



Allies in Innovation

Forging a Transatlantic
Biotechnology Partnership
to Meet the China Challenge

By Elly Rostoum, PhD

ABOUT CEPA

The Center for European Policy Analysis (CEPA) is a nonprofit, nonpartisan, public policy institution headquartered in Washington, DC with hubs in London and Brussels, focused on strengthening the transatlantic alliance through cutting-edge research, analysis, and programs. CEPA provides innovative insight on trends affecting democracy, security, and defense to government officials and agencies; helps transatlantic businesses navigate changing strategic landscapes; and builds networks of future leaders versed in Atlanticism.

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Cover photo: Hesse, Darmstadt: Biology lab technician Julia Volk removes a freeze-dried sample from a container in a laboratory of the Darmstadt-based pharmaceutical and technology group Merck KGaA. The Early Formulation Screening Service in Merck's Life Science business sector supplies manufacturers of vaccines and therapeutics with customized lipid nanoparticles for effective mRNA applications. Credit: Arne Dedert/dpa via Alamy Live

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Contents

Executive Summary	1
Biotechnology as the Next Geopolitical Battleground	2
Europe: America’s Indispensable Biotech Partner	5
The China Conflict — and Why the Alliance Matters Beyond It.....	10
Policy Roadblocks — and How to Remove Them.....	13
A Concrete Agenda for Action.....	14
Conclusion	15
About the Author	16
Acknowledgments.....	16
Glossary.....	17
Endnotes	18

Executive Summary

Biotechnology is becoming one of the defining sectors of 21st-century geopolitical and economic competition. Advances in the field have moved it from a domain of scientific discovery to one of strategic design. This shift is driven by the convergence of several forces: artificial intelligence, data analytics, gene editing, semiconductor-enabled biological measurement, automation, and advanced biomanufacturing. Together, they are making what was once only theoretically plausible a reality. Biotech is now poised to revolutionize medicine and transform a broad range of industries, including defense, pharmaceuticals, agriculture, and energy.

Together, the United States and the European Union (EU) constitute one of the most powerful engines of biotech innovation. They feature premier academic institutions, robust venture and capital markets, advanced regulatory institutions, and synergistic industrial capabilities. Importantly, global biotech dominance extends beyond scientific discovery, AI capability, and industrial output. It hinges on the ability to integrate biological design with rapid experimentation, verifiable measurement, regulatory clearance and validation, and scalable manufacturing. The transatlantic biotech partnership has yet to realize its global leadership potential. Regulatory divergence splits the industry. Funding mechanisms remain uncoordinated. Standards are fragmented. Tariff disputes and a trade investigation into European pharmaceutical pricing add tension.¹

Global leadership in biotechnology will confer enormous scientific, economic, commercial, and national security advantages. It will determine access to critical therapeutics, advanced materials, and technologies. This is not a competition that the US and the EU can afford to approach slowly, incrementally, or in isolation. Global biotech leadership depends on connecting the US and the EU into an integrated biotechnology stack. Beijing is not waiting for Washington and Brussels to reconcile regulatory, commercial, or strategic differences. For the past two decades, China has treated biotechnology as a strategic national priority. It has boosted the sector through sustained state financing, industrial policy, and a deliberate effort to acquire, scale, and pioneer the technological platforms likely to shape the next generation of the bioeconomy.

The US and Europe possess the deepest concentration of biotechnology talent, capital, scientific infrastructure, and research capacity outside China. Transatlantic alignment is imperative to prevent Beijing from establishing irreversible dominance. Each year of transatlantic fragmentation provides additional time for China to consolidate capabilities and deepen industrial advantages.

This policy brief examines the structural barriers to transatlantic biotech cooperation. It makes the case, at a strategic level, for a formal US-EU partnership and proposes a concrete agenda for action. The brief represents the inaugural publication of the CEPA Biotech Initiative.

Biotechnology as the Next Geopolitical Battleground

With the advent of artificial intelligence, biotechnology has crossed a new threshold. Nations increasingly compete not just to publish pioneering research, but also to control the platforms, supply chains, and manufacturing capacity that translate biological knowledge into cutting-edge products. The strategic competition resides in who can complete the design-build-test-learn cycle most rapidly and reliably — and then translate the resulting design into a manufacturable product.

Synthetic biology is a revolutionary driver of modern medicine. It enables the design and engineering of new biological organisms, or the redesign of existing ones, to perform specific functions, ranging from producing therapeutic compounds and vaccines to manufacturing materials and chemicals inside living cells. Two major advances have driven this shift. Gene-editing technologies, such as CRISPR, allow scientists to precisely add, remove, or alter DNA sequences within living cells. AI-driven protein design uses machine learning models to predict and design entirely new protein structures with specific desired functions. Together, these advances have turned what was once a slow, discovery-driven science into a fast-moving field of engineering and competition.

Some of the leading and most promising advances, spanning treatment and measurement, include:

- Cell and gene therapies that modify, replace, or supplement a patient's own genes and cells to address diseases at the genetic and cellular cause, from cancers to inherited diseases.
- Engineered bacteriophages, or viruses that infect and kill bacteria, which can be modified using genetic engineering to precisely target drug-resistant infections, offering an alternative to antibiotics, especially as resistance grows.
- Next-generation diagnostics, such as genomic sequencing, which are advanced technologies that detect diseases earlier, more precisely, and often faster than conventional lab methods, enabling more targeted treatment decisions.
- Biosensors and bioelectronic interfaces that allow biological activity to be measured continuously rather than only through centralized laboratory testing. These capabilities support health care, agriculture, environmental monitoring, manufacturing quality control, and biosurveillance.



