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25 Years of Biotechnology Innovation: Reflecting on much success and anticipating more



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In 2000, Candriam took a bold stand, launching a then avant-garde investment strategy entirely dedicated to the emerging biotechnology sector. Over the past two decades, biotechnology has grown into a vital and central pillar of the healthcare industry. We have witnessed an explosion in scientific breakthroughs and therapeutic innovation, supported by strong early-stage research and robust funding.

Today, the industry spans hundreds of companies across numerous therapeutic areas and technological platforms, from R&D-focused businesses to fully commercialised firms. Candriam's investing has developed along with these changes, anticipating trends and identifying the key players shaping the future of medicine.

Our investment strategy is implemented by a management team combining financial expertise and scientific specialisation, with experience in biotechnology research. It is based on rigorous analysis and an in-depth understanding of the sector, and has generated long term attractive performance (Figure 1).

Explore Close up



25 Years of Scientific Breakthroughs: A moment to Reflect on Their Value

The last two decades-plus have seen unprecedented discoveries in the biotechnology sector, with innovations and successes that have changed lives and redefined life expectancy for millions of patients. As we mark this milestone, we reflect on some of the major advances that have made biotechnology indispensable to longevity and quality of life today.

This recognition and reflection is especially relevant today, as the biopharma sector faces challenges to its core foundations. The value of rigorous scientific investigation, transparency and peer review, along with a desire to push our understanding and seek proof is at the heart of this science-driven sector.

These principles underpin everything: from basic science, our understanding of diseases, to successful drug discovery and development, and the role of regulators who ensure the safety and efficacy of drugs that enter the commercial markets. In a world where these fundamentals risk being overlooked or challenged, it is more crucial than ever that this is respected and supported.

The Genetic Revolution: a Keystone Technology

During the last 25 years we have seen the completion of the Human Genome Project, which mapped the entire human genetic code – a huge international feat which brought together decades of scientific innovation and discovery.

Our understanding of the genetic origins of many diseases has paved the way for many revolutionary treatments, including over 180 FDA-approved cancer drugs that specifically target the underlying genetic fault. Over one million diseases have now been identified as having a genetic association, many of them rare diseases affecting only a small number of patients, but often with severe and expensive complications.

Furthermore, the rapid improvements in sequencing technology have significantly reduced both the time and cost of gene sequencing. The Human Genome Project took 13 years and cost \$2.7 billion¹. Today, a genome can be sequenced in a day and could cost as little as \$200². This has already had, and will continue to have, a profound impact on our understanding of disease and on the future of drug discovery.

1 - Source: The Cost of Sequencing a Human Genome

2 - Candriam

Oncology: a Revolution in Therapeutics

Nowhere has genetics had more impact than in the early diagnosis, treatment, and monitoring of cancer. Once dominated entirely by traditional chemotherapy, cancer treatment has progressively shifted toward therapies that target specific cancer-driving mutations, as well as immuno-oncology approaches that harness the patient's own immune system.

Keytruda (pembrolizumab), developed by Merck³, was the world's best-selling drug in 2024⁴. First approved in the US in 2014, it targets a marker on immune cells and works by activating the immune system to recognise and fight cancer. It is now approved for the treatment of more than 18 different types of cancer⁵. Looking back over a decade at some of the early approved indications, such as metastatic melanoma, data now shows that half of the patients treated can expect to live at least ten vears⁶.

Multiple myeloma is another example of a cancer type that has seen major innovation leading to significant survival benefits. Where patients once faced an average life expectancy of just two to three years in the late 1990's, we now have more than 17 approved targeted therapies for this disease⁷, including cutting-edge patient-derived cell therapies. In many countries, including Europe, these have helped to extend overall survival to more than eight years.

Since 1991, cancer mortality has fallen by 34%⁸, thanks largely to earlier detection and significant advances in treatment. Yet with the increasing life expectancy for the overall population, the likelihood of developing cancer also rises today, the lifetime risk is estimated at around 40%. Cancer remains one of the leading causes of death globally and continues to be a major focus of research and development investment across the healthcare industry.



