Inclusive and affordable healthcare

BCG hello tomorrow

Report 2

Inclusive and affordable healthcare

COVID-19 won't be the last pandemic in our lifetimes. We'll likely see more and more epidemics stemming from the impact of human activity on the environment. Think deforestation, thawing permafrost, and our rising resistance to antibiotics. In addition, the WHO anticipates a demographic shift that will put more than 22% of our population [(1)] in the over-60 age bracket by 2050. What will that mean? An inevitable increase in demand for remote diagnostics and care is sure to accelerate the convergence of digitization and healthcare.

Not insignificantly, it was deep tech startups BioNTech and Moderna that developed a vaccine to fight COVID-19 in less than a year. Heavily influenced by the ongoing situation and the futuristic advances made in medicine, this year's deep tech trends in healthcare involve the digitization of health tech (digital patient twins), regenerative medicine, next generation diagnostics, and advanced therapeutics.

2.1 Digital patient twins

Building on the momentum of digitization of healthcare, digital twin technology, a new concept of digital replication that generates virtual models of objects or systems, is paving the way for personalized medicine. Using real-time data feeds, digital biomarkers, and machine learning, digital patients' twin solutions dramatically improve the way patients are diagnosed and treated, leading the charge towards an interconnected ecosystem of care.

2.2 Regenerative medicine

Development of regenerative approaches to heal a range of injuries, including post-operative wounds, is growing by more than 11% annually and is set to reach $57.08 billion by 2027. Imagine a world where normal breast shape can be restored post-mastectomy, or where biodegradable steel implants are used to heal bone fractures. Thanks to advances made in stem cell technology and new materials, regenerative medicine has entered a new era.

2.3 Next generation diagnostics

The recent pandemic has emphasized the vital role played by polymerase chain reactions (PCR), next-generation sequencing (NGS), and serology tests, with the PCR segment claiming the highest growth rate in 2020. Technologies like CRISPR and LAMP are introducing the efficiency and reliability of genomics testing to remote diagnostics. Advances made in molecular biology, sensor technology, AI, and medical imaging and their convergence has taken diagnostics out of sophisticated labs to provide point of care diagnosis within minutes and often directly accessible to the patient. Few, if any, will miss the "hours if not days" medical tests requiring rigorous clinical laboratory settings and skilled technicians to perform them.

2.4 Novel molecular therapeutics in the post-COVID-19 era

If digital patient twins and molecular diagnostics are the first step in the journey towards personalized treatments, therapies and enabling therapeutics are the second. Finding cures for diseases like cancer, genetic disorders, and the dreaded resistance to antibiotics, which have rankled hospitals around the world, seems like an endless tunnel. Molecular therapeutics powered by advances in genomics, proteomics, and cellular biology may well be the light at the end.

Inclusive and affordable healthcare

Why it matters

While deep tech and digitization in healthcare will not replace healthcare professionals (HCPs), they will certainly enhance the healthcare experience for both patients and HCPs. Advances with deep tech and digitization can reduce HCP overload by assisting them with early and accurate diagnoses of health problems, generate optimum treatment plans, and facilitate latest interventions towards improved patient outcomes. The confluence of medicine and technology is revolutionizing healthcare by addressing some of its most persistent challenges such as rising treatment and pharmaceutical costs, HCP shortages, and epidemic preparedness.

Due in part to COVID-19 and the aforementioned challenges, the healthcare market is projected to reach $10 trillion by 2022 [(3)]. In 2020, global AI alone generated $8.23 billion for the healthcare industry and is estimated to reach $19.4 billion by 2030, implying a CAGR of 38.1% from 2021 until then [(4)].

An ecosystem game — Why should we be team players?

Moderna and BioNtech showed the world that startups, and not big pharmaceutical companies, were able to bring mRNA vaccine technology up to speed to fight COVID-19. By collaborating with corporations, startups were able to pull off the incredible feat of developing, producing, certifying, and distributing vaccines — with half of the world's population getting at least one shot — in less than a year. This rapid scaling up was made possible by the evolution of platform technologies, and by the intense collaborations formed within the ecosystem. Decades of research were needed to build and perfect the LNPs, or Lipid Nanoparticles, that were used to deliver the mRNA to the cells, the covid virus genome was sequenced by researchers in another part of the world, while the platform infrastructure to mass produce the vaccines came from corporates like Pfizer and Lonza. Each of these components was imperative for the eventual vaccine production.

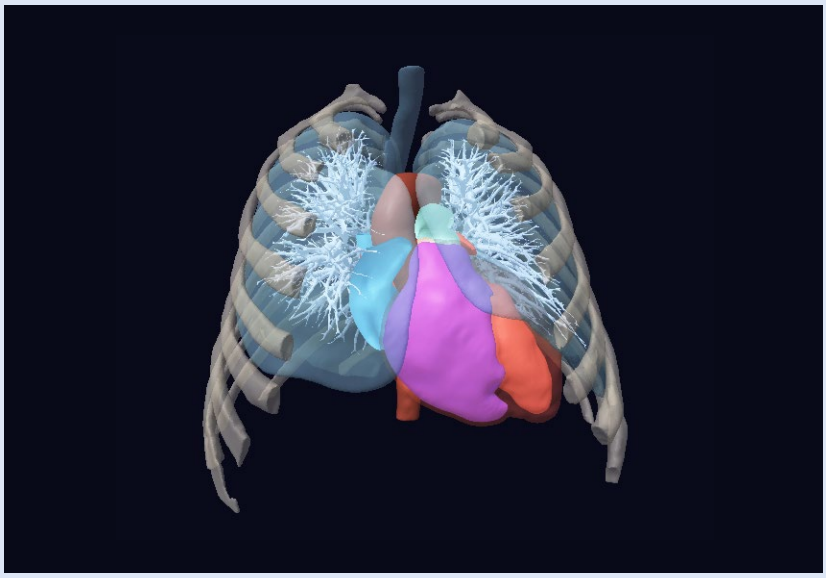
The multiple partnerships formed in the ecosystem are the key success factor for making the vaccine production and distribution possible on an accelerated time scale. Collaborative approaches in the ecosystem are the key to large-scale industry disruptions. Companies must capitalize on these approaches to answer current and future health care challenges successfully. Managing the ecosystem's complexity and diversity will remain challenging, but successfully navigating them might determine the next disruptive healthcare product/service to appear in the market.