Image: 3D rendered medically accurate illustration of bacteriophage Credit: Sebastian Kaulitzki via Alamy Live

Medicine, however, is not where biotechnology's impact ends. It is simply the sector where biotechnology has the longest history. Biotech advances such as programmable organisms, precision fermentation, and engineered enzymes are reshaping other sectors, too. In biomanufacturing, for instance, these advances produce chemicals, materials, and fuels inside bioreactors instead of refineries. In critical minerals, microbial bioleaching recovers rare-earth elements and other strategic metals from low-grade ore and electronic waste. In agriculture, gene-edited crops are becoming more climate-resilient. In the environment, engineered organisms break down plastic waste, capture carbon, and remediate contaminated land.

Biotechnology, in other words, is not a single industry. It is closer to a general-purpose technology — one that, like electricity or artificial intelligence, does not stay confined to a single sector, but instead reshapes the entire economy.

In effect, biotechnology can be both a platform and a method. It produces medicines, materials, food, chemicals, and data while changing how these products can be designed, tested, and manufactured.



Image: Researchers working in the clinical laboratory, scientists working in the lab, science, chemists are working on project of vaccine development. Credit: Pickadook via Alamy Live

The breadth and impact of biotechnology are why it has become a cornerstone of national security. Four dynamics make it so:

1. Many foundational biotechnology capabilities are inherently dual-use. The same gene-editing tools, biomanufacturing platforms, and AI-biology models that cure disease or engineer stronger crops can, in the wrong hands, be turned toward creating biological weapons or engineered pathogens.
2. Biotechnology supply chains have become as strategically exposed as those for semiconductors. A small number of manufacturers, disproportionately concentrated in China, now produce active ingredients for widely prescribed medicines and critical agricultural inputs. A single geopolitical crisis could potentially translate directly into shortages and public health emergencies at home. Biotechnology dependencies also include specialized reagents, cell-culture media, analytical equipment, instrumentation components, contract research services, and pilot-scale manufacturing capacity.
3. Biotech's impact on the military is expanding fast. Biosurveillance and biosensing support battlefield and population-level intelligence. Synthetic biology produces fuels, materials, and medical countermeasures inside contested supply lines, reducing dependence on long-haul logistics. Human performance enhancement research has direct force-readiness implications. The same AI tools that accelerate vaccine design also lower barriers to engineering novel pathogens.
4. Control matters. Whoever controls biotech's foundational platforms will gain a broad and compounding advantage. These include the AI models that generate biological designs, the instruments that measure and validate them, the biofoundries that build them, as well as the manufacturing systems that produce them at scale. The countries that build the most complete and scalable biotech ecosystem will gain leverage that is difficult for rivals to reverse.

Europe: America's Indispensable Biotech Partner

In scientific research, the US and the EU's combined capabilities exceed what either could achieve on its own. Biotechnology represents a natural fit for partnership between allied democracies. It is a science historically built on open publication, cross-border clinical collaboration, and shared regulatory science.

The infrastructure for transatlantic cooperation already exists. Europeans and Americans work together on joint clinical trials, co-authored research, and parallel regulatory review. Each side owns crucial assets. The US brings unmatched depth of venture and growth capital. It converts academic discovery into companies faster than anywhere else in the world.²

The EU brings a strong research base. European scientists author roughly a fifth of the world's top biotechnology publications.³ The EU also brings significant biomanufacturing capacity⁴ and strong public health systems that generate rich clinical and biological datasets. Europe also offers important strengths in precision instrumentation, industrial biotechnology, regulatory science, manufacturing quality systems, and engineering-intensive scale-up, all of which are important parts of the ecosystem.

Specific European countries add specific strengths. The United Kingdom leads in cell and gene therapy research, clinical trials, and early-stage innovation.⁵ Germany boasts a strong industrial biotechnology base and pharmaceutical sector. Most recently, German company BioNTech and Pfizer co-developed the world's first widely authorized mRNA COVID-19 vaccine in partnership with American pharmaceutical giant Pfizer.⁶ Denmark leads in industrial biomanufacturing. It is also home to one of the world's largest industrial enzyme-engineering clusters.⁷ These are networks that allow biotech firms, research universities, and chemical manufacturers to collaborate in the design, optimization, and scale of custom protein catalysts by turning lab-stage protein modifications into large industrial applications.

Novo Nordisk's glucagon-like peptide-1 (GLP-1) receptor agonists and advanced insulin therapies are quintessential biotechnology innovations.⁸ They are manufactured by genetically altering living host organisms to express highly specific therapeutic proteins. The translation of these molecular sequences into scalable, highly effective treatments underscores the sophisticated bioengineering capabilities and rigorous research frameworks that define Denmark's biotech industry.⁹

Together, the US and the EU host some of the world's leading biotechnology research universities. They also hold the deepest concentration of trained biotechnology talent outside China.¹⁰ Translational biotechnology also requires bioprocess engineers, regulatory scientists, manufacturing technicians, data engineers, and people trained at the intersection of biology, electronics, computation, and manufacturing. Neither side currently leverages this asset base. A joint transatlantic research and mobility architecture would treat this combined talent pool as a strategic asset. Right now, it is treated as separate national resources.

