

SCIENCE CENTRE NEWS LETTER

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SCIENCE CENTRE

WHAT'S NEW IN SCIENCE?

8000 steps a day to reduce the risk of premature death

A research led by the University of Granada, Spain had identified the optimal number of steps at which most people obtain the greatest benefits and also shows that the pace at which person walk provides additional benefits. It shows how many steps a person need to take per day to significantly reduce the risk of premature death: 8000. Given the average length of human stride (76 centimetres for men and 67 centimetres for women), taking 8000 steps is equivalent to walking approximately 6.4 kilometres a day.

Researchers have also shown that the pace at which person walk has additional benefits and that it is better to walk fast than slow with regard to the risk of dying from cardiovascular disease (it is a condition affecting the heart or blood vessels), most of the benefits are seen at around 7000 steps.

The researchers conducted an analysis on 110,000 participants. The result shows that health benefits

are obtained at less than 10,000 steps. "In this study, they showed that measurable benefits can be obtained with small increase in the number of steps per day and that for people with low levels of physical activity, every additional 500 steps improves their health because not everyone can walk almost 9000 steps a day at least not at first, so a person can set small, reachable goals and gradually make progress, increase the number of steps per day", explains Esmee Bakker, post doctoral research fellow at University of Granada, Spain.

The research revealed no difference between men and women. It also found that faster walking is associated with a reduced risk of mortality, regardless of the total number of steps per day. Additionally, according to Bakker, "It doesn't matter how person count their steps, whether they wear a smart watch, a wrist based activity tracker or a smart phone: the step targets are the same."

Courtesy - Suman High School No.-18



SCIENTIST OF THE MONTH

Sir K. S. Krishnan

Sir Kariamanikkam Srinivasa Krishnan was born on 4th December 1898 at Watrap, Tamil Nadu. He had early education in Hindu Higher Secondary School in Watrap.

In 1920, Krishnan went to work with C.V. Raman at the Indian Association for the Cultivation of Science, Kolkata, where he did experimental study of the scattering of light in a large number of liquids and its theoretical interpretations. He played a significant role in the discovery of the Raman scattering.

In 1928, he joined the Dacca University (now in Bangladesh) as a Reader in the Physics department, where he studied magnetic properties of crystals in relation to their structure. Krishnan, along with other Scientists such as Santilal Banerjee, B. C. Guha and Asutosh Mukherjee developed an elegant

and precise experimental technique to measure the magnetic anisotropy (it refers to how direction affects the magnetic property of a material) of diamagnetic (substance that are usually repelled by a magnetic field) and paramagnetic (substance that are weakly attracted to magnets) crystals. In 1933, he returned to Kolkata to take up the post of Mahendralal Sircar Professor of Physics in the Indian Association for Cultivation of Science.

Krishnan was elected as Fellow of Royal Society, London in 1940. In 1942, he moved to Allahabad University as Professor and Head of the Department of Physics. On 4th January 1947, K.S. Krishnan was appointed first Director of National Physical Laboratory (NPL), New Delhi. He was awarded Padma Bhushan in 1954 and the first recipient of the prestigious Bhatnagar Award in 1958.

