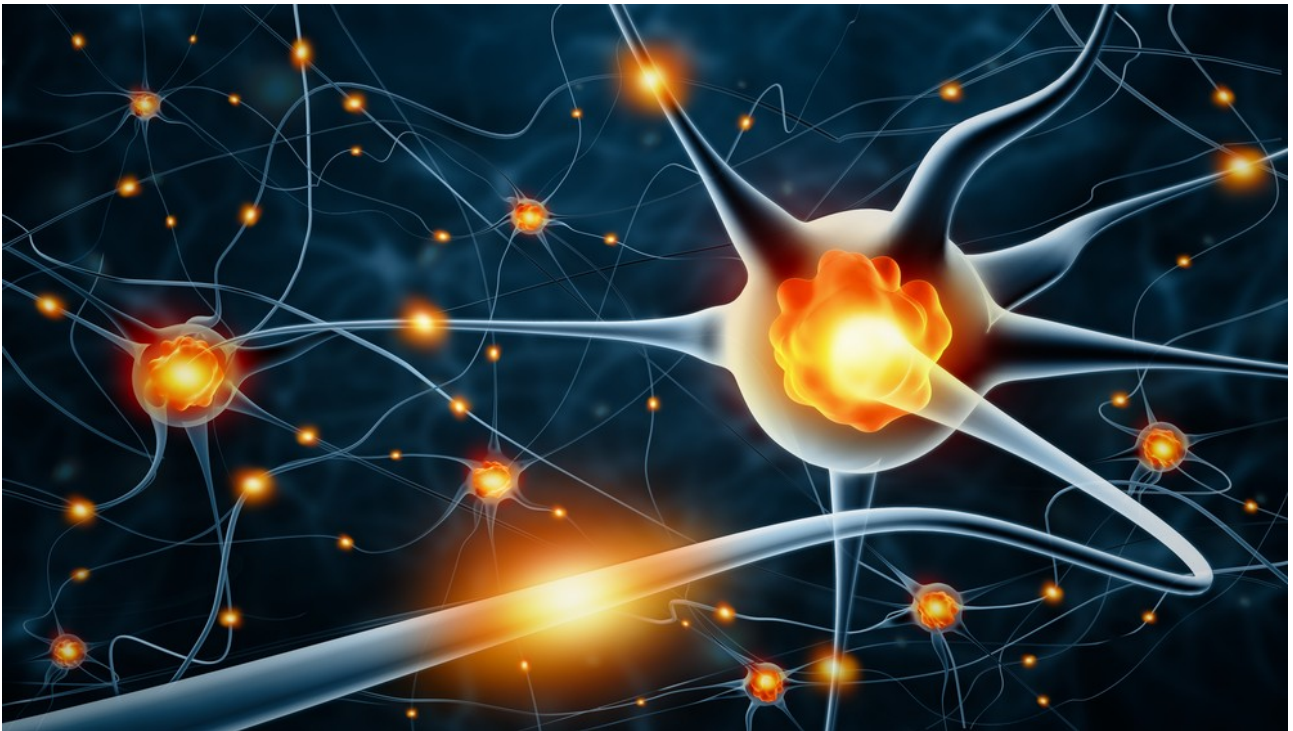
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Amyotrophic Lateral Sclerosis (Lou Gehrig's Disease)

Debjit Sarkar, semester II

Amyotrophic Lateral Sclerosis is a motor neuron disease which degenerate the motor neurons of body and switch off the proper functioning of voluntary muscles.



This disease is very rare in nature, leads patient towards paralysis and eventually death via respiratory failure. The very first symptom of ALS usually appears in the hand or arm, which can be seen as difficulty with simple tasks such as writing, buttoning a shirt, turning a key in lock. As the motor neuron get destroyed progressively, other functions controlled by voluntary muscles such as chewing, talking, eating, walking get hampered. Muscle cramp, stiffness of muscle, muscle wasting may also be observed in patients.

As the neurons are destroyed and patients become paralysed, they get depressed and anxious, loses ability of understanding, remembering, problem solving etc. Some patients also form fronto-temporal dementia (atrophy of frontal and temporal lobe of brain) as side effects.

Causes

Nearly all cases of ALS are considered sporadic, about 5 to 10 percent of ALS cases are familial and about 25 to 40 percent of all familial cases are caused by genetic mutations such as:

- Defect in C9ORF72 gene (which makes a protein, found in motor neuron and nerve cells in the brain).
- Mutation in SOD1 gene that is involved in production of the enzyme copper zinc superoxide dismutase 1.
- ALS of children linked to the mutation of the gene SPTLC1 which is part of body's fat production system.

Other causes such as unorganised immune system may attack nerve cells of body, glutamate (chemical messenger present in brain) exotoxicity can lead the death of nerve cells, exposure to toxins during warfare may also accelerate the death of neurons.

Treatment

There is no proper treatment to cure ALS and reviving the damaged motor neurons. Some medications along with supportive health care can help to control symptoms and make living with the disease easier.

The **USFDA** has approved drugs to treat ALS such as:

- **Riluzole**- This medicine is taken via oral route, it declines the rate of damage of motor neuron via reducing the level of glutamate in the body and prolong survival of patient.

- **Edevarone**- This medicine is given by intravenous infusion and has been shown to slow the decline in clinical assessment of daily functioning in patients with ALS.

Apart from those medications,

- ✓ Physical Therapy such as low impact exercises are essential to improve cardiovascular fitness. Mobility aids such as walkers and wheelchair can be used.
- ✓ Occupational therapy can help patients to maintain their independence for longer.
- ✓ Speech Therapy is useful for ALS patients who feel difficulties in speaking.
- ✓ Breathing therapy can enhance respiratory support.

References:

- [Amyotrophic lateral sclerosis](#) by Wikipedia
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 - [What is ALS](#) by ALS Association

টাইম ট্রাভেল, এক ব্যাখ্যাভীত রহস্য

কৌশিক কান্তি দাস, চতুর্থ সেমিস্টার

Time travel বা আরও স্পষ্ট করে বললে টাইম মেশিন - যে শব্দগুচ্ছের সাথে আমরা প্রত্যেকেই কমবেশি পরিচিত। টাইম ট্রাভেল শুনতে সহজবোধ্য হলেও বিষয়টি অত্যন্ত জটিল এবং তর্কসাপেক্ষ। সময় পরিভ্রমণ বা Time Travel এর সংজ্ঞানুযায়ী একজন ব্যক্তি তখনই Time Travel করে যখন পারিপার্শ্বিক পরিবেশ দ্বারা পরিমাপযোগ্য তার আগমন ও প্রস্থানের মধ্যকার সময়কাল আদতে ব্যক্তি দ্বারা অতিক্রান্ত সময় এর সমান নয়।



ধরা যাক, কোনো ব্যক্তি দুটি ঘড়ির একটি বাড়িতে রেখে অপর ঘড়িটি নিজের সাথে নিয়ে উড়োজাহাজে এক ঘন্টা সময় পরিভ্রমণ করে বাড়িতে এসে দেখলেন আদতে দুই ঘন্টা সময় অতিক্রান্ত। ঘড়িদুটি ক্রটিহীন হলে ব্যক্তিটি একজন টাইম ট্রাভেলার। ১৮৯৫ সালে H.G.Wells যুগান্তকারী এক উপন্যাস লেখেন, নাম 'The Time Machine'। যে উপন্যাসের পর বহু philosopher এবং physicist এর কাছে time travel বহুল চর্চিত বিষয় হয়ে দাঁড়ায়। সিনেমা, কল্পবিজ্ঞান, গল্প, কাহিনী প্রায় সর্বত্র time travel সম্পর্কিত নানা ধারণা গড়ে উঠতে থাকে। এরই ভিত্তিতে গড়ে ওঠা একটি জনপ্রিয় সিনেমা Christopher Nolan পরিচালিত 'Interstellar'।

Time travel বিষয়টি আমরা সবাই প্রায় অসম্ভব হিসেবে ধরি। আজকের দিনে দাঁড়িয়ে অতীতে ফিরে যাওয়া বা ভবিষ্যতে এগিয়ে যাওয়া কি সত্যিই সম্ভব? উত্তর হল - হ্যাঁ। কিছু পরিমাণ হলেও time travel করা সম্ভব। এই time travel সম্পর্কিত নানা ধারণা philosopher এবং physicist দের মধ্যে বর্তমান। তবে time travel মূলত দু-প্রকার, যথা- ভবিষ্যতে পরিভ্রমণ এবং অতীতে পুনরাগমন।

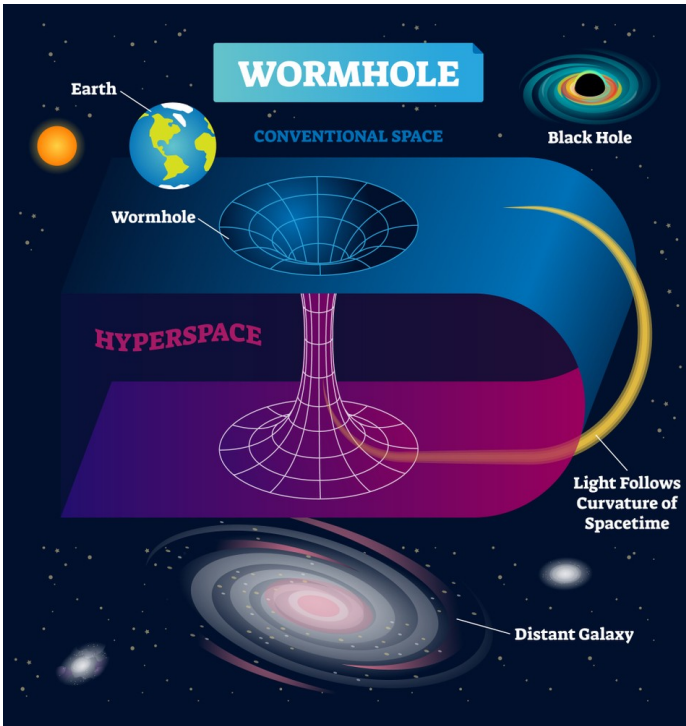
ভবিষ্যতে পরিভ্রমণ সংক্রান্ত time travel নিয়ে যেসমস্ত বিজ্ঞানভিত্তিক তত্ত্ব আছে সেগুলি **Albert Einstein** এর **Theory of Special Relativity** থেকে গৃহীত। জনপ্রিয় বৈজ্ঞানিক **Issac Newton** বলেছিলেন স্থান-কাল-পাত্র নির্বিশেষে সময় একটি ধ্রুবক রাশি। কিন্তু, **Albert**



