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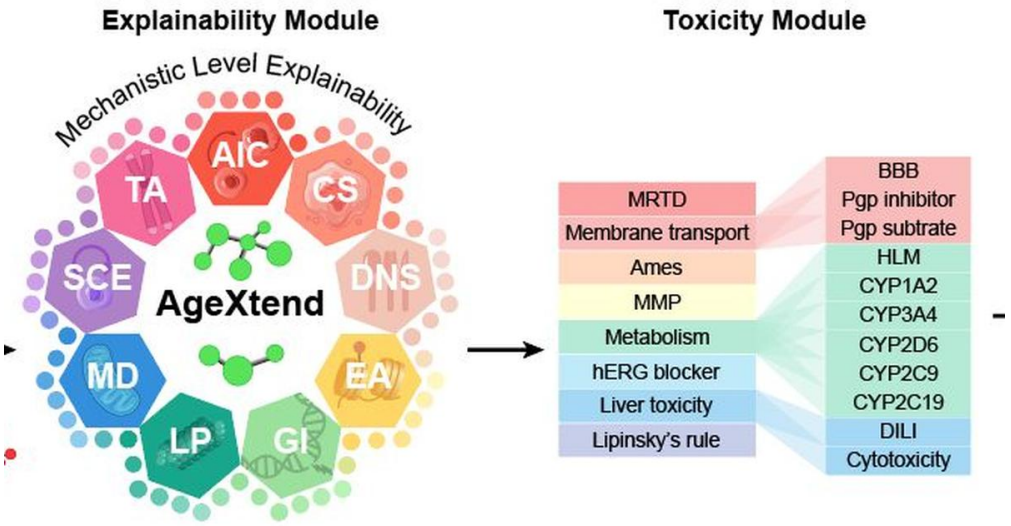
AgeXtend

Researchers at IIIT-Delhi develop AI-based platform to identify age-defying molecules rapidly.

- It is a unique platform that uses data from existing ***anti-ageing*** molecules to predict new ones.
- This platform harnesses Artificial Intelligence to discover substances that support healthy aging.
- **Developed by** - Indraprastha Institute of Information Technology in Delhi.
- **Methodology** - Over two years, they evaluated more than 1.1 billion compounds.
- The findings have been corroborated through experiments conducted on yeast, C. elegans (a type of worm), and human cellular models.
- From this extensive search, fewer than 1% of compounds were recognized for their anti-aging effects.
- AgeXtend employs AI to forecast and pinpoint components with age-reversing properties, evaluate their safety profiles, and analyze their biological impacts.
- It examines the structural attributes of novel molecules and can accurately predict their gero-protective qualities.
- The platform has effectively revealed the advantages of established compounds like metformin and taurine, even without any previous information about them.
- It also explores natural metabolites sourced from the human microbiome and their potential in reducing cellular senescence.
- AgeXtend significantly reduces the time necessary to identify promising molecules with geroprotective, or age-reversing, effects through traditional research methods.
- AgeXtend's adaptability and promise in revealing previously undetected pathways that influence the aging process.



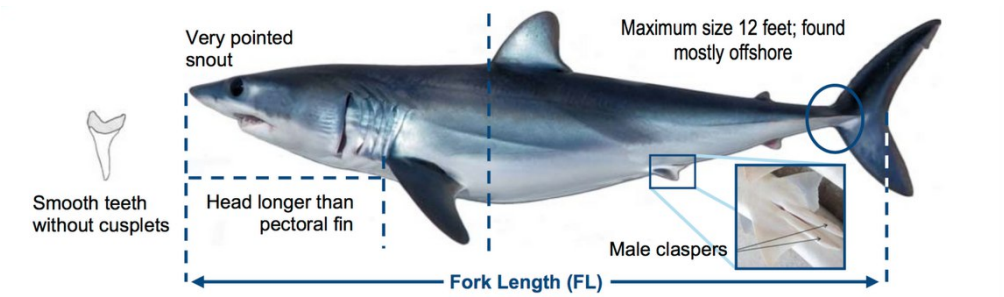
References

The Hindu | AgeXtend

Shortfin Mako Shark

The researchers recently spotted a Mako shark in the Mediterranean Sea from Virginia Tech, United States, for the first time.