Courtesy - Suman High School No.-18





Timings

Tuesday to Sunday
& Public Holidays
9.30 am to 4.30 pm

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SCIENCE FACTS DECEMBER 2023

1 December 1925	American Scientist Martin Rodbell (Co-winner of the 1994 Nobel Prize in Physiology or Medicine for their discovery of G- proteins and the role of these proteins in signal transduction in cell) was born.
3 December 1900	Austrian-German Biochemist Richard Kuhn (Winner of the 1938 Nobel Prize in Chemistry for his work on carotenoids and vitamins) was born.
3 December 1933	Dutch Chemist Paul J. Crutzen (Co- winner of the 1995 Nobel Prize in Chemistry for their work in atmospheric chemistry, particularly concerning the formation and decomposition of ozone) was born.
3 December 1967	First successful heart transplant carried out by Christiaan Barnard.
4 December 1908	American bacteriologist Alfred Hershey (co-winner of the 1969 Nobel Prize in Physiology or Medicine for their discovery on the replication of viruses and their genetic structure) was born.
5 December 1901	German Physicist Werner Heisenberg (winner of the 1927 Nobel Prize in Physics for the creation of quantum mechanics) was born.
5 December 1903	English Physicist Cecil Frank Powell (Winner of the 1950 Nobel Prize in Physics for his development of the photographic method of studying nuclear processes and his discoveries regarding mesons made with this method) was born.
8 December 1947	American Chemist Thomas R. Cech (Co- winner of the 1989 Nobel Prize in Chemistry for their discovery of the catalytic properties of RNA) was born.
9 December 1868	German Chemist Fritz Haber (Winner of the 1918 Nobel Prize in Chemistry for his invention of the Haber- Bosch process, a method used in industry to synthesize ammonia from nitrogen gas and hydrogen gas) was born.
10 December 1934	American geneticist Howard Martin Temin (Co- winner of the 1975 Nobel Prize in Physiology or Medicine for discovery of reverse transcriptase) was born.
11 December 1843	German bacteriologist Robert Koch (Winner of the 1905 Nobel Prize in Physiology or Medicine for his investigations and discoveries in relation to tuberculosis) was born.
11 December 1882	German Physicist Max Born (Winner of the 1954 Nobel Prize in Physics for his fundamental research in quantum mechanics, especially in the statistical interpretation of the wave function) was born.
11 December 1925	American neuroscientist Paul Greengard (Co- winner of the 2000 Nobel Prize in Physiology or Medicine for their discoveries concerning signal transduction in the nervous system) was born.
12 December 1866	Swiss Chemist Alfred Werner (Winner of the 1913 Nobel Prize in Chemistry for proposing the octahedral configuration of transition metal complexes) was born.
13 December 1923	American Physicist Philip Warren Anderson (Co-winner of the 1977 Nobel Prize in Physics for his investigations into the electronic structure of magnetic and disordered systems, which allowed for the development of electronic switching and memory devices in computers) was born.
14 December 1546	Danish astronomer and alchemist Tycho Brahe was born.
14 December 1909	American geneticist Edward Tatum (Co-winner of the 1958 Nobel Prize in Physiology or Medicine for showing that genes control individual steps in metabolism) was born.
14 December 1922	Soviet Physicist Nikolay Basov (Co-winner of the 1964 Nobel Prize in Physics for his fundamental work in the field of quantum electronics that led to the development of laser and maser) was born.
15 December 1852	French Physicist Henri Becquerel (co-winner of the 1903 Nobel Prize in Physics for the discovery of spontaneous radioactivity) was born.
17 December 1908	Willard Frank Libby (Inventor of The Carbon – 14) was born.
18 December 1856	English Physicist Joseph John Thomson (Discoverer of electron) was born.
20 December 1890	Czech Chemist Jaroslav Heyrovsky (winner of the 1959 Nobel Prize in Chemistry for his invention and development of the polarographic methods of analysis) was born.
31 December 1937	Israeli biologist Avram Hershko (co-winner of the 2004 Nobel Prize in Chemistry for his discovery of ubiquitin-mediated protein degradation) was born.

U. N. : United Nations

WHO -World Health Organization

UNESCO - United Nations Educational Scientific & Cultural Organization

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

SCIENTIFIC QUESTION

HIV/AIDS

Acquired Immuno Deficiency Syndrome (AIDS) is a chronic, potentially life-threatening condition caused by the human immunodeficiency virus (HIV). By damaging your immune system, HIV interferes with your body's ability to fight infection and disease. HIV is spread by contact with infected blood and from illicit injection drug use or sharing needles. It can also be spread from mother to child during pregnancy, childbirth or breastfeeding. Without medication, it may take years before HIV weakens your immune system to the point that you have AIDS.