Overview of trends

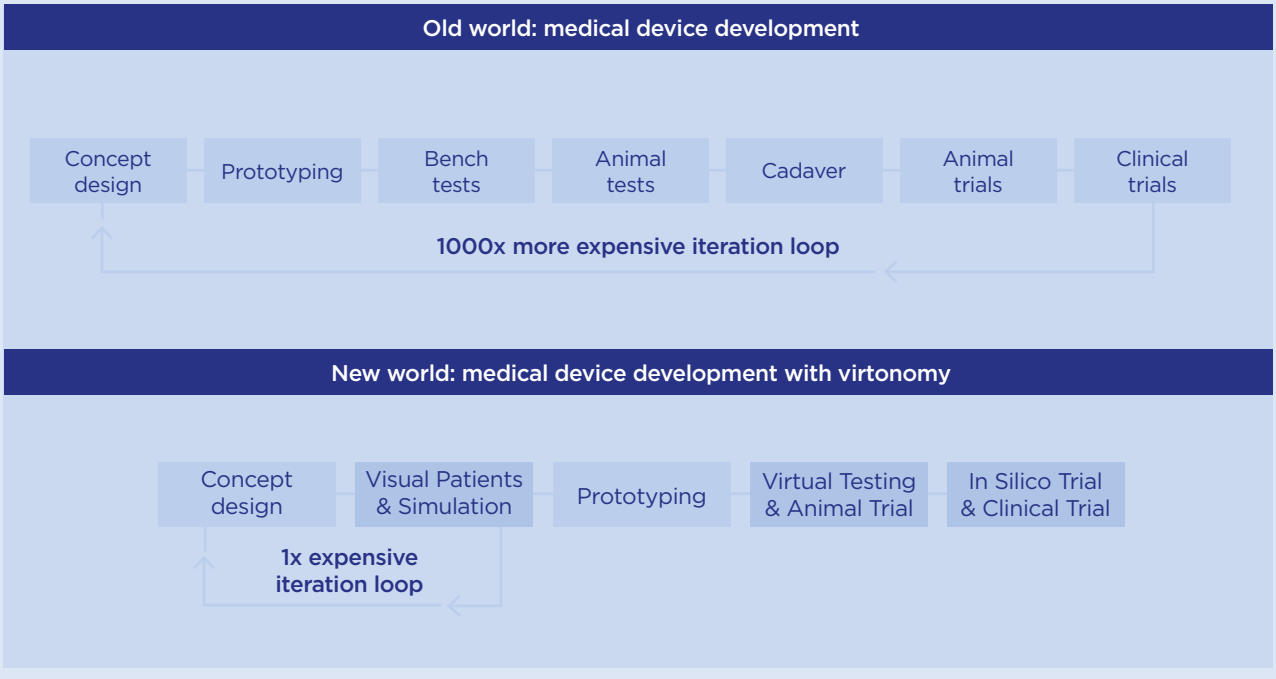
This year, deep tech pioneers proved that solutions they developed can truly help solve the health challenges of this decade by helping to build more resilient, inclusive, and affordable healthcare.
Keys to this achievement are the digital capabilities these solutions employ to create digital patient twins at scale, increased precision in the fine-tuning of treatments, and boosting progress in drug discovery (see page 6). Some of these startups have taken inspiration from nature to design implants that can enhance tissue growth and repair, prompting natural regeneration (see page 12). At the same time, plug-and-play solutions have facilitated remote and point-of-care diagnostics, and novel molecular therapeutics could provide the solution to problems like antibiotic resistance (see page 20).

What's next to watch?

A review of over 218 deep tech pioneers selected this year (133 in Digital Healthcare and Medical Devices, and 85 in Medical Biotech) revealed multiple areas of interest. However, digitalization of healthcare leading to its delocalization and democratization, is a key upcoming trend that has taken the market by storm.



Virtonomy » Medical device testing can take up to 10 years and more, resulting in high development costs. **Virtonomy**'s v-Patients are 3D/4D anatomy models created using high-resolution CT scans that offer virtual medical device testing, data-driven clinical trials on digital twins, decreased animal and human trials, and accelerated time to market.



Trends' expected time to market [5]

2030

page 20-21

Novel molecular therapeutics in the post-COVID-19 era

Chain Biotech » Microbiome therapeutics company developing oral immuno-therapies, i.e. oral vaccines

Trobix Bio » Phage-based antibiotic sensitizing solution that creates a selection pressure to reverse antibiotic resistance.

SideROS » Ironomycin is a chemical molecule that disturbs iron homeostasis in persistent cancer cells, and provokes cancer cell death.

2028

page 12-13

Regenerative medicine

Healshape »
Breast bioprosthesis.

Medjeduse » Patented degradable biomaterial for recovery from spine injury.

