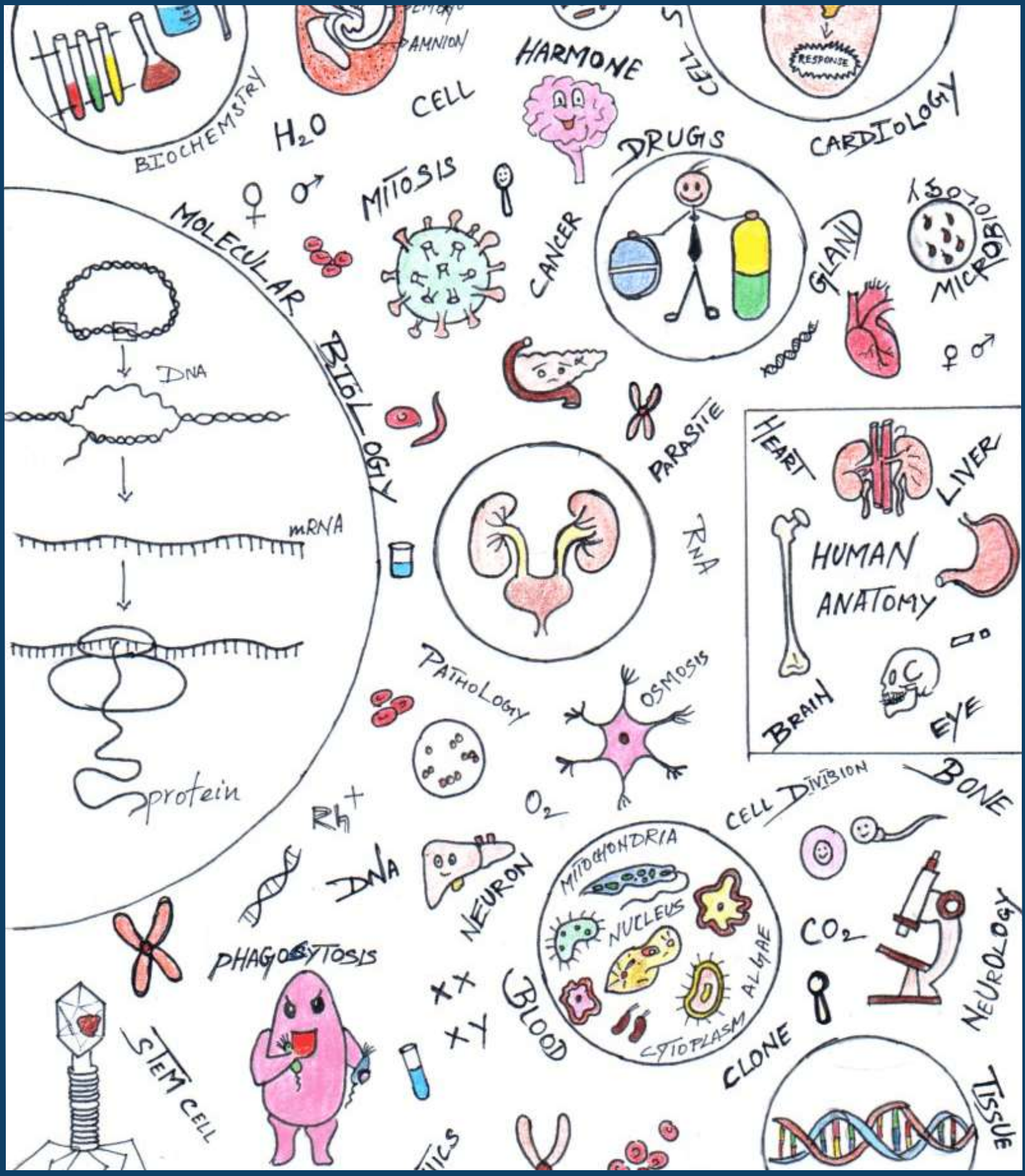
BIOMED FUTURA

APRIL 2023 VOLUME 3



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DO YOU KNOW WHAT BIOMED FUTURA IS?

It is a club to encourage students to think outside the box and beyond their course of study. Its goal is to develop leadership qualities, bring them out of their classrooms, and conquer the world. This is accomplished by involving the students in activities such as debates, quizzes, speeches, and so on. Furthermore, prominent people are invited to give a talk to the pupils.

