

Biotechnology & Health:

1. Groundbreaking Advancements in Gene Editing (CRISPR):

Targeting Cancer with Vitamin D Metabolism: Researchers have made a significant breakthrough by identifying a gene, SDR42E1, crucial for vitamin D absorption and metabolism. Using CRISPR/Cas9 gene editing, scientists demonstrated that disabling this gene in colorectal cancer cells not only crippled their survival but also disrupted thousands of other cancer and metabolism-related genes. This opens new avenues for highly targeted cancer therapies, potentially by cutting off vitamin D supply to tumors or enhancing the gene's activity to boost health. (Published July 18, 2025)

Gene Editing for Species Conservation: Gene editing technologies are being repurposed to address endangered species conservation. A new Nature Reviews Biodiversity article explores using genome engineering to restore genetic diversity in vulnerable populations, such as the pink pigeon, by reintroducing lost DNA variation or borrowing climate-tolerance genes from related species. This could be a "transformative solution" for species teetering on the brink of extinction. (Published July 18, 2025)

Improved Delivery of Gene Editing Tools to the Brain: Researchers at the University of Maryland School of Medicine have won an NIH prize for successfully demonstrating a new technique to deliver genome editing tools across the blood-brain barrier to targeted brain cells in preclinical models. They used a combination of

engineered nanoparticles, microbubbles, and focused ultrasound to temporarily open the barrier, allowing CRISPR agents to reach specific brain regions, which holds immense promise for treating neurological genetic conditions like Huntington's disease. (July 2025)

Personalized CRISPR Therapies and Clinical Progress: The first personalized in vivo CRISPR treatment was administered to an infant last month for a rare genetic disease, developed and delivered in just six months. This landmark case sets a precedent for rapid approval pathways for on-demand gene-editing therapies. Additionally, clinical trials for CRISPR-based treatments for heart disease and liver editing are showing highly positive early results, with an expansion of disease targets in both common and rare conditions. (July 2025 Update)

2. AI's Growing Role in Drug Discovery:

Strategic Collaborations: The market for generative AI in drug discovery is experiencing exponential growth. In July 2025, XtalPi, an AI-powered drug R&D company, announced a strategic collaboration with Pfizer to expand its AI-driven drug discovery and materials science simulations.

Market Growth and Investment: The global generative AI in drug discovery market size is projected to reach approximately USD 318.55 million in 2025, with a significant CAGR of 27.42% between 2025 and 2034. North America leads the market, but Asia Pacific is expected to grow fastest. AI's usefulness in reducing time, cost, and effort in drug discovery is a key driver.

Enhanced Efficiency and Precision: AI and machine learning models are routinely informing target prediction, compound prioritization, pharmacokinetic property estimation, and virtual screening strategies. They are accelerating the "hit-to-lead" phase in drug discovery through AI-guided retrosynthesis and high-throughput experimentation, leading to faster and more precise development of new therapies. (July 2025)

AI for Rare and Neglected Diseases: In July 2025, Healx, an AI-powered drug discovery expert for rare conditions, allied with SCI Ventures to introduce AI-powered solutions for paralysis.

3. Advances in Personalized Medicine:

Genomic Insights for Cancer Treatment: Personalized medicine continues to revolutionize cancer treatment by utilizing genomic insights to tailor therapies. Advances in next-generation sequencing (NGS) and bioinformatics are crucial for identifying clinically relevant mutations, enabling targeted therapies. The convergence of genomics, gene editing (CRISPR), and AI is refining treatment selection for more precise and adaptive strategies. (April 2025 review)

New Tool for Breast Cancer Treatment Choices: Yale pathology researchers have developed a reliable test called Tropex™ that precisely measures key proteins (HER2 and TROP2) in breast cancer cells. This assay can help oncologists choose the most effective targeted therapies, particularly antibody-drug conjugates (ADCs), by providing detailed information about the exact protein levels in each patient's tumor. (Published July 16, 2025)

Precision Neurology: Pharmacogenomics is transforming neurology, allowing for optimization of drug therapies and minimization of adverse events based on individual genetic makeup. Advancements in genomics, AI, and neuroimaging are driving innovations for earlier diagnosis and more targeted therapies in neurological disorders like Alzheimer's, Parkinson's, stroke, and migraine. (AAN 2025 meeting insights, April 2025)