Medical Magnesium »
Bioabsorbable orthopedic implants made of proprietary magnesium alloy.

page 16-17

Next generation diagnostics

D-NOME » Creating plug-and-play solutions to the DNA diagnostic methods without complex instruments, thereby bringing Point of Care (POC) affordable solutions to the market.

DeepSpin » Portable MRI created using an AI-powered intuitive interface and system design to reduce the weight and size of the MRI while keeping the image quality comparable and lowering the costs.

Pear Bio » Organ-on-a-chip technology with algorithms that measure the impact of different treatment options on stopping cancer in its tracks i.e. personalized treatments for cancer patients.

Klavant Gmbh »
IDA — Intraoperative Digital Aortography reduces the need for reoperations during aortic valve reconstruction.

2026

Ochre Bio »
Pre-treatment of suboptimal donor livers and treatment of non-symptomatic cirrhosis by using deep phenotyping for drug development.

2024

page 8-9

Digital patient twins

RTsafe » 3D printed, individual patient-specific model of human head and brain to foresee cancer radiation treatment impacts.

iLoF » Cloud-based library of diseases biomarkers and biological profiles built from unique patient optical fingerprints, using AI and photonics.

IDUN Technologies » Translating brain waves into emotional and cognitive insights, developing a kit for products or services enhancements through neurofeedback.

2022

2.1 Digital patient twins

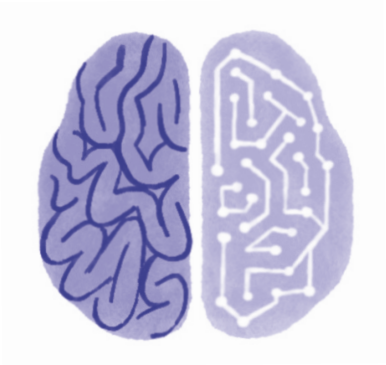
Digital twin technology, a new concept of digital replication that generates virtual models of objects (like engines or even people) or systems, has already disrupted the aeronautics and construction industries. Building on this momentum, it is now paving the way toward more efficient, less intrusive, and more personalized medicine. How? By empowering patients, doctors, and healthcare organizations to better understand and manage health, test, and predict treatment and lifestyle habit outcomes. Using new captors, real-time data feeds, and machine learning, digital patients' twin solutions produce models that offer a more accurate vision of what healthcare professionals are dealing with. By drawing individual data points from a variety of unique and secure biomarkers, they are helping to build a more interconnected ecosystem of care.

2.1.1 Why does it matter now?

Making use of digital twins could dramatically improve the way patients are diagnosed and treated. Digital twins are non-invasive in nature, cater to personalized medicine approaches, and would be instrumental in curbing costs in clinical trials and medical device testing. They would also align with future public healthcare schemes aimed at increasing value/performance-based medicine. Value/performance-based medicine refers to a system where drugs are reimbursed based on their performance and health providers are paid based on the patient's health outcomes.

2.1.2 Applications and market potential

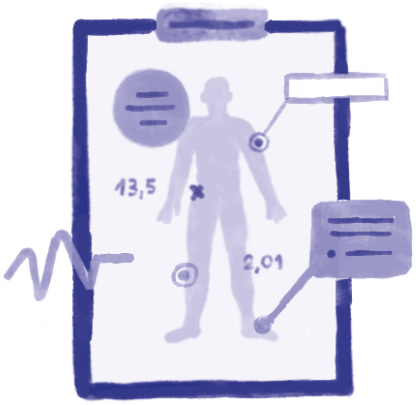
Digital patient twins operate at the crossroads of large, dynamic markets. These include personalized medicine, which is expected to reach $751 billion by 2027, and niche markets like global digital biomarkers, which is expected to grow at 30.6% CAGR reaching $22.54 billion in the next decade. There are two factors driving this steady market growth: an increase in the demand for personalized medicine and the effort to optimize early-stage drug development costs by pharmaceutical companies. Startups have already begun developing practical applications to this revolutionary technology. This year, deep tech startups produced digital organs that simulate patient reactions to treatments, and helping practitioners to fine-tune personalized medicine. Cloud-based digital biomarker solutions for optimizing patient data access and evolved technologies are helping us better understand our emotions.



2.1.3 Key roadblocks to overcome

As promising as its start may be, digital patient twin technology faces multiple hurdles on its way to becoming a solution widely embraced by the healthcare domain. The most significant of these are fragmented, ever-evolving patient data, a lack of digital twin development models in healthcare, and privacy and security concerns in established healthcare practices (GDPR, HIPAA, clinical trials, and medical device testing) — not to mention its inherently high development costs.

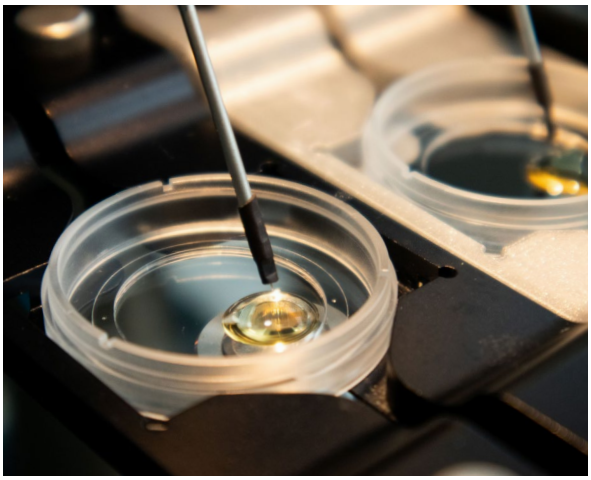
To fully unleash this trend's economic potential, industry policy makers and researchers will need to make a collective and collaborative effort to develop and mobilize the healthcare ecosystem around digital twin technology, ensuring its rapid adoption.