- The Shortfin Mako Shark is a ***large, predatory, and fast shark***.
- It is one of the ***fastest fish on the planet***, covering over 74 kilometres per hour.
- It is known as the *Shortfin Mako, Blue Pointer, Atlantic Mako shark and Bonito Shark.*
- **Scientific name** – Isurus oxyrinchus.
- **Appearance** – Large-sized with very pointed snouts, long gill slits, dark blue/grey backs, light metallic blue sides, and white undersides.
- **Characteristics** – It has a specialized blood vessel structure called a ***Countercurrent Exchanger***, which allows it to maintain a body temperature higher than the surrounding water.
- It allows them to move more quickly and intelligently.
- It is highly migratory, with individuals migrating long yearly.
- It is an aggressive predator that feeds near the top of the food web.



The federal recreational minimum size is 54 inches FL, but shortfin mako sharks aren't sexually mature until the **males are 73 inches FL (over 150 lb)** and **females are 108 inches FL**. Releasing smaller sharks gives them a chance to reproduce and add a new generation to the population.

- **Size** – 12 feet (3.8 m) in length.
- **Lifespan** – Live over 30 years old.
- **Habitat** – It is a *pelagic species*, which lives in the upper zones of the open ocean.
- **Distribution** –Found widely ***in tropical to temperate latitudes*** of all oceans worldwide.
- **Diet** –Feeds primarily on bony fishes, large tunas, squids, bluefish, swordfish, other sharks, small marine mammals, sea turtles, and even dead organic matter.
- **Breeding** – It cannot reproduce until about 8 years old for males and 19 years for females. The breeding occurs from summer to fall.
- **Threats**
  - Overfishing.
  - Sold commercially for the high quality of their fins and meat.
  - Captured accidentally while targeting other species.
- **Conservation Status**
  - **IUCN** – Endangered.
  - **CITES** – Appendix II.

References

1. Down to Earth| Shortfin Mako Shark
2. Oceana| Shortfin Mako Shark
3. NOAA| Shortfin Mako Shark

Hyperloop track

Union minister recently announced that the construction of India's 1st Hyperloop test track at the Discovery Campus of IIT Madras in Chennai has been completed.

- It is the ***1st Hyperloop test facility*** (ultra-high-speed public transportation system) in Asia.
- **Led by -** IIT Madras's Avishkar Hyperloop team in partnership with TuTr, a startup incubated at the institute.
- **Partnered with -** Ministry of Railways.
- It is expected to be operational by the end of 2024.
- **Implementation** – **Phases -** The technology will be implemented in 2 phases
    - First phase will feature an 11.5-kilometre test track to validate and certify the technology.
    - The second phase will expand the track to nearly 100 kilometres after successful trials.
- **Speed -** Hyperloop trains are designed to reach speeds of up to 1,100 km/h, with an operational speed of around 360 km/h.
- **Efficiency -** The system operates within a vacuum-sealed, frictionless environment, offering faster travel and higher energy efficiency.
- The first full-scale Hyperloop project in India is planned for the ***Mumbai-Pune corridor.***

Hyperloop technology

- Hyperloop is a high-speed transportation system in which pods, functioning as pressurized vehicles, and travel at incredible speeds through low-pressure tubes.
- Each pod, capable of carrying 24-28 passengers, will travel directly between destinations *without stops*, making it a highly efficient and promising solution for point-to-point travel.
- The idea of using low-pressure tubes for transportation has been around since the late 17th century. Elon Musk first proposed the Hyperloop in 2012.

References

1. India Today | Hyperloop train test track
2. Hindustan Times | Hyperloop test track

Green Steel Taxonomy

Recently, the Union Minister of Steel & Heavy Industries announced the taxonomy for Green Steel based on emissions.

