Belén Garijo
Chair of the Executive Board & CEO
Merck Group

MERCK

New medicines

Process

Pharma and life science - digital, data – automation

Rise of AI and automation technologies

Lack of access to unbiased, high-quality data

Cross-sector business collaboration

and also in other markets

AI, drugs and faster cures

The time, cost and risk of bringing a new medicine to market has risen steadily for several decades. On average, each new drug launch now costs more than EUR €2 billion and takes at least 12 years. And yet, nine out of every ten new drugs will fail during clinical development.

Such setbacks can be disastrous for patients and their families, who may be anticipating the approval of new medicines in the hope they might save, extend, or enhance life. To overcome these critical challenges for patients we urgently need a solution that increases the speed and effectiveness of R&D in our industry.

One exciting beacon of hope has emerged in recent years – the scientific megatrend of bio convergence. This convergence of modern technologies from across biotech, engineering and digital is helping to accelerate the speed and impact of science. By increasing our understanding of human biology, this new trend can make healthcare far more precise, personal, preventative and predictive.

Driving the bio convergence paradigm

As a globally diversified science and technology company with leading positions in life science, healthcare and electronics, Merck is well-positioned to unite two previously separate worlds: the world of small molecule and biological drugs and the world of AI and other digital tools.

By bringing these worlds together, we have begun to identify much faster and more efficient ways to discover, develop and manufacture drugs. These learnings are applied to our future drug products and the many biopharma companies that benefit from our contract testing, development and manufacturing (CTDMO) services.

Building a bridge across disciplines

As an early pioneer in this new era of bio convergence, Merck was one of the first to explore the potential benefits of combining technologies and knowledge from various scientific fields to benefit patients. We leveraged a mix of top-down and bottom-up approaches to establish multi-disciplinary teams of experts in drug discovery, AI and Machine (ML), chemistry, bioinformation, data science and software engineering.

Additionally, we collaborated with partners to combine our R&D innovations, such as our in-house AI/ML models trained on our proprietary R&D data, with industry-recognised tools to build best-in-class solutions. By working across sectors and unlocking hidden synergies, our multi-disciplinary teams increased speed and created impactful solutions with a 'patient-first' mindset.

Why AI?

This approach led to a new wave of innovation across Merck. Conventional processes for drug discovery usually took around four to five years and accounted for nearly one-third of the total cost of bringing a new drug to market. However, by leveraging Generative AI and robot-assisted automation to evaluate thousands of potential compounds more efficiently, we compressed the time required for pre-testing by 70%.

For example, our AIDDISON™ software uses Generative AI and predictions based on proven R&D data to identify the best drug-like candidates. The platform also integrates our SYNTHIA™ retrosynthesis software to assess optimal routes for the manufacturability of the target molecule. This AI-software combination provides scientists with intelligent, faster and novel approaches to drug discovery while integrating sustainability into the design process.

AI has also helped to inspire new ideas that would be impossible to conceive using traditional methods. Supported by the automation of repetitive tasks during the discovery process, AI tools enable us to design "dream molecules" with enhanced safety and efficacy. Plus, they can save hundreds of human hours and valuable materials in molecule optimisation and synthesis experiments.

Making it real

The potential applications of data and digital to push healthcare boundaries extend far beyond the design and discovery of new drug products.

As one example, consider a scenario where AI-enabled digital twins for smart manufacturing systems are used to generate accurate virtual representations of a physical object. The predictive capabilities and adaptability of automated systems, digitalised processes and robotics would make drug production more efficient and sustainable at any lab, clinical or commercial scale.

These and other advances are being applied at our recently inaugurated Biotech Development Centre in Switzerland. The Centre features our latest digital solutions and is designed to the highest standards for continuous production.

It is the key to accelerating the transition of many exciting molecules into clinical drug candidates.

Leadership in a new era

Transformative healthcare is now occurring globally. Europe can spearhead this AI-driven innovation wave thanks to its deep expertise in pharma, biotech and smart materials, and its leading R&D hubs, trusted regulatory framework and commendable record for data protection. This would be a win-win for European citizens as well as its industrial base, both in the pharma sector and for our digital industries.

Yet some factors are holding us back. First of all, our healthcare system is too fragmented and bureaucratic. Second, conflicting legislative agendas may hinder progress.

For Europe to remain a biopharma leader in the AI era, we must strengthen our Single Market.

This means streamlining regulations, cultivating local talent, safeguarding intellectual property, fortifying strategic industries, and easing export controls. For example ensuring the data privacy of patients is vital. Europe's strict rules on data privacy, security, and exchange can thus become a competitive advantage. Yet this can only occur via the use of open ecosystems where anonymised information can be safely leveraged by trusted healthcare parties for the benefit of patients.

For European innovation to prosper in the 21st century, it must be cross-sectoral, strategic and collaborative. Yet for such dynamic innovation ecosystems to live up to their potential, the right framework conditions must be established by public stakeholders. Patients cannot afford to wait for new cures longer than necessary. To serve them, Europe must be bold and unified to secure its long-term competitiveness.