DEPARTMENT OF BIOMEDICAL SCIENCE
BHARATHIDASAN UNIVERSITY
TIRUCHIRAPALLI

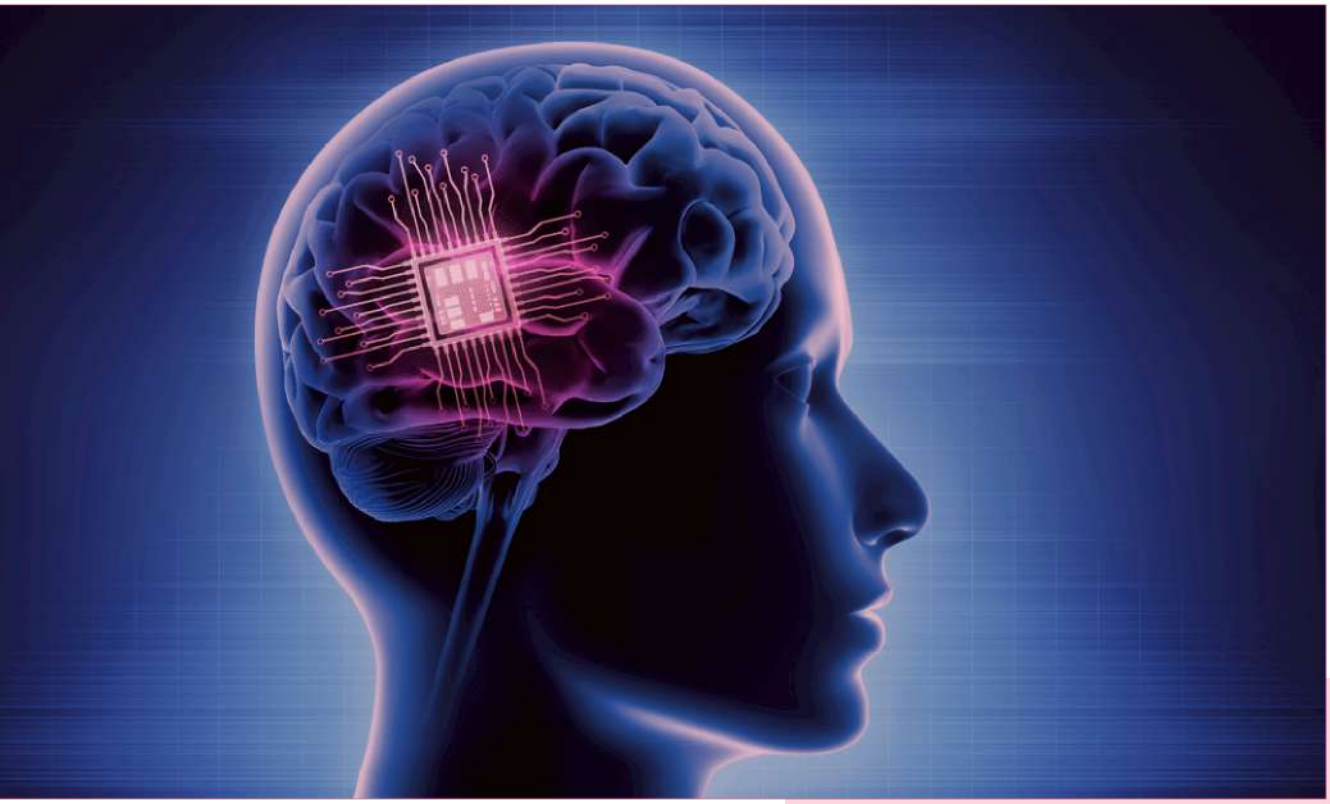
ARTIFICIAL NEURON

By Subashini.S.S
3rd Year

We know that neurons are very sensitive cells and they die when we suffer a concussion or after a stroke. Neurons also die when faced with changes in their functions, like in neurodegenerative diseases like Parkinson's disease and Alzheimer's disease. Unlike other cells in the body, the brain cannot replenish or replace the dead neurons as neurons reside in a terminal G0 phase. When a neuron is damaged or dead, it can be replaced only by designing a working artificial neuron.

A team of scientists at the University of Bath created artificial neurons on silicon chips that behave just like the real neuron that could potentially help to overcome paralysis, connect minds to machines, and restore failing brain circuits. The researchers accurately replicated the complete dynamics of hippocampal neurons and respiratory neurons under a wide range of stimuli. The first-of-its-kind achievement with enormous scope for medical devices to cure chronic diseases, such as heart failure, Alzheimer's, and other neuronal degenerative diseases. Artificial brain cells could now be implanted in the brain to repair the damage.

Besides behaving like working biological neurons they also need only one billionth the power of a microprocessor, making them ideally suited for medical implants and other bio-electronic devices. Designing artificial neurons that respond to electrical signals from the nervous system like real neurons has been a major goal in medicine for decades, as it opens up the possibility of curing conditions where neurons are not working properly.



Artificial neurons could repair diseased bio-circuits by replicating their healthy function and responding adequately to biological feedback to restore bodily function. In heart failure, for example, neurons in the base of the brain do not respond properly to nervous system feedback, they, in turn, do not send the right signals to the heart, which then does not pump as hard as it should. It acts as a smart pacemaker that won't just stimulate the heart to pump at a steady rate but use these neurons to respond in real-time to demands placed on the heart – which happens naturally in a healthy heart.

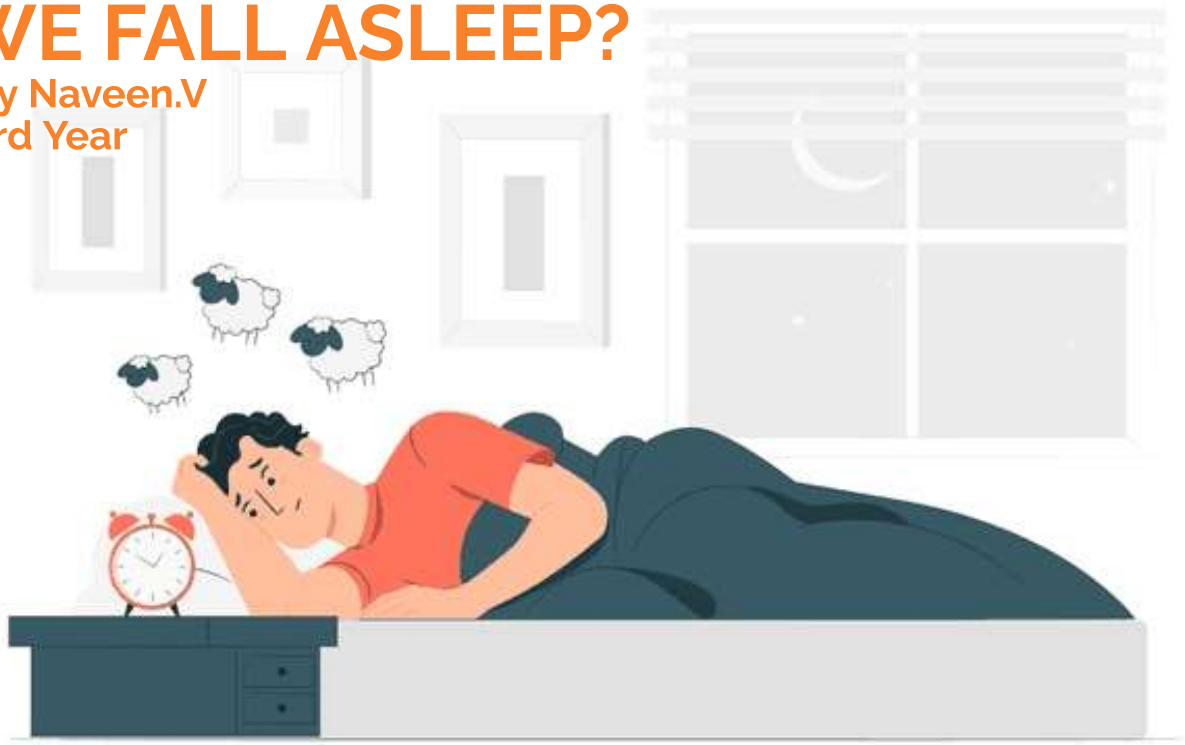
Like a biological neuron, the artificial neuron has inputs (dendrites), a neuronal membrane (lipid bilayer) around the spike generator (soma, nucleus), and an output (axon).