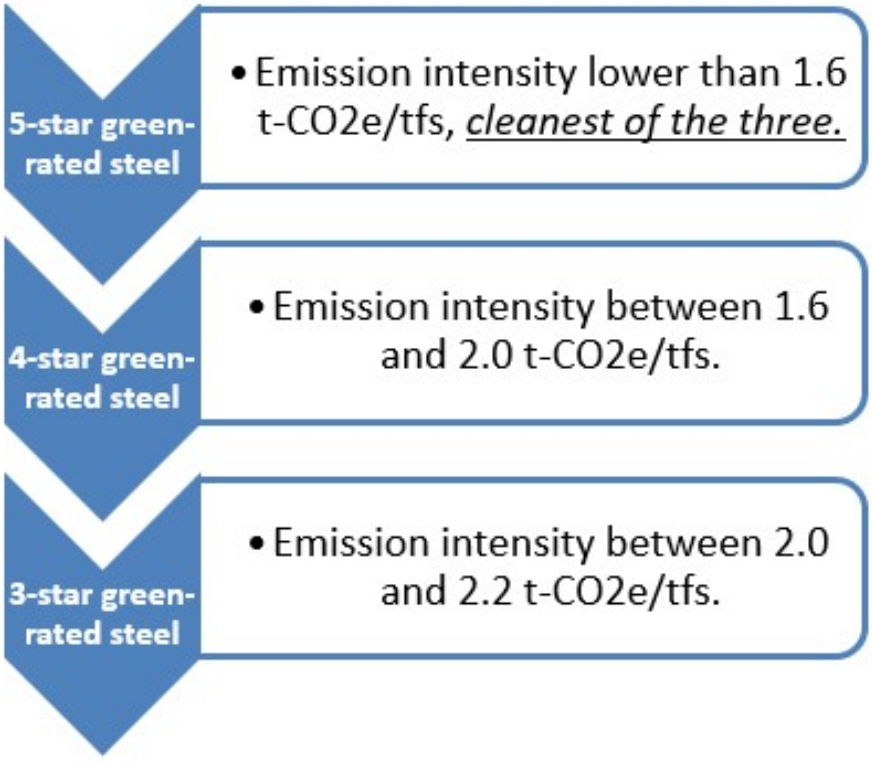
- The initiative aims to decarbonise the steel sector in alignment with net-zero emission intensity target by 2070.

India is the world's first nation to release the Taxonomy of Green Steel.

- **Aim** – To redefine the *production of steel by focusing on reducing carbon emissions* and fostering innovation in sustainable practices.
- **Ministry** – Ministry of Steel & Heavy Industries.
- **Green Steel** – It is defined in terms of ***percentage greenness of the steel.***
- It is produced with Carbon dioxide (CO_2) emission intensity less than ***2.2 tonnes*** of Carbon dioxide equivalent (CO_2e) per Tonne of Finished Steel (tfs).

Carbon dioxide equivalent (CO_2e) means the number of metric tons of CO_2 emissions with the same global warming potential as 1 metric ton of another greenhouse gas.

- The greenness is expressed as a percentage, based on the steel plant's emission intensity, which is lower compared to the 2.2 t-CO_2e/tfs threshold.
- **Taxonomy** – Based on the quantity of carbon emissions per metric tonne, the steel is rated.



- Steel with emission intensities ***exceeding 2.2 tCO_2/tfs will not qualify for a green rating.***
- The star rating is *reviewed every 3 years*.
- **Emission Scope** – It includes Scope 1, Scope 2, and limited Scope 3, up to finished steel production.
- It is from beneficiation, agglomeration processes, and embodied emissions in raw materials.
- **Monitoring** – The *National Institute of Secondary Steel Technology (NISST)*, as the nodal agency to oversee the Measurement, Reporting and Verification (MRV).
- NISST also issue the greenness certificates and star ratings for the steel.
- The certificate is issued on *yearly basis* (financial year).

India is the world's biggest steel producer after China.

