

HEALTH

Hunt for Alzheimer's breakthrough continues, drug fails in clinical trials

CONTEXT: An experimental Alzheimer's drug aimed at slowing or preventing cognitive decline in people at risk of developing the disease early has failed in clinical trials, landing a blow to efforts aimed at finding a trailblazing treatment to the neurodegenerative disease.

❖ **What is Alzheimer's disease?**

- Alzheimer's is a degenerative brain disorder that slowly robs people of their memory and thinking abilities. Worldwide, it is the most common form of dementia or loss of cognitive functioning — thinking, remembering, and reasoning – contributing 60%-70% cases, according to the World Health Organisation (WHO).
- Progressive and irreversible, it usually begins with mild memory loss, and as symptoms grow severe, patients lose the ability to perform even simple tasks.
- Pathology of the disease is deposition of an abnormal protein called beta-amyloid in the brain. The disease starts much before the symptoms show up. The symptoms may come at a certain age, but the pathology changes almost a decade earlier.
- The disease was discovered after Dr Alois Alzheimer examined a memory-loss patient's brain after her death in 1906 and found abnormal clumps (beta-amyloid plaque) and bundles of fibres (neurofibrillary tangles).
- The plaque and tangles, along with loss of connections between the neurons to transmit messages inside the brain, are key markers of the disease.

❖ **What was the latest trial that failed?**

- The decade-long effort used crenezumab, a drug designed to block beta-amyloid, and involved people with a specific genetic mutation which leads to the early onset of Alzheimer's around the age of mid-40s.
- The trial was backed by drugmaker Roche, the United States National Institute on Aging and the Arizona-based nonprofit Banner Alzheimer's Foundation. It targeted the less-prevalent autosomal-dominant Alzheimer's disease (ADAD).
- Earlier in 2019, Roche had stopped crenezumab phase 3 trials for sporadic Alzheimer's, which accounts for over 90% cases, after results fell short of expectations.
- Roche announced recently that the results for its latest trial too were disappointing and did not show "significant clinical benefits".
- Both ADAD and sporadic AD, according to researchers, have similar neuropathological and clinical features.

❖ **Why is the failure seen as a major setback?**

- A drug to prevent and treat the memory-robbing disease has proved elusive for years. According to WHO, dementia is currently the seventh leading cause of death among all diseases and one of the major causes of disability and dependency among older people globally.
- In 2020, there were 121 unique therapies being tested in 136 trials to find a cure for AD, according to research published in the journal of the Alzheimer's Association (of the US). This drug development pipeline, scooped from a review of the US FDA's clinical trials registry, sounds impressive — until juxtaposed with another statistic.
- Prior to this, a similar review of the AD drugs pipeline by researchers had looked at 244 compounds in 413 clinical trials between 2002 and 2012, and found a staggering 99.6% failure rate — against 81% for cancer. By the time a drug pipeline review was published in 2020, no drug had made it past the finish line.
- In 2021, however, the USFDA approved Biogen's beta-amyloid targeting drug aduhelm, making it the first new Alzheimer's drug to receive approval in the US in almost 20 years. But the fast-track approval was followed by a fierce debate among scientists over its trial data.
- While that controversy continues to rage, crenezumab's failure has called into question the very approach of relying too much on neutralising beta-amyloid to fight the disease, the strategy being tried in the majority of Alzheimer's studies.
- The latest drug pipeline review published in May 2022 says that there were 143 agents in 172 clinical trials for AD as on January 25, 2022.