The key difference is in the neuronal membrane. In a real neuron, this would be a lipid bilayer, which essentially acts as both a resistor and a capacitor. The membrane is replaced with a small square of germanium-antimony-tellurium (GST) in an artificial neuron.

It is a paradigm-changing invention because it provides a robust method to reproduce the electrical properties of real neurons in minute detail which can be used to save the lives of mankind.

WHAT HAPPENS WHEN WE FALL ASLEEP?

By Naveen.V
3rd Year



Every night virtually every species on the planet goes to sleep. Sleep appears to be almost universal in the animal kingdom. We spend about one-third of our lives sleeping. Have you ever wondered what happens while we sleep? Why do we sleep? What happens to our brain when we are sleep deprived?

For thousands of years, we are regarding sleep as nothing more than an annihilation of consciousness. As researchers attempt to penetrate the mysterious world of sleep and decipher its secrets, we have found that contrary to popular belief that in parts of sleep, the brain is at least as active and maybe most active than it is during awake.

There are many sleep-specific words you've probably never heard! Somniphobia is the fear of falling asleep. Oneirophobia is the fear of nightmares or dreams.

Clinomania is the irresistible urge to stay cozy in bed all day, while dysania is the word for that feeling when you've just woken up and really don't want to get out of bed.

Dr. Stickgold and Dr. Sabine Seehagen have found that the brain carries out its most sophisticated memory functions while we sleep. While sleeping, the neocortex and the hippocampus are more active as they process all the information we have gathered while awake. Dr. Killgore has found that cutting down sleep even by a couple of hours alters the brain's connectivity thereby affecting emotional intelligence and decision making.

Sleep deprivation causes temporary brain damage, Almost similar to a stroke which gets reversed by good sleep. Dr. Ken Wright has discovered that the chances of developing obesity and heart diseases are down the road due to lack of sleep. Ghrelin and Leptin are the hunger hormones Ghrelin initiates hunger. Leptin sends signals to the brain to stop eating once required energy is acquired but sleep deprivation meltdown these regulatory systems causing overeating and obesity problems.

Neuroscientists Jeff Iliff and his team have found that sleep deprivation may contribute to the development of Alzheimer's disease. Amyloid-β (Aβ) is a physiological peptide secreted by neurons. Extracellular plaque deposit of the Aβ is the hallmark of Alzheimer's disease. Aβ levels rise while we awake and decrease while we are sleeping. It turns out that sleeping shrinks the brain cells causing blood to flow out from our brain, followed by rushing in of CSF, washing our brain in rhythmic, pulsing waves. The whole tissue is completely bathed, flushing out all the metabolic byproducts like Aβ from the brain.

TRYOUT!

By Kishore.J
3rd Year

1. How many ligaments are in the body?
2. The total number of cells present in humans?
3. Which is the longest amino acid?
4. Which substrate is common between the urea cycle and the TCA cycle?
5. Which is the largest protein in human history?
6. Which disease is the second most caused disease in human history?
7. OTC drugs are scheduled under which schedule?
8. Name the first coronavirus testing kit developed in India
9. Name the scientist who discovered DNA
10. The study of algae is known as?
11. Codons that code for the same amino acids are called?
12. Number of base pairs in the human genome?
13. The duration of spermatogenesis in humans is?
14. Father of embryology?
15. Sodium is primarily excreted through?
16. Corticosteroids are used for?

IMPACT OF SHIGELLA AND ITS EFFECTS ON SHAWARMA

By Dharanidharan.D
4th Year

Shigella is a member of the enterobacter family of bacteria and one of the most common causes of diarrhea in the globe. The digestive system is impacted by the intestinal infection known as shigellosis, which is brought on by the bacteria Shigella. After passing through your stomach, the Shigella bacteria continue to grow in your small intestine. They then moved into your colon, which is also known as your large intestine, causing discomfort and diarrhea there.

According to the US Centre for Disease Control and Prevention (CDC), the bacteria is easily contagious since it only takes "a few bacteria to make someone sick". Direct or indirect touch with the patient's waste can quickly spread the sickness. If you swim or take a bath in contaminated water, you could get infected. According to medical professionals, infections rarely result in death unless the patient has a compromised immune system or the bacteria is resistant to the prescribed treatments.

The presence of the bacterium was confirmed in the blood and feces of patients who were hospitalized after eating chicken shawarma, according to a report by the Indian Express. Doctors found that the Shawarma samples had Shigella and Salmonella bacteria. Mild infections last only a few days and may not require medical treatment. Shigella may have spread through the mayonnaise and accompanying vegetable salad in addition to the shawarma's meat.

As a result, a 16-year-old girl who acquired shigella from shawarma and died was the first case to be documented. The same bacteria that cause food poisoning also caused more than 40 other people in the same state to be hospitalized. Shigella outbreaks typically occur more frequently and severely during pregnancy, in young children under 5, and people with weakened immune systems.