Einstein সর্বপ্রথম বলেন - সময় কোনো ধ্রুবক রাশি নয়। Speed এবং gravitational force এর ওপর নির্ভর করে সময় কখনও দ্রুত, কখনও ধীর হয়। এই সম্পর্কে বিস্তারিতভাবে আলোচনা করা হয়েছে **Albert Einstein** এর **Time Dilation** তত্ত্বে। এখন time dilation দুরকমভাবে হতে পারে - speed বাড়িয়ে বা gravitational force বাড়িয়ে। একজন ব্যক্তি একটি ঘড়ি বাড়িতে রেখে অপর একটি ঘড়ি নিয়ে কোনো spacecraft এ করে কিছু সময় পরিভ্রমণ করে বাড়িতে এসে দুটি ঘড়ির সময় তুলনা করলে দেখবেন তার সাথে নিয়ে যাওয়া ঘড়িটিতে সময় কিছুটা ধীরে হয়ে গেছে। ১৯৭১ সালে দুটি Atomic clock নিয়ে এরকমই একটি পরীক্ষা করা হয়, যা **Hafele and Keating experiment** নামে পরিচিত। এই পরীক্ষা **Albert Einstein** এর time dilation তত্ত্ব প্রমাণের সাথে ব্যাখ্যা করে - *Time is relative, relative to surroundings*।

রাশিয়ান মহাকাশচারী **Gennady Padalka** সবথেকে বেশি ৮৭৯ দিন মহাকাশে ছিলেন এবং তখন তার বেগ ছিল ঘন্টায় প্রায় ২৮০০০ কিলোমিটার। তাই আজকের দিনে দাঁড়িয়ে তিনি সবথেকে বেশি ০.০২ সেকেন্ড time travel করেছেন বলে ধরা হয়। তাত্ত্বিকভাবে, যদি এমন একটি spacecraft নির্মাণ করা যায়, যার বেগ আলোর বেগের সমান হয় এবং ওই spacecraft এ করে কোনো ব্যক্তি যদি মহাকাশে দশ বছর সময় অতিক্রান্ত করে পুনরায় পৃথিবীতে ফিরে আসে, তাহলে সে দেখবে পৃথিবীতে প্রায় ৯০০০ বছর সময় অতিক্রান্ত হয়ে গেছে। **Albert Einstein** এর time

dilation তত্ত্বের আরেকটি অংশ হল gravitational Force। এই ইউনিভার্সে কোনো planetary object এর ভর যত বেশি তার gravitational Force তত বেশি। যেমন পৃথিবীর gravitational force ৯.৮ মি/সে^২, বৃহস্পতির ২৪.৭৯ মি/সে^২, সূর্যের ২৭৪ মি/সে^২। যেখানে gravitational force যত বেশি সেখানে time dilation তত বেশি অর্থাৎ সেখানে সময় আরও ধীরগতিতে চলবে। সূর্যের থেকেও ব্ল্যাক হোল এর gravitational force বেশি। বলা হয় - **Black Holes are the heaviest object in the universe**। তাই সেখানে সময় আরও ধীরগতিসম্পন্ন।



ভবিষ্যতে পরিভ্রমণ অনেকাংশে সম্ভব হলেও অতীতে পুনরাগমন সত্যিই কি সম্ভব? ২৮ শে জুন ২০০৯ তারিখে **Stephen Hawking** এক পার্টি আয়োজন করেন। কিন্তু মজার ব্যাপার হলো পার্টিতে সকলে নিমন্ত্রিত থাকলেও কেউ আসেননি। আসলে তিনি এই পার্টি আয়োজন করেন ভবিষ্যতের Time Travellers দের জন্য। তার এই মজার পরীক্ষা প্রমাণ করে অতীতে পুনরাগমন সম্ভব নয়। অতীতে পুনরাগমন সম্ভব না হলেও অতীতের এক

ঝলক দেখা আজকের দিনে দাঁড়িয়েও সম্ভব। কোনো ক্ষেত্রে যদি আলোর বেগের তুলনায় বেশি বেগে ভ্রমণ করে লক্ষ্যে পৌঁছানো যায়, তাহলে সেখানে যে আলোটি এসে পৌঁছবে তা আসলে অতীতের আলো। যে পদ্ধতির ওপর সাম্প্রতিককালে উৎক্ষেপিত **James Web Telescope** এর কার্যপদ্ধতি দাঁড়িয়ে। **Albert Einstein** এর **Theory of Special Relativity** সময়ের অতীতে পুনরাগমন কে ভুল প্রমাণ করে না। তার বক্তব্য অনুযায়ী, মহাবিশ্বে যদি কোথাও extremely powerful gravitational force থাকে তাহলে সেখানে **wormhole** তৈরীর দরুণ আমরা অতীতে পুনরাগমন করতে পারবো। নোবেলজয়ী পদার্থবিদ **Kim Throne** এর মতে, মহাবিশ্বে এরকম wormhole হামেশাই তৈরি হচ্ছে। কিন্তু সেগুলি একটি পরমাণুর আকারের তুলনাতেও ছোটো। এই wormhole গুলির আকার বড় করতে এক বিশাল পরিমাণ শক্তির প্রয়োজন, যা হল - **Negative energy**। **Negative energy** আসলে একপ্রকার anti-gravitational force। কিন্তু অতীতে পুনরাগমনের

সময় এমন বাধা বিপত্তির সৃষ্টি হয় যেগুলি তাত্ত্বিক দিক দিয়ে সমাধান করা সম্ভব নয়। এই সমস্ত বাধা বিপত্তিগুলিকে বলা হয় **paradox**। এরকমই একটি paradox হল **Grandfather paradox**। যদি আপনি অতীতে ফিরে যান এবং আপনার ঠাকুরদাকে মেরে ফেলেন, তাহলে আপনি জন্মালেন কিভাবে? আর যদি আপনি না জন্মান তাহলে আপনি অতীতে ফিরলেন কীভাবে? এর একটি সমাধান হতে পারে- **Theory of Multiverse**। যে তত্ত্বনুসারে, একবার যা সৃষ্টি হয়েছে, তা অবিদ্বন্দ্ব। যদি অতীতে ফিরে গিয়ে তার পরিবর্তন করা যায়, তাহলে সেখান থেকে একটি নতুন multiverse সৃষ্টি হবে। এরকমই আরেকটি paradox হল **predestination paradox**। যে তত্ত্বে বলা হয়, আপনি যদি অতীতে ফিরে গিয়ে কোনো দুর্ঘটনা আটকানোর চেষ্টা করেন এবং বর্তমানে ফিরে আসেন, তাহলে আপনি দেখবেন আপনার অতীতে ফিরে যাওয়ার জন্য এবং কিছু পরিবর্তন করার জন্যই আজ দুর্ঘটনাটি ঘটলো। যে তত্ত্বের ভিত্তিতে বেশ কিছু সিনেমা নির্মাণ করা হয়েছে, যথা- 'Time Crime', 'Predestination'।

অতীতে পুনরাগমন হয়তো সম্ভব হবে না paradox গুলির জন্য। তবে অতীতের এক ঝলক দেখা কিংবা ভবিষ্যতের দিকে ভ্রমণ সম্ভব। তাই বলা যায় আজকের দিনে দাঁড়িয়ে আংশিক ভাবে হলেও time travel এর অস্তিত্ব আছে। আগামী দিনে প্রযুক্তি আরও যত সমৃদ্ধ হবে, time travel করার আরও সুযোগ আমাদের সামনে এগিয়ে আসবে।

References:

- [Time travel](#) by Wikipedia
- [Is time travel possible?](#) by Vicky Stein , Ailsa Harvey

ছোটোগল্প - 'তোমায় ভুলবো না'

দীপ দাস চৌধুরী, ষষ্ঠ সেমিস্টার

ছবি- স্বর্ণালী বিশ্বাস, ষষ্ঠ সেমিস্টার



ছোট্ট একটা গ্রাম, 'সুখপাখি'। সবুজ দিয়ে ঘেরা। এই গ্রাম বিখ্যাত গোলাপ আর গাঁদা ফুল চাষের জন্য। গ্রামে ঢোকান মুখে বিরাত একটা বটগাছ। গাছের পাতার মধ্যে দিয়ে সূর্যের আলো লুকোচুরি খেলা করে। তারপর খানিকটা পেরিয়ে

ভীম সর্দারের বাড়ি, ও এই গ্রামের পাহারাদার। তারপর, ওই ছোট্ট ডোবাটা পেরিয়ে বাঁ পাশের প্রথম বাড়িটাই অরিত্রদের। অরিত্র, ১৫ বছরের ছোট্ট ছেলে, বেশ ভালো পড়াশোনায়। ওর কাজ বিবর্ণ গোলাপের পাঁপড়ি যত্নে রাখা। আসলে, ওর প্রতি বছর জন্মদিনে পাওয়া উপহার প্রিয় রঙের প্রিয় এই গোলাপ। প্রতিবছর জন্মদিনের পাওনা গোলাপ সম্বন্ধে ডায়েরীর পাতায় আটকে রাখা ওর স্বভাব। শুকনো গোলাপ রাখতে রাখতে সেটা আজ হয়ে গেছে গোলাপ ডায়েরী। আজ অরিত্র গোলাপ ডায়েরীটা বুকে জড়িয়ে ধরে ফুঁপিয়ে ফুঁপিয়ে কাঁদছে। আজ ওর জন্মদিন। সন্ধ্যে গড়িয়ে রাত্রি নেমেছে, এখনও সতেজ গোলাপ উপহার পায়নি ও। ওর মা ওর মাথায় হাত বোলাতে থাকে। কিন্তু, অরিত্রের চোখের জল কিছুতেই বাঁধ মানেনা। এক ছুটে গিয়ে জানলা দিয়ে আকাশের দিকে তাকায় ও।

এবছর গোলাপ ডায়েরীর পাতা থেকে যাবে শূন্য। কারণ, প্রিয় ফুল উপহার দেওয়ার মানুষ আজ আর নেই। দেশরক্ষার বীর সৈনিক অরিত্রের বাবা নিহত হয়েছেন গতবছর। অরিত্র আগের বছর পাওয়া গোলাপে হাত বোলাতে বোলাতে কাঁপা গলায় বলে উঠে, 'বাবা যেখানেই থাকো, ভালো থাকো।' দেওয়ালে টাঙানো ওর বাবার ছবিটা আজ যেন অন্যরকম লাগছে, কত কথাই যেন বলতে চাইছে ছবির মুখ। বিঁবিঁ পোকাকার ডাক ক্রমশ বাড়ছে।

অরিত্র ডায়েরীটা মাথায় ঠেকিয়ে নিয়ে বলতে লাগলো-

আমরা তোমায় ভুলবো না।

দেশ তোমাকে ভুলবে না।

দেশবাসী কখনো ভুলবে না।

কবিতা – 'আত্মকথা'

শ্রেয়া বিশ্বাস, দ্বিতীয় সেমিস্টার

চেয়ে দেখো ঐ জ্বলন্ত প্রদীপের শিখার দিকে...কেমন তার তেজ!

চেয়ে দেখো ঐ প্রদীপের আধপোড়া সলতে আর ঘি,

যারা জ্বলার জন্য পোড়ে, পোড়ার জন্য জ্বলেনা।

মিশে যায় হাওয়ায় তাদের দগ্ন ইতিহাস,

রচিত হয়না ইতিহাস।

সমাগু!

সুস্মিত!

চেয়ে দেখো তাদেরকে, যারা পোড়ার জন্য জ্বলে।

অপ্রয়োজনীয় তেল, ঘি,

রচিত হয় এক জ্বলন্ত ইতিহাস!

