

The European Innovation Council supports innovative portfolios in health biotech

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The European Innovation Council aims to catalyze the formation and growth of science-based businesses in Europe through highly targeted initiatives, actively managed innovative portfolios and a stepped funding pathway of grants and equity investment.

The European Innovation Council (EIC) was launched fully and formally in March 2021 with a budget of €10 billion (\$11.7 billion), following a pilot phase that started in 2018. Described as potentially the most effective catalyst of breakthrough science to disruptive innovation¹, the EIC has the objective of creating an ecosystem that fosters deeptech science-based businesses by harnessing European research and development efforts, unblocking innovative potential in Europe. The EIC supports innovation from early-stage research through proof of concept and the financing of start-up and SME corporate activities, and it provides support both through conventional open calls and through highly targeted challenge-based calls with well-defined goals. Here, I discuss EIC Challenge-based support in health biotechnology.

Biotechnology is strategically critical for the European Union (EU)'s future economic security. In a recent move designed to create the right environment for the growth of biotechnology in the European Union, the European Commission (EC) has proposed that it will advocate more EIC investment for the development and scale-up of innovative biotechnology and biomanufacturing, alongside measures tackling the complex EU-and-national regulatory framework for biopharmaceuticals, advanced therapies and in vitro diagnostics.

Although the numbers of research publications in healthcare and biological sciences are similar in the EU and the United States, higher US healthcare spending levels stimulate greater translation and development of research into clinical products, propelled by venture capital and a largely unified public capital market. In the centrally organized, socially oriented healthcare systems of Europe, health spending as a proportion of GDP is roughly half that in the United States².

In health, two key pillars of EU strategy were health sovereignty and strategic autonomy: in short, Europe does not want to be reliant on imports of key technologies developed elsewhere; it wants its own armory of health solutions, developed through new mechanisms that coordinate programs toward shared ends and lead to the stimulation of early finance. The EIC is part of that: in 2023, it provided biotechnology and biomanufacturing projects with around €350 million (\$385 million) in support and investment. This could increase, considering the new EC "Biotech and Biomanufacturing Initiative" launched in March 2024.

Table 1 | Main features of EIC support

Feature	Detail
Stepped funding path	Funding at different levels of development through Pathfinder, Transition, Accelerator instruments
Challenge-based calls	Closely defined innovative goals guided by strategic intelligence (on science, development and medical needs)
Portfolio approach	New inter-project and inter-company collaborative actions at portfolio level (portfolio activities) funded, including lines of research beyond those originally proposed
Proactive management of portfolios	Program managers conceive, develop and manage portfolios of projects
Business Acceleration Services (BAS) to support EIC projects	Network of coaches, mentors and experts; focused partnering, trade shows and access to venture capital networks; business development workshops
Equity investment	€4 billion (\$4.4 billion) EIC Fund—equity, convertible loans
Agile funding	Booster grants up to €50,000 (\$55,500) to move projects from open calls to EIC portfolios and to support innovation; fast track to EIC Accelerator
Bespoke workshops and training on the initiative of the program manager and/or in collaboration with other European institutions (e.g., EMA, EPO)	For example, licensing in biotech

The EIC's challenge-based approach in health biotech

The EIC is not a pan-science funding mechanism, nor an administrative authority dispensing funding. It fosters businesses operating in specific, largely technological arenas, and this demands modes of operation, such as the EIC Challenge-based calls, that differ from those of other EC funders (Table 1). Conventional research programs generally operate through open calls in broad areas of science, with grant funding allocated at the outset of the project for scientific goals defined internally by the researcher.

Unlike most EC funding programs, the EIC uniquely designs and operates challenge-based calls in addition to open calls. EIC Challenges are 3–4-year programs toward targeted goals defined by an EIC program manager based on strategic intelligence about opportunities or gaps in technology, regulatory or exploitation areas³. The program manager, backed by sector-specific advisors, not only designs the challenges but also chairs the evaluation panel that selects the portfolio projects. The programs are funded through grants (for EIC Pathfinder) or through both grants and equity investment (for EIC Accelerator).

