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WHAT'S NEW IN SCIENCE?

Blood Test For Alzheimer's Before Symptoms

Researchers can detect 'toxic' small aggregates of a particular protein in the blood of individuals with Alzheimer's disease. As well as in individuals who showed no signs of cognitive impairment at the time the blood sample were taken, but who developed it at a later date. This blood test picks up oligomers or small, misfolded aggregates of the amyloid beta protein, which Researchers believe triggers the development of Alzheimer's.

Today, by and large, patients receive a diagnosis of Alzheimer's only after they exhibit well known signs of the disease, such as memory loss. By that point, the best treatment options simply slow further progression of symptoms.

But research has shown that the seeds of Alzheimer's are planted years even decades earlier, long before the cognitive impairments surface that make a diagnosis possible. Those seeds are amyloid beta proteins that misfold and clump together, forming small aggregates called oligomers. Over time, through a process Researchers are still trying to understand, those 'toxic' oligomers of amyloid beta are thought to develop into Alzheimer's.

Researchers at the University of Washington, U.S (United States) have developed a laboratory test that can measure levels of amyloid beta oligomers in blood samples. The Research paper published in the Journal Proceedings of the National Academy of Sciences. Their test known by the acronym SOBA (Soluble Oligomer Binding Assay) could detect oligomers in the blood of patients with Alzheimer's disease, but not in most members of a control group who showed no signs of cognitive impairment at the time the blood samples were taken.

However, SOBA did detect oligomers in the blood of 11 individuals from the control group. Follow-up examination records were available for 10 of these individuals and all were diagnosed years later with mild cognitive impairment or brain pathology consistent with Alzheimer's disease. Essentially, for these 10 individuals, SOBA had detected the toxic oligomers before symptoms surfaced.

"What Clinicians and Researchers have wanted is a reliable diagnostic test for Alzheimer's disease - and not just an assay that confirms a diagnosis of Alzheimer's, but one that can also detect signs of the disease before cognitive impairment happens. That's important for individuals' health and for all the research into how toxic oligomers of amyloid beta go on and cause the damage that they do," said Valerie Daggett, a University of Washington Professor of Bioengineering and Faculty Member in the University of Washington Molecular Engineering and Sciences Institute.

SOBA exploits a unique property of the toxic oligomers. When misfolded amyloid beta proteins begin to clump into oligomers, they form a structure known as an alpha sheet. Alpha sheets are not ordinarily found in nature. At the heart of SOBA is a synthetic alpha sheet that can bind to oligomers in samples of either cerebrospinal fluid or blood. The test then uses standard methods to confirm that the oligomers attached to the test surface are made up of amyloid beta proteins.

SCIENTIST OF THE MONTH

Subramania Ranganathan

Subramania Ranganathan was born on 2nd February 1934 in Tamil Nadu. Graduated in Chemistry from Madras University and continued there to complete his master's degree in 1957. Before moving to U.S (United States) to pursue his doctoral studies on a Sloan Kettering Foundation fellowship, he worked at the Biochemistry Department of the Central Leather Research Institute for a short while. In the US, he enrolled at Ohio State University at Harold Shechter's laboratory and secured a Ph.D in 1962. On his return to India in 1966, he joined IIT (Indian Institute of Technology), Kanpur where he spent his entire official academic career. He holded positions of Professor, Head of the Department and Dean before superannuating in 1994. Post-retirement, he served as an INSA (Indian National Science Academy) Senior Scientist, first at National Institute for Interdisciplinary Science and Technology and later at the Indian Institute of Chemical Technology (IICT).

During his post-doctoral days, Ranganathan worked closely with Robert Burns Woodward (an American Organic Chemist) and was known to have assisted the latter in his work on WoodwardHoffmann rules. It was during this time, he accomplished the total synthesis of Cephalosporin C (antibiotic). Later, basing his researches on synthetic and mechanistic organic chemistry, he identified new methodologies for the synthesis of prostaglandins, a group of biologically active compound.

Subramania Ranganathan received the Basudev Banerjee Medal in 1975 and the Council of Scientific and Industrial Research awarded him the Shanti Swarup Bhatnagar Prize, one of the highest Indian science awards, in 1977. He received R. C. Mehrotra Endowment Gold Medal in 2000 and the Silver Medal of the Chemical Research Society of India in 2001. In 2014, he was awarded the Best Teacher Award by the Indian National Science Academy. The Indian Academy of Sciences elected him as a fellow in 1975. Ranganathan was holding the honorary position of Senior Scientist at IICT when he died on 8 January 2016, at the age of 81.