The US and the EU have, independently, reached similar diagnoses of their own weaknesses. The National Security Commission on Emerging Biotechnology (NSCEB) concluded that the US is losing ground to China across biotechnology.¹¹ Mario Draghi's 2024 report on European competitiveness lamented that Europe has failed to convert its world-class research into commercial and industrial leadership.¹² This gap is most visible in biologics (complex medical treatments made from living organisms such as cells, proteins, or tissues), orphan medicines (specialized pharmaceutical products developed to diagnose, prevent, or treat rare conditions), and advanced therapies.¹³

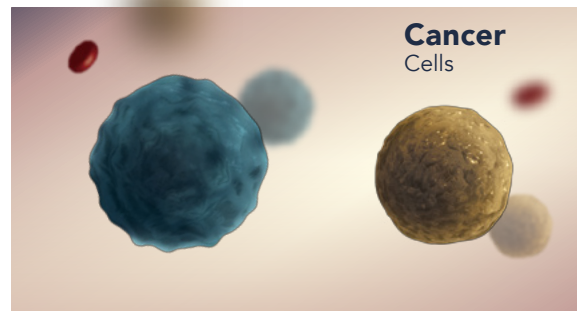
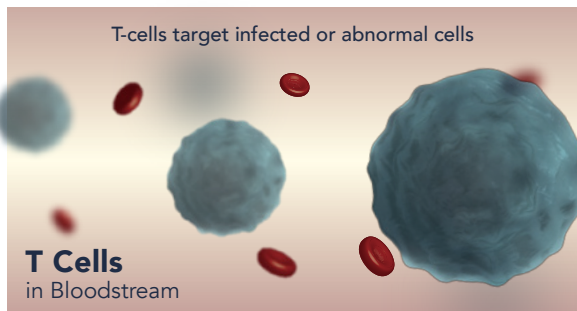
Both the US and the EU would benefit from shared solutions in key biotech sectors. In cell therapy, the field is moving beyond first-generation, patient-specific CAR-T treatments, an advanced immunotherapy that reprograms a patient's own white blood cells to identify and attack cancer cells. It is shifting toward "off-the-shelf"¹⁴ treatments using trained immune cells from healthy donors, rather than patients themselves.¹⁵ These could make the therapy more affordable and scalable, provided manufacturing and quality testing can be standardized. The UK's Quell Therapeutics, working with AstraZeneca, is advancing engineered regulatory T-cell therapies targeting autoimmune disease.¹⁶

In the fight against antimicrobial resistance, American firms such as Locus Biosciences are advancing engineered bacteriophage therapies through clinical trials, including a CRISPR-enhanced phage therapy for drug-resistant infections.¹⁷ A €15m (\$17.4m) Horizon Europe-funded consortium led by Frankfurt University Hospital is running the first randomized trial combining phage therapy with microbiome restoration for recurrent urinary tract infections.¹⁸ These are complementary approaches that could benefit from coordinated clinical validation and regulatory standards.

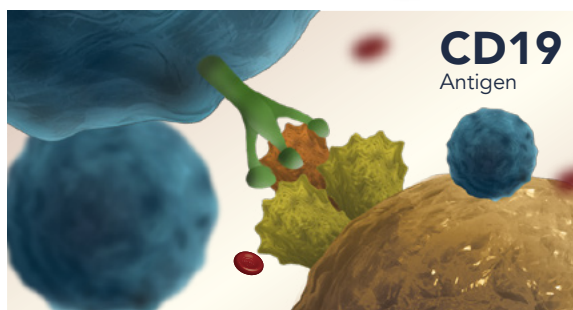
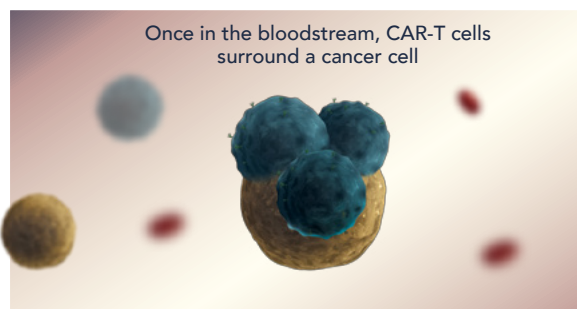
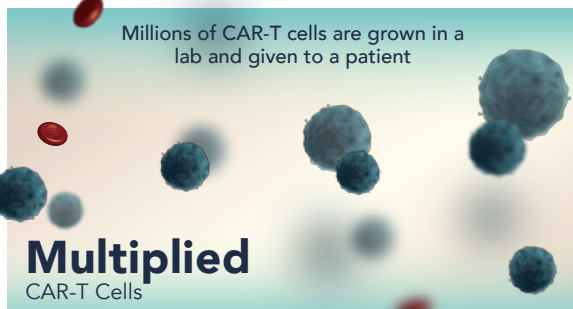
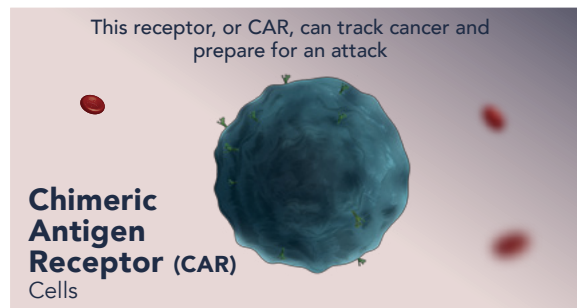
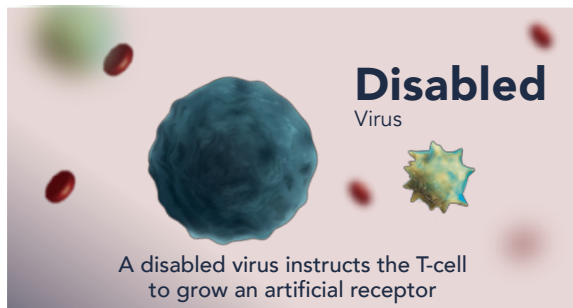
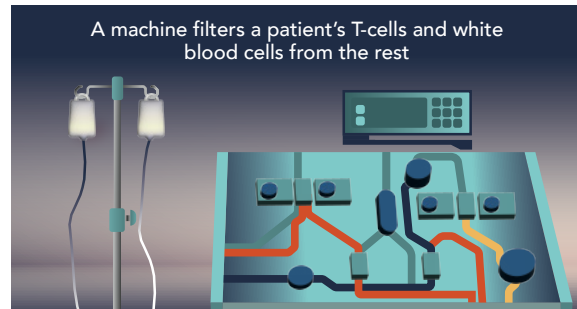
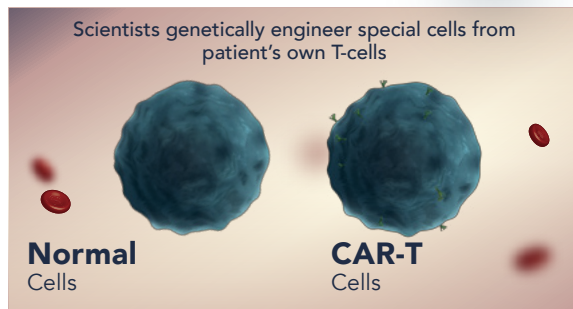
In agriculture, Europe is overcoming its resistance to American-style genetically modified crops. The European Parliament recently approved new rules that stop treating all gene editing as genetic modifications.¹⁹ The new, product-based model moves closer to the American approach, offering a simplified pathway for certain gene-edited plants.²⁰ It removes a long-standing point of transatlantic regulatory friction and opens the door to shared investment in drought- and disease-resistant crop varieties.

