

# biotech focus

## New Zealand: unique biodiversity and world-class science converge

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With a heritage of world-leading agricultural primary production and a tradition of scientific research excellence spanning >150 years, New Zealand has contributed to some of the world's most important scientific advancements. In 1904, it was a New Zealander, Ernest Rutherford, who first split the atom and whose efforts led to the development of modern nuclear energy. In 1906, another New Zealander, Joseph Nathan, founded Glaxo, now part of one of the world's largest pharmaceutical companies – GlaxoSmithKline (GSK). Together with Francis Crick and James Watson, New Zealander Maurice Wilkins discovered the structure of DNA in 1953.

New Zealand's geographic isolation was a challenge overcome by the scientific community, but distance from other land masses has led to the development of a unique natural environment, the best animal health status in the world and a rich biodiversity that offers great potential as a resource for bioactive material discovery (see [Figure 1](#) for a map of New Zealand).

Recognizing its potential to provide a significant economic boost to the country, successive governments have invested heavily in biotechnology research, building on a rich history of expertise in the genetic improvement of animals and plants. This has led to the development of a vibrant and innovative biotechnology industry – renowned for finding new approaches to solving old problems ([Table 1](#)).

### Biotechnology research

The burgeoning growth in New Zealand's biotech industry is funded through considerable investment in R&D infrastructure. All of New Zealand's eight universities conduct world-class biotechnology research. The nine Crown Research Institutes (CRIs), which are primarily funded by the New Zealand Government, complement university research and, where appropriate, collaborate with university researchers and the business community.

The industry's research capability recently received high acclaim from the Organization for Economic Cooperation and Development (OECD). The organization declared New Zealand's framework for allocating funding to research, science and technology to be one of the best in the world, and ahead of Europe in terms of the structure of its research systems. Other accolades have come from the World Bank, which states that New Zealand's economy is the best for doing business globally, and the journal *New Scientist*, which describes New Zealand as punching 'way above its weight' in scientific research.

Supporting research, including postgraduate and postdoctoral studies, is a strong focus for the New Zealand Government, which invests >NZ\$600 million (US\$392.5 million) in research each year through the Foundation for Research, Science and Technology, the Health Research Council and the Marsden Fund Council, which funds blue skies, curiosity-driven research.

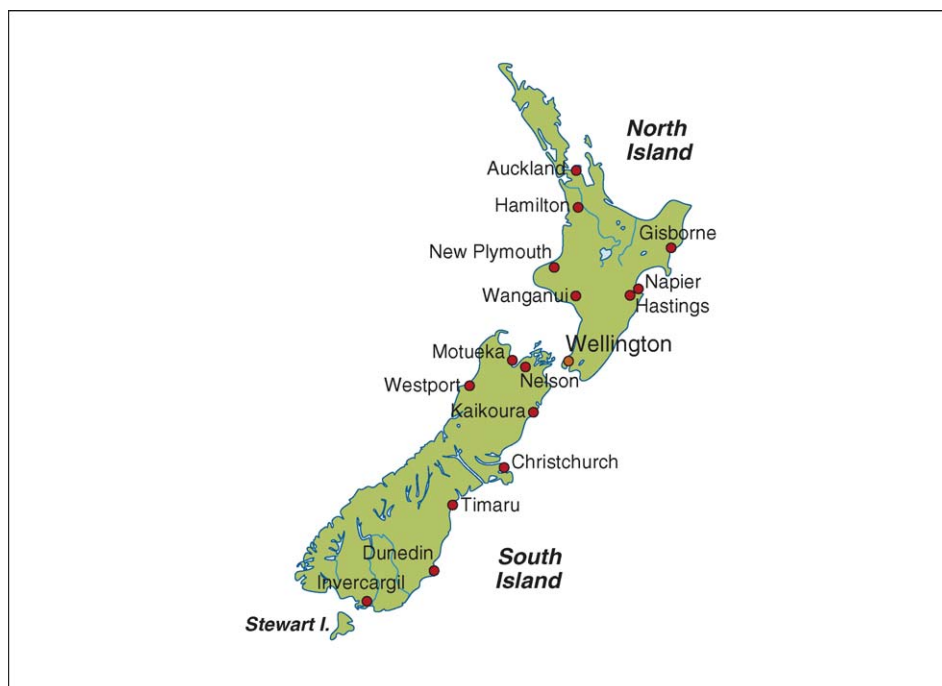
Two medical schools, at the universities of Auckland and Otago, are performing internationally respected medical research in cancer, diabetes, immunology, neurology, nutrition, reproduction and aging. This research is in various stages of commercialization. For example, the Protemix lazarin molecule for the treatment of diabetic heart disease will soon enter Phase III clinical trials; Proacta Therapeutics is developing cytotoxic prodrugs for treating cancer; and Neuren Pharmaceuticals is developing novel brain therapies – based on the discovery that nerve cell death is often delayed for hours or days after injury.

### New bioactive materials

New Zealand spans subantarctic to subtropical regions, with geography that provides valuable plant, microbe and animal resources that are used for the identification of bioactive materials. The country's biological diversity offers a superb natural resource for developing new ingredients and compounds that can satisfy the growing international demand for nutraceuticals, bioactives and functional health foods. New Zealand universities have key capabilities in food technology, as well as product and process development. For example, the Nutrigenomics Centre of Excellence, located at the University of Auckland, leads New Zealand's development of new foods for individualized health and nutritional benefits, by studying the interaction of food with human genes.