ঠিক এভাবেই পুড়তে চাই।

জ্বলতে না।

ভেবে দেখো শ্মশানে পরে থাকা আধপোড়া হাতের কথা;

যে পুড়তে চেয়েও পারেনি পুড়তে! তাই আজ অর্ধদগ্ন।



ছবি- স্বর্গালী বিশ্বাস, ষষ্ঠ সেমিস্টার

কবিতা - 'বিদায় বেলা'

শ্রেয়া বিশ্বাস, দ্বিতীয় সেমিস্টার

যদি না বলে চলে যেতে হয়?
যদি সময় না থাকে হাতে,
ডাক আসে ওই ভোর রাতে।
জোনাকিরা গল্প থামায়...
তবে কি মা খুঁজবি আমায়?

ধরো, না বলে চলে যাই যদি...
সব কাজ ফেলে রেখে,
ছাইয়ের আবির মেখে...
কোনো এক ঘোর বর্ষায়
তবে কি মা খুঁজবি আমায়?
যদি না বলেই চলে যাই... তবে?
যদি গভীর ঘুমের ঘোরে ফুলের পালকি চড়ে মিশে যায় আগুন হাওয়ায়...
তবে কি মা খুঁজবি আমায় ?

যদি ভেজে বালিশ রক্তে
যদি না ভাঙে ঘুম কোকিলের ডাকে...
তবে কি মা দিবি আমায় গন্ধরাজের মালা!
ভাঙবে পাহাড় অভিমানের...
গলবে বরফ, লাগবে অভিশাপ...



ছবি- স্বর্ণালী বিশ্বাস, ষষ্ঠ সেমিস্টার

কবিতা – 'নিঃশব্দ'

দীপ দাস চৌধুরী, ষষ্ঠ সেমিস্টার



ছবি- স্বর্ণালী বিশ্বাস, ষষ্ঠ সেমিস্টার

সবুজ হাতগুলো প্রসারিত হচ্ছে,
দুলছে ওরা আনন্দে, হাসিতে।
চিন্তামগ্ন সময় এগিয়ে চলেছে,
দাপিয়ে বেড়াচ্ছে বিবেকহীন বোকার দল।
ছিন্ন - ভিন্ন করে দেয় ওদের দেহ,
কান্না বৃষ্টির মতো ঝরে পড়ে।
অনেক চেষ্টায় শক্ত করা ভিটে,
ওরা ছাড়তে বাধ্য হয়।

সবুজ হাতগুলো আকাশ ছোঁয়ার স্বপ্ন হারায়..

বিদ্রোহ-মিছিল, ব্যর্থতায় মুখ লুকায়
চাপা পড়ে যায় যন্ত্রণা-শ্লেষ
মস্ত ইমারতে।

রোগ ও তার কথা

দীপ দাস চৌধুরী ও নিতিকা খাঁ, ষষ্ঠ সেমিস্টার

অ্যালঝেইমার্স রোগ (Alzheimer's Disease)

অ্যালঝেইমার্স (Alzheimer's) হল একধরনের স্মৃতিভ্রংশ, স্নায়বিক ব্যাধি। অধিকাংশ ক্ষেত্রে স্মৃতিভ্রংশের নেপথ্যেই থাকে এই অ্যালঝেইমার্স (Alzheimer's)। এরই কারণে বয়সের সাথে সাথে মস্তিষ্কের কিছু কোশ ও তাদের সংযোগ ধীরে ধীরে নষ্ট হতে শুরু করে, ফলে মারাত্মক ক্ষতি হয় স্মৃতি ও চিন্তাভাবনায়। এটি আমাদের দৈনন্দিন কাজকে ব্যহত করে।

১৯০৬ সালে এই রোগটি প্রথম লক্ষ্য করেছিলেন - জার্মান মনোরোগ বিশেষজ্ঞ **Dr. Alois Alzheimer**।

এই রোগে আক্রান্ত ব্যক্তি তার দৈনন্দিন কাজের রুটিন গুলিয়ে ফেলে, বাড়ি কিংবা অন্যত্র অদ্ভুতভাবে জিনিসপত্র হারিয়ে ফেলে, পরিচিত শব্দ ও নাম মনে না পড়া, সাম্প্রতিক কোনো ঘটনা ভুলে যাওয়া, সাধারণ ব্যাপারগুলোও ভুলে যাওয়া। সামাজিক বোধবুদ্ধিও অনেকাংশে লোপ পায়। রোগ



বাড়লে অতি পরিচিত কেউ চিনতে না পারা, চেনা রাস্তায় হারিয়ে যাওয়ার মতো বিভিন্ন ধরনের সমস্যা হয়। ধীরে ধীরে বিচার বুদ্ধিও লোপ পেতে থাকে।

বিজ্ঞানীরা এখনও পুরোপুরি বুঝতে পারছেন না অ্যালঝেইমার্স (Alzheimer's) রোগের কারণ। সম্ভবত কোনো একটি কারণে হয় না বরং বিভিন্ন কারণ রয়েছে, যা প্রতিটি ব্যক্তিকে ভিন্নভাবে প্রভাবিত করতে পারে। এই রোগের জন্য বয়স ঝুঁকির কারণ। গবেষকরা বিশ্বাস করেন যে জিন এই রোগের বিকাশে ভূমিকা পালন করতে পারে। একটি স্বাস্থ্যকর জীবনধারা আপনার এই রোগের ঝুঁকি কমাতে সাহায্য করতে পারে। অনেকক্ষেত্রে মস্তিষ্কের কোশগুলির মধ্যে বার্তা বা সংকেত পাঠানোর

সাথে জড়িত রাসায়নিক বার্তাবাহক (নিউরোট্রান্সমিটার নামে পরিচিত) হ্রাস পায়। একটি নিউরোট্রান্সমিটারের (অ্যাসিটাইলকোলিন) মাত্রা বিশেষ করে আলঝেইমার্স (Alzheimer's) রোগে আক্রান্ত ব্যক্তিদের মস্তিষ্কে কম থাকে। যেহেতু মস্তিষ্কের ক্ষতি কোনোভাবেই ঠিক করা যায় না, তাই এর কোনো নিরাময় নেই।

এই রোগের প্রতিরোধে দরকার সচেতনতা। একদম শুরুর সময় যখন এই রোগের সামান্য কিছু কিছু লক্ষণ দেখা যায়, তখন অনেকেই তা বোঝেন না, আবার অনেকে বুঝেও তা অগ্রাহ্য করেন। যদি সামাজিক মেলামেশা অনেক বেশি হয়, লোকের সঙ্গে বেশি কথাবার্তা বলেন এবং যারা মাথার ব্যায়াম, যেমন ধরুন শব্দছক, সুডোকু, দাবা ইত্যাদি খেলেন, তাদের এই রোগের আক্রান্ত হবার অনেক আশঙ্কা কম।

তাই সচেতন হোন, সুস্থ ও সুন্দরভাবে বাঁচুন।

ভিটিলিগো ব্যাধি (Vitiligo disorder)

ভিটিলিগো (vit-il-EYE-go) হল একটি ত্বকের ব্যাধি, এতে ত্বকের রঙ হারায়। লোম আছে এমন জায়গায় ব্যক্তির ভিটিলিগো থাকলে, সেই ব্যক্তির শরীরের চুলও সাদা হয়ে যেতে পারে।



অবস্থাটি ঘটে যখন মেলানোসাইটস অর্থাৎ ত্বকের কোষ যা মেলানিন তৈরি করে এবং ত্বকের রঙ দেয়, একে পিগমেন্টেশন বলে। শরীরের প্রতিরোধ ব্যবস্থা ধ্বংস করে দেয়। এটি সাধারণত হাত, পা এবং মুখ থেকে শুরু হয়।

ভিটিলিগো (Vitiligo) ব্যাধির ইতিহাস

১৪০০ খ্রিস্টপূর্বাব্দে সাদা কুষ্ঠের দাগকে অথর্ববেদে 'স্বেতা খুষ্ঠ' বলা হয়েছে। আধুনিক চিকিৎসায় এই রোগটিকে ভিটিলিগো (Vitiligo) বা লিউকোডারমার সাথে তুলনা করা যেতে পারে। রোমান চিকিৎসক আউলাস কর্নেলিয়াস সেলসাস (Aulus Cornelius Celsus) এই ভিটিলিগো (Vitiligo) শব্দটি বলেছিলেন।

ভিটিলিগো (Vitiligo) ব্যাধি দ্বারা প্রভাবিত মানুষ

বিশ্বব্যাপী প্রায় ১% মানুষ ভিটিলিগো (Vitiligo) তে আক্রান্ত হয়। কিছু জনসংখ্যার মধ্যে এটি ২-৩% পর্যন্ত প্রভাবিত করে। পুরুষ এবং মহিলা সমানভাবে প্রভাবিত হয়। প্রায় অর্ধেক ২০ বছর বয়সের আগে ব্যাধি দেখায় এবং বেশিরভাগই ৪০ বছর বয়সের আগে এটি বিকাশ করে।

ভিটিলিগো (Vitiligo) রোগের প্রকার

- সবচেয়ে সাধারণ (Generalized) প্রকারটি হল - যখন শরীরের বিভিন্ন স্থানে অসংখ্য দাগ দেখা দেয়।
- সেগমেন্টাল (Segmental) প্রকার, যা শরীরের একপাশে বা একটি অংশে সীমাবদ্ধ, যেমন - হাত বা মুখ।
- মিউকোসাল (Mucosal), যা মুখের মিউকাস ঝিল্লি বা যৌনাঙ্গকে প্রভাবিত করে।
- ফোকাল (Focal), যা একটি বিরল প্রকার যেখানে দাগগুলি একটি ছোট অংশে থাকে।
- ট্রাইকোম (Trichome), যার অর্থ হল একটি সাদা বা বর্ণহীন কেন্দ্র, তারপরে হালকা পিগমেন্টেশনের একটি অংশে এবং তারপরে সাধারণত রঙিন ত্বকের একটি এলাকা।
- ইউনিভার্সাল (Universal), আরেকটি বিরল ধরনের ভিটিলিগো (Vitiligo) ব্যাধি এবং যার মধ্যে শরীরের ৮০%-এর বেশি ত্বকে পিগমেন্টের অভাব রয়েছে।

ভিটিলিগো (Vitiligo) ব্যাধির লক্ষণ

- ত্বকের নিজস্ব রঙ হারায়। এর মধ্যে চোখ এবং আক্রান্ত ব্যক্তির মুখ বা নাকের মিউকাস মেমব্রেন আক্রান্ত হতে পারে।

- আক্রান্ত ব্যক্তির মাথা বা মুখের চুলের নিজস্ব রং অকালে ধূসর বা সাদা হয়ে যায়।

ভিটিলিগো (Vitiligo)-র কারণ

যদিও ভিটিলিগো (Vitiligo)-র সঠিক কারণগুলি সম্পূর্ণরূপে জানা যায়নি, তবে বিভিন্ন কারণে হতে পারে। যেমন-