Key Biotech Treatments

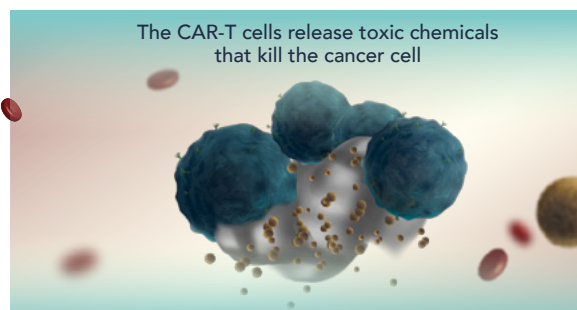
CAR-T Treatment



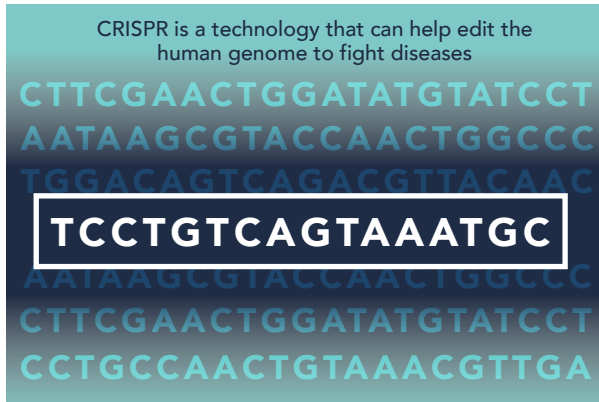
A T-cell's defenses can be blocked by cancer



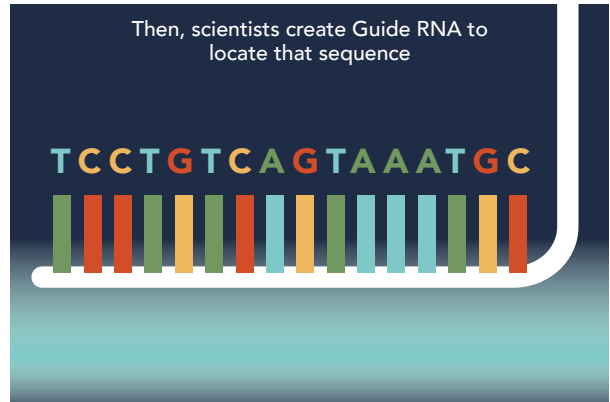
CAR-T cells recognize cancer through its antigen and grab hold