❖ **What else does the search for an Alzheimer's cure involve?**

- Another approach involves the targeting, instead of the toxic beta-amyloid plaque, the tau protein that misfolds and deposits in brain cells in the form of twisted fibres called neurofibrillary tangles. But drugs targeting these proteins individually – the 'one drug, one target' model – have not achieved a breakthrough yet.
- Some scientists are also turning their focus to a drug strategy that targets multiple enzymes and pathways that contribute to the progress of the disease.
- This involves multifunctional compounds or multi-target-directed ligands (MTDL) that attempt to engage or modulate multiple biochemical targets, and are seen as a potential master key that would open several locks.
- Another approach is aimed at modifiable lifestyle factors to slow cognitive decline. This is the basis of the World-Wide FINGERS study, which expanded out of encouraging results of the two-year FINGERS (Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability) randomized clinical trial. The FINGERS study showed a 40% improvement in memory function and 25% in overall cognition in the 1,260 participants aged 60-77 years.
- According to experts Genetics and aging are non-modifiable, irreversible factors in Alzheimer's. Genetics is a loaded gun, the trigger for which are the modifiable factors. The strongest modifiable factors linked to the disease are hypertension, diabetes, smoking, alcohol consumption, and sedentary lifestyle.
- Something that has come up in the last 4-5 years is that the lack of a social network and isolation can also be triggers for the disease. Studies like FINGERS targeted such modifiable lifestyle factors, and they have found a reduction in the incidence of Alzheimer's in the Western scenario.

❖ **What is the India scenario?**

- In India, only 1 in 10 people with dementia receive any diagnosis, treatment or care for the disease, according to the World Alzheimer's Report, 2021.
- Lack of awareness is a major problem in battling the disease. "Most of our population accepts it as normal aging, which is incorrect. Only when it reaches an unmanageable stage – like when patients start wetting their clothes and are not aware of it, is when medical help is sought.
- An increasing prevalence of diabetes, hypertension, and obesity is expected to drive up the incidence of dementia in India in the coming decades.
- According to the Global Burden of Disease study published this year in The Lancet, India could see a 197% jump in dementia, including Alzheimer's, from 3.84 million cases in 2019 to 11.44 million cases by 2050.

PRELIMS

1. Potential in using non-humanoid robots for teaching children with autism

- A research paper examines whether non-humanoid robots can act as teaching aids, and whether they can reduce the workload of human special educators. Experiments by researchers from the Indian Institute of Science (IISc) and the Academy for Severe Handicaps and Autism (ASHA), Bengaluru, indicated that non-humanoid toy robots indeed may have significant potential in aiding special educators in autism education. Robotics has been used as teaching aids for children with autism spectrum disorder (ASD), but these interventions have often been expensive humanoids.
- The paper was presented at IEEE International Conference on Robotics and Automation in Xi'an, China in 2021. It has now won the IISc's Murthy Govindaraju 'Women in Computer Science' Research Endowment Award for one of its lead authors, Nabanita Paul.
- ASD is a developmental disability caused by differences in the brain; people with ASD may behave, communicate, interact, and learn in ways that are different from most other people. In the paper, the interventions focused on ASD children's communication and gross motor skills.
- The paper details three studies: a toy robot called Cozmo assists special educators in verbal lessons on school premises; a mini drone Tello helps special educators in exercise lessons, again on school premises; and Cozmo, special educators and ASD children connect remotely for verbal lessons. The 'Talk With Cozmo' sessions (20 children) included storytelling

followed by questions related to the story; 'Exercise With Tello' (55 children) included rudimentary lessons such as raising arms and squatting; and 'Learn With Cozmo Online' (7 children) included various aspects including spelling three-letter words and phonetic learning.

- The researchers measured and compared learning outcomes with these interventions and without them.
- All three studies showed improvement in learning outcomes and reduction in prompts from the Ses (special educators), denoting reduced workload.
- Results show that children spent more time on lessons in online intervention with Cozmo, suggesting that using robots should also be considered when designing online interventions. Furthermore, the roles of Cozmo were analysed, and found children showed increased spontaneous interaction when Cozmo acts as a co-instructor.

