

SCIENCE CENTRE NEWS LETTER

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SCIENCE CENTRE

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WHAT'S NEW IN SCIENCE?

Early Life Experiences Can Have Long Lasting Impact On Genes

The Researchers of University College, London (UCL), United Kingdom finds a new study in fruit flies that early life experiences can impact the activity of our genes much later on and even affect longevity.

The study published in Journal Nature Aging, the Researcher report that gene expression 'memory' can persist across the lifespan and may present a novel target for improving late-life health.

Lead Author Dr Nazif Alic (UCL Institute of Healthy Ageing, UCL Biosciences) said that "Health in old age partially depends on what a person experienced in their youth or even in the womb. Here, we have identified one way in which this happens, as changes in gene expression in youth can form a 'memory' that impacts health more than half a lifetime later."



The Researchers were building on their previous research in which they found that fruit flies fed a high-sugar diet early in life lived shorter lives, even after their diets were improved in adulthood. In this study, the researchers found that a high-sugar diet inhibited a transcription factor called dFOXO, which is involved in glucose metabolism and is known from multiple studies to affect longevity, so the Researchers now sought to enact the opposite effect by directly increasing the activity of dFOXO. Transcription factors are proteins that regulate transcription, or copying,

of information from DNA into messenger RNA, which is the first and key step in gene expression. For this study, the researchers activated dFOXO by increasing its levels in female fruit flies during the first three weeks of the fly's adulthood. They found that these early-life experiences caused changes to chromatin - a mixture of DNA and proteins that can be seen as the 'packaging' of DNA - that persisted lifetime and resulted in genes being expressed differently late in life. This counteracted some changes that would be expected as part of the normal ageing process, eventually improving health in late life and impacting the fruit flies' lifespan more than a month later. The researchers say their findings could lead to ways to impact late-life health in people as well.

Dr Alic said that "What happens early in an animal or person's life can affect what their genes do late in life, for better or for worse. For example, it may be that a poor diet early in life could impact our metabolism later in life by tweaking how our genes are expressed, even after substantial dietary changes over the years. Now that we know how gene expression memory can persist across the lifespan to affect gene activity, we may be able to develop ways to counteract these changes later in life to preserve health and enable people to stay healthy for longer."

SCIENTIST OF THE MONTH

Subhash Mukhopadhyay

Subhash Mukhopadhyay was born in Bihar and Orissa Province (now in Jharkhand) on 16th January 1931. He studied B.Sc in Physiology in 1949 from University of Calcutta . He then studied MBBS in 1955 from the Calcutta National Medical College.

He later earned a Ph.D. in 1958 from the Rajabazar Science College campus of University of Calcutta in 'Reproductive Physiology' under the stewardship of Prof. Sachchidananda Banerjee. Later he earned his second Ph.D. from the University of Edinburgh in 1967 in 'Reproductive Endocrinology'.

After completing his studies, he worked as a Lecturer, Reader and Professor of Physiology at Nil Ratan Sircar Medical College, Kolkata from 1967 to 1975. He created history when working with Sunit Mukherji, a Cryobiologist and Gynecologist Dr. Saroj Kanti Bhattacharya. He became the first Physician in India to perform the In-Vitro Fertilisation resulting in a test tube baby "Durga" (alias Kanupriya Agarwal) on 3rd October 1978.



He Passed away at Calcutta on 19th June 1981.

His feat has been given belated recognition as the Indian Physician who in 1986 was officially regarded as being the first Doctor to perform In-Vitro Fertilisation in India. His recognition is attributable to T. C. Anand Kumar. Research institute in Kolkata was built in Reproductive Biology in memory of Mukhopadhyay. A film Ek Doctor Ki Maut directed by Tapan Sinha was made on his life. The Dictionary of Medical Biography, published by World Foundation, enlists names of 1100 Medical Scientists from 100 Countries around the World for their path breaking contributions to the Medical Science.

Dr. Mukhopadhyay's name is one of those names.