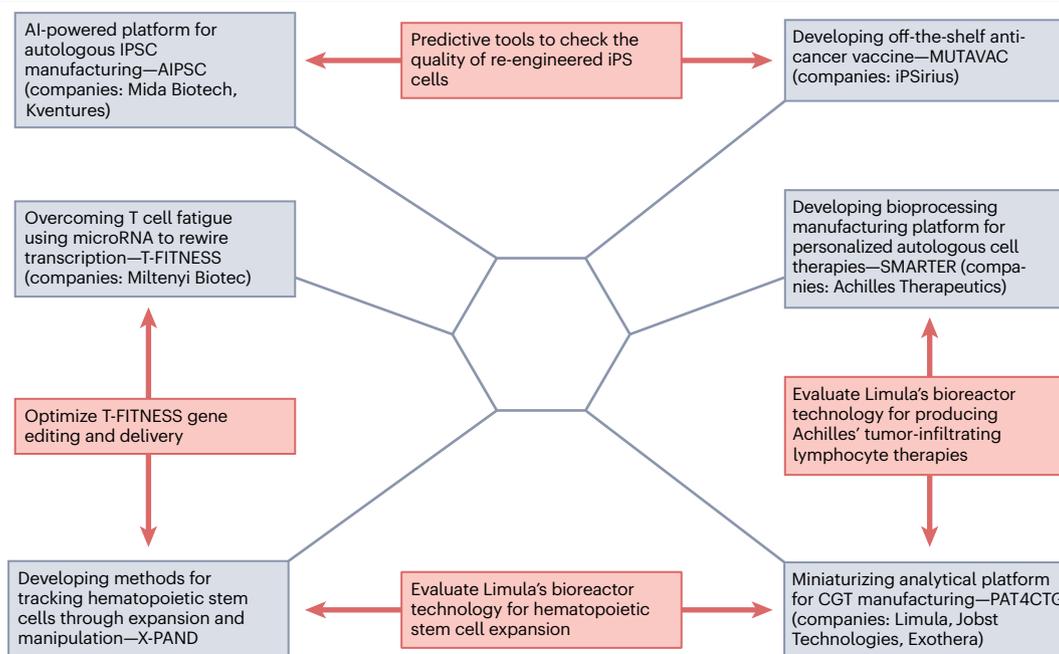


Fig. 1 | EIC cell therapy manufacturing portfolio projects and activities of common interest. Six selected projects (gray boxes) form the cell therapy manufacturing sub-portfolio; subsequent discussions led to the emergence and funding of four additional cross-project collaborations/portfolio activities (light red boxes).

EIC Challenge-based calls are directed to groups (portfolios) of projects that interact and collaborate within a portfolio, rather than acting as isolated research entities. Support is provided across the entire EIC portfolio, a group of projects with shared innovation and business interests and guided by strategic intelligence. To establish a portfolio, EIC projects are selected based not only on an isolated technical evaluation but also on their ‘fit’ with the portfolio, according to well-defined and published considerations. The EIC program manager is responsible for the development of the Strategic Plan for a portfolio, and they guide the implementation of portfolio activities.

To make a trans-Atlantic comparison, the EIC’s approach in health biotech looks less like that of the US National Institutes of Health (NIH), as its focus is largely on molecular mechanisms underlying the diseases and thus more like that of the Advanced Research Projects Agency for Health (ARPA-H), whose program managers oversee targeted approaches to health and biotechnology. The targets both at the EIC in health biotech and at ARPA-H are not broad swathes of new biology but astutely defined problems, informed by strategic intelligence, that are strongly linked to the healthcare industry and to investors. Whereas in the ARPA-H model, the focus is on enabling technologies, with program managers framing challenges around their own championed ideas, EIC program managers in health shape several challenges in a range of agreed areas. There is no overall health program director at the EIC, and some other details differ (such as the number of program managers, portfolio budgets and timeframes), but the intentions are similar.

The next section illustrates some of the ongoing EIC Challenge programs in health biotech. An overarching message from these examples is that the approach is dynamic and responsive to the changing external environments, a mode of operation that has parallels with early-stage seed and venture investing.

The strategic starting point of the EIC Pathfinder Challenge in Cell and Gene Technology (CGT) in 2021 was that gene and cell therapies still face huge difficulties in scaling and manufacture. It is true that Yescarta (axicabtagene ciloleucel) and Kymriah (tisagenlecleucel) were approved for narrowly defined medical uses in some blood cancers in 2017 (ref. 4), yet many products in the area are functionally inefficient, expensive to use and still attract strong regulatory concerns⁵, making their administration to patients onerous and clinically intense. Overall, the product development pathway remains cumbersome: only 11 therapies had emerged by 2022 despite thousands of clinical trials of CGT candidates (over 2000 in 2022 alone).