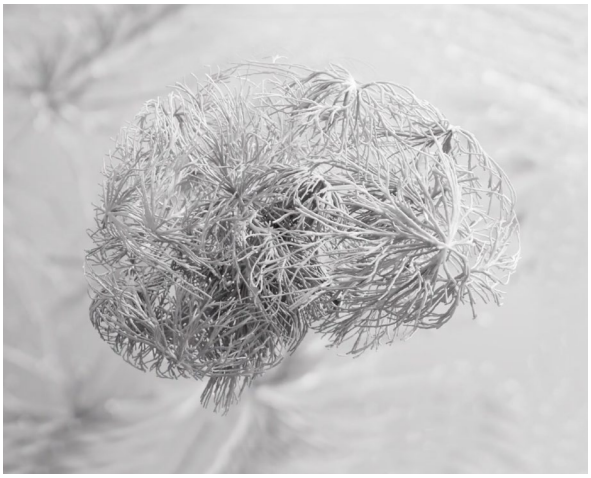
“Digital twins are non-invasive in nature, cater to personalized medicine approaches, and would be instrumental in curbing costs in clinical trials and medical device testing”

2.1.4 Use cases

RTsafe » Brain cancer radiotherapy is still risky and could cause severe side effects (blindness, paralysis, early death) or even prove inefficient as a treatment. In a world first, **RTsafe** has developed, patented, and commercialized a process/device to form an anatomically accurate 3D-printed replica of the patient’s head that can perfectly mimic the interaction with radiation. This means medical teams can simulate a planned treatment before administering the latter to the real patient, establishing radiological and geometrical accuracy of the delivery to reduce any unforeseen risks.



iLof » For many complex and heterogeneous diseases like Alzheimer’s, the idea that one medication works equally for everyone no longer holds water. **iLof** develops unique optical fingerprints for patients using AI and photonics to build a cloud-based library of disease biomarkers and biological profiles. Efficient, portable, and inexpensive for the industry, comfortable patient screening is made possible by “fingerprints” collected from nano-scale structures in blood and bodily fluids (e.g. serum, plasma). As a result, trials can be optimized and millions of euros saved by eliminating costly procedures like PET scans and lumbar punctures on patients that will be excluded from trials.



IDUN Technologies AG » A better understanding of our brain signals is key in treating certain diseases like epilepsy and in more general applications like sleep management. **IDUN Technologies AG** translates brain waves into cognitive and actionable insights to produce a kit for electronic manufacturers, pharma companies, and automotive or content providers wishing to enhance their products and services with neurofeedback. The product enables new biomarker exploration (depression, epilepsy, and more) that could dramatically reduce the time and cost needed to correctly diagnose and prescribe the best medical treatment, making EEG available to the mass market in a non-obtrusive way.