- অটোইমিউন ব্যাধি (Autoimmune disorder) আক্রান্ত ব্যক্তির ইমিউন সিস্টেম অ্যান্টিবডি তৈরি করতে পারে, যা মেলানোসাইট ধ্বংস করে।
- জিনগত কারণ(Genetic factors) - কিছু কারণ যা এই রোগ হওয়ার সম্ভাবনা বাড়িয়ে তুলতে পারে, তা উত্তরাধিকার সূত্রে প্রাপ্ত হতে পারে।
- নিউরোজেনিক ফ্যাক্টর (Neurogenic factor) - মেলানোসাইটের জন্য বিষাক্ত একটি পদার্থ ত্বকের স্নায়ুর প্রান্ত থেকে নির্গত হতে পারে।

ভিটিলিগো (Vitiligo) ব্যাধির জন্য চিকিৎসা

ভিটিলিগো (Vitiligo)-র চিকিৎসায় ত্বকের রঙ পুনরুদ্ধার করে, তার চেহারা পরিবর্তন করা যায়। কিন্তু, চিকিৎসার প্রভাবগুলি সাধারণত স্থায়ী হয় না এবং এটি সর্বদা অবস্থার বিস্তারকে নিয়ন্ত্রণ করতে পারে না। আর আক্রান্ত ব্যক্তি চিকিৎসার জন্য একজন ডাক্তারের কাছে যেতে পারেন, যিনি চর্মরোগ বিশেষজ্ঞ।

এই ব্যাধির জন্য প্রয়োজন

- ✓ আক্রান্ত ব্যক্তির ত্বককে সূর্য থেকে রক্ষা করতে হবে এবং সানবেড(sunbed) ব্যবহার করবেন না। ভিটামিন ডি (vitamin-D)-এর প্রধান উৎস সূর্য। তাই মাঝে মাঝে সূর্যালোকের সংস্পর্শে আসা প্রয়োজন।
- ✓ ত্বকের সাদা দাগে স্কিন ক্যামোফ্লেজ (Skin camouflage) ক্রিম লাগাতে পারেন।
- ✓ ফটোথেরাপি (Phototherapy) শিশুদের বা প্রাপ্তবয়স্কদের জন্য ব্যবহার করা যেতে পারে যদি সাময়িক চিকিৎসা কাজ না করে।

- ✓ স্কিন গ্রাফ্ট (Skin grafts) হল একটি অস্ত্রোপচার পদ্ধতি যেখানে শরীরের বিভিন্ন অংশের থেকে সুস্থ ত্বক সংগ্রহ করে এবং ভিটিলিগো (Vitiligo)-র অংশে প্রতিস্থাপন করা হয়।
- ✓ প্রাপ্তবয়স্কদের জন্য যাদের শরীরে ৫০% এর বেশি ভিটিলিগো (Vitiligo) আছে তাদের জন্য ডিপিমেন্টেশন (Depigmentation) সুপারিশ করা যেতে পারে।

এই রোগ সম্পর্কে সচেতন হোন, সুস্থ ও সুন্দরভাবে নিজে বাঁচুন এবং অন্যকে সুন্দরভাবে বাঁচতে সহায়তা করুন।

References:

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- [Alzheimer's disease](#) by Mayo clinic
- [What Causes Alzheimer's Disease?](#) by NIH
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Snakes and Human Life

Pronobesh Bhattacharya, semester II

Snakes, a word which generates a frightening feeling in our mind because, we often hear the death reports caused by snake biting, for this only reason people (mainly in village) kill snakes whenever they see it and for that reason many species like Golden tree snake (*Crysopela ornata*) as well as our whole eco system is in great danger.



So, we should let the common people know about the difference between venomous and non-venomous snakes and also try to prohibit killing snakes. Basically snakes are not harmful for human being until they are hurt. They like to live near the human's habitat as their preys such as rodents, frogs etc. live at the same place.

Difference between venomous and non-venomous snakes

There are more than 3000 species of snakes in the world. These are divided into 3 categories according to their venom intensity:

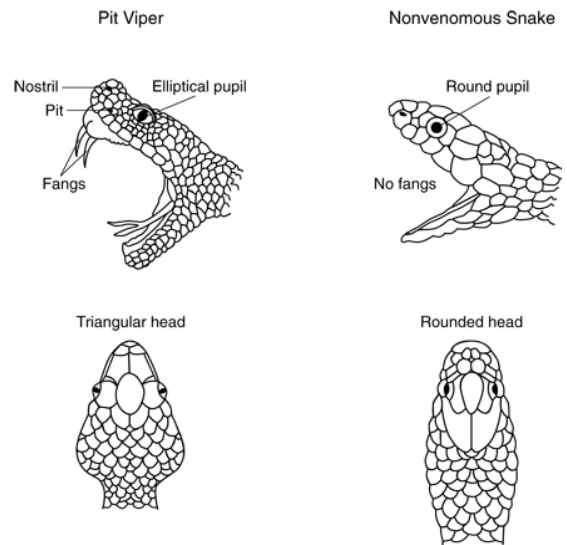
- Venomous
- Semi-venomous
- Non-venomous

Here we are going to differentiate between **venomous** and **non-venomous** snakes:

Features	Venomous Snakes	Non-Venomous Snakes
Head shape	Triangular and widen with thinner neck	‘U’ shaped
Pits	Venomous snakes specially the pit vipers has pits on their head	They don’t have it
Pupils	Oval or rod like structures	Round shaped
Fangs	They have 2 special teeth called fangs, which are connected to the venom gland	They don’t have it
Colour	They are very colourful, some of them have geometric shapes on whole body	Specially have a solid matte colour on whole body
Biting scars	Mainly seen 2 punctures made by animal fangs	Several wounds are seen



Fangs



Difference of head shapes & pupil in venomous and non-venomous snakes

Venomous Snakes in India

India has seen an estimated 12 lakh snake bite deaths during 2000-2019 at an average of 58000 per year which is highest in the world. In India, there are near about 40-50 species of venomous snakes. Among them, 8 are very dangerous for human being and for those species' bite, most of the death cases happen in India.

Those species are:

Name	Characteristics	Venom type & mortality	Mainly seen in (Indian regions)	Habitat
Spectacled Cobra (<i>Naja naja</i>)	It has hood like other cobras but on that a spectacle like structure is present. An adult can grow up to 5ft.	Neurotoxin; after being bitten by this species, only 5-6 hours in hand.	All over India, specially in the field area of West Bengal, Odissa, Assam etc.	Grass land, cultivation field vicinity of water land.

<p>Monocled Cobra (<i>Naja kaouthia</i>)</p>	<p>It has hood like other cobras but on that a circular structure is present. An adult can grow up to 4.5-5ft.</p>	<p>Neurotoxin. After being bitten by this species less than 12 hours in hand.</p>	<p>North-East India and Odissa regions</p>	<p>Specially in waterland</p>
<p>Common Krait (<i>Bungarus caeruleus</i>)</p>	<p>Dorsal body is glossy jet black or blueish black with milky white bands across the body. Larger hexagonal scales along vertebra sometimes double white bands are seen.</p>	<p>A kind of neurotoxin called beta-bungarotoxin; 8-12 hours in hand after being bitten by this species.</p>	<p>Sindh to West Bengal and throughout South India</p>	<p>Fields, low scrub jungle to settled area</p>
<p>Banded Krait (<i>Bungarus fasciatus</i>)</p>	<p>Alternate black and yellow cross bands are present in whole body and its body cross section is triangular.</p>	<p>Neurotoxin - only 12 hours in hand after being bitten.</p>	<p>North, Central and North-Eastern India</p>	<p>Dense forest and agricultural land</p>
<p>Russell's Viper (<i>Vipera russelli</i>)</p>	<p>Head is triangular with a 'v' shaped white line meeting at the tip of the snout. The dorsal surface is brown and has 3 longitudinal rows of circular or oval shaped dark markings.</p>	<p>Hematotoxin - after being bitten by this species only 12-24 hours in hand.</p>	<p>West and East part of India</p>	<p>Mostly found in open, grassy or bushy areas, but may also be found in second growth forests (scrub jungles), on forested plantations and farmland.</p>

King Cobra
(*Ophiophagus hannah*)

Presence of a pair of large scales and whole body can be yellowish, greenish, blackish or brownish with white stripes and can stand on it's vertebra near about 4ft and adults can grow up to 16ft.

Neurotoxin; after being bitten by this specie only 4-6 hours in hand.

Throughout the India especially North-east and South India

Dense forest area, bamboo thickets, dense mangrove swamps



King Cobra



Russel Viper



Banded Krait



Common Krait



Monocled Cobra



Spectacled Cobra

Some notable species of snakes seen in India

Some extra facts about snakes' venom:

What is in snake anti venom?

Snake antivenom (also known as antivenin, antivenene, and antisnakebite serum) is the concentrated enzyme-refined immunoglobulin of animals, usually horses or sheep, that have been exposed to venom.

How anti-venom is made?

Antivenom is traditionally made by collecting venom from the relevant animal and injecting small amounts of it into a domestic animal. The antibodies that form are then collected from the domestic animal's blood and purified. Versions are available for spider bites, snake bites, fish stings, and scorpion stings.

How does antivenom neutralise venom?

Antivenom (often spelled “antivenin”) is an antibody product that can disable a particular venom's toxins. If injected quickly after a bite or sting, the antibodies in antivenom neutralize the venom, potentially saving the victim's life or limb.

Do's and Don'ts for prevention from snakes:

- ✓ We should not use phenol or carbolic acid for getting rid of snakes as the phenol's molecule causes a huge damage in snake's respiratory system and often snakes die of it and the ecological balance breaks down.
- ✓ At the rural side people often kill snakes whenever they see it and for this the ecological balance is disrupted.
- ✓ We should keep our surroundings clean.

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Snoring

Sudipta Biswas, semester IV

Sounds while sleeping because of the obstruction of breathing is called Snoring. The sounds of snoring does not come from nose. Actually the sounds come from the middle portion of nose and throat.

Symptoms

Lack of concentration, headache, sleepy eyes in day, lack of oxygen in blood, loss of memory are some symptoms of snoring.



