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## VIDEO GAMES CAN ASSIST WITH STROKE RECOVERY

- A group of Indian engineers and neuroscientists has put the video games to use in a field which is not entertainment but for recovery of stroke patients.

### About:

- Video games, popular among children in the 1990s, have made a comeback with the advent of virtual reality or VR, which gives users a sense of touch when augmented with add-on instruments.
- The technique developed by a group of researchers at the Indian Institute of Technology, Gandhinagar, is a computer-based exercise platform augmented with a feeling of touch. It is a performance-sensitive platform that can intelligently adapt itself as per performance of patients.
- The software of the platform consists of 48 templates of VR-based reaching and coordination tasks that trigger abduction and adduction movement of the shoulder joint as prescribed in physiotherapy guidelines.
- These tasks in the video game have three difficulty levels to suit severity of stroke. The hardware interface consists of a haptic stylus that provides tactile feedback to users. In addition, the platform has modules for task switching and physiological data acquisition.
- For instance, the car navigation task requires users to tackle dynamic obstacles like a pedestrian crossing the road as well as static obstacles like tree pots at the edge of the road. This is a coordination task, designed for abduction movement of the shoulder joint.
- Similarly, a reaching task where participants have to puncture balloons, avoiding dynamic and static obstacles, is supposed to spur adduction movement.

### Significance:

- The researchers said the system can deliver real-time feedback on one's skill progress. Patients can play and perform these exercises on a daily basis without feeling bored. At the same time, they can receive feedback about their improvement.
- Results indicated that their performance improved in terms of better scores, reduced task completion time and reduced performance errors. It has the potential to be deployed as a low-cost exercise platform for stroke patients in future. Such game-based recovery may help in precise motor unit activation which makes recovery rational and task-oriented,

doing or thinking about something new or in a different manner allows the brain to create new pathways or awaken old ones

- Games allow patients to make repeated, calculated movements in some cases with constraint-induced movement and other specific rehabilitative methods without being aware of time passing or that they are even exercising.
- This is a wonderful solution as lack of funds or access to rehabilitative facilities and transportation often keeps patients from receiving therapy on a regular basis.
- The privacy and comfort of being able to receive treatment at home is also paramount, as continuation of therapy after initial, intensive rehabilitation ends and at-home participation tends to wane. Patients might choose to invite friends and family members to play with them or observe, providing further motivation and encouragement.

### Background:

- Stroke is one of the leading health problems and causes of disability in India. It affects muscle weakness and movement disabilities related to the upper limb.
- The rehabilitation of such patients usually involves physiotherapy involving repetitive exercises, but this has to be carried out by trained physiotherapists either at home or in hospitals. Lack of trained therapists often poses a problem.
- Therefore, this new technology-assisted rehabilitation technique can help overcome these challenges.

### A NEW STRATEGY TO FIGHT OVARIAN CANCER

- A new discovery opens the possibility of developing a novel way to fight ovarian cancer.

### About:

- Researchers at Baylor College of Medicine and the University of Texas MD Anderson Cancer Center have revealed a previously unknown cellular pathway that selectively regulates a mutant protein, called p53-R175H, linked to ovarian cancer growth.
- The researchers identified a key regulator of this pathway USP15 and suggest that designing drugs directed at this regulator might lead to better ways to control cancer growth in the future.
- More than 96 percent of high-grade serous ovarian carcinomas, the most lethal and common form of ovarian cancer, have mutations in the p53-R175H gene. These mutations

have been shown to play key roles in the production of tumors and in the development of drug resistance.

- If the mutant p53-R175H is removed from cancer cells, the cells will enter a path toward cell death and become more sensitive to chemotherapy. But it should be done without affecting the normal p53 proteins because this also can lead to cancer.
- Ovarian cancer is currently treated with surgery and chemotherapy. Chemotherapy for ovarian cancer is based on drugs that act on any cell that is rapidly dividing, healthy or malignant, which has side effects, the side effects can be overcome by developing the treatments that target only cancer cells.
- Thus, by treating with MCB613 resulted in reduced levels of p53-R175H in ovarian cancer cells without affecting p53.

### Ovarian Cancer:

- Ovarian cancer is a type of cancer that begins in the ovaries. The female reproductive system contains two ovaries, one on each side of the uterus. The ovaries each about the size of an almond produce eggs as well as the hormones estrogen and progesterone.
- It's not clear what causes ovarian cancer, though doctors have identified factors that can increase the risk of the disease.
- In general, cancer begins when a cell develops errors (mutations) in its DNA. The mutations tell the cell to grow and multiply quickly, creating a mass (tumor) of abnormal cells. The abnormal cells continue living when healthy cells would die. They can invade nearby tissues and break off from an initial tumor to spread elsewhere in the body (metastasize).
- Factors that can increase your risk of ovarian cancer include Older age, **Inherited gene mutations**, Family history of ovarian cancer, Age when menstruation started and ended
- Treatment for ovarian cancer may consist of surgery, chemotherapy, radiation therapy, hormone therapy, or targeted therapy. Often more than one treatment is used.