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बहुजनहिताय बहुजनसुखाय

SCIENCE FACTS FEBRUARY 2023

1 Feb	Indian Coast Guard Day
2 Feb	World Wetlands Day (recognized by U.N.).
2 Feb	RA (Rheamatoid Artheritis) Awareness Day.
4 Feb	World Cancer Day.
5 Feb 1971	Apollo-14 landed on the moon.
6 Feb	International Day against Female Genital Mutilation.
8 Feb	Safer Internet Day.
8 Feb 1834	Dimitri Ivanovich Mendeleiev (Formulator of Periodic Table) was born.
10 Feb	National Deworming Day by the Ministry of Health and Family Welfare to make every child Worm-free in the Country.
10 Feb	World Pulses Day to spread awareness about the Nutritional and Environmental Benefits of Pulses as part of sustainable food production.
11 Feb1847	Thomas Alwa Edison (Inventor of Dynamo) was born.
11 Feb1847	International Day for contribution of Woman in Science.
12 Feb 1941	Sir Alexander Fleming did first experiment of Penicillin.
12 Feb	"Darwin Day" – To commemorate the birth Anniversary.
13 Feb	World Radio Day- To raise awareness about the important of Radio (UNESCO)
14 Feb 1929	Devendra Lal (Vise President of Indian Academy of Science and Ex-Director of PRL) was born.
15 Feb 1564	Galileo Galilee (Famous Astronomer) was born.
16 Feb 1919	Jyoti Bhushan Chetarjea (Discoverer of Haemoglobin-E) was Born.
18 Feb 1745	Alessandro Volta (Inventor of Electric Battery) was born.
19 Feb1473	Nicolaus Copernicus (Famous Astronomer) was born on this day.
20 Feb	World Day of Social Justice (recognized by U.N.)
20 Feb 1962	John Glenn the first American Astronaut to orbit the Earth.
21 Feb	International Mother Language Day. (UNESCO)
24 Feb 1940	Sengamedu Shrinivasa Badrinath (Specialist in Vitreo Retina Surgery) was born.
25 Feb 1988	First successful test fire of "PRUTHVI - 1 MISSILE" by India was done.
28 Feb	National Science Day is celebrated in India to mark the discovery of the"Raman effect".

U. N. : United Nations
UNESCO United Nations Educational Scientific & Cultural Organization

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

SCIENTIFIC QUESTION

What is Ramsay Hunt Syndrome?

Inflammation of the geniculate ganglion (is a collection of Pseudounipolar sensory neurons of the facial nerve located in the facial canal of the head) of the facial nerve is a late consequence of varicella zoster virus (VZV) known as Ramsay Hunt syndrome (RHS), commonly known as herpes zoster oticus. In regards with the frequency, less than 1% of varicella zoster infections involved the facial nerve and result in RHS. It is traditionally defined as a triad of ipsilateral facial paralysis, otalgia (ear pain) and vesicles (it is a small blister) close to the ear and auditory canal. Due to its proximity to the vestibulocochlear nerve [it is a cranial nerve (nerves that emerge directly from the brain) that transmits sound and equilibrium information from the inner ear to the brain], the virus can spread and causes hearing loss, tinnitus (hearing noises that are not causes by outside sounds), and vertigo. It is common for diagnoses to be overlooked or delayed, which can raise the likelihood of long-term consequences.

Signs and Symptoms: Early symptoms include intense pain in one ear, the jaw on one side or the neck on one side which may precede the acute facial paralysis by a week or more. Acute symptoms includes acute facial nerve paralysis, pain in the ear, jaw and/or neck, taste loss in the front two-thirds of the tongue, dry mouth and eyes also an erythematous (it is redness of the skin or mucous membranes) vesicular rash (a vesicle is small, fluid-filled blister) in the ear canal, the tongue, and/or hard palate. Because the vestibulocochlear nerve is in proximity to the geniculate ganglion, it may also be affected and patients may also experience tinnitus, hearing loss, hyperacusis (it is the increased sensitivity to sound and a low tolerance for environmental noise) and vertigo. Involvement of the trigeminal nerve [it is responsible for sensation in the face and motor functions (regulation of movement in organisms) such as biting and chewing] can cause numbness of the face.

Diagnosis: Ramsay Hunt Syndrome can be diagnosed based on clinical features. However, in ambiguous cases, PCR (Polymerase Chain Reaction) or direct immunofluorescent assay of vesicular fluid can help with the diagnosis. Laboratory studies such as WBC count, ESR (Erythrocyte Sedimentation Rate - which shows if you have inflammation in your body) and electrolytes can distinguish infectious versus inflammatory etiologies (the cause or origin of disease).

Clinical Diagnosis: On a physical exam, look for vesicular exanthema (skin eruption or rash) on the external auditory canal, concha and pinna (visible part of the ear that is outside the head). Dry eyes with possible lower cornea epithelium damage due to incomplete closure of eyelids.

Diagnostic procedures: Ramsay Hunt Syndrome can usually be diagnosed based on clinical features. However, for suspected cases with unclear presentation, varicella zoster virus can be isolated from vesicle fluid. Tear culture PCR can have positive varicella zoster virus. However, 25-35% of patients with Bell's palsy (it is a type of facial paralysis that results in a temporary inability to control the facial muscles on the affected side of the face) can have false positive varicella zoster virus detected in tears.

Prevention: Shingles is prevented by immunizing against the causal virus, varicella zoster, using a zoster vaccine. Vaccination is recommended for adults of 50 years and older.