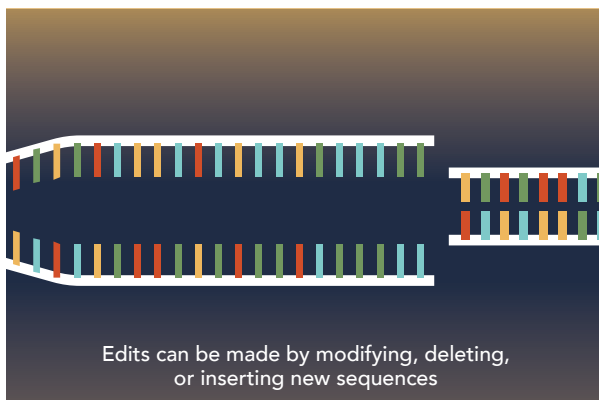
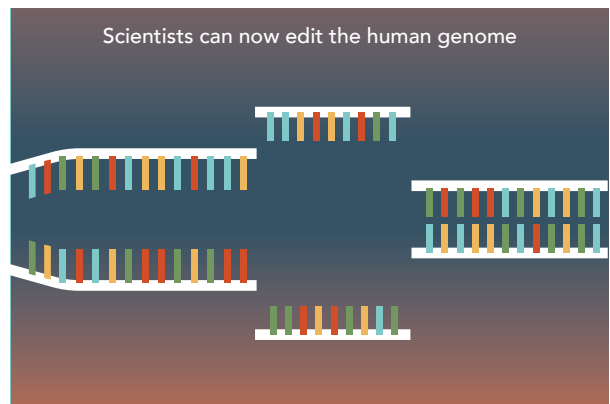
CRISPR Gene Editing



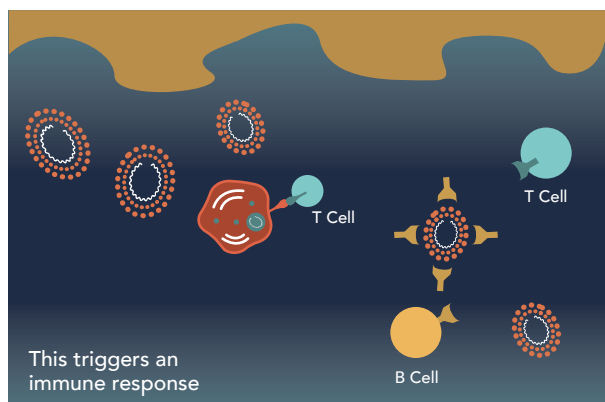
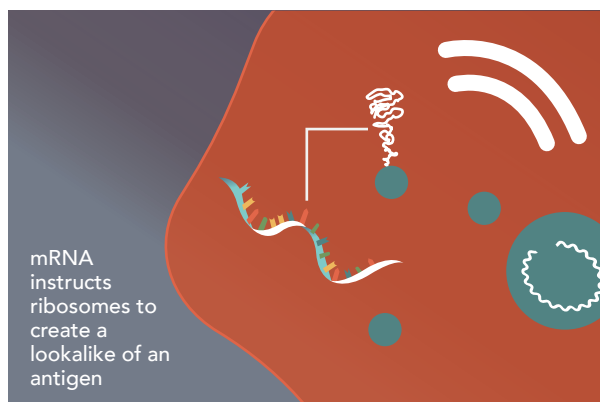
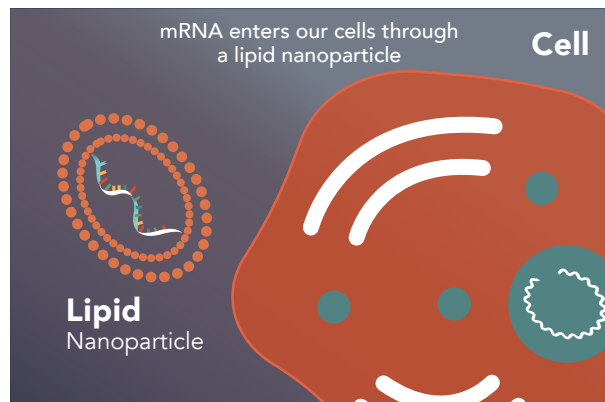
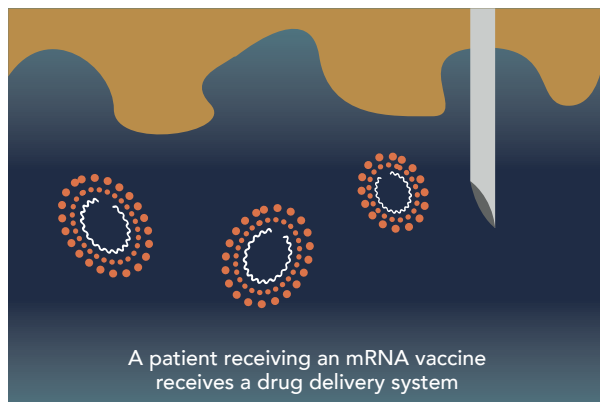
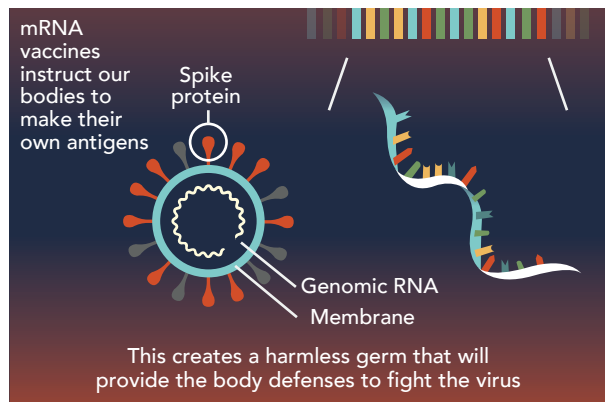
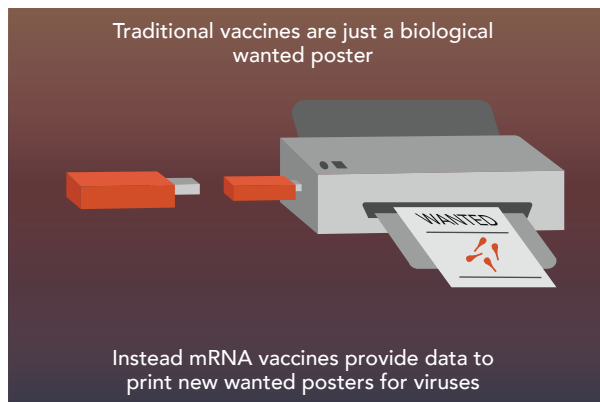
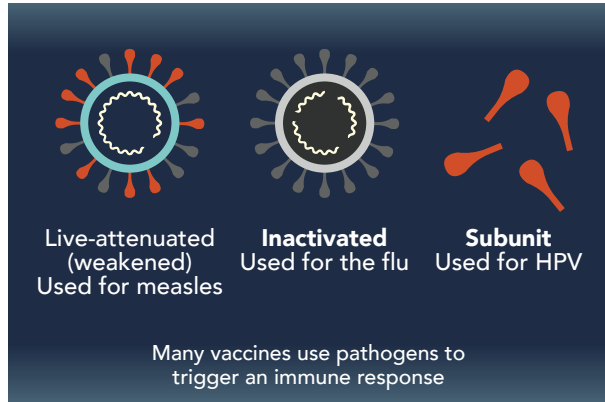
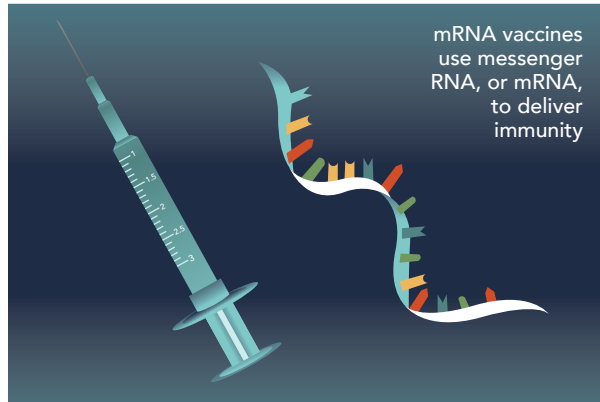
Scientists first identify a sequence of the human genome