Timings

Tuesday to Sunday
& Public Holidays
9.30 am to 4.30 pm

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SCIENCE FACTS JANUARY 2023

2 Jan 1822	German Physicist Rudolph J. E. Clausius (Who researched Thermodynamics) was born.
2 Jan 1959	Soviet Union launched first man made Satellite "Lunik - 1".
4 Jan 1643	Sir Isaac Newton, great Physicist, Mathematician and Astronomer (who invented Newton's Law of Motion) was born.
4 Jan 1797	German astronomer Wilhelm Beer (who made the first moon map) was born.
4 Jan 1809	Louis Braille (inventor of a reading system for the blind) was born.
5 Jan 1859	Dewitt B. Brace (inventor of the spectrophotometer) was born.
5 Jan 1900	Physicist, Dennis Gabor (inventor of holograph) was born.
7 Jan 1610	Galileo observed first time Jupiter and its four moons with telescope.
8 Jan 1942	English Physicist Stephen Hawking (who first revealed Black Holes and Baby Universes) was born.
10 Jan 1877	Frederick Gardner Cottrell (who invented the electrostatic precipitator) was born.
12 Jan 1899	Swiss Chemist, Paul H. Muller (who perform the first open heart surgery) was born.
15 Jan 1759	"The British Museum" world's oldest and biggest museum was opened for the people.
19 Jan 1736	James Watt (Inventor of Steam Engine) was born.
21 Jan 1743	John Fitch (who invented steam boat) was born.
21 Jan 1921	Barney Clark (who was the first person to receive a permanent heart) was born.
21 Jan 1954	America launched its first Atomic power operated Submarine named "Nautilus"
24 Jan 1880	Elisabeth Achelis (who invented the world calendar) was born.
25 Jan 1627	Robert Boyle (who wrote Boyle's Law of Ideal Gases) was born.
27 Jan 1834	Dmitri Mendeleev (who invented the periodic table of the elements) was born.

Answer : 1) d, 2) c, 3) c, 4) b, 5) d, 6) c, 7) d

SCIENTIFIC QUESTION

What is Sickle Cell Disease (SCD)?

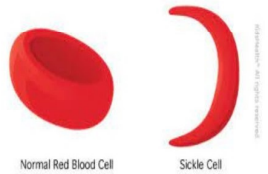
Sickle Cell Disease (SCD) is a group of blood disorders typically inherited from a person's parents. The most common type is known as Sickle Cell Anaemia. It results in an abnormality in the Oxygen-Carrying Protein haemoglobin found in Red Blood Cells. This leads to a rigid, sickle-like shape under certain circumstances. Problems in sickle cell disease typically begin around 5 to 6 months of age. A number of health problems may develop, such as attacks of pain, anaemia, swelling in the hands and feet, bacterial infections and stroke. Sickle Cell Disease occurs when a person inherits two abnormal copies of the β -globin gene that makes haemoglobin, one from each parent. This gene occurs in chromosome 11. A person with a single abnormal copy does not usually have symptoms and is said to have sickle cell trait. Such people are also referred to as carriers. Diagnosis is by a blood test and some countries test all babies at birth for the disease.

Signs and Symptoms: Signs of sickle cell disease usually begin in early childhood. The severity of symptoms can vary from person to person.

Sickle Cell Crisis: The terms "Sickle Cell Crisis" or "Sickling Crisis" may be used to describe several independent acute conditions occurring in patients with Sickle Cell Disease (SCD), which results in anaemia and crises that could be of many types, including the Vaso-Occlusive Crisis, Aplastic Crisis, Splenic Sequestration Crisis and Haemolytic Crisis.

Vaso-Occlusive Crisis: The Vaso-Occlusive Crisis is caused by Sickle-Shaped Red Blood Cells that obstruct capillaries and restrict blood flow to an organ, resulting in ischaemia (it is a restriction in blood supply to any tissue, muscle group or organ of the body, causing a shortage of Oxygen that is needed for cellular metabolism (the sum of all chemical changes that take place in a cell)), pain, necrosis (it is a form of cell injury) and often organ damage.

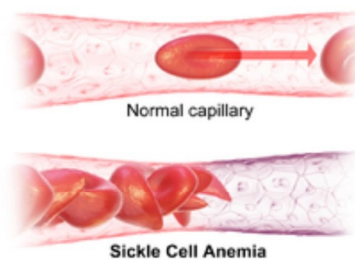
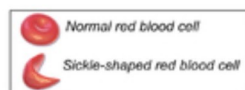
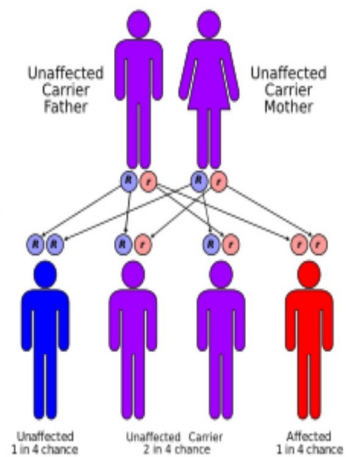
Aplastic Crisis: Aplastic Crises are instances of an acute worsening of the patient's baseline anaemia, producing pale appearance, fast heart rate, and fatigue. This crisis is normally triggered by parvovirus B19, which directly affects production of Red Blood Cells by invading the red cell precursors and multiplying in and destroying them.



