

Israel Is Spearheading a “Bio-Convergence” Revolution

By Israel Innovation Authority

Four months after the World Health Organization declared it a pandemic, COVID-19 remains at the forefront of the global health agenda and will likely continue to be in the foreseeable future. But this acute global challenge hasn't displaced the long-term problems plaguing health systems worldwide – [increasing rates of chronic disease](#), [soaring drug development costs](#), and inefficient, unsustainable and prohibitively expensive healthcare delivery models. Indeed, the pandemic has only accentuated and exacerbated these pre-existing conditions.

Ignoring or downplaying these deeper issues won't help countries effectively combat the current health crisis and are only a recipe for ensuring more crises down the line. Researchers, clinicians, entrepreneurs, business leaders and governments must therefore adopt a two-pronged approach, investing in innovative solutions for addressing both near- and long-term healthcare challenges.

This will entail nothing short of a revolution in medical treatment – and Bio-convergence is poised to play a major role in making it happen. Bio-convergence represents the next technological wave of the 21st century that will revolutionize the healthtech industry, as well as many other industries and fields.

What exactly is Bio-convergence? The nascent field is an approach to problem-solving. It fuses life sciences with different technologies from mathematics, engineering, and the physical and computational sciences, creating a sum set to be far greater than all of its parts. Indeed, the human body is an incredibly complex organism made up of countless intricate systems, so it makes perfect sense that treating it must be equally multidisciplinary and multifaceted. Enabled by advances in genomics, gene therapy, DNA sequencing, artificial intelligence, big data, nanotechnology, and synthetic biology, Bio-convergence is paving such a holistic path to remarkable innovations in treatment, discovery and delivery, regenerative medicine, and diagnostics, with potential benefits for COVID-19 and well beyond.

It is exactly this tremendous potential for improving healthcare across the board – and in the process bettering lives – which has led the Israel Innovation Authority, Israel's public agency for promoting innovation at all levels, to spearhead efforts to turn the country into a hub of Bio-convergence endeavor and invention.

Bio-Convergence and the Healthcare Landscape

The Bio-convergence opportunity coincides with a crisis moment in the global health system. While breakthroughs in medical research and treatment have [increased global life expectancy at birth](#) from 52.6 years in 1960 to 72.6 years in 2018, aging populations and rising rates of chronic conditions like cancer, heart disease, and diabetes have sent healthcare costs surging.

By 2022, global health expenditure will [surpass \\$10 trillion](#). That spending tends to be disproportionately devoted to managing chronic illness: In the U.S., for instance, 60% of adults have at least one chronic condition, and these individuals account for 90% of healthcare spending overall, [according to the Rand Corporation](#).

Improving outcomes for patients with chronic illnesses while also controlling costs hinges on early, effective, and personalized intervention – and that’s precisely what Bio-convergence aims to make possible.

How Israel Is Propelling Bio-Convergence Forward

In theory, it’s clear why Israel is well-positioned to lead the Bio-convergence revolution. With [1,600 active life sciences companies](#), unparalleled expertise in fields from AI to digital health to nanotechnology, and some of the world’s leading universities, research centers, and hospital systems, the Start-Up Nation is incubating some of the most promising developments in Bio-convergence. [Ranked](#) fifth in the world in patents per capita, the country has the world’s second-largest centralized electronic health records system and is home to more than 600 active medical device companies, 500 AI-driven healthcare companies, and R&D centers established by major multinational companies like Medtronic, Philips, GE, and more. Israel’s medical, engineering, and scientific knowhow can fairly be described as a perfect fit for Bio-convergence, with healthcare systems and patients alike standing to gain big.

And in practice? Israeli-developed innovations in Bio-convergence are attracting global attention. Consider the case of [BiomX](#), which combines synthetic biology with advanced AI platform to discover and develop innovative microbiome-based therapeutics to prevent and treat cancer, and skin disorders among others. BiomX is a young company, publicly traded, that offers a complete end-to-end solution from target discovery to development of therapeutic compounds. It’s solution offers flexible capabilities to precisely modulate the microbiome and restore microbial balance through adding or eradicating bacteria with both native and synthetically altered phages.

BiomX is part of an expanding ecosystem of Israeli companies operating in the field of Bio-convergence. [MeMed](#) harnesses AI, systems engineering, and molecular biology for a diagnostic platform that delivers precise distinctions between bacterial and viral infections. The Technion’s Lab for Cancer Drug Delivery & Cell-Based Technologies has developed [nano-ghosts](#), a drug delivery system that delivers cancer drugs directly to cancerous cells, sparing surrounding healthy cells. Such companies are continuing a longstanding Israeli tradition of biotechnological innovation. In 1996, the Weizmann Institute of Science [developed Copaxone](#), the groundbreaking multiple sclerosis drug that reduces the frequency of relapses, and in the 1970s the Technion, in collaboration with Teva Pharmaceuticals, [incubated Azilect](#), a drug used to treat Parkinson’s Disease.

Notably, these breakthroughs were the product of multi-stakeholder, multidisciplinary collaborations bringing together academic researchers, technologists, and industry – exemplifying the kind of cross-pollination at the heart of bio-convergence.

Accelerating Innovation in Bio-Convergence

At the core of Israel’s early success in Bio-convergence is its world-renowned human capital. Unleashing the full potential of Israel’s human capital requires smart investments to support and accelerate promising technologies and cutting-edge solutions – which is why over the past decade, the Israel Innovation Authority has invested more than \$100 million annually in the life sciences sector across a number of different programs.

Through international cooperation agreements, R&D incentive programs targeting multinational corporations, and early-stage incubator programs, the Innovation Authority is propelling Bio-convergence forward for the benefit of humankind.

The innovations that will define the future of healthcare will transcend disciplines, relying on ingenuity and expertise across different domains. That outside-the-box approach gave rise to the Start-Up Nation – and it's put Israel in a prime position to pioneer a new era of healthcare with this groundbreaking approach to human wellness.