CRISPR consists of two parts



mRNA Vaccinations



In biomanufacturing, AI-driven strain engineering, real-time process monitoring, and precision fermentation are advancing on both sides of the Atlantic. American tax incentives and EU biomanufacturing investment²¹ are parallel industrial-policy tools. They could become complementary rather than competing. The US uses market-driven tax credits to subsidize high-volume production, while the EU relies on complex regulatory fast-tracking and centralized capital grants that favor early-stage health research and development over industrial scaling. Although this policy asymmetry risks draining European startups to US production hubs, it creates a complementary pipeline. Europe dominates AI-driven strain engineering and high-margin precision fermentation, while the US provides the infrastructure for high-volume, low-cost scaling.

The China Conflict — and Why the Alliance Matters Beyond It

No account of why the US and EU should cooperate on biotechnology is complete without taking into account China's high ambitions. Beijing has treated biotechnology as a strategic priority for two decades, combining aggressive technology development with sustained investment in talent and infrastructure.²² China produces approximately 20% of the world's active pharmaceutical ingredients, making it the largest producer by volume. In the pharmaceutical supply chain, China supplies an estimated 41% of key starting materials globally and roughly 70% to 80% of the ingredients used in worldwide antibiotic and heparin production.²³ It also holds near-monopolies on inputs for penicillin and amoxicillin.²⁴ A coordinated allied response could meaningfully diversify supply chains beyond Chinese chokepoints. Such an effort would combine targeted incentives for domestic manufacturing of active pharmaceutical ingredients, strategic stockpiling of critical inputs, and joint investment to rebuild production capacity outside China.

Moderna and Merck recently announced that their personalized mRNA cancer vaccine, intismeran autogene, had met its endpoints in a Phase 3 melanoma trial. This was the first positive late-stage result for an mRNA cancer vaccine. This breakthrough builds on mRNA platform science pioneered in the US and Germany (BioNTech-Pfizer) during the COVID-19 pandemic, now redirected toward oncology. The milestone also illustrates the urgency of the China challenge. Moderna's CEO, Stéphane Bancel, publicly warned that Beijing is pouring state financing into mRNA biotechnology specifically to contest US leadership in personalized cancer treatment and advanced drug manufacturing.²⁵ While American and European firms retain the world's most advanced mRNA science, sustaining that lead against a



Image: A China pharmaceuticals science concept with a macro closeup of medicine ingredients and manufactured medicines on the flag of China.. Credit: Yau Ming Low via Alamy Live

state-backed Chinese challenger will require sustained and deliberate investment and coordinated regulatory approvals.

The US and the EU could answer the China challenge through unilateral national action, parallel-but-uncoordinated national strategies, or genuine transatlantic collaboration. The first two are already underway, and neither is proving sufficient. Unilateral action forfeits the scale advantage of a combined transatlantic research and market base. Bifurcated strategies also leave the US and the EU separately resolving the same regulatory, funding, and standards problems without benefiting from each other's progress. Collaboration complements US and EU capabilities while reducing costly duplication. Combined, American and European regulatory sophistication and innovation capacity form a stronger counterweight to China than either side alone. US tools designed to restrict China's progress, such as investment screening, export controls, or data localization, could easily be applied against allies. Similarly, the EU's own Made in Europe sovereignty push risks boomeranging if it restricts cooperation with the US.