Causes

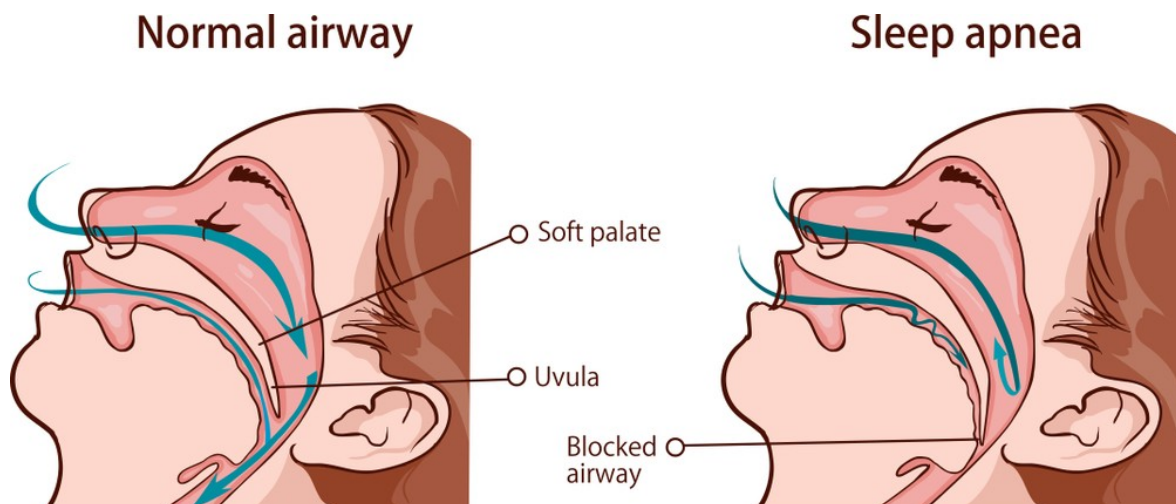
Causes of snoring are described below:

- **Alcohol** - Drinking alcohol makes the tissues and the muscles of throat relaxed, which obstructs the breathing air.
- **Obesity** - Individuals who have obesity, fats are conjugated in their throat and trachea. It can be a cause of snoring.
- **Gender** - Males have thinner trachea than women. That is why a male person snores more than female.
- **Stress** - Lack of sleep and stress can be cause of snoring. Because when we go to sleep with stress, the muscle of trachea and throat become relaxed and we snore.
- **Nose problem or consumer** - Long term nose problem like unstable bone in nose or consumer on tongue can be a cause of snoring.

- **Sleeping position** - Lying on back while sleeping can be a cause of snoring. Because when we lay on back , our roof of mouth becomes down because of gravity and we snore.
- **Allergy** - Allergy can be a cause of snoring.
- **Tonsil**- Increase of tonsil and thyroid gland.
- **Smoking** - Smoking is also a cause of snoring.

Disease

The individuals who snore, individual may have **sleep apnea**. They can face heart attack while sleeping, even death.



How to identify the disease

Doctors do endoscopy of nose, x-ray of nose and chest, ECG, some blood tests to identify the disease. Polysomnography can be used to recognize the sleeping disorders.

Treatments

If tumor is the cause of snoring, the tumor on tongue or tonsil or throat must be removed by surgery. If individuals have unstable bone in nose, it must be fixed by surgery. CPP machine can be used as a treatment of snoring.

How to reduce snoring

- ✓ Reduce drinking alcohol. Specially before 4-5 hours of sleeping, do not drink alcohol.
- ✓ Decreasing weight helps to reduce snoring. Take healthy foods.
- ✓ Do not take too much stress.
- ✓ Lay on side.
- ✓ Change pillow cover frequently.
- ✓ Drink enough water (2-3 L per day).

Some home remedies to reduce snoring:

- ✓ **Olive oil** - Take one drop of olive oil into nose. Olive oil cleans your nose and reduce snoring.
- ✓ **Turmeric** - Drinking warm milk with turmeric can reduce snoring.
- ✓ **Garlic** - Mix garlic paste with warm water and gargle with it.
- ✓ **Mint** - Mix mint leaves with warm water and gargle with it.
- ✓ **Cinnamon** - Mix cinnamon powder with warm water and gargle with it.



References:

- [Snoring](#) by Mayo clinic
- [What you need to know about sleep apnea](#) by Kathleen Davis
- [Sleep apnea](#) by Alexandra Benisek

An overview of Esophageal Cancer

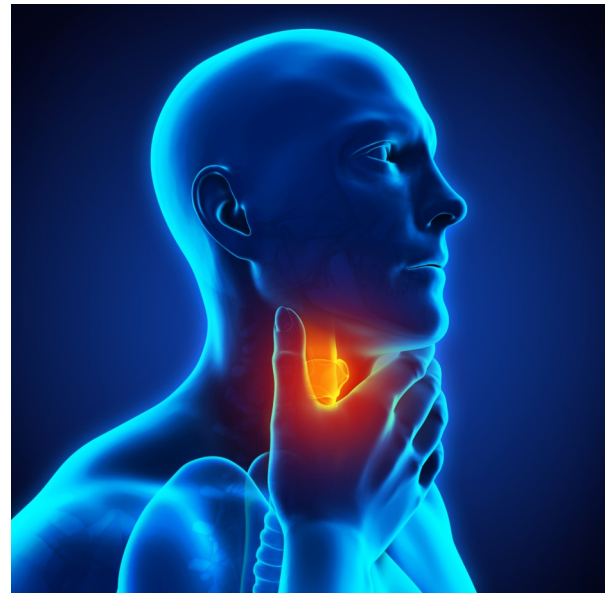
Paromita Debnath, semester II

Esophageal cancer is one of the eight most common cancer world wide with 572,000 new cases estimated in 2018 and the sixth most common cause of death from cancer with 508,600 deaths. More than 80% of Esophageal cancer cases and deaths occur in developing countries and approximately 80-90% are squamous cell carcinomas in the high-incidence regions.

The incidence rates of Esophageal cancer vary internationally 10 times in men (Age standardized incidence rate (ASR)) 17.9 per 100,000 in Eastern Asia compared to 1.6 in Western Africa) and almost 15 times in women (ASR 7.1 per 100,000 in Eastern Africa compared to 0.46 in Central America).

The esophagus is a long muscular tube that runs from the Throat to the stomach. The esophagus is made up of several layers of muscle that contract to help move food down the tube and into the stomach. A special muscle called that the Esophageal sphincter acts as a valve, opening to allow food and liquids to pass form the esophagus into stomach. Esophagus is clinically divided into four segments cervical esophagus, upper thoracic esophagus, middle thoracic esophagus, lower thoracic esophagus/GEJ.

Esophageal cancer results when abnormal cells grow out of control in esophageal tissue. Eventually the cells form a mass called a tumour.



Identification of Gastro Esophageal Junction (GEJ)

To recognize that the esophagus is lined by columnar epithelial, endoscopists first must identify the GEJ. GEJ is the line at which the esophagus ends and the stomach begins. Practically there are no universally accepted and clearly reproducible landmarks that identify the GEJ with great precision.

Types of Esophageal cancer

There are two main types of Esophageal cancer:

Squamous Cell Carcinoma (SCC)

- It develops in the squamous cell
- Squamous Cell Carcinoma can occur in any portion of the esophagus but is most common in the middle third
- Superficial Esophageal cancer appear as pink tan or gray white of mucosa
- Advanced Esophageal cancer grow obstruct the lumen
- This type of cancer often begins like plaques or small out growths

Adenocarcinoma

- It forms in the glandular tissue, which lines certain internal organs and makes and releases substances in the body
- It affects the lower 1/3 part of esophagus
- Many cases occur due to Barrett's esophagus

Risk factors

Squamous Cell Carcinoma (SCC)

Smoking and alcohol

The main risk factors for Esophageal Squamous Cell Carcinoma are tobacco smoking and alcohol consumption, which in individual studies have been found to account for 75-90% cases.

After alcohol consumption most of the alcohols are converted into acetaldehyde by the process of alcohol dehydrogenase in the liver. Acetaldehyde is so poisonous. In 2007, it was classified by the WHO as a group-1 carcinogen. There is an enzyme, aldehyde dehydrogenase 2, in our body. Acetaldehyde is converted by ALDH2 into acetic acid which is not harmful to the cells. ALDH2 deficiency a lot of acetaldehyde which is category 1 carcinogen will accumulate in our body. Patients with inactive ALDH2 in whom facial flushing is usually observed after drinking of alcohol, are at high risk for ESCC as well as multiple UADT cancers.

After smoking the concentration of acetaldehyde produced from tobacco burning is 7 times higher in our saliva. Acetaldehyde is a highly reactive, DNA damaging metabolite, causes interstrand cross linking in DNA which is a dangerous kind of DNA damage. As a result, it obstructs cells division and protein products. Ultimately accumulation of ICl damage may lead to cell death and cancer.

Human Papillomavirus (HPV)

Human Papillomavirus is a common virus which can effect males and females of all age. It spread through skin to skin contact with an infected person, usually during sexual contact. HPV can cause cancer in anus, mouth, throat, esophagus in both genders.

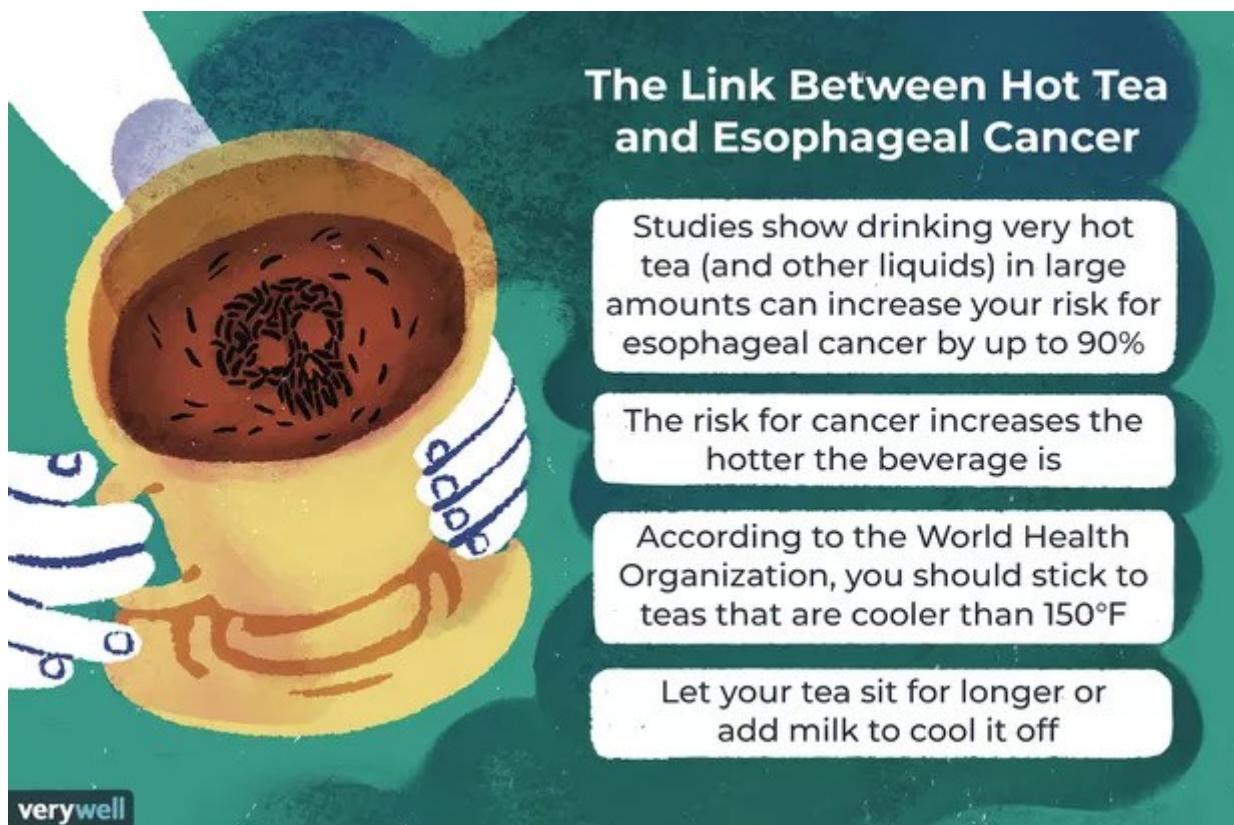
HPV causes cancer after it infects cells in these areas. Over time, the infection can cause precancerous changes in the cells, which can eventually lead them to mutate into cancer cells. This happens over a number of years.