BREAKTHROUGH DRUG TRIAL SHOWS 100% SUCCESS RATE IN ENDOMETRIAL CANCER

By Harini Priyadharshini.K.B
4th Year

Endometrial cancer is a type of cancer that begins in the uterus. Endometrial cancer begins in the cell layer forming the lining (endometrium) of the uterus.

Between 20-30% of the endometrial cancer are associated with a mismatch repair (MMRD) protein deficiency or high microsatellite instability (MSI-H) characteristics that render the tumor more sensitive to immune checkpoint inhibitors. Patients enrolled in the trial received the "PD-1 monoclonal antibody dostarlimab" at 500mg intravenously every 3 weeks for 6 months total of 9 cycles.

According to data from the phase 2 trial (NCT04165772) presented at the 2022 ASCO annual meeting, "single agent dostralimab – gxly (Jemperli)" elicited a Clinical Complete Response (CCR) rate of 100% with no evidence of residual tumor among 14 patients with STAGE II (III mismatch repair – deficient (dMMR) locally advanced endometrial cancer. No patients have required chemotherapy, radiation, or surgery and no disease recurrence was observed during the follow–up period.

RIDDLES

By Biswa Bhusan Sarangi
3rd Year

1. I can rush, be still, be cold, be hard, and can slip through almost anything. Who am 'I'?
2. I am present in almost ¾ part of the universe, still almost nothing is known about me. Who am 'I'?
3. It is impossible to create me or destroy me, I can only change my forms. Who am 'I'?
4. I eat a lot of Iron (Fe), but I never fall sick. Who am 'I'?
5. I am a planet and can measure temperature, some people call me a god too. Who am 'I'?
6. Everyone breaks me to use. Who am 'I'?
7. When I care more everyone hates me, When I am not there everyone wants me, I can add flavor so everyone loves me. Who am 'I'?
8. I am as hard as a stone, I am present in living beings, daily you use me for tearing things. Who am 'I'?
9. I can exist in both living and non-living forms; I can make a human and a device sick. Who am 'I'?
10. I have two loops, I can fit perfectly to you and can save you from various diseases. Who am 'I'?

EVENTS CONDUCTED BY OUR TEAM

Dr. B. KADALMANI, Assistant professor in the Department of Animal Science at Bharathidasan University, shared his view on "FEMALE INFERTILITY AND ITS MANAGEMENT" on February 16, 2023.

Female infertility is a condition where a woman without contraception cannot conceive or has multiple miscarriages after a year or more. It is responsible for 50% of infertility cases, with various etiologies including anatomical, ovulatory, endocrine, endometriosis, and lifestyle factors. Conventional treatments like hormone therapy and in vitro fertilization have helped many female patients, but they are not satisfactory due to long treatment times and emotional and financial burdens. In recent years, more patients are seeking alternative and complementary medicines to improve their outcomes.

On March 9, 2023, Dr. A. ANTONY JOSEPH VELANGANNI, Assistant Professor in the Department of Biochemistry at Bharathidasan University, presented a lecture on "CANCER BIOLOGY".

Cancer cells exhibit unique behaviors, such as the inability to divide without growth factors, a lack of signaling to stop further division and immortality. They maintain genomic integrity through telomerase activity, which plays a crucial role in survival and development. Cancer cells achieve replicative immortality by activating the silent telomerase encoding gene hTERT, which bypasses cancer cell senescence. During cancer development, malignant tumor cells migrate to nearby cells and tissues, encouraging angiogenesis and circumventing apoptosis. However, little information is available on the cancer cell metabolic modification mechanism.

Dr. S. RAJAKUMAR, Assistant professor in the department of Marine Biotechnology at Bharathidasan University, presented his thoughts on "GUIDELINES FOR COMPETITIVE EXAMS" on March 30, 2023.

Competitive exams are annual exams conducted at the state or central level in India, aiming to select deserving candidates for various job strata. these exams are conducted at various levels and fields like engineering, medicine, and law among many others. The preparation strategies for these include: Creating a plan, paying attention to concepts, Making Notes, Trying out mock tests, time management, Reviewing your Performance, and Revising Regularly.

WORD PUZZLE ON ALLERGY

By S.V. Salai Meivazhvu
2nd Year

U	S	D	S	R	E	G	U	L	A	T	O	R	Y	O	H
L	U	S	I	N	N	A	T	E	I	M	M	U	N	E	A
A	C	H	E	M	I	C	A	L	S	O	A	P	A	D	N
M	A	B	P	U	M	K	A	R	C	A	N	H	I	N	I
I	L	T	I	T	A	U	W	E	X	N	E	V	V	E	M
N	L	S	T	A	T	I	N	R	O	A	R	B	E	D	A
A	E	Z	O	G	S	N	A	E	B	P	G	C	C	A	L
P	R	Y	P	E	I	D	H	S	S	H	Y	E	E	N	D
R	G	P	E	N	H	E	H	P	M	Y	L	L	L	D	A
O	Y	O	S	E	I	B	A	R	T	L	S	L	L	I	N
P	Z	T	H	Y	M	U	S	O	H	A	V	T	V	C	D
R	H	A	Y	F	E	V	E	R	E	X	C	P	E	S	E
I	N	T	E	R	F	E	R	O	N	I	T	L	A	M	R
A	T	P	F	S	C	I	T	P	E	S	E	R	U	M	M

QUESTIONS:

1. Which of the body system cause allergic reaction?
2. Which is the most common food allergy?
3. What is the reason of getting allergy in a skin?
4. What is an exaggerated IgE mediated immune response?
5. Allergies to food and insect can triggers a severe reaction is known as?
6. Allergic rhinitis is also known as?
7. Example for airborne allergens?
8. Which is the chemical your body releases in response to allergens?
9. Children who have an egg allergy should not get which of the vaccine?
10. Dust mites are a common trigger for indoor respiratory allergies where are you most likely to find then in the home?