### FREEDOM BABY INDIA'S FIRST-BORN PENGUIN DIED

- The first Humboldt Penguin chick in the country that hatched at the Mumbai Zoo on August 15, died of a health complication, the species is native to Peru and Chile in South America.

## About:

- The cause of death is due to newborn anomalies including a yolk sac retention and a liver dysfunction but animal rights activists in Mumbai later filed a police complaint, alleging negligence by zoo authorities and demanding that the death of the 18-month-old penguin be investigated.
- According to a research, there is a 60 per cent mortality chance for penguin chicks owing to various conditions, including infertility of egg, malpositioning of the chick inside the egg, deformities in the newborn, inability of the parents to feed the newborn, yolk sac retention and residual albumin in the newborn. Also, the first three months are crucial for the survival of a penguin chick.

## Background:

- In July 2016, eight Humboldt Penguins were imported from Coex Aquarium in South Korea's Seoul. They were later named Dory, Donald, Daisy, Popeye, Olive, Bubble, Flipper, and Mr. Molt.
- After Dory's death in October last year, the zoo has four female penguins and three male penguins, and six of them have already paired up. Flipper, the oldest female penguin in the zoo, mated with Mr. Molt in captivity to produce an egg in July.
- The penguins stay in a special chilled enclosure, with the nest also kept there. Spread over 1,700 square feet, an average temperature of 16 to 18 degrees Celsius is maintained in the enclosure. Zoo officials constantly monitor the quality of water inside and the birds are fed on fish, including Indian mackerel.

## Humboldt penguin:

- The Humboldt penguin is a South American penguin that breeds in coastal Chile and Peru. Its nearest relatives are the African penguin, the Magellanic penguin and the Galápagos penguin.
- The penguin is named after the cold water current it swims in, which is itself named after Alexander von Humboldt, an explorer. The species is listed as Vulnerable by the IUCN.
- Humboldt penguins nest on islands and rocky coasts, burrowing holes in guano and sometimes using scrapes or caves. In South America the Humboldt penguin is found only along the Pacific coast, and the range of the Humboldt penguin overlaps that of

the Magellanic penguin on the central Chilean coast. It is vagrant in Ecuador and Colombia.

- In addition to their home waters near South America, Humboldt penguins can be found in zoos all around the world, including Spain, Germany, India, Ireland, Japan, the United Kingdom, the United States and other locations.
- Over-fishing, climate change, and ocean acidification, is a major threat to Humboldt penguin. Historically it was the victim of guano over-exploitation. Penguins are also declining in numbers due to habitat destruction including by invasive species.

### **BACTERIA HELP REMOVE SULPHUR FROM FOSSIL FUELS**

- Scientists from CSIR-Institute of Minerals and Materials Technology (CSIR-IMMT) in Bhubaneswar used four bacterial strains that use dibenzothiophene (an organic Sulphur compound which is a major contaminant of fossil fuel) as an energy source thereby getting rid of the Sulphur.

#### **About:**

- Researchers searched the microbial type culture collection (MTCC) of CSIR-IMTECH and selected 10 bacterial strains with dsz genes.
- The dsz genes are central to sustainable bio-desulfurization. They found that four bacteria were able to use almost 99% of the sulphur compound in just 10 days. The four strains are Rhodococcus rhodochrous, Arthrobacter sulfureou, Gordonia rubropertinita and Rhodococcus erythropolis.
- The new process is also eco-friendly and economical, and these new bacterial strains can be potentially explored for the removal of sulphur from fossil fuels on a commercial scale.
- The fact is that the hydro desulfurization units for the high extent of desulfurization are extremely expensive to build and operate. Therefore, as an alternating promising method for desulfurization of fossil fuels has attracted attention of many researchers.
- The biocatalytic desulfurization is a better option because of its low capital and operating expenses.

#### **Sulfur Compounds in Fossil Fuels:**

- Sulfur is the most abundant element after carbon and hydrogen in petroleum. This element can be found in three phases of material, which are gas, solid and liquid.



- The fact that it make up nearly 60% of existing sulfur compounds in petroleum products is DBT and its alkyled derivatives and also persisting of this compound in the environment for more than three years
- Burning and combustion of sulfuric compounds in crude oil lead to release sulfur oxides (SO<sub>x</sub>) in the atmosphere. Releasing SO<sub>2</sub> can be one of the main causes of lung cancer, cardiopulmonary and respiratory problems such as bronchial irritation and asthma attacks in prone human

- **2018 is declared as the Year of the Bird by The National Geographic Society, Bird Life International, Cornell Lab of Ornithology.**
- **It is celebrated in order to mark the centennial of the Migratory Bird Treaty Act, the most powerful and important bird-protection law ever passed.**
- **In honor of this milestone, nature lovers around the world are joining forces to celebrate the “Year of the Bird” and commit to protecting birds today and for the next hundred years.**

### **HALL OF OCEAN GALLERY**

- The Hall of Ocean, a new gallery at the Regional Science Centre in Kerala, which aims to provide scientific understanding of the mystery, magic and beauty of the ocean through three dimensional images, was opened.

