MICROPLASTIC IN HUMAN BRAINS: SCIENCE & TECHNOLOGY

NEWS: What are all these microplastics doing to our brains

WHAT'S IN THE NEWS?

Recent studies have detected **microplastics in human brains**, highlighting serious health risks such as neurological disorders. This has intensified global calls for a **legally binding Global Plastics Treaty**, currently under negotiation by the Intergovernmental Negotiating Committee (INC) to address plastic pollution across its lifecycle.

Microplastics in Human Brains & the Global Plastics Treaty

Scientific Context: Microplastics Detected in Human Brains

- **Recent Discovery:**
    - Studies have confirmed the presence of **microplastics in human brain tissues**, raising serious health concerns.
    - It highlights the ability of microplastics to **cross the blood–brain barrier**, a biological shield that typically protects the brain from harmful substances.
- **Health Implications:**
    - **Neuroinflammation:** Microplastics may trigger immune responses, leading to inflammation in brain tissues.
    - **Cognitive Dysfunction:** Linked to memory loss, anxiety, and attention disorders.
    - **Neurodegenerative Diseases:** Potential contributors to diseases like Alzheimer's and Parkinson's.
    - **Cumulative Exposure Risk:** Continuous exposure can lead to chronic effects over time due to **bioaccumulation**.

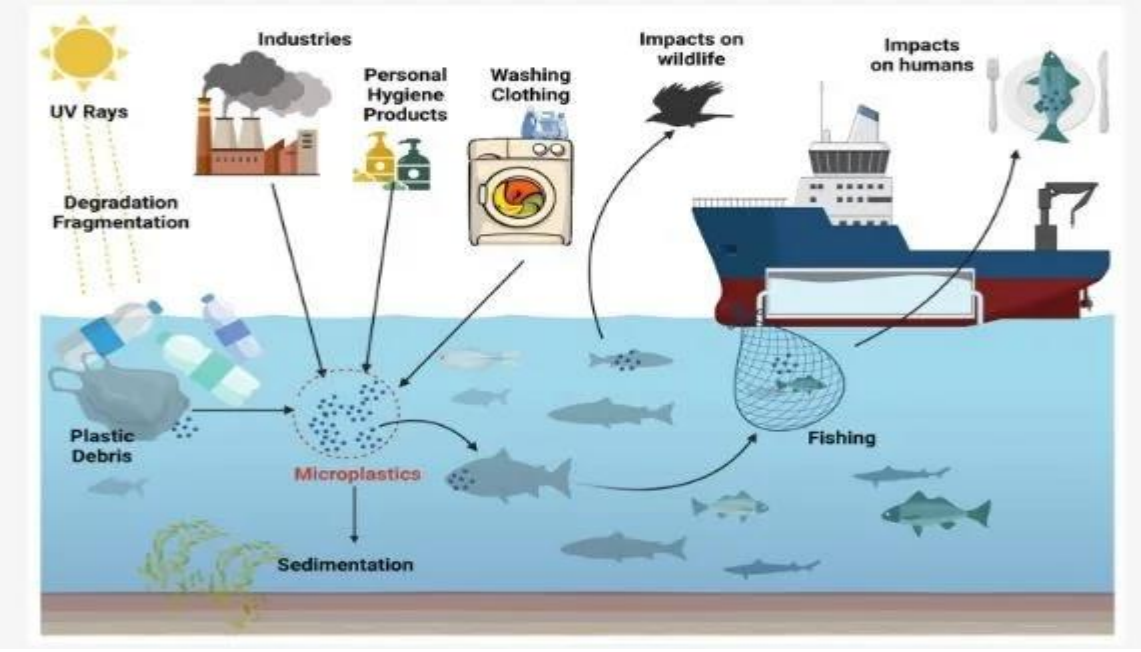
What Are Microplastics?

- **Definition:**
    - Microplastics are **plastic particles less than 5 mm** in diameter.
- **Types:**
    1. **Primary Microplastics** – manufactured intentionally small (e.g., microbeads in cosmetics).
    2. **Secondary Microplastics** – result from breakdown of larger plastic items due to sunlight, abrasion, etc.

- **Origin of Plastics:**
    - Plastics are synthetic or semi-synthetic materials made of **polymers** (long chains of monomers).
    - Their **plasticity** (ability to deform permanently) makes them versatile and widely used.

Environmental Impacts of Microplastics

- **Soil Degradation:**
    - Microplastics reduce **soil fertility** and disturb **soil microbial communities**.
- **Water Pollution:**
    - Found in both **freshwater and marine ecosystems**, microplastics persist for decades.
- **Marine Life Hazard:**
    - Ingestion by marine organisms causes **intestinal blockage**, starvation, and death.
    - Leads to **bioaccumulation in the food chain**, affecting larger predators and humans.
- **Toxicity Transfer:**
    - Microplastics act as **carriers for pollutants** (e.g., heavy metals, pesticides), causing **toxic effects** in organisms.



Global Plastics Treaty – Overview

- **Mandate Origin:**
    - Adopted under **UN Environment Assembly Resolution 5/14** (2022).
    - Developed through the **Intergovernmental Negotiating Committee (INC)**.
- **Objective:**
    - Create a **legally binding international agreement** to **end plastic pollution**, especially in marine ecosystems.
    - First global agreement to target **entire plastic lifecycle**, unlike previous waste-centric efforts.
- **Key Components:**
    - **Lifecycle Approach:** Focuses on **upstream (production)**, **midstream (use)**, and **downstream (waste management)**.
    - **Circular Economy Promotion:** Encourages reuse, recycling, eco-design, and alternatives to plastic.
- **Current Negotiation Status:**
    - Ongoing session **INC-5.2 in Geneva (Aug 5–14, 2025)** to finalise treaty details.

Focus on Article 6 – Plastic Supply Regulation

- **Article 6 Highlights:**
    - Targets **reduction in plastic production**, especially virgin (non-recycled) plastics.
    - Seeks control over **imports and exports of plastic raw materials**.
    - Aims to curb excess and unnecessary plastic supply at the source.
- **Negotiation Challenge:**
    - Balancing **global equity**, as developing nations depend on plastic for economic sectors like healthcare and packaging.
    - Requires **scientific benchmarks**, support for **green tech transitions**, and **financial aid**.

Way Ahead: Policy and Global Action

- **Urgency of Action:**

    - Brain exposure to microplastics marks a **turning point** in the understanding of plastic-related health risks.

- **Recommendations:**
    - Adopt **ambitious caps on virgin plastic production**.
    - Enhance **regulatory enforcement and global accountability**.
    - Promote **research** on plastic alternatives and **safe disposal technologies**.
    - Support **Global South** with technology transfer and capacity building.

Conclusion

- The infiltration of microplastics into the human brain is a **critical red flag**, reinforcing the **need for strong global governance**.
- The **Global Plastics Treaty**, especially **Article 6**, is a **historic opportunity** to address the plastic crisis at its root—**production**.
- For it to be meaningful, the treaty must be **scientific, enforceable, and equitable**, ensuring a **healthier planet and people**.

Source: **https://epaper.thehindu.com/ccidist-ws/th/th_international/issues/142206/OPS/GHPEN8IKN.1+GTJEN91PG.1.html**