SENILE DEMENTIA

By Solaimanikandan.S
2nd year

Senile Dementia (Alzheimer's disease) is a progressive neurodegenerative disease associated with memory loss caused due to abnormal build up of Amyloid and Tau proteins in the brain cells. The Amyloid proteins form plaques around the brain cells and the Phosphorylated Tau proteins deforms tangles within the brain cells. Amyloid proteins are high affinity towards Nucleic acid resulting in genetic mutation. This makes Alzheimer's an hereditary neurodegenerative disorders. Biomarkers can detect the presence of plaques and neurofibrillary tangles in the plasma and Cerebro Spinal Fluid (CSF) in association with Positron Emission Tomography (PET) Scan. Magnetic Resonance Imaging (MIR) uses radio waves and strong magnetic field to produce images of Alzheimer's . At first the plaques are formed in the brain cells which causes the neuron's degeneration and finally causes the shrinkage of brain tissues.

. There are five stages associated with AD they are:
i. Preclinical AD is mainly performed in research
ii. Mild cognitive impairment causes memory loss, thinking and speaking problems
iii. Mild dementia causing AMNESIA, APHASIA
iv. Moderate dementia causing confusion, amnesia, poor judgement
v. Severe dementia causing APRAXIA, AMNESIA, APHASIA, and AGNOSIA

Medication and recent advances

- LEVODOPA – cholinesterase inhibitor inhibit cholinesterase from hydrolyzing Acetylcholine thus chemical impulse transfer through neurotransmitter is preserved..
- ADUHELM – drug designed to clear B-amyloid deposits in brain thus reducing the effect of Alzheimer's disease

Terms

1. AMNESIA – Loss of memory
2. APHASIA – Loss of ability to express or understand speech
3. APRAXIA – Loss of involuntary motor skills (Physical Functioning)
4. AGNOSIA – Loss of recognition or identification of an object, person even themselves

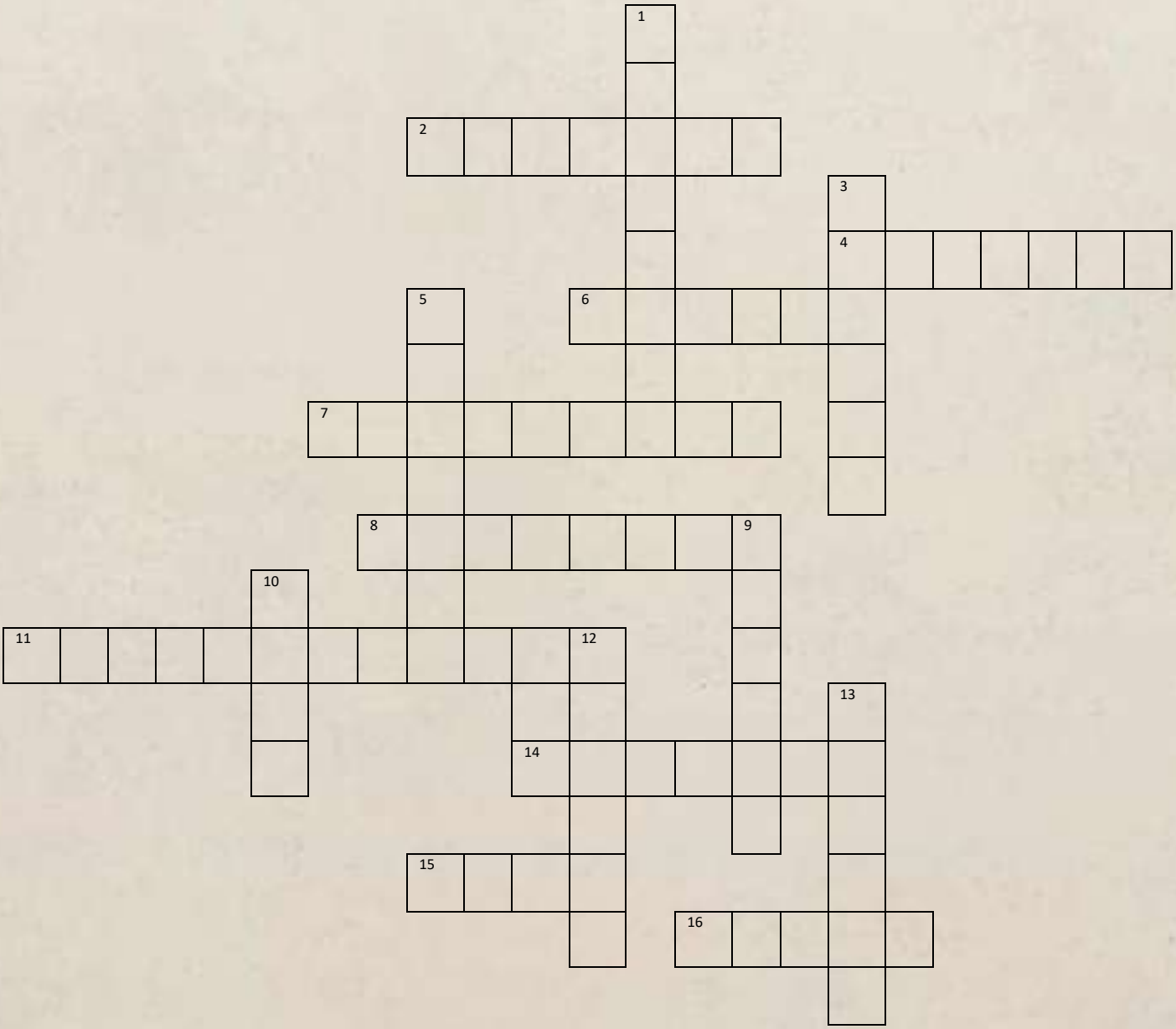
CAN YOU ANSWER THESE?