#### **About:**

- The Hall of Ocean attempts to provide visitors with a unique and breathtaking introduction to the majesty of the ocean and delve deep into its mysteries.
- Visitors are welcomed to the exhibition by the replica of a blue whale and a cylindrical section of the ocean depth that towers above all the exhibits in the gallery. It comprises a variety of creatures at different levels of the ocean.
- The concept of continental drift, which resulted in the creation of continents and oceans 200 million years ago, is explained in one section while another pays tribute to the frozen oceans and explains their significance in stabilizing the global climate.
- The phenomenon known as Mudbank (Chakara) is explained in one section while the process of harvesting salt from the ocean is explained in another section. The exhibit helps



one explore how the powers below the oceanic plates influence and shape the world in which we live in.

- The gallery features working as well as still models, replicas of sea creatures, marine artefacts, information kiosks, multimedia expositions, 3D TVs and digital installations. It also cautions against unsustainable and illegal fishing, marine pollution and climate-related issues caused by human activities.
- Oceans are just an accumulation of waves when seen from outside, but they hold a different world of mysteries inside. This hall provides a chance to the common people and students to witness them.
- It would help in instilling the scientific temper in youth so they would keep up with the times. The gallery would play an important role in disseminating facts and concerns people have about the ocean.

### HAEMOPHILIA

- Haemophilia is an inherited bleeding disorder where the blood doesn't clot properly. It is caused when blood does not have enough clotting factor.
- A clotting factor is a protein in blood that controls bleeding. An affected individual may bleed spontaneously or for longer than a healthy person after injury or surgery.

#### About:

- The bleeding episodes, or “bleeds”, may occur spontaneously, or as a result of trauma or injury. Specialized treatment is needed to help blood clot normally and is often infused or injected into a vein.
- If internal bleeding is not quickly stopped with treatment, it will result in pain and swelling. Over a period of time bleeding into joints and muscles can cause permanent damage such as arthritis, chronic pain and joint damage requiring surgery.
- Haemophilia is not contagious. Bleeding is most commonly internal. The deficiency in clotting factor produces a wide range of bleeding episodes, usually into the joints or muscles.
- The blood coagulation mechanism is a process which transforms the blood from a liquid into a solid, and involves several different clotting factors. The mechanism generates fibrin when it is activated, which together with the platelet plug, stops the bleeding. When

coagulation factors are missing or deficient the blood does not clot properly and bleeding continues.

- Patients with Hemophilia A or B have a genetic defect which results in a deficiency in one of the blood clotting factors.
- Bleeding disorders are due to defects in the blood vessels, the coagulation mechanism, or the blood platelets.

### Inherited disease:

- Haemophilia is an inherited condition and occurs in families. They are typically inherited from one's parents through a chromosome with a nonfunctional gene.
- However, in 1/3 of cases it appears in families with no previous history of the disorder. The haemophilia gene is passed down from parent to child through generations.
- Men with haemophilia will pass the gene on to their daughters but not their sons. Women who carry the haemophilia gene can pass the haemophilia gene on to their sons and daughters. Sons with the gene will have haemophilia. Some women and girls who carry the gene may also experience bleeding problems.

### Royal disease:

- Haemophilia has featured prominently in European royalty and thus is sometimes known as 'the royal disease'.
- Queen Victoria passed the mutation for haemophilia B to her son Leopold and, through two of her daughters, Alice and Beatrice, to various royals across the continent, including the royal families of Spain, Germany, and Russia.
- In Russia, Tsarevich Alexei, the son and heir of Tsar Nicholas II, famously suffered from hemophilia, which he had gotten from his mother, Empress Alexandra, one of Queen Victoria's granddaughters. The hemophilia of Alexei would result in the rise to prominence of the Russian mystic Grigori Rasputin, at the imperial court.

### World Federation of Hemophilia:

- The World Federation of Hemophilia (WFH) is an international non-profit organization dedicated to improving the lives of people with hemophilia and other genetic bleeding disorders. It educates hemophiliacs and lobbies for improved medical treatment. 75% of people in the world with bleeding disorders do not know it and do not receive care.

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- The WFH was established in 1963 and has its headquarters in Montreal, Canada. It has member organizations in 113 countries and official recognition from the World Health Organization.
  - World Hemophilia Day is an international observance held annually on April 17 by the WFH. It is an awareness day for hemophilia and other bleeding disorders, which also serves to raise funds and attract volunteers for the WFH.