Based on this strategic conclusion and the underlying detailed intelligence, one high-level aim of the challenge is to broaden the utility of CGT by addressing these limitations. Project evaluation and selection took place during 2022. The outcome of the challenge was a multinational consortium of European firms and research institutes, each involved in exploring and validating different critical process parameter data for cell culture using prototypes of advanced cell types. The portfolio of projects represented a range of interlocking technical solutions that could attain more effective gene delivery and manufacture and that might extend utility from blood cancers to solid cancers.

By design, one group of projects centers on improving gene delivery vectors and involves three companies (Cellularis Biomodels, InnovaVector and Genethon) working alongside a range of research institutions around Europe. A second sub-portfolio of six projects centers on advancing cell therapy manufacturing and draws together research institutes/academia and companies with expertise in reactor design, sensor technology, regenerative medicine contract manufacturing and Good Manufacturing Practices biologics services (Fig. 1). This ‘cell therapy manufacturing’ sub-portfolio bridges several development gaps in cell therapy, stretching from projects on the genetics

Table 2 | ‘Shared component’ model of the EIC Cardiogenomics Challenge portfolio

Project acronym	Cardiomyopathy sub-portfolio	Clinical indication	Technology
B-specific	Ischemic	Myocardial infarction, stroke, ischemic disease, atherosclerosis	Transcriptome, proteome (autoantigens)
TargetMI	Ischemic	Myocardial infarction	Genome, transcriptome, metabolome, proteome, AI
MIRACLE	Ischemic	Myocardial infarction, stroke, peripheral artery disease	Genome, transcriptome, AI
IMPACT	Non-ischemic	Cardiomyopathies, arrhythmias	Genome, transcriptome
CARDIOREPAIR	Non-ischemic	Cardiomyopathies	Transcriptome, proteome (protein and phosphorylated proteins)
DCM-NEXT	Non-ischemic	Myocardial infarction, cardiomyopathies, heart failure	Genome, transcriptome, AI
Nav1.5-CARED	Non-ischemic	Cardiomyopathies, arrhythmias	Genome

Supported projects are grouped as sub-portfolios that share technical approaches and/or disease scopes—‘shared components’ that build utility and enhance added value.

and cell biology of cell expansion and cell exhaustion in culture to downstream projects in monitoring and control and the development of systems that take cell therapy manufacturing to localized, small-scale, near-patient units rather than the current high-cost, centralized facilities.

The CGT portfolio is not a static entity with fixed goals. Bringing together organizations with common interests and applying a flexible, active-management ethos makes it possible for new inter-project collaborations to emerge within the portfolio. Extended discussions within the cell therapy manufacturing sub-portfolio led to four new, productive strands of research. In two of these (Fig. 1), prototypic reactor configurations could be tested with advanced ‘next-generation’ cell types (donor T cells, tumor-infiltrating lymphocyte-like cells or modified human stem cells) rather than with standard cells approved currently. Similarly, elsewhere within the sub-portfolio, those same advanced cell types could be subject to optimized gene-editing methods. The portfolio approach enables technological progress in parallel rather than in series.

Another ongoing health biotech challenge area for the EIC is in cardiovascular disease (CVD)—the Cardiogenomics Pathfinder Challenge, which became operational in 2023 after a launch in 2022. In CVD, the strategic framework arose from the clear mismatch between technological potential and medical practice: even though cardiovascular disease (CVD) accounts for nearly 45% of deaths in Europe and family history is a known and significant indicator of CVD susceptibility, few molecular markers had been definitively associated with specific CVD indications. Existing CVD diagnostics were used largely to distinguish types of CVD and guide subsequent treatment, possibly perpetuating siloes of clinical specialization.

The EIC Cardiogenomics Challenge is designed to encourage improved correlations between the well-studied pathology of heart disease and various biomarkers (see Table 2). The selected projects fall into two sub-portfolios distinguished by clinical indication— ischemic disease and non-ischemic cardiomyopathies—with projects also linked by shared ‘omic’ approaches. The EIC Cardiogenomics portfolio is designed to provide valuable, cross-cutting insights into the molecular contributions of known and newly discovered polymorphisms to the susceptibility, onset and progression of several form of cardiovascular disease.