By Mega Varshini.S
2nd Year

1. In each body cell, the average individual carries _____
2. All the DNA in one cell of an organism is called _____
3. The first successful treatment of a human genetic disorder through gene therapy was _____
4. Hemophilia is also called _____
5. Sickle cell anemia is an example of _____ mutation.
6. The mode of inheritance for the trait- Fragile X syndrome is _____
7. Hemochromatosis alters the body to regulate _____ absorption.
8. The common symptom of Marfan syndrome is _____
9. The most common skin cancer is _____ , which accounts for 90% of the cancer.
10. A genetic disorder that affects a single gene is categorized as _____

CAN YOU SOLVE THE PUZZLE?

By Farah Riyaz - 3rd Year



ACROSS

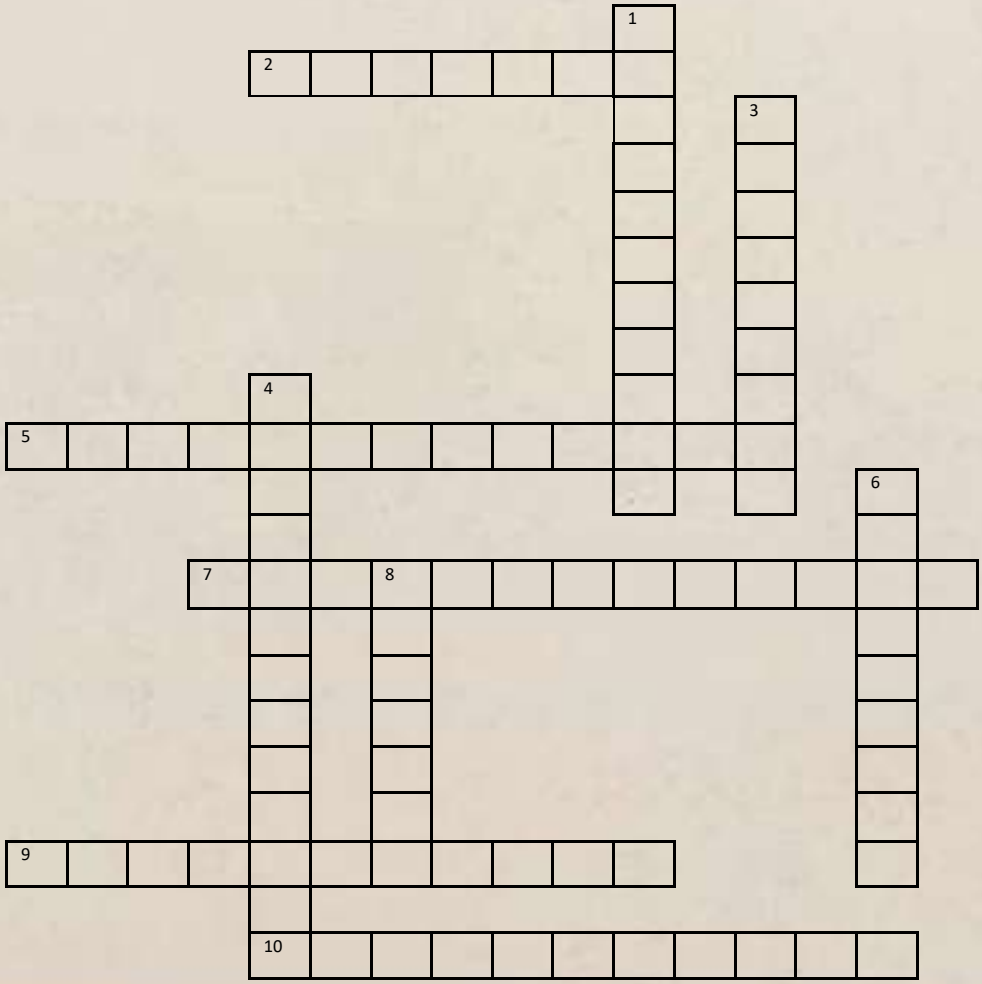
2. What disease is a person suffering from "Lockjaw" has?
4. "Pruritus" is a medical word for?
6.Which is the part of the eye where the images are focused?
7. Whooping Cough disease is also known as?
8. Anti-malarial drug "Quinine" is made from which plant?
11. BCG immunisation is for which disease?
14. What function do the ears provide other than hearing?
15. What is the largest joint in the human body?
16. Which is the only bone in the body that is not attached to another bone

DOWN

1. Diabetes happens because of the problems in which organ of the body?
3. Pellagra disease is caused due to the deficiency of?
5. What is the scientific term for a disease that causes dizziness?
9. What is the word for a person with very pale skin and eyes?
10. What is the skin malady that is caused due to the extra oil production by the skin?
12. What is the smallest bone in the human body?
13. An overgrowth of a scar tissue is known as?

PUZZLE ON BIOCHEMISTRY

By Shafiq Ahamed – 2nd Year



ACROSS

2. Abundantly found in collagen.

5. Important for white blood cell recognition.

7. The study of energy relationships and conversions in biological systems.

9. Hormone responsible for the activation of phospholipase C.

10. Has beads on a string structure.

DOWN

1. Migration of cancerous cells from the site of origin to other part of the body forming secondary tumors is called _____.