3 - Securities not in the portfolio

- 4 Source: 10 Best-Selling Drugs of 2024 Rake in Billions Amid Exclusivity Threats BioSpace
- 5 Source: Keytruda product label 6 - Source: ESMO 2024
- 7 Source: https://www.myeloma.org/multiple-myeloma-drugs

8 - Source: National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention, 2022

^{9 -} Sources: National Institute of Health (NIH), World Health Organization (WHO)

Obesity: an Historic Turning Point

The rise in obesity and its impact on population morbidity and mortality since the 1980s has become one of the most significant public health challenges globally. Yet, largely thanks to biopharmaceutical innovation, for the first time we are beginning to see a decline in obesity rates in the Unites States, the market where the new antiobesity medications have been available at scale for the longest period.

Large, comprehensive clinical trials conducted across the industry have demonstrated that these approved weight-loss agents offer substantial additional health benefits and prove a link between obesity and many other chronic conditions. They have been shown to significantly reduce the risk of cardiovascular events, such as heart attacks, slow the progression of chronic kidney disease, protect the liver in metabolic liver disease, and lessen the severity of obstructive sleep apnea. Later this year, we expect data related to the impact of these drugs on Alzheimer's disease.

While the connection between obesity and cancer may seem intuitive, some of the first data showing that weight loss can reduce the incidence of obesity-related cancers was presented by several independent investigators at last year's American Society of Clinical Oncology (ASCO) annual meeting. According to the American Cancer Society, 8% of cancer cases in US adults are attributable to excess body weight. At the ASCO conference, data showed that patients on GLP1 therapy had a 39% lower risk of developing cancer versus to those without intervention.

These new therapies, backed by extensive research, have the potential to reshape public health beyond simple weight loss and will also likely reduce total healthcare spending over the longer term.

Virology: Huge Advancements Over The Last 25 Years

Virology has also seen broadly acknowledged success over the years. This includes the treatment of AIDS, long term HIV control -- and now prevention -- as well as curative therapies for chronic Hepatitis C infection. Perhaps less widely-known, the rollout of the Human Papilloma Virus (HPV) vaccine had a profound impact on the prevention of cervical cancer. A study published in the Lancet in 2021 reported a substantial reduction in cervical cancer incidence among young women following the introduction of the HPV immunisation programme in England. The findings suggests that the programme has almost eliminated cervical cancer in women born since September 1, 1995¹⁰.

Following the approval of the first direct-acting antivirals with high cure rates, the UK government committed to eliminating Hepatitis C by 2030. These breakthrough therapies offer cure rates exceeding 90% in under three months¹¹. According to the most recent UK Government update (March 2025), the number of people with chronic hepatitis C in England fell by 56.7% between 2015 (when the UK began reimbursing Sovaldi) and 2023.

10 - Lancet, Falcaro et al 2021 Vol 398 p 2084 11 - Source: Drug label Sovaldi A 2023 study published in *The Lancet HIV*¹² reported that life expectancy for people with HIV taking antiretroviral therapy (ART) has increased substantially over the past 25 years. In the early 1980s, when AIDS was discovered, life expectancy was just one to two years. Today, for patients diagnosed early and on ART, life expectancy is now only slightly lower than that of the general population. Over time, treatment efficacy has improved and side effect profiles have improved considerably. We are now awaiting US regulatory approval for a twice-annual injection to prevent HIV infection.

These successes illustrate biotech's ability to transform previously incurable diseases into longterm manageable conditions.

COVID-19 Pandemic: Unprecedented Mobilization and Responsiveness

A currently more controversial anti-viral success story, but one we think is important to highlight is the remarkable agility the biopharma sector showed in responding effectively to the COVID-19 health emergency. This period highlighted the decisive role of biotechnology and clinical research in addressing global public health challenges with speed and at scale.

It took 63 days from receiving the initial genetic sequence of the virus for Moderna¹³ and the NIH¹⁴ to initiate human clinical testing of an mRNA-based vaccine. Within less than a year, these vaccines received approval with efficacy data exceeding expectations. A 2022 article from *The Lancet Infectious Diseases*¹⁵ modelled that over 14 million deaths were prevented in the first year of vaccine availability, substantially altering the course of the pandemic.

12 - Trickey et al, Vol 10 p E295

13 - Securities in the portfolio

15 - Source: The Lancet Infectious Diseases, Watson et al, Vol 22, p 1293

^{14 -} US-based and predominantly US-government-funded National Institutes of Health

Looking Ahead: The Next 25 Years

If the last 25 years have brought profound transformation, the years ahead promise discoveries that could be equally revolutionary. Biotech's long-term value proposition remains intact. The biotechnology industry exists to improve patient outcomes, a mission that is inherently aligned with both ethical impact and commercial success. Candriam remains committed to identifying the technologies, science and patient needs that will shape tomorrow's medicine, and to integrating these into our investment strategy.