Image: Robot arm with test tube virus in laboratory.. Credit: Itsanan Sampuntarat via Alamy Live

The Making of an American Bipartisan Biotech Strategy

The current wave of US biotechnology-related legislation enjoys bipartisan support.

1. **Data:** AI-driven biotech will belong to whoever controls the best biological datasets. US government data is vast but fragmented across federal agencies. This fragmentation slows American researchers relative to China's state-directed data system. In response, the bipartisan Web of Biological Data Act of 2026²⁶ aims to create a centralized, secure portal managed by a national laboratory to consolidate fragmented federal biological datasets into AI-ready formats.
2. **Capital:** The Biotech Investment National Security Act aims to deny financing, licensing rights, and manufacturing know-how to China. It folds biotechnology into the outbound-investment screening regime Congress built for semiconductors, AI, and quantum computing.²⁷
3. **Industrial capacity:** Biotech advances require a manufacturing base that is not hostage to China. Several legislative solutions have been proposed, including a National Biotechnology Coordination Office²⁸ to centralize federal policy, the Biomanufacturing Excellence Act²⁹ to fund a public-private manufacturing center, an Independence Investment Fund³⁰ at Treasury, and a new Department of Energy bio-industrial facility to back production.³¹
4. **Biology as critical infrastructure:** Pending legislation would also designate biomanufacturing, biological data, and testing infrastructure as critical national assets under the US Cybersecurity and Infrastructure Security Agency, alongside the power grid and water systems.³²
5. **Alliance dependence:** The Biodefense Diplomacy Enhancement Act would direct the US State Department to coordinate biotechnology export controls with NATO members.³³

Policy Roadblocks — and How to Remove Them

A transatlantic biotech partnership requires changes in both Brussels and Washington.

- **Regulatory divergence:** American and European frameworks for gene editing, novel foods, and advanced therapies have historically diverged, creating different approval timelines and disincentives to pursue simultaneous transatlantic commercialization. The clearest illustration concerns agricultural biotech. A 2018 European Court of Justice ruling banned gene-edited crops, which are widely grown in the US.³⁴ The EU approved new rules for “new genomic techniques” in June 2026, creating a pathway for gene-edited plants in Europe.
- **Funding fragmentation:** Horizon Europe, the US National Institutes of Health, the US Defense Advanced Research Projects Agency, the European Innovation Council, and national research agencies fund biotech programs with limited cross-Atlantic coordination. The purchasing-power case for coordination is only growing. European NATO members and Canada spent roughly \$419bn on defense in 2023 alone, a figure that has since risen by more than 40%.³⁵ Biotech’s ascending place within the national security domain warrants a share of that funding.
- **Standards and norms engagement:** China now participates in roughly 200 more International Organization for Standardization technical committees relevant to biotechnology than the US does.³⁶ EU standards are often fragmented across 27 member states.
- **Export-control harmonization:** The Wassenaar Arrangement, the primary multilateral framework governing exports of dual-use technologies, was not designed to cope with modern biotechnology. Its consensus-based structure has made it slow to develop risk-based controls for gene synthesis and AI-driven biological design, technologies that barely existed when the framework was last updated.

A Concrete Agenda for Action

1. **Establish a standing US-EU biotechnology regulatory dialogue.** The Food and Drug Administration and European Medicines Agency already run limited parallel scientific advice procedures for certain drug categories, proving the model works. It should be formalized and extended to cell and gene therapies, novel foods,³⁷ and biomanufacturing standards. One review process substitutes for two wherever the underlying science is shared.
2. **Launch a dedicated US-EU Biotechnology Research Fund,** requiring grants to name a co-principal investigator on each side of the Atlantic. This would build durable institutional partnerships between the two sides' leading research universities and could anchor joint degree and fellowship tracks between paired institutions.
3. **Create a transatlantic biotechnology talent and mobility program** offering multiyear, portable funding, and streamlined visas. China offers young scientists stability, including long, guaranteed funding horizons instead of the year-to-year grant uncertainty common in the US and the EU. The US and the EU should offer five- to seven-year funding commitments, combined with fast-track visas or work authorizations for researchers moving between American and European institutions.
4. **Co-fund a transatlantic biomanufacturing network** to diversify active pharmaceutical ingredients and production away from single chokepoints. Joint investment in US and EU pilot facilities, validation centers, and contract manufacturing capacity, paired with mutual surge-capacity agreements modeled on strategic stockpiling arrangements, should prioritize antimicrobial-resistance therapies, vaccine platforms, and oncology drug development collaborations that are already underway.
5. **Establish a joint US-EU biomining research initiative** applying biotechnology to critical minerals. The US already funds microbial bioleaching, a green biotechnology to extract valuable metals like copper, gold, and zinc from low-grade ores and industrial waste.³⁸ A matched EU commitment, drawing on the Critical Raw Materials Act,³⁹ could reduce dependence on Chinese-dominated rare-earth refining.
6. **Ensure reciprocal access to data.** The US Web of Biological Data and the EU's European Health Data Space are being developed on roughly the same timeline, creating a rare window to design interoperability. A joint technical working group should align anonymization, security, and access to benefit vetted European and American researchers.
7. **Form a joint US-EU standards coordination cell** to forge common positions ahead of major standards meetings.