A third EIC Pathfinder Challenge deals with early-stage exploratory technology, in Engineered Living Materials. The hurdles in early development include identifying spatiotemporal control parameters

for patterning and dimensions and understanding the interplay among the multicellular components and non-living components to enable materials with a variety of properties and functions. For example, the NextSkins project uses a community of bacteria and yeast to create a wearable patch that can sense and treat atopic dermatitis, whereas Sumo, Prism-LT and BioRobot-MiniHeart explore how cellular functions can be used to control cell morphogenesis.

The EIC Challenge structure originally included Transition Challenges, which aimed to advance preliminary technologies or early protocols through to readiness for clinical validation. In health biotechnology, one ongoing Transition Challenge is “RNA-based therapies and diagnostics for complex or rare genetic diseases.” It aims not only to develop robust formulation for mRNA to improve the safety and effectiveness of the current generation of mRNA therapeutics, but also to go beyond mRNA and define validation projects for therapies for rare or complex diseases based on microRNA, long non-coding RNA, tRNA or small interfering RNA. The transition phase is no longer part of the EIC Challenge Work Programs. However, RNA-based therapies remain a burgeoning area, something that reflected in the prominence of RNA projects supported in EIC open calls.

Accelerator Challenges are targeted at technologies that are relatively well advanced on the path to exploitation. They support companies and provide a step up in funding not only from grants (up to €2.5 million, or \$2.8 million) but also from convertible loans and equity investment (up to €15 million, or \$16.7 million) from the dedicated EIC Fund—in effect, a venture capital arm of the EIC⁶.

The first EIC Accelerator Challenge in health biotechnology relates to cancer—“Novel biomarker-based assays to guide personalized cancer treatment.” Launched at the end of 2023 with a €65 million (\$72 million) budget, the intention is to encourage a portfolio of vibrant precision oncology companies in Europe as a nucleus for an industry developing companion diagnostic biomarker-based technologies to optimize cancer treatments. Biomarkers have been used to optimize personalized cancer treatment, but the strategic focus of the challenge is on companies whose diagnostic ‘omics’ technology might enhance the use of existing drugs, to identify patients who are particularly responsive to existing cancer drugs without accompanying chemotherapy⁷; define the likelihood of progression from precancerous to cancerous lesions⁸; predict sensitivity to the side effects of routinely used drugs⁹; or characterize molecular markers that correlate with high or low recurrence rates after current treatments¹⁰.

Table 3 | Mixed origins of the EIC Accelerator precision oncology portfolio

Acronym and project origin (open call or challenge)	Company	Financing limit ^a , grant/equity
QlandQD (challenge)	QLUCORE AB (Sweden)	€2.5m/- (\$2.8m/-)
ROUTINE (challenge)	PamGene (Netherlands)	€2.5m/€5.0m (\$2.8m/\$5.6m)
IOO Improving IO (challenge)	FASTBASE SOLUTIONS SOCIEDAD LIMITADA (Spain)	€2.5m/- (\$2.8m/-)
Histotype Px (challenge)	DoMore Diagnostics (Norway)	€2.5m/€15m (\$2.8m/\$16.7m)
TUMAGNOSTIC (open)	Convert Pharmaceuticals (Belgium)	€2.5m/€1.6m (\$2.8m/\$1.8m)
WomEC (open)	MiMARK Diagnostics (Spain)	€2.5m/- (\$2.8m/-)
Smart Pro T Cell (open)	Smart Immune (France)	€2.5m/€15m (\$2.8m/\$16.7m)
MYcureX (open)	Peptomyc (Spain)	€2.5m/€2.5m (\$2.8m/\$2.8m)
NEOpTTL (open)	NEOGAP Therapeutics AB (Sweden)	€2.5m/€5.6m (\$2.8m/\$6.2m)
Cellularity (open)	SAMPLIX ApS (Denmark)	€2.5m/€7.5m (\$2.8m/\$8.3m)

^aActual amount of equity financing to be finalized.