Symptoms: The symptoms of HIV and AIDS vary, depending on the phase of infection

• **Primary Infection (Acute HIV):** Some people infected by HIV develop a flu-like illness within 2 to 4 weeks after the virus enters the body in which symptoms like fever, headache, muscle aches and joint pain, rash, swollen lymph glands mainly on the neck, diarrhoea, Weight loss and Cough are occurred. These symptoms can be so mild that you might not even notice them. However, the amount of virus in your bloodstream is quite high at this time. As a result, the infection spreads more easily during primary infection than during the next stage.

• **Clinical Latent Infection (Chronic HIV):** In this stage of infection, HIV is still present in the body and in white blood cells. This stage can last for many years if person receiving Antiretroviral Therapy (ART) (it is the treatment of people infected with HIV using anti-HIV drugs). Some people develop more severe disease much sooner.

• **Symptomatic HIV infection:** As the virus continues to multiply and destroy your immune cells, a person may develop mild infections or chronic signs and symptoms such as fever, fatigue, swollen lymph nodes, weight loss, shingles, and pneumonia.

• **Progression to AIDS:** Untreated, HIV typically turns into AIDS in about 8 to 10 years.

Causes: HIV is caused by a virus. It can spread through sexual contact, illicit injection drug use or sharing needles, contact with infected blood, or from mother to child during pregnancy, childbirth or breastfeeding. HIV destroys CD4 T cells (white blood cells that play a large role in helping your body fight disease).

How HIV doesn't spread

Person can't become infected with HIV through ordinary contact. That means person can't catch HIV or AIDS by hugging, dancing or shaking hands with someone who has the infection. HIV isn't spread through the air, water or insect bites.

Prevention: There's no vaccine to prevent HIV infection and no cure for HIV/AIDS. To help prevent the spread of HIV:

1) **Consider preexposure prophylaxis (PrEP).** The combination oral drugs emtricitabine plus tenofovir disoproxil fumarate (Truvada) and emtricitabine plus tenofovir alafenamide fumarate (Descovy) can reduce the risk of sexually transmitted HIV infection.

2) **Use post-exposure prophylaxis (PEP) if person been exposed to HIV.** If person exposed the HIV, taking PEP as soon as possible within the first 72 hours can greatly reduce person's risk of becoming infected with HIV.

3) Use a clean needle.

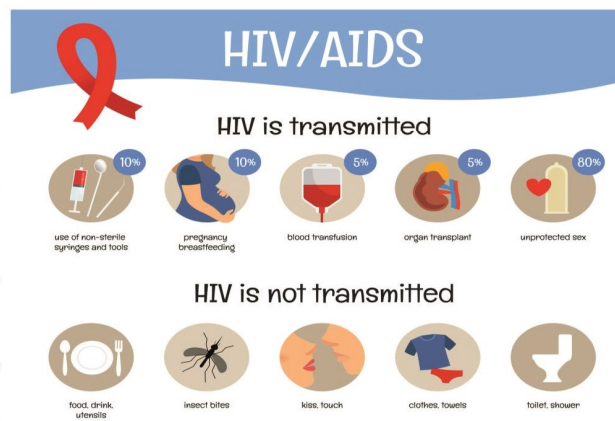
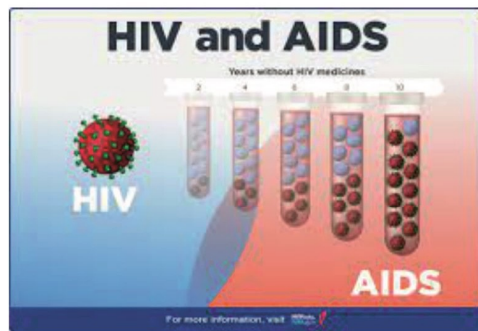
Diagnosis: HIV can be diagnosed through blood or saliva testing. This includes following tests:

- **Antigen/antibody tests:** These tests usually involve drawing blood from a vein. Antigens are substances on the HIV virus itself and are usually detectable — a positive test — in the blood within a few weeks after exposure to HIV.
- **Antibody tests:** These tests look for antibodies to HIV in blood or saliva.
- **Nucleic acid tests (NATs).** These tests look for the actual virus in your blood.