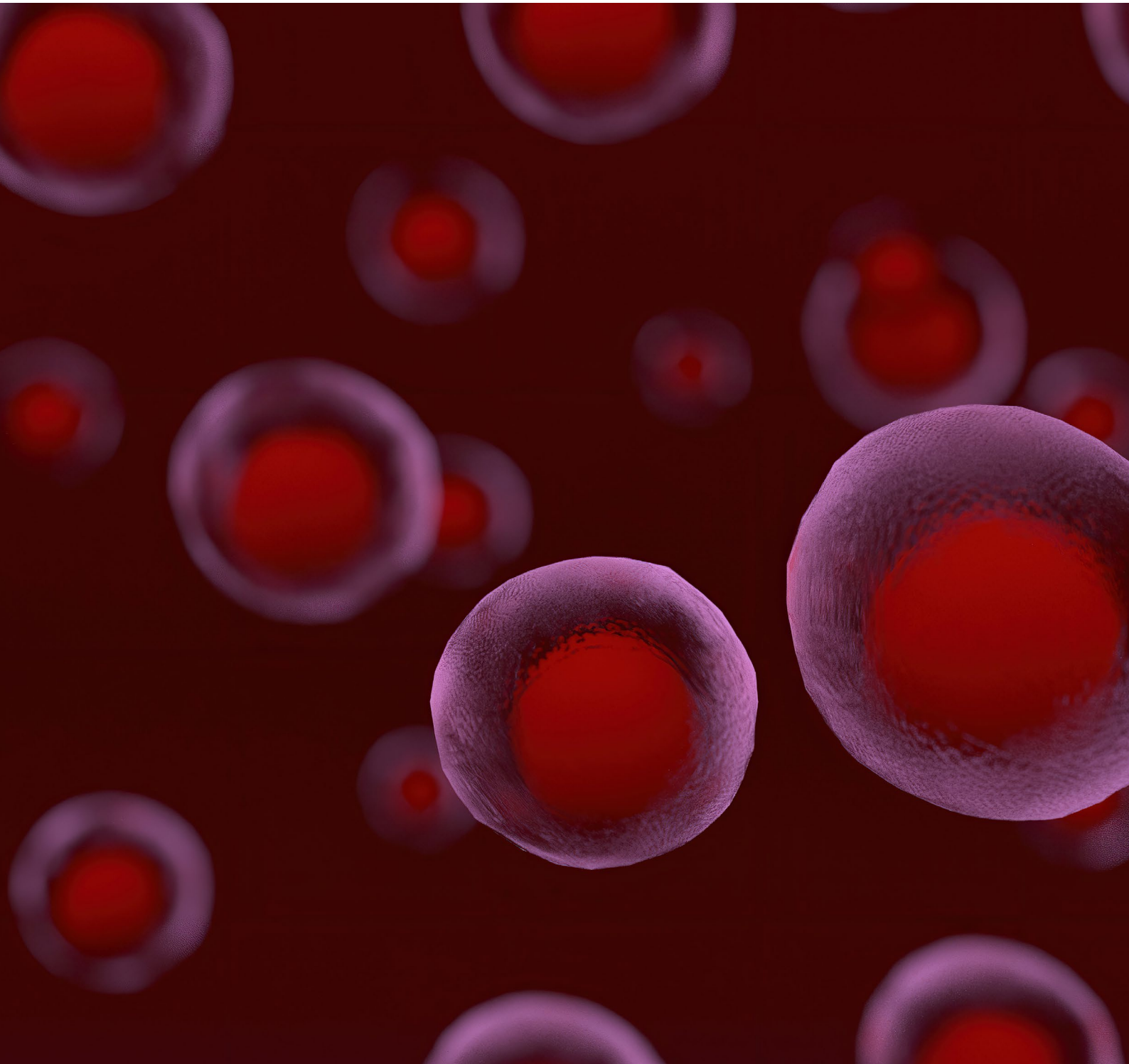
2.1.5 What our startups need

Collaboration opportunities and constraints based on our deep tech pioneers' insights.

Experiment				Develop			Scale	
1	2	3	4	5	6	7	8	9
Exploration		Experimental, proof of concept		Functional proof of concept	Minimum viable product		Industrialization	Commercialization
				» Giving access to Lab and testing facilities. » Financing investigative studies. » Leveraging national or international public-private corporate and startups consortium projects to facilitate access to larger pharma-lead clinical trials.			» Accelerating product distribution. » Giving access to specific customer bases.	

2.2 Regenerative Medicine

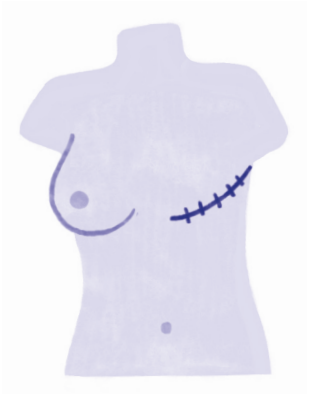
Regenerative medicine has inspired humankind's imagination since the myth of Prometheus and his regenerating liver. Only recently has the myth become reality. The term "regenerative medicine" was first used by Leland Kaiser in his 1992 paper listing key technologies set to revolutionize the way we heal and the future of hospital processes. That the future is now. Combining knowledge from the fields of tissue engineering (TE), cell transplantation, stem cell biology, biomechanical prosthetics, nanotechnology, and biochemistry, regenerative medicine is now able to restore or regenerate functioning tissue, cells, and organs.



2.2.1 Why does it matter now?

Regenerative medicine refers to finding cures for previously untreatable diseases and injuries, often by restoring the structure and function of damaged tissues and organs. Patients and healthcare industry actors alike can now avoid additional patient suffering and stigma brought on by removal surgeries, thanks to regenerative medicine. The technology can build on bodies' healing capabilities, giving rise to entirely new markets and treatments.

2.2.2 Applications and market potential



Absorbable implants

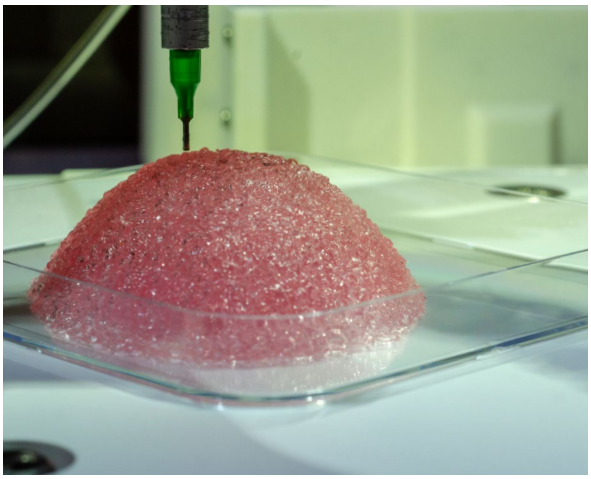
The most outstanding applications from this year's Hello Tomorrow Global Challenge explore the use of regenerative approaches in healing a range of injuries, including post-operative wounds. Some of these include post-mastectomy breast bioprostheses that promote natural tissue growth and are absorbed by the body to restore a normal breast shape, or the use of natural materials like silk for bone reconstruction or controlled magnesium absorption, and biodegradable steel implants to heal bone fractures. As a market, regenerative medicine is growing more than 11% annually and is set to reach $57.08 billion by 2027 [6], with oncology claiming the lion's share of estimated revenue.

2.2.3 Key roadblocks to overcome

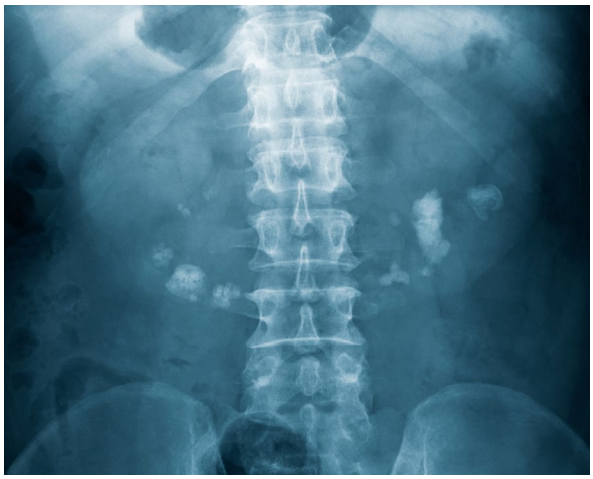
Two key roadblocks stand in the way of regenerative medicine becoming a mainstream treatment: high development and final costs, and the stringent regulatory approvals it currently requires. Existing cellular and tissue regenerative treatments can cost anywhere from $100,000 to millions.
As it stands, these high costs can be mitigated by decentralized production of cells, better reimbursement schemes, and improved bioengineering to lower the cost of cultivating and testing the cells. The regulatory and compliance certification process must be accelerated, a goal only achievable through expertise and knowledge sharing (most of these approaches being for Class 3 devices) of device design and its decentralized manufacturing.