2. Azooxanthellate Corals

- For the first time, four species of azooxanthellate corals were recorded in Indian Waters (waters of Andaman and Nicobar Islands).
- Discovery - Truncatoflabellum crassum, T. incrustatum, T. aculeatum, and T. irregulare are the four species of azooxanthellate corals recorded.
- They are found in the shallow water region of Andaman and Nicobar Islands. These 4 coral species are from the same family Flabellidae.
- All these four species were previously found from Japan to the Philippines and Australian waters.
- Only T. crassum was reported within the range of Indo-West Pacific distribution including the Gulf of Aden and the Persian Gulf.
- Azooxanthellate corals - These corals are a group of hard corals that do not contain zooxanthellae - unicellular, golden-brown algae.
- They have a highly compressed skeletal structure.
- They are non-reef-building solitary corals, which are found in dark habitats, especially within caverns.
- They derive nourishment not from the sun but from capturing different forms of plankton.
- Distribution - Their distribution is not limited to the upper layer of ocean alone, but is known from the tropical seas to polar seas and from the intertidal zone to over 6,328 metres depth.
- These groups of corals are deep-sea representatives, with the majority of species reporting from between 200 m to 1000 m.
- Their occurrences are also reported from shallow coastal waters.
- Zooxanthellate corals, meanwhile, are restricted to shallow waters.
- There are about 570 species of hard corals found in India and almost 90% of them are found in the waters surrounding Andaman and Nicobar Islands.
- The pristine and oldest ecosystem of corals share less than 1% of the earth's surface but they provide a home to nearly 25% of marine life.

3. Open Network for Digital Commerce

- The Union Commerce Minister chairs the Open Network for Digital Commerce (ONDC) Advisory Council Meeting.
- The government has constituted an advisory council to analyze the potential of ONDC as a concept and to advise the government on measures needed to accelerate its adoption.
- The Open Network for Digital Commerce (ONDC) is a not-for-profit organisation.
- It is an initiative of the Department for Promotion of Industry and Internal Trade (DPIIT), under Ministry of Commerce and Industries.
- The ONDC is a **network based on open protocol** that will enable local digital commerce stores across industries to be discovered and engaged by any network-enabled applications.
- It is neither an aggregator application nor a hosting platform.
- All existing digital commerce applications and platforms can **voluntarily choose** to adopt and be a part of the ONDC network.

- In this system, the ONDC plans to enable sellers and buyers to be digitally visible and transact through a single network, regardless of what e-commerce platform or application they use.
- **ONDC Model** - The ONDC model is trying to replicate the success of the Unified Payments Interface (UPI) in the field of digital payments.
- The UPI allows people to send or receive money irrespective of the payment platforms they are registered on.
- Under ONDC, it is envisaged that a buyer registered on one participating e-commerce site (for example, Amazon) may purchase goods from a seller on another participating e-commerce site (for example, Flipkart).
- The open network concept also extends beyond the retail sector, to any digital commerce domains including wholesale, mobility, food delivery, logistics, travel, urban services, etc.
- The members of ONDC include Chairpersons of MNCs, NGOs, National Health Authority, NPCI, Quality Council of India and Capacity Building Commission, and Additional Secretary of DPIIT.
- The platform will be compliant with the Information Technology Act, 2000 and designed for compliance with the emerging Personal Data Protection Bill.
- **Benefits** - The ONDC platform aims to create new opportunities, curb digital monopolies and by supporting micro, small and medium enterprises and small traders and help them get on online platforms.
- The ONDC will standardise operations like cataloguing, inventory management, order management and order fulfillment.
- Hence, the ONDC makes it simpler and easier for small businesses to be discoverable over network and conduct business.
- Presently, ONDC is in its pilot stage in 5 cities - Delhi NCR, Bengaluru, Bhopal, Shillong and Coimbatore - with a target of onboarding around 150 retailers.

ANSWER WRITTING

Q.Industrialisation and Colonialisation complemented each other in establishing British Supremacy across the globe. Analyse.(150 words)

Introduction

Industrialisation refers to the emergence of machine based production using inanimate power resources like steam or electricity. Colonisation on the other hand, refers to the practice of acquiring colonies by conquest or other means and using them to serve its own economic and political interests.