The person diagnosed of HIV/AIDS, the treatments includes like CD4 T cell count, viral load (this measure the amount of virus in person's body), drug resistance (some strains of HIV are resistant to medications).

Treatment: Currently, there's no cure for HIV/AIDS. Once person have the infection, person's body can't get rid of it. However, there are many medications that can control HIV and prevent complications. The anti-HIV drugs include the following:

- **Non-nucleoside reverse transcriptase inhibitors (NNRTIs)** turn off a protein needed by HIV to make copies of itself.
- **Nucleoside or nucleotide reverse transcriptase inhibitors (NRTIs)** are faulty versions of the building blocks that HIV needs to make copies of itself.
- **Protease inhibitors (PIs)** inactivate HIV protease, another protein that HIV needs to make copies of itself.



KNOW THE EXHIBIT

Health in Space- Kidney Stones

About 1 in 10 people develop a kidney Stone during their life time on Earth. But that risk is far greater for Astronauts in space because bones demineralise in a weight less environment that release salts such as Calcium Phosphate into the blood. Concentrating in the kidneys, these salts may forms stones that range in size from microscopic to as big as walnut. Kidney stones may cause excruciating pain. But it's also possible for the kidney to stop working if a stone blocks the Urinary tract that drains the organ.

For Astronauts, the risk intensifies because microgravity also causes a decline in blood volume. In addition, many Astronauts don't drink the 2 litres of water needed to stay completely hydrated and pass the stones in their urine.

At least 14 American Astronauts developed kidney stones shortly after their missions ended. In 1982, one soviet Cosmonaut doubled over excruciating pain for two days on the Salyut 7 Space Station. Before the Soviets were able to given a treatment for what they thought was appendicitis, the Cosmonauts passed a small stone in his urine.

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



SCIENCE PROJECT

Surat Municipal Corporation had organized 'Science Fair-2023' at Art Gallery, Science Centre Surat on 18th and 19th August, 2023 for the students of std. 8 to 12. Suman School No-18 had participated their project on 'Renewable Energy based Smart City' under the sub theme of 'Affordable and Clean Energy'.

The aim of the project is to convert solar energy, wind energy, water energy and thermal energy into electrical energy. Renewable energy is the energy obtained from natural sources which can be regained after consumption. It is a re-attainable resources.

On the other hand, fossil fuels such as Coal, Petrol, Diesel and Oil is non-renewable resources which takes millions of years to form when fossil fuels are burned to obtain energy , it emits harmful green house gases like Carbon Dioxide and this causes pollution. The transition to renewable energy is the key to avoid the climate crisis.



QUIZ

- The first model of an atom was given by _____.
a) N. Bohr
b) E. Goldstein
c) Rutherford
d) J. J. Thomson
- An atom with 3 protons and 4 neutrons will have a valency of _____.
a) 3
b) 7
c) 1
d) 4
- Which of the following disease is not transmitted by mosquito?
a) Brain fever
b) Malaria
c) Typhoid
d) Dengue
- Viruses, which cause hepatitis, are transmitted through _____.
a) Air
b) Water
c) Food
d) Personal contact
- Two objects of different masses falling freely near the surface of the Moon would _____.
a) Have same velocities at any instant.
b) Have different acceleration
c) Experience forces of same magnitude
d) Undergo a change in their inertia
- Which is not a source of Carbohydrate?
a) Rice
b) Millets
c) Sorgum
d) Gram
- Rocket works on the principle of conservation of _____.
a) Mass
b) Energy
c) Momentum
d) Velocity