Drinking hot tea or coffee

A tea drinkers who like their tea to be warmer than 60°C are at a higher risk of developing Esophageal cancer. Most people prefer hot or warm food to feel warm and energetic.

Any type of hot food or liquids has the potential to irritate the lining of the Throat and esophagus. It's the temperature which is the biggest risk factor. This hot liquids or food can cause a thermal injury in the lining of the throat of esophagus. This thermal injuries can lead to chronic inflammation and the formation of cancer cells.

The ideal temperature is the body temperature which is about 37 °C. If the temperature is above that it will damage cells. The cells are designed to survive within the body temperature.



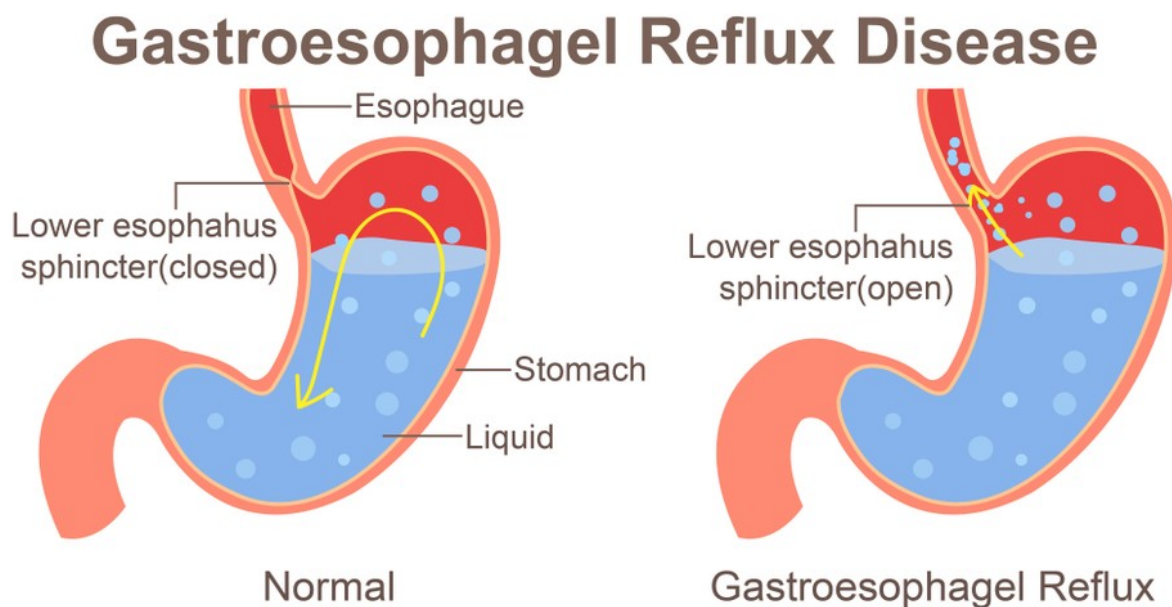
Adenocarcinoma

Gastro Esophageal Reflux

Gastroesophageal reflux disease occurs when stomach acid frequently flows back into the esophagus. This backwash or acid reflux can irritate the lining of our esophagus. The flat thin cells lining the esophagus are called squamous cells. Below this surface it divides to make new squamous cells as the old ones were out.

If a man have a condition of Gastro Esophageal Reflux, frequently there occurs a back flow or reflux of acid from stomach into esophagus. Over time gut may cause the squamous cells lining lower esophagus to be replaced with gland cells that makes mucus called goblet cells. This change in the lining of esophagus is a condition called Barrett's Esophagus.

One type of Esophageal cancer called Adenocarcinoma may occur in the change lining of Barrett's Esophagus. Another type of Esophageal cancer called squamous cells Carcinoma occurs in the squamous cells in the esophagus.



Obesity

Being overweight is the biggest factor associated with GERD. If a person is obese, he is nearly three times more likely than people of a normal weight to develop acid reflux. Being overweight may cause extra uncomfortable symptoms.

The body weight increases pressure of abdomen. The extra fat around the belly squeezes stomach so more fluid travels upward into esophagus. That's why GERD occurs. Thus obesity is also linked with the risk of Esophageal Adenocarcinoma.

Cholecystectomy

Cholecystectomy is the surgical removal of the gallbladder. It is a common treatment of symptomatic gallstones and other gallbladder conditions. After cholecystectomy the increased risk of Esophageal cancer is through bile reflux.

Bile the fluid, our small intestine uses to digest food, is produced by the liver and flows into the duodenum or the upper part of small intestine. It normally can't backup into the stomach because of a one way valve called pylorus but after cholecystectomy once the gallbladder is removed bile may overflow directly into the stomach. The serious condition may occur when long term exposure to stomach acid damages tissue in the lower esophagus. The damaged Esophageal cells have an increased risk of becoming cancerous.

Symptoms

- **Progressive dysphagia** - The most common symptom of Esophageal cancer is a problem of swallowing. Esophageal cancer causes dysphagia by narrowing the Esophageal lumen. Such narrowing generally do not restrict the passage of liquids and consequently these diseases characteristically cause dysphagia only for solid foods. Dysphagia for both solids and liquids is known as progressive dysphagia.
- **Odynophagia** - One of the symptoms of esophageal cancer is odyuophagia or the trouble of swallowing, it is a feeling of food stuck in the throat. Swallowing may become painful if the cancer is large enough to limit the passage of food through the esophagus. In those diseases, dysphagia also may be present, but pain is the dominant complaint.
- **Regurgitation** - It is the spitting up of blood from the esophagus or stomach without nausea or forceful contractions of the abdominal muscles. A ring shaped muscle between the stomach and esophagus normally helps prevent regurgitation. Regurgitation of tasteless fluid containing mucus or undigested food can result from narrowing or a blockage of the esophagus.

- **Hematemesis** – It is an uncommon symptom of esophageal cancer. Hema means blood and Emesis means vomiting. Hematemesis is the medical terminology of vomiting blood with or without stomach contents. In this case the appearance of blood is in bright red colour.
- **Melena** – This refers to black stools that occur as a result of Gastrointestinal bleeding. This bleeding typically originates from the upper GI tract which includes the mouth, esophagus and stomach. Symptoms that may be seen with melena vary depending on the amount of blood loss and the source of bleeding. Significant blood loss can lead to symptoms of low blood volume, anaemia, or shock, such as weakness, shortness of breath, pale skin, clamminess, dizziness, confusion, and tachycardia or a fast heart rate.
- **Weight loss** - Roughly 50 percent of people with esophageal cancer experience unexplained weight loss. This can be due to eating less due to swallowing problems, or a decreased appetite due to the cancer.

Diagnosis

- CT scan, PET scan
- Barium swallow
- Endoscopy with biopsy

Treatment

- ✓ Chemotherapy
- ✓ Radiation therapy
- ✓ Esophagectomy
- ✓ Esophagogastrectomy

References:

- *Esophageal Cancer and Barrett's Esophagus (3rd Edition)* by Prateek Sharma et al.
 - *Esophageal Squamous Cell Carcinoma diagnosis and treatment (2nd Edition)* by

Nobutoshi Ando

Polycystic Ovary Syndrome (PCOS)

Barnali Kundu, semester IV

PCOS also called **PCOD (polycystic ovary disease)** is a hormonal disorder common among women of reproductive age. Women with PCOS may have infrequent or prolonged menstrual periods or excess male hormone (androgen) levels. The ovaries may develop numerous small collection of fluid (follicles) and fail to regularly release eggs.

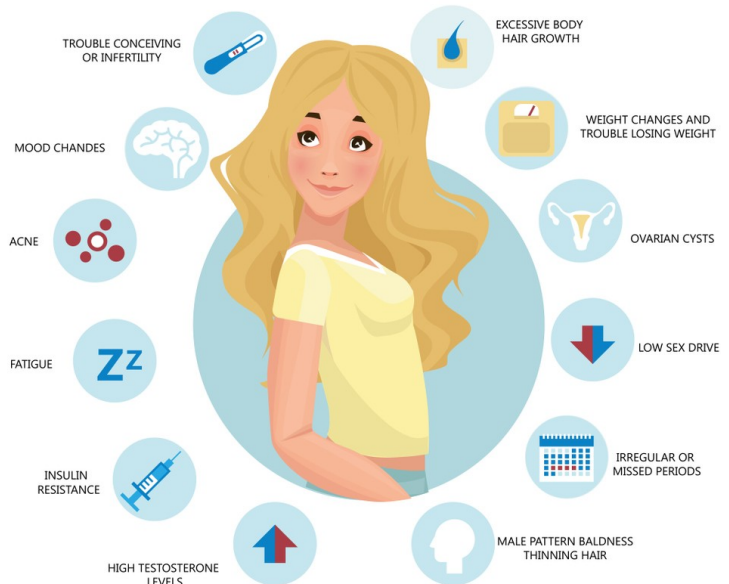


Symptoms

Signs and symptoms of PCOS may vary. The most common symptoms of PCOS include:

- **Irregular (or no) period** – The lack of ovulation prevents the lining of the uterus from shedding every month. While some women might have fewer than 8 periods a year, some don't get their period at all.

- **Heavy bleeding at the time of menstruation** – Since the lining of the uterus takes longer than usual to build up, it is likely that you will have heavier bleeding than normal.
- **Excess androgen** – Due elevated male hormones, females with PCOS tend to have excess hair growth on their face and body condition known as hirsutism and occasionally severe acne and male pattern baldness occur.
- **Polycystic ovaries** – The ovaries might be enlarged and contain follicles that surround the eggs. As a result, the ovaries might fail to function regularly.
- **Weight gain** – This is one of the most common symptoms of PCOS. Over 80% of women who have PCOS are overweight or obese.
- There are many hormonal changes that happen to women who suffer from PCOS which can trigger headache. Also, hair loss, skin darkening are the common symptoms.



What are the main causes of PCOS?

The exact cause of PCOS is unknown. Factors that might play a role include:

- **Excess insulin** – Insulin is the hormone produced in the pancreas that allows cells to use sugar, body's primary energy supply. If the cells become resistant to the action of insulin, then the blood sugar levels can rise and body might produce more insulin. Excess insulin might increase androgen production, causing difficulty with ovulation.

- **Excess androgen production** – High androgen levels prevent the ovaries from releasing eggs, which causes irregular menstrual cycles. Irregular ovulation can also cause small, fluid-filled sacs to develop in the ovaries.
- **Heredity** – Women with PCOS show certain genetic correlation.
- **Low-grade inflammation** – As per the recent study, females with PCOS are having low-grade inflammation that causes increased levels of androgen production which can lead to blood vessels or heart problems.