Body

The first wave of colonisation, during the Age of Exploration, was dominated by countries like Spain and Portugal. But in the second wave, with pioneering start of the Industrial Revolution, Britain emerged as number one amongst colonisers. Industrialisation led to:

- Emergence of new ideas.
- Increase in scale of production.
- Development of modern equipment.
- Improvement in transportation and communication. All these provided disproportionate advantage to Britain over other colonising powers and led to expansion of its territories.
- With more colonies under its control, it was able to satiate the demand of raw material for its industries back at home.
- As industries grew, more and more raw materials were needed to feed those industries.
- India and Egypt were good sources of cotton, Congo and the East Indies, of rubber, other products needed were food grains, tea, coffee, indigo, tobacco and sugar.
- To obtain these, it was necessary to change the pattern of production in the countries where they could be grown.
- Thus, the colonists forced the cultivation of only one or two crops which they needed as raw materials for their industries.

- Later with an augmented scale of production, domestic markets got saturated and the surplus was diverted towards the colonies like India, turning them into markets. With inexorable pace of industrialization aided by the raw material, manpower for labour and army from the colonies, Britain established Pax Britannica.

Conclusion

This domination was not confined only to the political, economic and military sphere. British culture, language, educational and administrative structure too enjoyed global prominence, making Britain a veritable global colonial power.

MCQs

1. Consider the following statements about the recognition of Indian Art and Culture:

1. Shantinatha Charita is the only Jain literature to be registered under the UNESCO Memories of the World Programme.
2. Buddhist Chanting of Ladakh is the only practice of Buddhism to be registered under the UNESCO List of Intangible Cultural Heritage.
3. The Sri Hariminder Sahib is the only monument of Sikhism to be recognized under UNESCO Cultural Heritage Sites.

Which of the statements given above is/are correct?

- a) 1 only
- b) 1 and 2 only**
- c) 2 and 3 only
- d) 1, 2 and 3

2. The Tsari Chu river, often mentioned in the news, is in which of the following states of India?

- a) West Bengal
- b) Arunachal Pradesh**
- c) Himachal Pradesh
- d) Uttarakhand

3. With respect to the “Secured Overnight Financing Rate (SOFR)”, consider the following statements:

1. It is an influential interest rate that the banks use to price the US dollar- denominated derivatives and loans.
2. It is based on the transactions in the Treasury Repurchase Market.

Which of the statements given above is/are correct?

- a) 1 only
- b) 2 only
- c) Both 1 and 2**
- d) Neither 1 nor 2

4. Consider the following statements with reference to Alzheimer’s disease

1. Alzheimer’s is a regenerative brain disorder that slowly robs people of their memory and thinking abilities
2. Genetics and aging are non-modifiable, irreversible factors in Alzheimer’s disease

Choose the correct statement using the codes given below

- a) 1 only
- b) 2 only**
- c) Both 1 and 2
- d) Neither 1 nor 2

5. Truncatoflabellum crassum, T. incrustatum, T. aculeatum, and T. irregulare are recently seen in news are species of which of the following?

- a) Tropical evergreen plants
- b) New species of river Otters
- c) Coral reefs**
- d) Lichen and mosses

6. Which among the following best describes the concept of "Domestic Systemically Important Banks (D-SIBs)"?
- Banks with the highest loan portfolios
 - Banks that are considered to be "Too big to fail"**
 - Banks with the highest deposits
 - Banks owned by the Government.
7. Which of the following is correct about 'Vetiver' often mentioned in the news?
- It is used for cosmetics, aromatherapy and ayurvedic soaps.**
 - It tends to reduce the biodiversity in the area in which it grows.
 - Its extract is used in the production of bio-plastics.
 - None of the above.
8. Which of the following countries are part of the Regional Comprehensive Economic Partnership (RCEP)?
- China
 - Bangladesh
 - India
 - Japan
 - Myanmar

Select the correct answer using the code given below:

- 1, 4 and 5 only**
 - 1, 3 and 5 only
 - 2, 4 and 5 only
 - 2, 3 and 4 only
9. Which of the following countries have joined the New Strategic Arms Reduction Treaty (New START)?
- Russia
 - China
 - The United States of America

Select the correct answer using the code given below:

- 1 and 3 only**
 - 2 and 3 only
 - 1 and 2 only
 - 1, 2 and 3
10. Recently, the 'Mulla Committee' was in the news. It is related to which of the following?
- Minorities
 - Jail reforms**
 - Forest cover
 - Disaster management