References

1. Business Standard| Green Steel Taxonomy
2. PIB| Green Steel Taxonomy

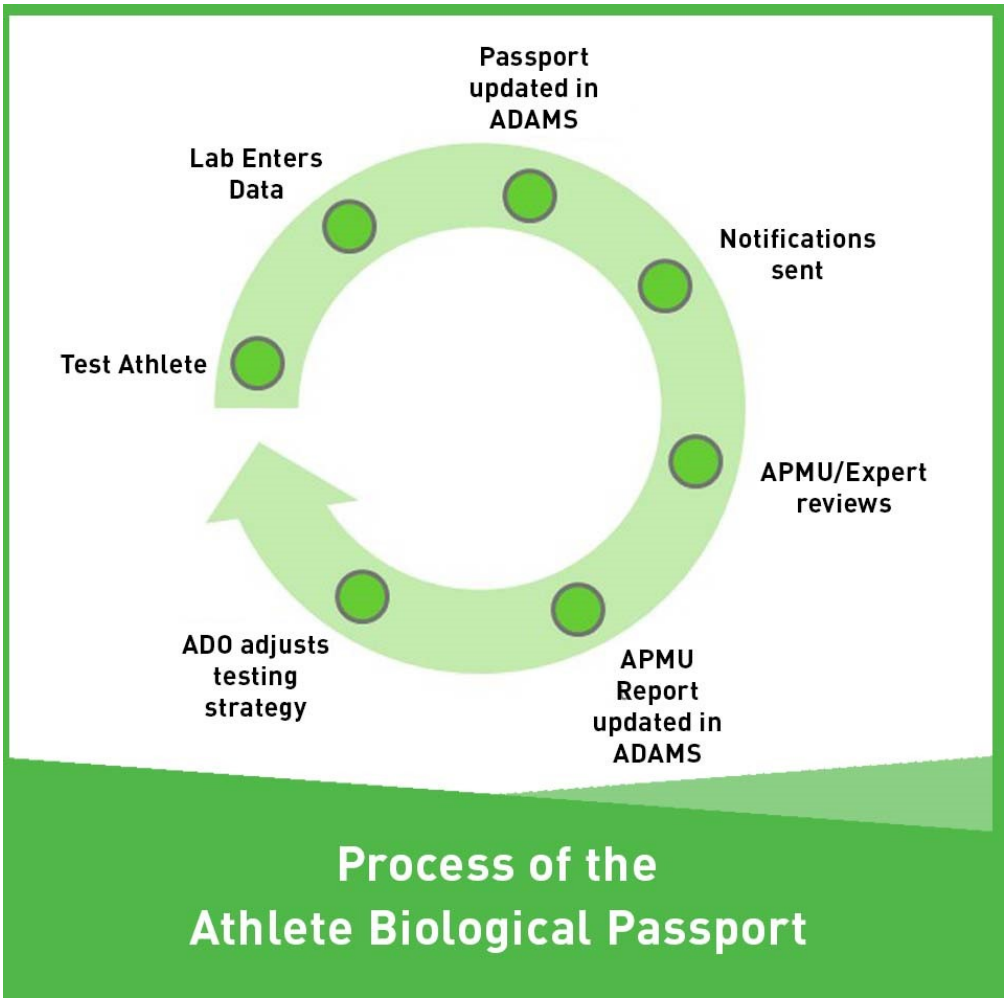
Athlete Biological Passport (ABP)

The World Anti-Doping Agency (WADA) has recently authorized India's National Dope Testing Laboratory (NDTL) to create an Athlete Passport Management Unit (APMU).

- It is a ***powerful anti-doping tool*** that monitors an athlete's blood profile over time and can detect changes in its overall composition, whether or not a specific banned substance is discovered.
- It helps to protect clean athletes by assessing the changes in factors like *athletes' blood and steroid profiles.*
- **Modules** – It is composed of 3 modules,

Haematological Module	Steroidal Module	Endocrine Module
Collects information on markers of blood doping.	Collects information on markers of steroid doping measured in urine and serum samples.	Collects information on markers of hGH doping.
Identify the enhancement of oxygen transport or delivery, and any form of blood transfusion or manipulation.	Identify endogenous Anabolic Androgenic Steroids (EAAS) when administered exogenously.	Identify hGH use and hGH analogs, fragments, releasing factors, and indicate use of insulin growth.

- **Objectives** – It indirectly reveal the effects of doping, rather than attempting to detect the doping substance or method itself.
- It pursue possible Anti-Doping Rule Violations (ADRVs) (use or attempted use by an athlete of a prohibited substance or a prohibited method) of the World Anti-Doping Code.
- It identify and target athletes for specific analytical testing by intelligent and timely interpretation of Passport data.
- WADA's Athlete Biological Passport Operating Guidelines (ABP Guidelines) were approved in 2009.
- Currently, there are 30 WADA-accredited laboratories in the world for dope testing.



India is part of a group of 17 Athlete Passport Management Units (APMUs), to serve the countries anti-doping organizations.

World Anti-Doping Agency (WADA)
• It is an *international independent agency* to lead a collaborative worldwide movement for doping-free sport. • **Aim** – To protect athletes, promote the values of clean sport, and preserve the spirit of sport internationally. • **Established on** – November 1999. • **Headquarters** – Montreal, Canada. • **Role –** To develop, harmonize and coordinate anti-doping rules and policies across all sports and countries. • **Funded by** – The Sport movement and Governments of the world.

References

1. The Times of India| Athlete Biological Passport (ABP)
2. NADA| Athlete Biological Passport (ABP)