Complications

Having higher than normal androgen levels can affect the health. These are the complications of PCOS or PCOD problems that require medical attention:

- Infertility
- Abnormal uterine bleeding
- Gestational diabetes or pregnancy- induced high blood pressure
- Miscarriage or premature birth
- Type 2 diabetes
- Cancer of the uterine lining (endometrial cancer)
- Sleep apnea
- Metabolic syndrome (high blood sugar, heart disease, stroke)
- Depression, anxiety and eating disorders

Diagnosis

There is no specific test to definitively diagnose PCOS. The gynaecologist might recommend:

- **A pelvic exam** – The doctor visually and manually inspects the patients reproductive organs for masses, growths or other abnormalities.

- **Blood tests** – The individuals' blood may be analysed to measure hormone levels. They might have additional blood testing to measure glucose tolerance and fasting cholesterol and triglyceride levels.
- **Ultrasound** – This test uses sound waves and a computer to create images of blood vessels, tissues and organs. This test is used to look at the size of the ovaries and see if they have cysts. The test can also look at the thickness of the lining of the uterus.

How is PCOS treated

Treatment for PCOS or PCOD depends on a number of factors. These may include your age, how severe your symptoms are and your overall health.

- ✓ **Metformin** – Metformin (glucophage, fortamet) is a drug used to treat type 2 diabetes. It also treats PCOS by improving insulin levels.
- ✓ **Clomiphene** – Clomiphene is a fertility drug that can help women with PCOS get pregnant.
- ✓ **Surgery** – Surgery can be an option to improve fertility if other treatments don't work.

Lifestyle modification

- ✓ **Maintaining body weight** – If anyone is suffering from PCOD, then her first task is to reduce her Body Mass Index (BMI). BMI ranges from 18.5-24.9 considered as ideal and healthy for females. Weight loss can reduce insulin and androgen levels and may restore ovulation.
- ✓ **Diet** – Low-fat, high-carbohydrate diets might increase insulin levels. Eat fish, meat, eggs, vegetables and natural fats (like sunflower seeds, pumpkin seeds etc.) and avoid sugar and starchy foods (like potatoes, rice, bread etc).
- ✓ **Do regular exercise and be active** – Exercise helps lower blood sugar levels. If one has PCOD or PCOS, increasing the daily activities that prevent

insulin resistance, keep the weight under control and avoid developing diabetes.



References:

- *[Polycystic Ovary Syndrome: Symptoms, Causes, & Treatment](#)* by Stephanie Watson
 - *[Polycystic ovary syndrome \(PCOS\)](#)* by Mayo clinic
- *[PCOD and PCOS: Causes, Symptoms, Differences and Treatment](#)* by Pace hospitals
 - *[Polycystic Ovary Syndrome \(PCOS\)](#)* by Johns Hopkins Medicine

Amblyopia (lazy eye)

Keya Kundu, semester VI

Amblyopia, better known as lazy eye, is an eye condition where children have good or perfect vision in one eye and decreased vision in the other eye. With one eye having better vision than the other, the brain starts to depend on the better eye and neglects the weaker one. Untreated lazy eye conditions may cause the brain to ignore any images it gets from the weaker eye in the long run. This may have an adverse impact on the child's vision.

Causes

Many factors give rise to amblyopia. In many cases, doctors don't know the cause of amblyopia. But sometimes, a different vision problem can lead to amblyopia.

Normally, the brain uses nerve signals from both eyes to see. But if an eye condition makes vision in one eye worse, the brain may try to work around it. It starts to 'turn off' signals from the weaker eye and rely only on the stronger eye.

Eyes with amblyopia usually have some form of refractive error like astigmatism or myopia. Amblyopia can also be due to conditions like childhood cataracts that obstruct your child's vision. Strabismus, or squinting, can also lead to amblyopia because the child's eyes do not look in the same direction as they are not aligned.



Types

- **Strabismic Amblyopia** - Prolonged squinting of an eye in child results in unocular suppression. The brain ignores the visual stimuli from the squinting eye to maintain a clear vision of the other eye and prevent diplopia.
- **Refractive Amblyopia** - It includes three major cases. It is caused by the refractive error in the eye. A child can have different refractive status in both eyes. That can be either, Anisometropia, Isometropia or Astigmatism even after perfect alignment of the two eyes.
- **Stimulation Deprivation** - This happens when something impedes the light to reach the retina. Congenital and traumatic cataracts, Corneal opacity, ptosis, covering the pupil are the major cause of stimulation deprivation.

Risk factors

Factors linked to a greater risk of amblyopia include:

- Premature birth
- Baby's small size at birth or low birth weight
- Previous family history
- Developmental challenges in baby's growth

Symptoms

Unfortunately, amblyopia may be challenging to detect at first because most children suffering from lazy eyes will not realize they have vision problems and thus do not voice their concerns out. The brain and the eye with better vision would compensate for the reduced vision in the other eye so well that it masks the amblyopia. Alternatively, the child may get used to having good vision in only one eye. Children who have well-aligned eyes may not have their amblyopia

noticeable. So the symptoms of amblyopia can be hard to notice. Kids with amblyopia may have poor depth perception – they have trouble telling how near or far something is. Parents may also notice signs that their child is struggling to see clearly, like:

- Squinting
- Shutting one eye
- Tilting their head

In many cases, parents don't know their child has amblyopia until a doctor diagnoses it during an eye exam. That's why it's important for all kids to get a vision screening at least once between ages 3 and 5.

What to detect?

If you notice your child squinting frequently, complaining of double or blurry vision, having crossed eyes, or tilting the head for better vision, your child may have lazy eyes. Compromised depth perception and problems with 3-dimensional viewing may be other indicators of amblyopia. Go for regular and timely eye check ups to detect amblyopia. Children should have their first eye check at 6 months old and at least once between the ages of 2 and 5 years. Above the age of 5, children who do not require glasses should go for an eye check every 2 years and for children who do wear glasses, once every year.

Treatment

If there's a vision problem causing amblyopia, the doctor may treat that first. For example, doctors may recommend glasses or contacts (for kids who are nearsighted or farsighted) or surgery (for kids with cataract). The next step is to re-train the brain and force it to use the weaker eye. The more the brain uses it, the stronger it gets. Treatments include:

- **Wearing an eye patch** on the stronger eye. By covering up this eye with a stick-on eye patch (similar to a Band-Aid), the brain has to use the weaker eye to see. Some kids only need to wear the patch for 2 hours a day, while others may need to wear it whenever they're awake.



- **Putting special eye drops** in the stronger eye. A once-a-day drop of the drug atropine can temporarily blur near vision, which forces the brain to use the other eye. For some kids, this treatment works as well as an eye patch, and some parents find it easier to use (for example, because young children may try to pull off eye patches).

After your child starts treatment, their vision may start to get better within a few weeks. But it will probably take months to get the best results. After that, your child may still need to use these treatments from time to time to stop amblyopia from coming back.

It's important to start treating children with amblyopia early – the sooner the better. Kids who grow up without treatment may have lifelong vision problems. Amblyopia treatment is usually less effective in adults than in children.

References:

- [*Amblyopia \(Lazy Eye\)*](#) by national Eye Institute
 - [*Lazy eye \(Amblyopia\)*](#) by Mayo clinic
- [*Everything you need to know about 'lazy' eye*](#) by Adam Felman

Keratoconus

Subhadip Singha, semester IV

Keratoconus is a condition that causes the cornea (the clear surface on the front of the eye) thin and bulge into cone shape. The cone shape cornea usually causes myopia and astigmatism, resulting in blurry and distorted vision.



Causes

The doctors and scientists don't know exactly what causes keratoconus. There are some possibilities researchers think about are:

- **Family history:** If someone in your closest has this condition, you have a greater chance to getting it yourself. If you have it, get your child's eyes checked for signs for starting around the age 10.

- **Age:** It usually starts when you are a teen. But it might show up earlier or not until you are 30. But often this also affects people above 40 which is rare.
- **Inflammation:** Inflammation from things like allergies, asthma or atopic eyes disease can break down the tissue of the cornea.
- **Eye rubbing:** Rubbing your eyes hard over time can break down the cornea. It can also make keratoconus progress faster if you already have it.

Signs and symptoms

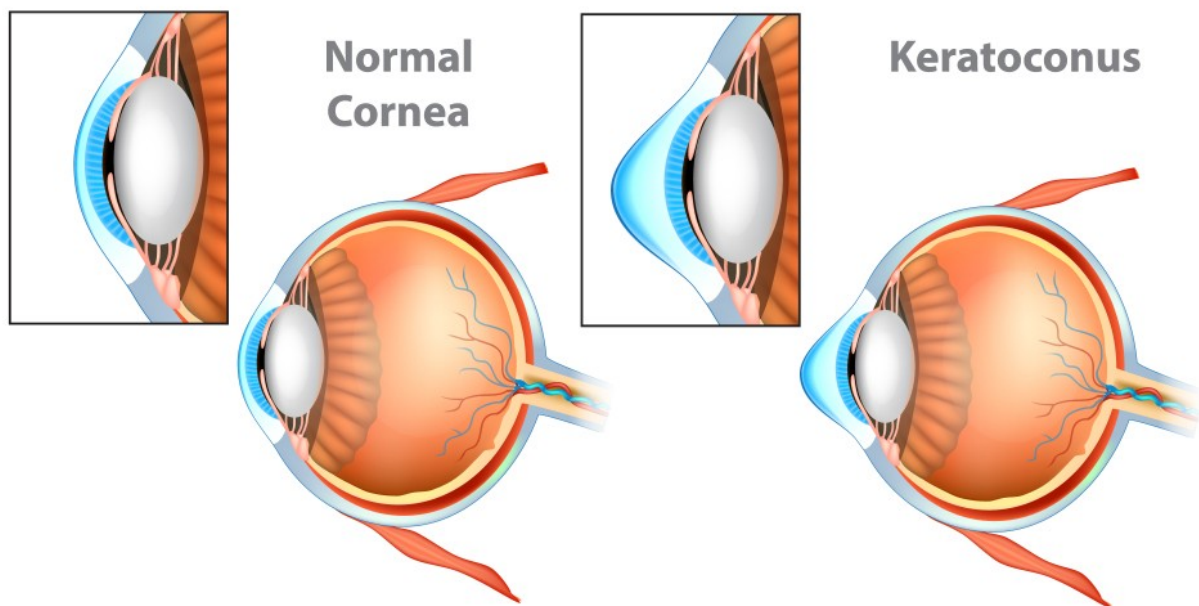
People with keratoconus often notice a minor blurring and distortion their vision, as well as increased sensitivity to light. At early stages, the symptoms of keratoconus may be no different from those of any other refractive defects of the eye and gradually becomes astigmatism.



Visual acuity becomes impaired at all distances, and night vision is also poor. The disease is often bilateral, though asymmetrical. Some develop photophobia (sensitivity to light), eye strain or itching. The classical symptoms of keratoconus is the perception of multiple "ghost" images, known as monocular polyopia.

Diagnosis

It can be diagnosed thorough a routine eye exam. The ophthalmologist will examine the cornea and may measure it's curvature. This helps to show if there is a change in its shape. The ophthalmologist may also map the patient's cornea surface using a special computer. The detailed image shows the condition of the cornea's surface.