8. **Pursue a “Wassenaar-plus” modernization of dual-use biotechnology.** Multilateral consensus on modernized biotechnology controls is unlikely. A more realistic near-term path is a “Wassenaar-plus” arrangement among willing allies that updates dual-use lists and screening practices.
9. **Establish a joint transatlantic bioethics council** to set shared guardrails on gene editing, dual-use research of concern, and the convergence of AI and biology. A joint council, issuing shared guidance ahead of the most contentious technologies reaching market, would let the US and EU set democratic norms first.
10. **Set up a standing NATO biodefense and R&D program** that fuses three currently separate initiatives into one mechanism, backed by the alliance’s growing purchasing power. These include the NSCEB’s advance-market-commitment recommendations,⁴⁰ NATO’s Defense Innovation Accelerator for the North Atlantic’s biotechnology priority,⁴¹ and the Biodefense Diplomacy Enhancement Act’s cooperation mandate.⁴² Together, these three initiatives deepen international biodefense, biosecurity, and biotechnology cooperation with both NATO allies and major non-NATO partners.

Beyond government, industry and research institutions should pursue joint transatlantic consortia, particularly on promising medical advances such as the CAR-T and mRNA therapeutics, where American and European developers are already collaborating organically. Moderna and Merck’s August 2026 Phase 3 success with a personalized mRNA melanoma vaccine,⁴³ built on platform technology first shown commercially by Germany’s BioNTech in partnership with Pfizer, is evidence of what transatlantic mRNA collaboration can deliver at scale. The private sector can demonstrate how coordinated transatlantic cooperation outperforms parallel national efforts, helping to build the political case for government-to-government cooperation.

Conclusion

The US and the EU do not need to invent a rationale for biotechnology cooperation. They need to act on the diagnosis each side has separately reached about its own weaknesses. The strongest response to Beijing’s model is not to mirror China’s instinct toward securitized silos, but to double down on the open, collaborative approach that remains the US and the EU’s real advantage. The US must make sure that its security measures distinguish allies from rivals. China is not waiting for Washington and Brussels to resolve their own trade disputes, or their own uncertainty about how open to remain with each other. Every year that regulatory divergence, funding fragmentation, standards disengagement, and undifferentiated securitization persist is a year in which China’s relative position strengthens against a divided US and EU. It’s time to act.

About the Author

Dr. Elly Rostoum is a senior resident fellow at the Center for European Policy Analysis (CEPA) and a political scientist specializing in China, economic security, and critical and emerging technologies. She is a lecturer at Johns Hopkins University and principal investigator of the Bull Dragon Project, which uses machine learning to identify vulnerabilities and hidden dependencies within supply chains. Rostoum was a recipient of the 2023 Johns Hopkins University Discovery Award, which recognizes researchers poised to make important discoveries or creative contributions, and the 2024 Johns Hopkins Nexus Award in Teaching for the course Biotech, Health Security, and Artificial Intelligence. She is the author of the forthcoming book *Entrenched: China, Supply Chains, and the Battle for the Global Order*. Previously, Rostoum served as a US intelligence analyst and as a member of the National Security Council staff at the White House across administrations of both parties. She was also the founding managing director of the Alperovitch Institute for Cybersecurity Studies and a Hans J. Morgenthau Fellow in US Grand Strategy at the University of Notre Dame.

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About CEPA

The Center for European Policy Analysis (CEPA) is a nonprofit, nonpartisan, public policy institution headquartered in Washington, DC, with hubs in London and Brussels, focused on strengthening the transatlantic alliance through cutting-edge research, analysis, and programs. CEPA provides innovative insight into trends affecting democracy, defense, and tech and security to government officials and agencies; helps transatlantic businesses navigate changing strategic landscapes; and builds networks of future leaders versed in Atlanticism.

Glossary

- **Agonist:** A drug or substance that binds to a receptor inside a cell or on its surface to mimic the action of a substance that normally binds to the receptor.⁴⁴
- **Biologics:** Complex medical treatments made from living organisms such as cells, proteins, or tissues.
- **CAR-T treatment:** An advanced immunotherapy that reprograms a patient's own white blood cells to identify and attack cancer cells.
- **CRISPR:** A gene-editing technology that allows scientists to precisely add, remove, or alter DNA sequences within living cells.
- **Engineered bacteriophages:** Viruses that infect and kill bacteria, which can be modified using genetic engineering to precisely target drug-resistant infections and offer an alternative to antibiotics.
- **Enzyme-engineering clusters:** Networks that allow biotech firms, research universities, and chemical manufacturers to collaborate in the design, optimization, and scale of custom protein catalysts by turning lab-stage protein tweaks into large industrial applications.
- **Glucagon-like peptide-1 (GLP-1) receptor agonists:** A class of medications used to treat type 2 diabetes mellitus and obesity by lowering patients' serum glucose levels, thereby managing metabolism.⁴⁵
- **Orphan medicines:** Specialized pharmaceutical products developed to diagnose, prevent, or treat rare conditions.
- **Protein catalyst:** A protein-based enzyme, natural or engineered, that accelerates a chemical reaction.⁴⁶
- **Therapeutic proteins:** Biologically derived molecules used to treat or prevent various diseases, particularly cancer, diabetes, and cardiovascular disease.⁴⁷

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Forging a Transatlantic Biotechnology Partnership to Meet the China Challenge

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