3. Based on which enzyme, hydrolysis reactions are catalysed?

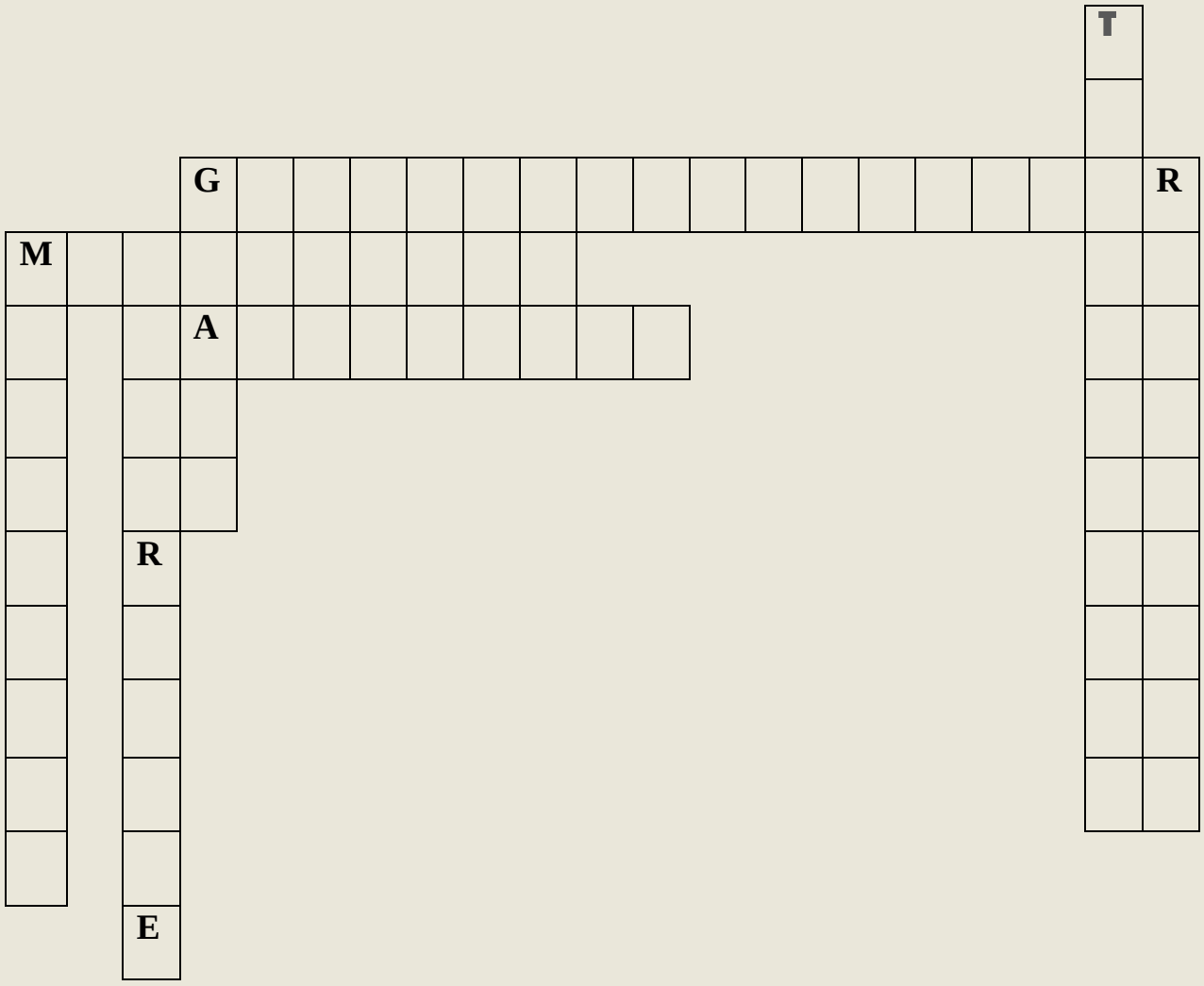
4. It is a 39-residue hormone of the anterior pituitary gland.

6. When visual stimulus reaches receptors in retina of eye, first process involving absorption of physical energy by receptors is?

8. Catalyses the reversible degradation of 2-phosphoglycerate to phosphoenolpyruvate.

LAB EQUIPMENTS AND INSTRUMENTS

By R. Divya Bharathi
4th Year



DOWN:

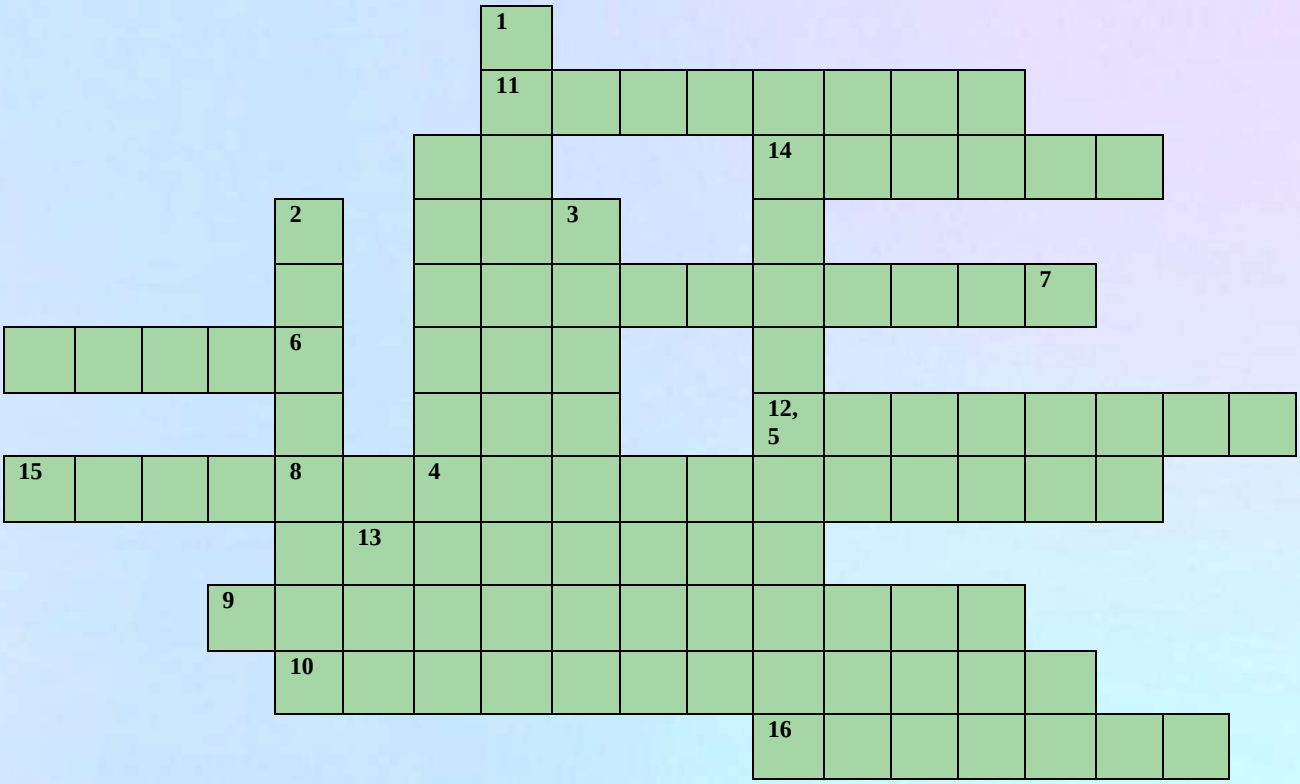
1. Which measurement quantity is found by using a triple beam balance?
2. This tool measures in Celsius or Fahrenheit.
3. Geiger counter is a common scientific measuring tool, what does this tool measure?
4. In laboratory experiments which tool is used to separate substances according to particle size, volume, density, etc?
5. Which instrument measures the pressure?