Multi-Omics Expansion: Personalized medicine trends for 2025 include the expansion of multi-omics (genomics, proteomics, metabolomics, spatial omics) for deeper biological insights, moving cell and gene therapies beyond blood cancers to solid tumors and rare diseases, and the growth of digital health ecosystems incorporating wearables and telehealth. (July 2025)

4. New Developments in Vaccine Technology:

Nipah Vaccine Entering Human Trials: A promising Nipah virus vaccine candidate (PHV02), developed by Public Health Vaccines, is ready for mid-stage human trials in Bangladesh, where outbreaks are frequent. This live, attenuated, recombinant vesicular stomatitis virus (rVSV) vector vaccine is based on the same technology as the approved Ebola vaccine and has shown good safety and immunogenicity in early trials. (July 10, 2025)

Universal Cancer Vaccine Potential: Researchers at the University of Florida have made a surprising finding: an experimental mRNA vaccine, even one not specific to any particular tumor or virus, boosted the tumor-fighting effects of immunotherapy in mouse

models. This suggests the potential for a "universal cancer vaccine" that could "wake up" the immune system against various cancers, possibly leading to an "off-the-shelf" cancer vaccine. (Published July 18, 2025)

Six-in-One Vaccine Rollout: A new six-in-one vaccine is being rolled out in low-income countries, marking a significant step in routine immunization efforts. (July 11, 2025)

Vaccines R&D Conference 2025: The "Vaccines R&D 2025" conference is scheduled to foster interdisciplinary collaboration, showcasing groundbreaking advancements in vaccine research, including mRNA, vector-based, and nanoparticle vaccines, as well as addressing challenges in preclinical studies, clinical trials, and manufacturing. (July 2025)

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1. Researchers recently identified a gene crucial for vitamin D absorption and metabolism, SDR42E1, and found that disabling it in colorectal cancer cells crippled their survival. What technology was used for this disabling?

- A) RNA interference
- B) Gene therapy
- C) CRISPR/Cas9 gene editing
- D) Proteomics

Answer: C) CRISPR/Cas9 gene editing

The summary states, "Using CRISPR/Cas9 gene editing, scientists demonstrated that disabling this gene in colorectal cancer cells..."

2. A new Nature Reviews Biodiversity article, published on July 18, 2025, explores the use of gene editing for species conservation. Which specific endangered species is mentioned as an

example where this technology could restore genetic diversity?

- A) Giant Panda
- B) Pink Pigeon
- C) California Condor
- D) Blue Whale

Answer: B) Pink Pigeon

The summary states, "A new Nature Reviews Biodiversity article explores using genome engineering to restore genetic diversity in vulnerable populations, such as the pink pigeon..."

3. Researchers at the University of Maryland School of Medicine won an NIH prize for a new technique to deliver gene editing tools to the brain. What combination of methods did they use to temporarily open the blood-brain barrier?

- A) Chemotherapy and radiation
- B) Engineered nanoparticles, microbubbles, and focused ultrasound
- C) Viral vectors and electrical stimulation
- D) Stem cell transplantation and drug delivery

Answer: B) Engineered nanoparticles, microbubbles, and focused ultrasound

The text details, "They used a combination of engineered nanoparticles, microbubbles, and focused ultrasound to temporarily open the barrier, allowing CRISPR agents to reach specific brain regions."

4. What significant precedent was set last month regarding personalized CRISPR therapies?

- A) The first FDA approval for a CRISPR-edited food product.
- B) The first personalized in vivo CRISPR treatment was administered to an infant for a rare genetic disease.
- C) A new CRISPR diagnostic tool for rapid pathogen detection was launched.



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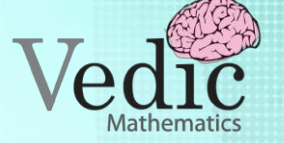
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D) CRISPR was successfully used to create a new organ for transplantation.

Answer: B) The first personalized in vivo CRISPR treatment was administered to an infant for a rare genetic disease.