“Regenerative medicine can build on bodies’ healing capabilities, giving rise to entirely new markets and treatments”

2.2.4 Use cases



Healshape » Of the 2 million women diagnosed with breast cancer worldwide in 2018, 40% got mastectomies, but only 30% opted for breast reconstruction. **Healshape** has developed a breast bioprosthesis, UR-shape, that restores shape and volume upon implantation. UR-shape implantation is done in tandem with a transfer of the patient’s own cells. Over time, the bioprosthesis is gradually absorbed and the patient’s tissue is restored as normal.



Medjeduse » According to the WHO, between 250,000 and 500,000 people suffer spinal injuries every year, and most are men between 16 and 30. **Medjeduse** has developed a patented degradable biomaterial (quasi-liquid hydrogel) that, when injected into a spinal cord lesion resulting from a traumatic shock, preserves and restores functional endogenous spinal tissue. The process also reconnects neuronal fibers and the surrounding cellular environment that would otherwise degenerate, causing sensory-motor interruption.

Medical Magnesium » Each year sees around 180 million bone fractures. In a smarter approach to healing them, **Medical Magnesium** gmbh has developed bioabsorbable orthopedic implants made of magnesium that use a proprietary magnesium alloy combined with a ceramic plasma-electrolytic oxidation coating (PEO). With it, the startup can pilot the metal's degradation — the crucial factor in bioabsorbable implant technology. As a result, the implant remains stable until the broken bone regains mechanical integrity. Once this is achieved, the implant degrades physiologically as new bone tissue forms.

2.2.5 What our startups need

Collaboration opportunities and constraints based on our deep tech pioneers' insights.

Experiment				Develop			Scale	
1	2	3	4	5	6	7	8	9
Exploration		Experimental, proof of concept		Functional proof of concept	Minimum viable product		Industrialization	Commercialization

» Bringing prior knowledge to the preclinical stage of certification.

» Clinical evidence for each stakeholder involved, be it customers (surgeons), payers (healthcare system, insurance companies) or end-users (patients).

» Connecting to experienced entrepreneurs or business people experienced in scaling healthtech and medtech companies.

» Helping startups build a strong network of KOLs (surgeons).

» Co-publishing clinical data with KOLs to illustrate the cost-effectiveness and added value.

» Growing market share through collaborative device roll-outs.

2.3 Next generation diagnostics

Next generation diagnostics refers to a collection of the latest molecular biology and imaging techniques as applied to different phases of medical testing, from detection to diagnosis, prognosis, and therapy response monitoring. At the end of the last decade, next generation diagnostics already included techniques like genomic and proteomic biomarkers, Next-Gen Sequencing, CRISPR and analysis of other biomolecules characteristic of a disease. Recently, healthcare adjustments in response to the COVID-19 pandemic has brought two additional techniques to light: remote care and rapid POC (point of care) diagnostics.

2.3.1 Why does it matter now?

On the journey towards personalized treatments, diagnostics is the first step. Being able to rapidly detect a disease will give medical practitioners the time they need to make the right clinical decisions. Additionally, the ability to monitor a given therapy throughout its duration will lead to more efficient and effective treatments through targeted therapeutics. Lastly, analyses based on the detection of cell phenotypes and nucleic acids — both DNA and RNA — enable much faster, more sensitive, and more precise identification of viruses, bacteria, and parasites than do traditional diagnostics.

2.3.2 Applications and market potential

Molecular tests

The recent pandemic has highlighted the practical application of the polymerase chain reactions (PCR), next-generation sequencing (NGS), and serology tests, with the PCR segment claiming the highest growth rate in 2020 [7]. In fact, the global molecular diagnostics market [8] is expected to go from $17.8 billion in 2021 to $31.8 billion by 2026. This large scale growth is owed largely to the use of PCR and qRTPCR in genomics and proteomics, PCR automation and repeat purchases of reagents and kits.

AI based diagnostics

The global market for AI in medical imaging is expected to hit $20.11 billion by 2031 [9]. In parallel, the global clinical decision support system market is on track to go from an estimated $1.2 billion as of 2020 to $1.8 billion by 2025. [10]

2.3.3 Key roadblocks to overcome

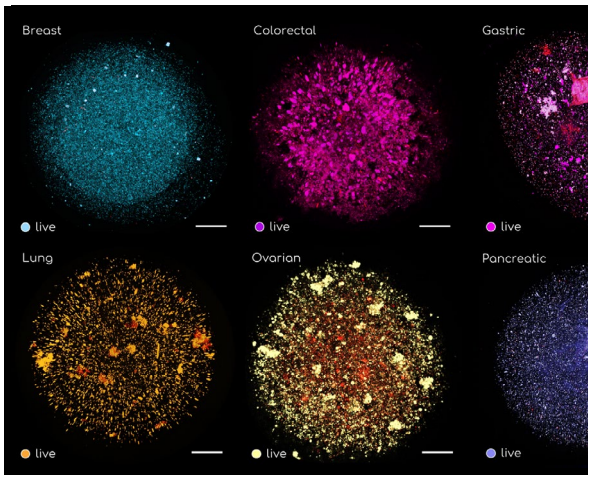
Traditional diagnostics mean heavy instrumentation, laboratory testing, longer detection time periods, and hefty price tags. Additionally, monitoring the response to an ongoing therapy (companion diagnostics) and discovery of new biomarkers remain incredibly expensive for now. AI supported medical imaging solutions and clinical-decision making are yet to be widely adopted by clinicians, patients, and reimbursement schemes. There is a need for democratization of patient data while associated policies need to be redefined to accelerate the time to market for innovations based on healthcare datasets.