ACROSS:

6. Which tool can measure the volume of liquids with a greater accuracy?
7. In a laboratory experiment, if the result cannot be seen with naked human eyes, then which device should be used?
8. At the start of a laboratory experiment, which device is used to sterilize the equipment?

DISEASE AND SYNDROME

By Hari Varsha.S – 4th Year



UP TO DOWN:

1. The disease which is also known as primary adrenal insufficiency.
2. Typical sign of this disease is red butterfly shaped rashes.
3. Genetic disorder which results in an extra copy of chromosome 21.

DOWN TO UP:

4. Blocking of internal organs through a weak area, mostly occurs in abdomen.
5. Abbreviated form of gastro oesophageal reflux disease.

RIGHT TO LEFT:

6. Chronic bone disorder results in deformed bone.
7. Example of auto immune disease that affects body's moisture producing glands.

LEFT TO RIGHT:

8. Psycholic illness, not able to distinguish their own ideas and thought from reality.
9. Also known as abnormal heart rhythms which associated with being drinking.
10. An eye disease caused by deficiency of vitamin A.
11. Secondary form of pericarditis that occurs at the setting if injury to pericardium.
12. Occurs in new born infants, caused by accumulation of antibiotic chloramphenicol.
13. A hereditary syndrome, disorder of reabsorption in proximal renal tubule.
14. The disease caused by echinococcus granuloses.
15. An auto immune disease where individual's immune system attacks their own RBC and Platelet.
16. Eating disorder, ends with the suffix nervosa.

FUN ZONE

By Krishna Deepthi.R
2nd Year

1. How do you call an acid with an attitude?
2. What did one cell say to his sister cell that stepped on his toe?
3. What is blood's message to the world?
4. What did the hippocampus say during his retirement speech?
5. A photon checks into a hotel and is asked if he needs any help with his luggage.

6. When a plant is sad, what do the other plants do?
7. Did you hear about the famous microbiologist who visited thirty different countries and learned to speak six languages?
8. Whenever I'm near you, I undergo anaerobic respiration.
9. Why was the mushroom so popular?
10. Why doesn't anybody talk to circles?

THE
MICROSCOPIC
BATTLEGROUND

TUMOR VS NK CELL

ANSWERS

TRYOUT

1. 900
2. 30 to 40 trillion
3. Tryptophan
4. Fumarate
5. Titin, composed of 27000 amino acid residue
6. Hepatitis-B
7. Schedule – H
8. Pathodetect
9. Friedrich Miescher
10. Phycology
11. Synonyms
12. Approx.3 billion
13. 74 days
14. Karl benzt vox baer
15. Kidney
16. Anti inflammatory effect

CAN YOU ANSWER THESE

1. 5-10 mutated gene
2. Genome
3. Sever combined immunodeficiency disease
4. Royal disease
5. Point
6. X- linked dominant
7. Iron
8. Myopia
9. Basal cell carcinoma
10. Monogenic disorder

PUZZLE ON BIOCHEMISTRY

ACROSS

2. Glycine 5. Glycoproteins
7. Bioenergetics 9. Vasopressin
10. Nucleosomes

DOWN

1. Metastasis 3. Hydrolase
4. Corticotropin 6. Reception
8. Enolase

RIDDLES

1. Water
2. Dark energy (or) dark matter
3. Energy
4. Rust
5. Mercury
6. Egg
7. Salt (NaCl)
8. Teeth
9. Virus
10. Mask

CAN YOU SOLVE THE PUZZLE

ACROSS

2. Tetanus 4. Itching
6. Retina 7. Pertussis
8. Cinchona 11. Tuberculosis
14. Balance 15. Knee
16. Hyoid

DOWN

1. Pancreas 3. Niacin
5. Vertigo 9. Albino
10. Acne 12. Stapes
13. Keloid

PUZZLE ON ALLERGY

1. Immune system
2. Soy
3. Chemical Soap
4. Atopy
5. Anaphylaxis
6. Hay fever
7. Animal dander
8. Histamine
9. Rabies
10. Bed

FUN ZONE

1. A mean oh acid
2. My toe sis
3. Be positive (B+)
4. Thanks for the memories
5. Because there's no point
6. Photo sympathises
7. He was a man of many cultures
8. Because you take my breath away
9. He was a real fungus
10. No thanks, I'm travelling light

LAB EQUIPMENTS & INSTRUMENTS

DOWN:

1. Grams
2. Thermometer
3. Radiation
4. Centrifuge
5. Monometer

ACROSS:

1. Graduated Cylinder
2. Microscope
3. Autoclave

DISEASE AND SYNDROMES

1. Addison
2. Lupus
3. Down (Syndrome)
4. Hernia
5. Gord
6. Paget
7. Sjogren
8. Schizophrenia
9. Holiday heart
10. Xeropthalmia
11. Dressler
12. Gray baby
13. Fanconi
14. Hyatid
15. Evans
16. Bulimia

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