The summary mentions, "The first personalized in vivo CRISPR treatment was administered to an infant last month for a rare genetic disease, developed and delivered in just six months."

5. In July 2025, which AI-powered drug R&D company announced a strategic collaboration with Pfizer to expand its AI-driven drug discovery and materials science simulations?

- A) DeepMind
- B) XtalPi
- C) BenevolentAI
- D) Atomwise

Answer: B) XtalPi

The summary states, "In July 2025, XtalPi, an AI-powered drug R&D company, announced a strategic collaboration with Pfizer..."

6. What is the projected global market size for generative AI in drug discovery for 2025?

- A) Approximately USD 100 million
- B) Approximately USD 318.55 million
- C) Approximately USD 500 million
- D) Approximately USD 1 billion

Answer: B) Approximately USD 318.55 million

The summary indicates, "The global generative AI in drug discovery market size is projected to reach approximately USD 318.55 million in 2025..."

7. Healx, an AI-powered drug discovery expert for rare conditions, allied with SCI Ventures in July 2025 to introduce AI-powered solutions for which specific condition?

- A) Diabetes

B) Alzheimer's disease

C) Paralysis

D) Cardiovascular disease

Answer: C) Paralysis

The summary notes, "In July 2025, Healx, an AI-powered drug discovery expert for rare conditions, allied with SCI Ventures to introduce AI-powered solutions for paralysis."

8. Yale pathology researchers have developed a new reliable test called Troplex™ for breast cancer. What does this test precisely measure to help oncologists choose the most effective targeted therapies?

- A) Tumor size and location
- B) Key proteins (HER2 and TROP2) in breast cancer cells
- C) Genetic mutations in BRCA1 and BRCA2 genes
- D) Blood sugar levels

Answer: B) Key proteins (HER2 and TROP2) in breast cancer cells

The summary states, "Yale pathology researchers have developed a reliable test called Troplex™ that precisely measures key proteins (HER2 and TROP2) in breast cancer cells."

9. Personalized medicine trends for 2025 include the expansion of "multi-omics." Which of the following is an example of an 'omic' mentioned in the summary?

- A) Cardiology
- B) Genomics
- C) Radiology
- D) Immunology

Answer: B) Genomics

The text mentions "multi-omics (genomics, proteomics, metabolomics, spatial omics)" as a personalized medicine trend.





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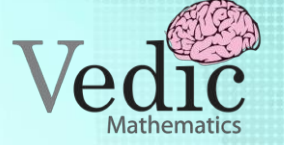
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10. A promising Nipah virus vaccine candidate, PHV02, developed by Public Health Vaccines, is ready for mid-stage human trials in which country, where outbreaks are frequent?

- A) India
- B) Malaysia
- C) Bangladesh
- D) Australia

Answer: C) Bangladesh

The summary states, "A promising Nipah virus vaccine candidate (PHV02), developed by Public Health Vaccines, is ready for mid-stage human trials in Bangladesh, where outbreaks are frequent."

11. Researchers at the University of Florida have made a surprising finding regarding an experimental mRNA vaccine and its potential for a "universal cancer vaccine." What was the key finding that suggests this potential?

- A) It completely eradicated all tumors in human trials.
- B) It boosted the tumor-fighting effects of immunotherapy in mouse models, even when not specific to a particular tumor or virus.
- C) It successfully prevented the spread of all types of cancer.
- D) It can be administered orally for widespread cancer prevention.

Answer: B) It boosted the tumor-fighting effects of immunotherapy in mouse models, even when not specific to a particular tumor or virus.

The summary notes, "an experimental mRNA vaccine, even one not specific to any particular tumor or virus, boosted the tumor-fighting effects of immunotherapy in mouse models. This suggests the potential for a 'universal cancer vaccine'."

12. A new six-in-one vaccine is being rolled out in July 2025, specifically targeting which group of countries for routine immunization efforts?

- A) High-income countries
- B) Middle-income countries
- C) Low-income countries
- D) Countries in the European Union

Answer: C) Low-income countries

The summary states, "A new six-in-one vaccine is being rolled out in low-income countries, marking a significant step in routine immunization efforts."