“There is a need for democratization of patient data while associated policies need to be redefined to accelerate the time to market for innovations based on healthcare datasets.”

1.3.4 Use cases

D-NOME » PCR and qPCR technologies require specific multi-step temperature cycling instruments. **D-NOME** is introducing plug-and-play solutions to the DNA diagnostics game. Their innovative technology enables cell-free DNA/RNA amplification at 37°C with no complex instruments needed, bringing solutions that are both Point of Care (POC) and affordable to market.

DeepSpin » In 2020 [11], the MRI (magnetic resonance imaging market) was valued at $5.3 billion and is expected to achieve a 6.0% compound annual growth rate (CAGR) between 2021 and 2028. However, MRIs are large machines that weigh several tons and come at a high price. **DeepSpin** uses an AI-powered system design to reduce the machine’s weight while maintaining comparable image quality and curbing costs.



Pear Bio » Around 10 million people died of cancer in 2020. Even now, available cancer treatments can produce different results from one patient to the next, which is why **Pear Bio** is developing personalized cancer treatments. The startup monitors cancer progression in patient-derived tumor samples against potential treatment options. Their organ-on-a-chip technology recreates core parts of the human tumor microenvironment for precision testing. Additionally, their computer-vision algorithms measure the efficacy of each treatment in stopping the cancer and removing the tumor.

Klavant Gmbh » Intelligent, or AI-powered, medical imaging has secured its role in Oncology, COVID-19 diagnosis, and even intraoperative care. **Klavant Gmbh**'s IDA-Intraoperative Digital Aortography limits the need for reoperations during aortic valve reconstruction — a major advance considering that undetected leakages during intraoperative procedures can currently result in cumulative mortality and morbidity rates of up to 13%.

2.3.5 What our startups need

Collaboration opportunities and constraints based on our deep tech pioneers' insights.

Experiment				Develop			Scale	
1	2	3	4	5	6	7	8	9
Exploration		Experimental, proof of concept		Functional proof of concept	Minimum viable product		Industrialization	Commercialization
							» Providing production infrastructure. » Creating specific supply chains. » Introduction to networks for financial market expansion. » Using the existing regulatory networks to gain faster approvals thereby decreasing the product to market timeline.	

2.4 Novel molecular therapeutics in the post-COVID-19 era

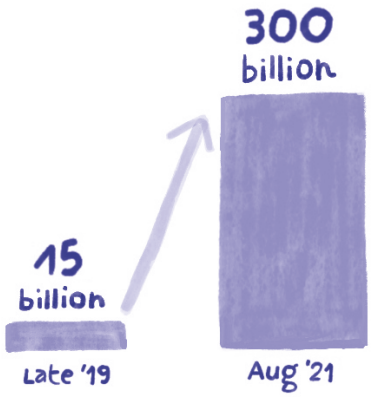
If molecular diagnostics is the first step in the journey towards personalized treatments, therapies and enabling therapeutics are the second. Ongoing advances in genomics, proteomics, and cellular biology are taking molecular therapeutics to another level. Due to these advances, we have progressed to a point where mRNA can be leveraged therapeutically in a vaccine, with wide-scale application, as witnessed during the COVID-19 pandemic. This progress offers a new perspective into mRNA, DNA and other biomolecules as therapeutics, ushering a new era for molecular therapeutics.

2.4.1 Why does it matter now?

Finding cures for diseases like cancer, genetic disorders, and the dreaded resistance to antibiotics that have rankled hospitals around the world seems like an endless tunnel. But advances in molecular therapeutics are now offering a bright end in sight, giving us the means necessary to successfully respond to both the future pandemic scenarios and ongoing healthcare challenges.

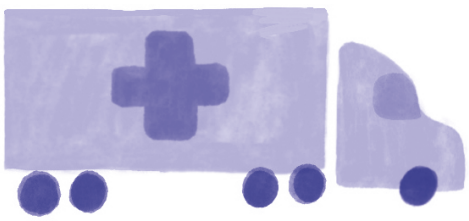
2.4.2 Applications and market potential

In 2020, the global antibiotics market was valued at $40.7 billion dollars and is expected to grow to $57.99 billion by 2028 [12]. In parallel, the global antibiotic resistance market was valued at $7.81 billion in 2017 [13], and is showing no signs of slowing down. The 5 publicly-listed companies developing mRNA had a combined market cap of $15 billion in 2020, which then grew to around $300 billion by August 2021 [14]. Comparatively, the global DNA vaccine market is only expected to grow from its $3.1 billion 2021 size to $11.5 billion by 2026 [15].