Treatment: Treatments for Ramsey Hunt Syndrome are used to reduce further damage caused by the viral infection. Initial treatment with a corticosteroid such as prednisone and an antiviral drug such as acyclovir, valacyclovir or famciclovir for 5 to 7 days is standard. Studies indicate that treatment started within 72 hours of the onset of facial paralysis improves the chances of the patient experiencing significant recovery. Chances of recovery appear to decrease when treatment is delayed. Delay of treatment may result in permanent facial nerve paralysis. However, some studies demonstrate that even when steroids are started promptly, only 22% of all patients achieve full recovery of facial paralysis.

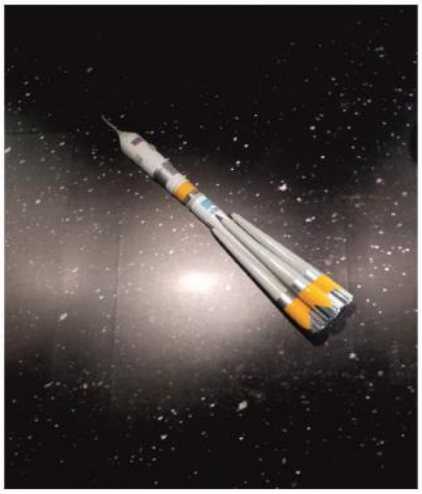
During the acute recovery phase, the eye on the affected side of the face may not blink completely or at all and may not close tightly or at all when sleeping. If the eye is dry or feels irritated, this is a strong indication that the eye is not properly blinking or closing completely. Using artificial tears every 5 to 20 minutes while awake and protecting the eye while asleep are very important to maintaining the health of the eye. While asleep, applying overnight eye gel and using sensitive skin medical tape or an eye patch to keep the eye closed or using a moisture chamber can protect the eye. Taking these precautions is extremely important to preserve the health and functionality of the eye and prevent corneal abrasions and corneal ulcers.

Nerve pain associated with Ramsay Hunt Syndrome may be extreme and centered in the ear, neck, cheek, jaw and face. This nerve pain may not respond well to standard pain treatments including NSAIDS (Non Steroidal Anti-Inflammatory Drugs) and opioids (substances that act on opioid receptors to produce morphine like effects). Medications specifically for nerve pain such as tricyclic antidepressants and gabapentin have been shown to be effective for the neuropathic pain and post-herpetic neuralgia common with RHS.

On 10 June 2022, Canadian Singer Justin Bieber announced that he had been diagnosed with this disease. In which the virus had affected nerves in his ear and face and that his right eye was not blinking.

KNOW THE EXHIBIT

Modern Rocket - Soyuz



Initially USSR (Union of Soviet Socialist Republics) developed Vostok that carried Sputnik (first artificial satellite), Lyka (first animal in space), Yuri Gagrin (first Cosmonaut) and Valentina Tereskova (first female Cosmonaut) to space. Very soon, the better performing Molniya Rockets replaced the "Vostok". Again, Molniya was replaced by its better version, "Voskhod". Soviet Russia USSR started its space program in 1966 with its series of Space Crafts and Rockets named Soyuz (Union). Modern day Russia is still continuing with these Soyuz series of Rockets with more than 1800 launches. These Rockets are designed by Korolev design bureau (now RKK Energia) and manufactured by progress Rocket Space Centre in Samara, Russia. Soyuz Rocket models are highly versatile, it can serve for different purposes. When International Space Station was being made, for that 17 long years, Soyuz 2.1A model acted as cargo. Whenever, it was needed to transport Astronauts to space stations, Soyuz-FG/Fregat space craft was used. To launch any Satellite, Soyuz-Starsem acts as launch vehicle. A Soyuz has room for these people to ride in it. Soyuz takes 6 hours to reach the International Space Station and takes 3.5 hours to comeback from there. Its success rate is 98% !!! The Soyuz is like a life boat. At least one Soyuz is always attached to the Space Station. If there were an emergency on the Space Station, the crew could use the Soyuz to leave the Space Station and return to Earth.

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. What is called insects responsible for transmitting disease?
a) Vector b) Transmitter c) Drones d) Conductor

2. Which one of the following is the largest endocrine gland in the body?
a) Adrenal b) Parathyroid c) Thyroid d) Pituitary

3. Which bacteria are helpful in the Nitrification process?
a) Acetobacter b) Nitrosococcus c) Cambylobacter d) Actinomycetes

4. Which one of the following is not a virus disease?
a) Salmonellosis b) Ranikhet Disease c) Laryngotracheitis d) Fowlpox

5. In which human body parts, strongest muscle masseter located?
a) Hand b) Jaw c) Thigh d) Chest

6. What is the other name of vitamin C?
A) Tartaric Acid b) Acetic Acid c) Ascorbic Acid d) Malic Acid

7. What is the unique feature of 'Anocovax', which was recently launched in India?
a) COVID-19 vaccine for Animals b) Warm COVID-19 vaccine
c) COVID-19 vaccine for New Born d) Monkey pox vaccine