

## Biotechnology & Health:

### India's Bio-companies and Biomanufacturing Initiatives:

Minister Dr. Jitendra Singh stated on September 1, 2025, that India now accounts for 21 of the 121 global bio-companies.

India has launched 21 new "Bio-enabler" facilities across the country as part of its High-Performance Biomanufacturing Platforms. These facilities aim to provide shared infrastructure for startups, SMEs, and academic institutions to scale and commercialize new technologies

The initiative is part of the BioE3 Policy and aligns with India's goal of becoming a global leader in biomanufacturing and achieving a bioeconomy of \$300 billion in the coming years.

### 2. AI and Biomanufacturing:

The integration of Artificial Intelligence (AI) into the biotechnology sector is accelerating, with companies like Biocon using AI to enhance drug testing and improve the manufacturing of biologic medicines.

The Indian government is promoting this synergy through initiatives like the BioE3 Policy and the IndiaAI Mission, which aim to create a strong ecosystem for AI-powered biomanufacturing.

AI is being used to revolutionize drug discovery, optimize production processes, and analyze vast and complex genomic data, leading to faster and more personalized healthcare interventions.

### 3. Advanced Therapies and Medical Breakthroughs:

Gene-editing technologies, such as CRISPR, are advancing rapidly. Improvements in delivery systems are expected to make these tools safer and more accurate, opening the door for broader clinical use.

New research has uncovered a surprising healing mechanism in injured cells called cathartocytosis, where cells "vomit" out their internal machinery to revert to a stem cell-like state. This discovery could have implications for cancer research.

Scientists have engineered a groundbreaking cancer treatment that uses bacteria to smuggle viruses directly into tumors, bypassing the immune system and delivering a powerful one-two punch against cancer cells.

### 4. Public Health and Policy:

The Department of Biotechnology (DBT) in India has launched a new program called "Emerging Frontiers in Biotechnology (EFB)" to support research and development projects. Proposals are being accepted twice a year for research in biomedical sciences, interdisciplinary sciences, and biological sciences.

Debate is intensifying in India regarding the country's path to Universal Health Care (UHC). While insurance-driven models have expanded formal coverage, critics argue that they reinforce for-profit healthcare and neglect public health infrastructure, particularly in primary and preventive care.



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## 5. Ethical and Biosecurity Concerns:

The rapid advancement of biotechnologies, particularly in synthetic biology, is raising ethical and biosecurity concerns. The potential for "mirror life" (organisms built from opposite versions of natural building blocks) could pose a risk if they escaped into the wild, as they would not interact with natural ecosystems in predictable ways.

Policymakers and ethicists are urging strict containment or a temporary ban on some of this research until society can decide on appropriate safeguards.

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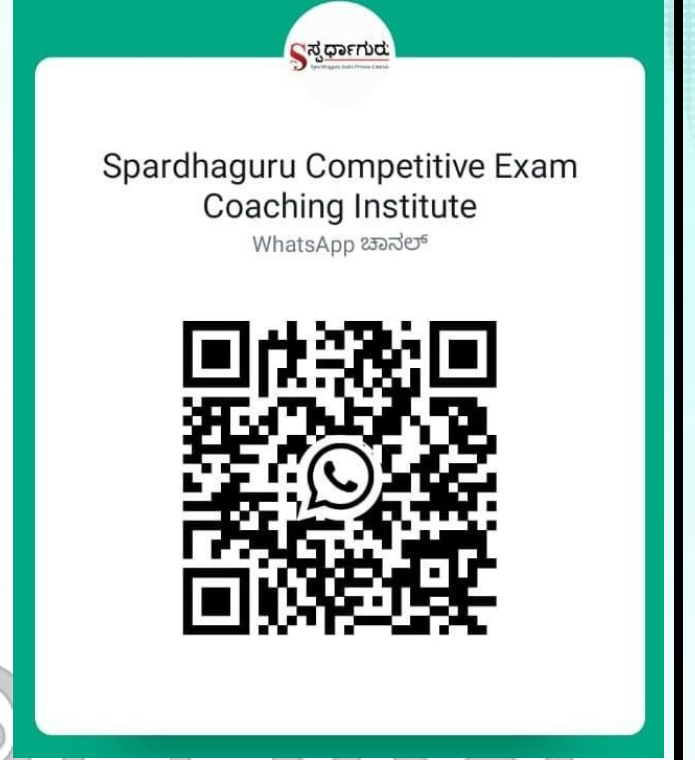
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## MCQS

1. According to the text, how many global bio-companies is India home to, as of a recent statement by Minister Dr. Jitendra Singh?

- a) 21 of 121
- b) 21 of 21
- c) 121 of 21
- d) 121 of 121

**Answer:** a) 21 of 121

The first point of the provided text explicitly states that Minister Dr. Jitendra Singh "stated on September 1, 2025, that India now accounts for 21 of the 121 global bio-companies."

2. The new "Bio-enabler" facilities launched in India are primarily intended to provide shared infrastructure for which of the following?

- a) Only large-scale corporations
- b) Startups, SMEs, and academic institutions







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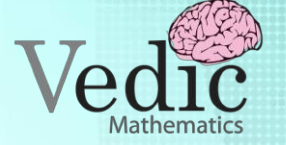
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- c) Government-run research laboratories exclusively  
d) Foreign biotechnology companies

**Answer:** b) Startups, SMEs, and academic institutions

The first point of the provided text mentions that the "Bio-enabler" facilities "aim to provide shared infrastructure for startups, SMEs, and academic institutions to scale and commercialize new technologies."

**3. What is the name of the new healing mechanism where injured cells "vomit" out their internal machinery to revert to a stem cell-like state?**

- a) CRISPR  
b) Cathartocytosis  
c) Biomanufacturing  
d) Genomic analysis

**Answer:** b) Cathartocytosis

The third point of the text, "Advanced Therapies and Medical Breakthroughs," states: "New research has uncovered a surprising healing mechanism in injured cells called cathartocytosis, where cells 'vomit' out their internal machinery to revert to a stem cell-like state."

**4. What is the primary purpose of the new "Emerging Frontiers in Biotechnology (EFB)" program launched by the Department of Biotechnology (DBT) in India?**

- a) To fund biosecurity research only  
b) To support research and development projects in various scientific fields  
c) To promote private healthcare insurance models  
d) To ban synthetic biology research

**Answer:** b) To support research and development projects in various scientific fields

The fourth point, "Public Health and Policy," notes that the DBT has launched the EFB program "to support research and development projects." It further specifies that proposals are being accepted for research in "biomedical sciences, interdisciplinary sciences, and biological sciences," indicating a broad scope.

**5. Why are some policymakers and ethicists concerned about the potential for "mirror life" in synthetic biology?**

- a) It would compete with natural life for resources.  
b) It would require new biomanufacturing facilities.  
c) It would be too costly to produce.  
d) It would not interact with natural ecosystems in predictable ways if it escaped.

**Answer:** d) It would not interact with natural ecosystems in predictable ways if it escaped.

The fifth point, "Ethical and Biosecurity Concerns," explains the risk of "mirror life" by stating that if it "escaped into the wild, as they would not interact with natural ecosystems in predictable ways."

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