Splenic Sequestration Crisis: The spleen is frequently affected in Sickle Cell Disease, as the Sickle-Shaped Red Blood Cells cause narrowing of blood vessels and reduced function in clearing the defective cells.

Haemolytic crisis: Haemolytic crises are acute accelerated drops in haemoglobin level. The red blood cells break down at a faster rate.

Genetics: Normally, humans have haemoglobin A, which consists of two alpha and two beta chains. Haemoglobin A2, which consists of two alpha and two delta chains and haemoglobin F (HbF) consisting of two alpha and two gamma chains. Of these three types, haemoglobin F dominates until about 6 weeks of age. Afterwards, haemoglobin A dominates throughout life. In people diagnosed with Sickle Cell Disease, at least one of the β -globin subunits in haemoglobin A is replaced with what is known as haemoglobin S.



Diagnosis: In Sickle Haemoglobin (HbS), the Complete Blood Count (CBC) (A set of medical laboratory tests that provide information about the cells in a person's blood) reveals haemoglobin levels in the range of 68 g/dl (grams per deliliter) with a high reticulocyte count (immature Red Blood Cells (RBCs)). In other forms of Sickle Cell Disease, haemoglobin (Hb) levels tend to be higher.

Treatment: Treatment involves a number of measures. Dehydration should be avoided. A diet high in calcium is recommended but the effectiveness of vitamin D supplementation remains uncertain. Blood transfusions are often used in the management of Sickle Cell Disease in acute cases and to prevent complications by decreasing the number of Red Blood Cells (RBCs). Bone Marrow transplant (it is transplantation of multipotent hematopopetic stem cells (multi-cellular organisms-stem cells that gives rise to other blood cells), usually derived from Bone Marrow in order to replicate inside of a patient and to produce additional normal blood cells) is also used in management of Sickle Cell Disease in acute cases.

KNOW THE EXHIBIT

Modern Rocket - Ariane 5

Ariane 5 is a family of rockets, launched by European Space Agency. In July 1973, Ten European nation joined together to form the European Space Agency. Total cost of the project was 3.92 Billion French Francs (currency of France). There series of rockets are named 'Ariane'.

Ariane Series:

Ariane 1 (1979-1986) was able to carry payload upto 1400 kg .

Ariane 2 (1986-1989) had the capacity to carry payload up to 2175 kg.

Ariane 3 (1984-1989) used to carry payload weight up to 2700 kg.

Ariane 4 (1990-2003) of payload capacity 7600 kg made 113 launches.

In 1987 European Space Agency started developing the most powerful rocket Ariane 5.

After 2 initial failures on 31st October 1998, Ariane 5 made its first successful launch. Today, these rockets can carry a payload upto 50 tones.

This Exhibit is situated at “Entering Space Gallery” between Fun Science Gallery and Power of Play Gallery at the first floor of Science Centre.



QUIZ

1. Which one of the following Species of Honey Bee is an Italian Species?

- a) Apis Dorsata b) Apis Florae c) Apis Cerana Indica d) Apis Mellifera

2. What is use in SONAR?

- a) Ultrasonic Waves b) Infrasonic Waves c) Radio Waves d) Audible Sound Waves

3. What is not in Pteridophyta?

- a) Root b) Stem c) Flowers d) Leaves

4. In which two chambered heart occurs?

- a) Crocodiles b) Fish c) Aves d) Amphibians

5. Who was given the first model of an Atom?

- a) Niels Bohr b) Eugen Goldstein c) Rutherford d) Joseph John Thomson

6. What is the valency of an Atom with 3 Protons and 4 Neutrons?

- a) 3 b) 7 c) 1 d) 4

7. Which one of the following also known as Alpha Particle?

- a) Subatomic Particle b) An Unionised Helium Atom
c) A Neutral Particle d) A Doubly-Charged Helium Ion