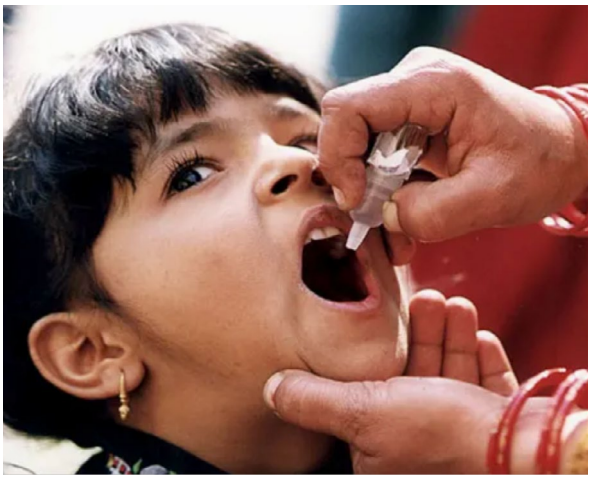
2.4.3 Key roadblocks to overcome

The advancement of molecular therapeutics faces multiple hurdles, not least of which are high research and development costs. Added to this are a hesitation to adopt amongst HCPs and the public alike, a lack of clinical trial designs that can determine the efficacy and duration of therapy effectiveness in selected populations, and a need for new supply chains (ex. cold storage and transport for mRNA vaccines).

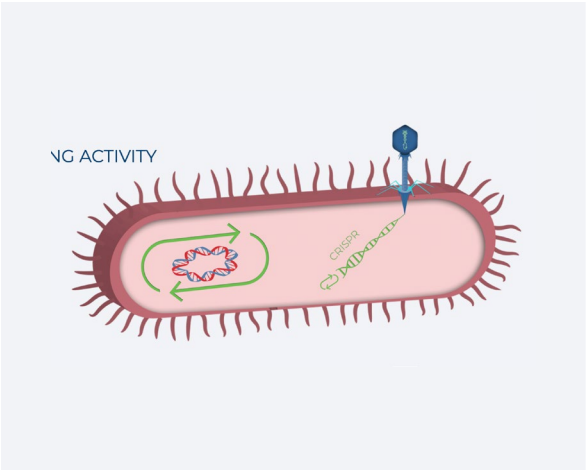


“Advances in molecular therapeutics are giving us the means necessary to successfully respond to future pandemic scenarios”

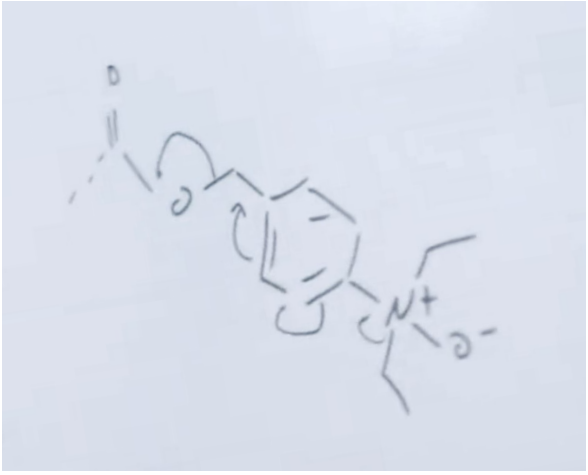
2.4.4 Use cases



Chain Biotech » The discovery of vaccines counts among the medical breakthroughs that have doubled average human life expectancy. The need for novel vaccines is more important than ever, given the recent pandemic. No surprise then that the novel vaccine delivery system market is expected to top $14.4 billion by 2030. **Chain Biotech** is a microbiome therapeutics company developing oral immunotherapies using a precision-engineered bacterium, Clostridium, to deliver therapeutic payloads to the lower gastrointestinal tract (GI). The payoff? Immunization, in the form of oral microbiome vaccines.



Trobix Bio » Each year, antibiotic resistance is responsible for an estimated 700,000 deaths — a number expected to hit 10 million by 2050 [16]. In response to this growing issue, **Trobix Bio** combines CRISPR and synthetic biology to engineer phages equipped with their ActiSenseTM technology to deliver DNA payloads targeting bacteria. This, in turn, creates selective pressure that reverses antibiotic resistance, thereby sustaining an antibiotic-sensitive environment.



SideROS » For cancer patients, recurrence is still one of the leading causes of death and lifestyle deterioration. The global chemotherapy market is projected to reach a market value [17] of $74.3 billion by 2027. **SideROS** has developed a molecule, Ironomycin, capable of accumulating in persistent cancer cells resulting in the disruption of iron homeostasis, which in turn promotes cancer cell death.

Ochre Bio » Each year, liver disease is behind approximately 2 million deaths [18]. But while liver transplants are the second most common organ transplants, less than 10% of global transplant needs are actually being met. **Ochre Bio** is bridging the gap between the demand for donor livers and suitable donor livers by pretreating suboptimal donor livers and treating asymptomatic cirrhosis using Deep phenotyping for drug development. Their approach combines genetics, advanced tissue imaging, cellular genomics, and machine learning to disease and gene systems at the tissue level.

2.4.5 What our startups need

Collaboration opportunities and constraints based on our deep tech pioneers' insights.

Experiment				Develop			Scale	
1	2	3	4	5	6	7	8	9
Exploration		Experimental, proof of concept		Functional proof of concept	Minimum viable product		Industrialization	Commercialization

» Investing in long-term ventures and fundamental research.

» Providing infrastructure and creating specific supply chains.

» Providing specific production facilities.

» Clinical trial recruitments and management.

» Using the existing regulatory networks to gain faster approvals thereby decreasing the product-to-market timeline.

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hello tomorrow

Hello Tomorrow is accelerating radical solutions to improve human and planetary health, leveraging the power of deep tech ventures. Its flagship startup competition, the Hello Tomorrow Global Challenge, received more than 25,000 applications from 132 countries. Thousands of corporates and VCs attend Hello Tomorrow events every year. Leveraging this international network and knowledge of deep tech trends, Hello Tomorrow partners with private and public organizations to help them identify new opportunities, and build new ventures to seize them.

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