Today, most of the world's best-selling drugs are biotech products¹⁶, a testament to the sector's central role in reshaping the medical landscape. The biotech industry, supported by a market capitalization of \$1,300 billion¹⁷, remains robust in terms of funding and scientific innovation. It is also poised to be one of the sectors most positively transformed by the application of Artificial Intelligence.

In parallel, continued advances in genomics and data integration are paving the way for truly personalized medicine, that is, treatments tailored to individual patients at the molecular level. Breakthroughs in synthetic biology, as well as next-generation gene and cell therapies, are expanding the boundaries of what medicine can achieve, offering curative potential for diseases that were previously untreatable.

The contribution to the future of the biotech sector from countries outside of the United States, particularly China, will also be a development to watch. Additionally, we believe it is inevitable that increasing focus on the drug pricing and broader access to medicines will push companies to make these priorities an integral part of their sustainability strategies.

We are often asked where we are focusing our attention from a therapeutic point of view, here are three areas we are watching closely, among many others!

16 - Source: Candriam

17- Source: NASDAQ Biotechnology Index, March 2025

Neurology and Central Nervous System: A New Horizon

Much like oncology 20 years ago, advances in our understanding of brain function, and of the role played by genetics, are paving the way for innovative treatments across a wide range of neurological disorders. Cobenfy, approved in the US last year, was the first new agent in 50 years to offer a novel mechanism of action for schizophrenia. Similarly, new drugs have been approved for Alzheimer's disease, although they have yet to achieve the commercial success many had anticipated. Promising blood-based diagnostic tools may be close to approval, potentially allowing for earlier and more accessible detection of neurodegenerative conditions.

In the coming years, we expect to see important data across multiple areas: in Parkinson's disease, additional Alzheimer's treatments based on new mechanisms of action, late stage trials investigating psychedelics for depression, as well as novel therapies for Angelman syndrome. Research is moving forward on drugs for both common and rare forms of epilepsy, as well as new options for narcolepsy, Huntington's disease, and many others. In 2023, neurology was second only to oncology as the therapeutic area driving the most M&A activity in biopharma¹⁸.

Cardiometabolism and Obesity: a Revolution in the Making

As previously highlighted obesity and interlinked metabolic diseases are a public health crisis and one we are only in the early stages of addressing with the new anti-obesity therapies. We anticipate drugs to treat metabolic diseases with an impact on the heart, liver and kidneys will continue to advance and reshape the field of cardiometabolic diseases.

Allergies: a Growing Challenge

The rise in allergy and inflammatory diseases in the Western world is being met with a deeper understanding of the underlying mechanisms, making this an increasingly important area of innovation within biotechnology. We have already seen major success with products like Dupixent, which has been approved for a range of conditions including atopic dermatitis, asthma, eosinophilic esophagitis and Chronic Obstructive Pulmonary Disease (COPD). While these diseases may appear unrelated, they share common biological pathways.

So far, progress in the treatment of more common allergies has been limited, leaving a significant opportunity for innovation. In our view, this represents a fertile area for long-term impact.

Looking Ahead: The Next 25 Years

For 25 years, our biotech investment strategy has been based on in-depth analysis of scientific trends and breakthrough innovations, with the goal of capturing the most compelling investment opportunities in the biotech sector. The natural evolution of our team and its collective expertise reflects this forwardlooking mindset, ensuring the continuity of a rigorous, dynamic approach. This consistency has been a cornerstone of the strategy's performance since inception.



Figure 1: A Strategy for the Long Term

Past performance is no guarantee of future results and is not constant over time. Source: Candriam, Dec 2024

As biotechnology continues to reshape the future of medicine, we remain as committed as ever to staying at the forefront. Supporting innovation, improving lives, and delivering long-term value for our investors.



All investments in our Biotechnology strategy involves risks. The main risks associated with investing in the strategy are:

- Risk of capital loss
- Equity risk
- Currency risk

• Liquidity risk

Derivative risk

Concentration risk

- Sustainability Risk
- ESG Investment Risk

The risks listed are not exhaustive and further details on risks associated with investing in the strategy are available in regulatory documents.

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