The cancer portfolio illustrates of flexibility within the EIC. Recent rule changes allow projects from EIC open calls to be admitted to challenge-based portfolios based on their ‘fit’ with the portfolio considerations. The Precision Oncology Accelerator portfolio now comprises two groups of firms (Table 3): those that responded to the 2023 Accelerator cancer challenge call (such as Pamgene) and those picked from earlier EIC open calls (such as Smart Immune and SAMPLIX ApS). From an oncological perspective, the portfolio scope is broad and diverse and yet coherent in its shared ambition to cross the gap from interesting diagnostic observation to new biomarkers that can guide treatment in the clinic.

A second Accelerator Challenge, established in 2024, is designed to enhance the EU response to future pandemics. Building on knowledge of current antiviral monoclonals and insight from the response to the COVID-19 pandemic, the challenge outlines objectives such as the need for broad-spectrum monoclonal antibodies (mAbs) to protect immune-compromised individuals or reduce the risk of new variant emergence. Additionally, the challenge discusses administration methods that could be applied in overwhelmed treatment facilities and calls for innovation in mAb production methods that reduce the times for batch development and testing.

In each of these challenges, strategic intelligence shapes the design of a call and the selection criteria that aim to generate a compact and manageable set of projects. The ultimate success of EIC Challenge-based support will be the development of new solutions for medical needs of great importance (from collaborations between projects at the portfolio level) and the emergence of vibrant, sustainable companies to bring these solutions in the clinic. Because the first health and biotech challenge launched only in 2021 and Accelerator Challenges were implemented only in 2024, that goal lies ahead.

The future of the EIC health biotech portfolio

From a program manager’s perspective, challenge-based calls are ways of focusing R&D activity toward predefined topics. They help define pre-emptive research that anticipates future technical obstacles, rather than merely applying problem-solving for a particular strand of science. They deal with generic obstacles head-on using the coordinated resources of multiple laboratories.

Challenge-based calls are clearly differentiated from open calls; the two are essential but non-competing components of the

R&D landscape. Within the translational arena, the advantage of challenge-based calls is the clear goals that help give researchers realistic appreciation of near-term value. Outside the EIC, the value of portfolio research for bringing awareness of multiple competing partial solutions, and the value of collaboration, are starting to be recognized.

The origin of projects that can be components of an EIC portfolio may evolve. Empowered by appropriate legal adaptations, future portfolios could include projects with relevant shared components supported by the EC or by national (member state) or regional innovation bodies. An extended EIC health and biotech portfolio (Fig. 2) would, theoretically, be flexible enough to harness a larger critical mass of strategically important technology under proactive management in the mode of the current EIC portfolio managed by a program manager—but undertaken at a larger scale.

As well as broadening the origins of eligible projects, EIC support is expanding and maturing. Although open calls represent 70% of all EIC calls, an increasing proportion of EIC funding is going to

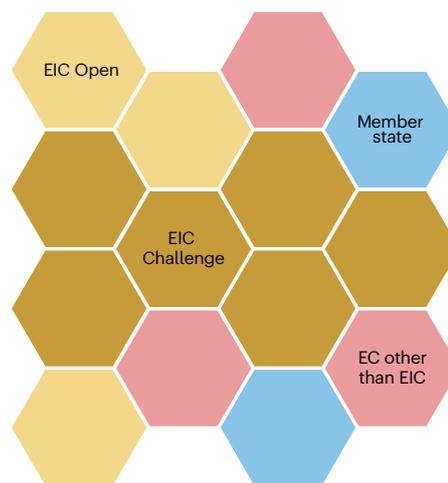


Fig. 2 | Project origins in a future extended EIC Portfolio. Projects within EIC portfolios might arise in many quarters, including other European Commission (EC)-funded programs and national bioscience and clinical initiatives within EU member states. Each hexagon represents a separate project brought into a single portfolio, with colors representing different origins.

challenge-based calls. The Accelerator Challenge-based calls represent 44% of EIC Accelerator support in 2024. The model may catch on within the EIC's Pathfinder when presented, given further evidence that the impact of portfolios is bigger than the sum of the impacts of individual projects.

Challenge-based support in health biotech is also a way of ensuring that public money is devoted to projects that represent medical needs of strategic importance and is not just maintaining the status quo within R&D.

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Competing interests

The author declares no competing interests.