Affected population

Keratoconus affects both men and women and all ethnic groups worldwide. The disorder tends to develop most often among adolescents at or around puberty or during the late teen age years. Recent studies (2015) show that African-American and Latin men have greater risk of developing keratoconus. While Asian-American women and people with diabetes appear to have a lower risk. The incidence and prevalence rates reported in the medical literature for keratoconus tend to vary widely. One long-term study in the US indicated a prevalence of 54.5 diagnosed individuals, or approximately 1 in 2000 individuals. However, some estimates suggest that the incidence may be as high as 1 in 400 individuals.

Individuals with a family history of keratoconus are not at a greater risk of developing the condition than people of the general population.

Treatment

In the mildest form of keratoconus, eyeglasses or soft contact lenses may help. But as the disease progresses and the cornea gets thinner and becomes more irregular in shape, the glasses and regular soft contact lenses no longer provide adequate vision correction. Treatments for progressive keratoconus include:

- **Corneal crosslinking**

This procedure, also called corneal collagen cross-linking or CXL, strengthens corneal tissue to halt bulging of the eye's surface in keratoconus.

There are two versions of corneal crosslinking: epithelium-off and epithelium-on.

- ✓ With **epithelium-off crosslinking**, the outer layer of the cornea (called the epithelium) is removed to allow entry of riboflavin, a type of B vitamin, into the cornea, which is then activated with UV light.
- ✓ With the **epithelium-on method** (also called transepithelial crosslinking), the corneal epithelium is left intact during the treatment. The epithelium-on method requires more time for the riboflavin to penetrate into the cornea, but potential advantages include less risk of infection, less discomfort and faster visual recovery, according to supporters of this technique.

Corneal crosslinking may significantly reduce the need for corneal transplants among keratoconus patients. It is also being investigated as a way to treat or prevent complications following LASIK or other vision correction surgery.

Using a combination of corneal crosslinking and Intact, implants have also demonstrated promising results for treating keratoconus. Also, progressive mild to moderate keratoconus has been safely and successfully treated with a combination of corneal crosslinking and implantation of a phakic toric IOL.

- **Custom soft contact lenses**

Recently, contact lens manufacturers have introduced custom soft contact lenses specially designed to correct mild-to-moderate keratoconus. These lenses are made-to-order based on detailed measurements of the person's keratoconic eyes and are more comfortable than gas permeable lenses (GPs) or hybrid contact lenses for some wearers.

Custom soft contact lenses are available in a very wide range of fitting parameters for a customized fit and are larger in diameter than regular soft lenses for greater stability on a keratoconic eye.

In a recent study of the visual performance of toric soft contacts and rigid gas permeable lenses for the correction of mild keratoconus, though GP lenses provided better visual acuity in low-Corneal transplant.

In some cases of advanced keratoconus, the only viable treatment option is a cornea transplant, also called a penetrating keratoplasty (PK or PKP). It can take several months for your vision to stabilize after a cornea transplant and you will need eyeglasses or contact lenses afterwards to see clearly.

References:

- [Keratoconus: Symptoms, causes and treatment options](#) by All about vision
 - [Keratoconus](#) by Mayo clinic
 - [Keratoconus](#) by Wikipedia
- [What Is Keratoconus?](#) by WebMD

Photography

by students of Department of Physiology



Paulav Guha (6th semester)



Swarnali Biswas (6th semester)



Subhadip Singha (4th semester)



Swarnali Biswas (6th semester)



Paulav Guha (6th semester)



Ratnodip Saha (6th semester)



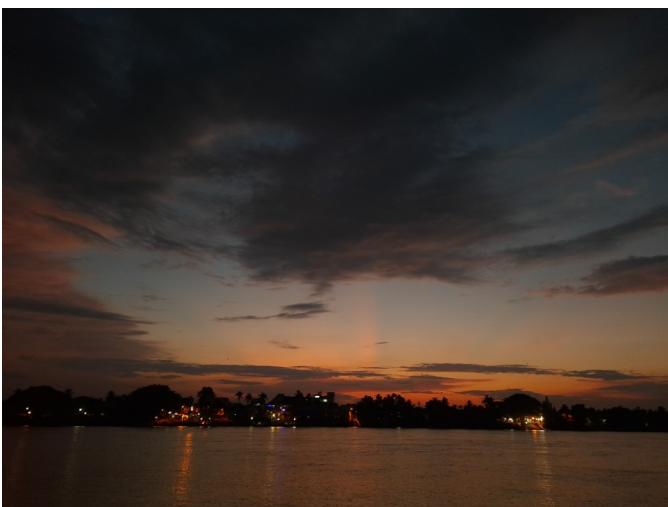
Dip Das Chowdhury (6th semester)



Pronobesh Bhattacharya (2nd semester)



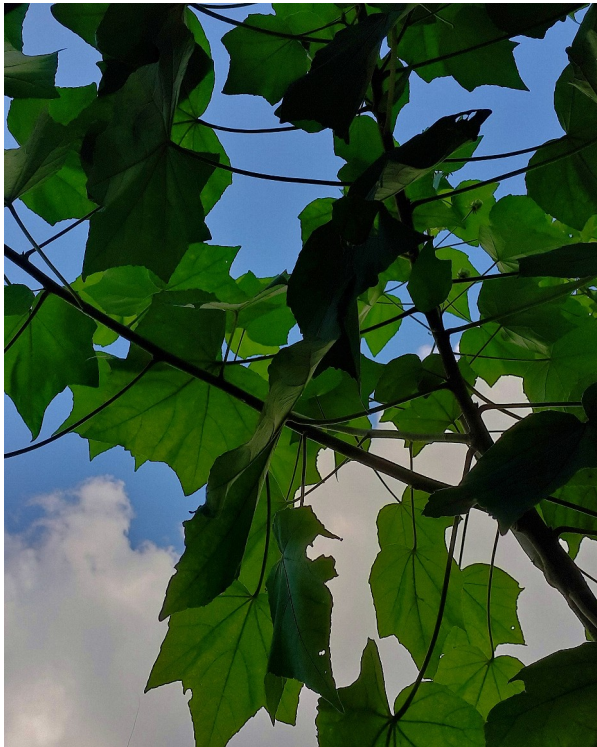
Ratnodip Saha (6th semester)



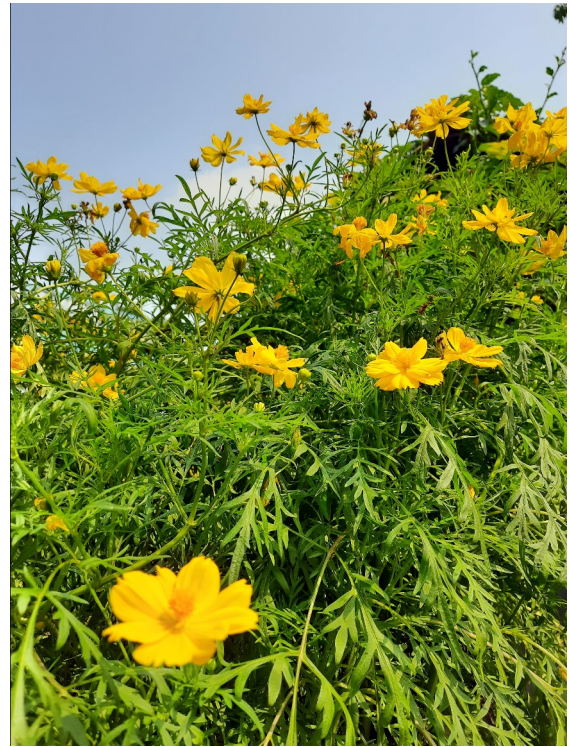
Swarnali Biswas (6th semester)



Dip Das Chowdhury (6th semester)



Swarnali Biswas (6th semester)



Swarnali Biswas (6th semester)



Ratnodip Saha (6th semester)



Subhadip Singha (4th semester)



Pronobesh Bhattacharya (2nd semester)



Ratnodip Saha (6th semester)

Artworks

by Students of Department of Physiology



Digital art by Swarnali Biswas, 6th semester



Art by Shreya Biswas, 2nd semester



Art by Keya Kundu, 6th semester



Art by Shreya Biswas, 2nd semester



Art by Shreya Biswas, 2nd semester



Digital art by Swarnali Biswas, 6th semester

Important Dates of Biology

by Dip Das Chowdhury, semester VI

last Sunday of January – World Leprosy Day

2 February - World Wetland Day

4 February - World Cancer Day

11 February - World Day of Sick

12 February - Darwin Day

22 February - World Thinking Day

28 February - National Science Day

last day of February - Rare Disease Day

3 March - World Wildlife Day

16 March - Measles Vaccination Day or
Measles Immunization Day

21 March - World Forestry Day

22 March - World Day for Water

24 March - World Tuberculosis (TB) Day

2 April - World Autism Awareness Day

7 April - World Health Day

17 April - World Haemophilia Day

22 April - World Earth Day

25 April - World Malaria Day

8 May - World Thalassaemia Day

15 May - International Day of Family

17 May - World Hypertension Day

22 May - International Day for Biological
diversity

31 May - World No-Tobacco Day

1 June - World Milk Day

5 June - World Environment Day

7 June - World Food Safety Day

8 June - World Brain Tumor Day

26 June - International Day Against Drug
Abuse and Illicit Trafficking

27 June - World Diabetes Day

1st week of July - Festival of Tree Planting (Van
Mahotsav)

1 July - National Doctors' Day

11 July - World Population Day

28 July - World Hepatitis Day

1-7 August - World Breast-Feeding Week

13 August - World Organ Donation Day

20 August - Malaria Day (World Mosquito Day)

25 August - 8 September - National Eye Donation
Fortnight

1-7 September - National Nutrition Week

21 September - Alzheimer's Day

26 September - World Contraception Day

29 September - World Heart Day

1 October - Voluntary Blood Donation Day/ World
Vegetarian Day

2-8 October - Wildlife Week

4 October - World Animal Welfare Day

10 October - World Mental Health Day

16 October - World Food Day

21 October - Global Iodine Deficiency Disorder
(IDD) Day

7 November - National Cancer Awareness Day

10 November - International Science Day for
Peace and Development

12 November - World Pneumonia Day

14 November - World Diabetes Day

17 November - National Epilepsy Day

1 December - World AIDS Day

2 December - National Pollution Control Day

5 December - World Soil Day

14 December - National Energy Conservation Day.

Our Department in Photographs



Publishing wall magazine 'বায়োস্পার্ক' on National Science Day, 2022



Students behind the idea of 'বায়োস্পার্ক'



Students of Krishnagar Govt. College with their professors at the **Two-day National Science Conference** arranged by ISCA in Kalyani University (28.04.2022)



Students of final semester presenting their posters (28.04.2022)



Students of Department of Physiology with their professors at **PHYSICON-2021** arranged by **PSI** at **Berhampore Girls' College** (15.03.2022)



Students of final semester presenting their works (15.03.2022)



Students of final semester on juniors' Freshers' day (19.04.2022)



Welcoming our respected professors with flowers on the Freshers' day celebration (19.04.2022)



Students of 2019-22 batch, Department of Physiology, with their professors on 'গোধূলি', farewell ceremony arranged by juniors (12.07.2022)



The whole family of Department of Physiology



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