New Zealand has bioprocessing technologies to help take these high-value molecules to the world and is a sought after source of animal bioactives and biochemicals because of its unique, category 1, animal-disease-free status.

Multinationals such as Merck Sharp and Dohme, Ego Pharmaceuticals and Nutricia are making good use of the country's



**FIGURE 1**  
Map of New Zealand.

state-of-the-art good manufacturing practice (GMP) research and formulation facilities.

Several research institutes and universities have bioprospecting programmes that are discovering new biomaterials and bioprocessing techniques. For example, CRI Scion is working with other New Zealand and international agencies to transform biomaterials into industrial products. Particular areas of focus are bio-based chemicals, polymer and fibre products, and novel bioactive plastics.

### People

A growing number of New Zealand scientists are returning home to use their expertise in the biotechnology industry, and highly respected individuals in the global biotechnology sector have forged strong links with the New Zealand biotech industry. These include:

- Larry Ellingson, who chairs the American Diabetes Association and formerly worked for the US pharmaceutical company Eli Lilly. He is now the USA-based CEO of the New Zealand biotechnology company Protomix.

**TABLE 1**  
**Leading New Zealand biotechnology companies**

Company	Web Address	Focus
Antipodean Biotechnology	<a href="http://www.antipodeanpharma.com">http://www.antipodeanpharma.com</a>	Treatments for disorders associated with mitochondrial dysfunction such as Parkinson's Disease and Friedreich Ataxia
Auckland Uniservices	<a href="http://www.uniservices.co.nz">http://www.uniservices.co.nz</a>	Responsible for all aspects of commercializing research from the University of Auckland – including contract research, consultancies, licensing and company start-up
BrainZ Instruments	<a href="http://www.brainzinstruments.com">http://www.brainzinstruments.com</a>	Brain monitors for the detection of brain injury
CoDa Therapeutics	<a href="http://www.codatherapeutics.com">http://www.codatherapeutics.com</a>	Wound healing with a lead antisense product that improves the body's ability to repair damaged tissue
EnCoate	<a href="http://www.encoate.com">http://www.encoate.com</a>	Novel foodgrade biopolymer technologies
Genesis Research and Development	<a href="http://www.genesis.co.nz">http://www.genesis.co.nz</a>	RNAi therapeutics for immune disorders
Glycosyn	<a href="http://www.glycosyn.com">http://www.glycosyn.com</a>	Small-molecule discovery, process development, scale-up solutions and contract cGMP manufacturing
IRL BioPharm	<a href="http://www.irlbiopharm.com">http://www.irlbiopharm.com</a>	Potent molecules for attachment to tumour-specific monoclonal antibodies
KODE Biotech	<a href="http://www.KODEbiotech.com">http://www.KODEbiotech.com</a>	Biomedical applications of KODE™ technologies in embryology, transfusion, transplantation, therapeutics and disease diagnosis
Lactopharma	<a href="http://www.lactopharma.com">http://www.lactopharma.com</a>	Bioactive discovery research to support development of functional food ingredients, health supplements and pharmaceuticals
Living Cell Technologies	<a href="http://www.lctglobal.com">http://www.lctglobal.com</a>	Implantation of healthy living cells to replace, repair or regenerate diseased or damaged organs
Neuren Pharmaceuticals	<a href="http://www.neurenpharma.com">http://www.neurenpharma.com</a>	Compounds that mimic innate CNS protection and repair mechanisms and those that regulate growth and metabolism
New Zealand Pharmaceuticals	<a href="http://www.nzp.co.nz">http://www.nzp.co.nz</a>	Synthetic carbohydrates and natural biochemicals extracted from plant and animal raw materials
Nutrizeal	<a href="http://www.nutrizeal.com">http://www.nutrizeal.com</a>	Manufacturer and supplier of nutraceutical products and ingredients
Pacific Edge Biotechnology	<a href="http://www.peblnz.com">http://www.peblnz.com</a>	Diagnostics and prognostics for human cancer
Proacta Therapeutics	<a href="http://www.proacattherapeutics.com">http://www.proacattherapeutics.com</a>	New anticancer prodrugs
Protomix	<a href="http://www.protomix.com">http://www.protomix.com</a>	Novel treatments for cardiovascular disease, diabetes mellitus and other metabolic disorders and diseases

- Aki von Roy, formerly European president of Bristol-Myers Squibb. He was CEO of Proacta Therapeutics in New Zealand and is now Chair of New Zealand biotech company Genesis Research and Development.
- Doug Wilson, formerly Senior Vice President of Boehringer Ingelheim in the US, who founded New Zealand company BioPharma Consultants.
- Peter Shepherd, an expatriate of New Zealand who relocated his company, Symansis, from the UK to New Zealand in 2005. Shepherd received the London Young Biotechnology Entrepreneur of the Year Award in 2002.
- Richard Beasley from the UK, who is Director of the Medical Research Institute of New Zealand. Under his leadership the institute has become internationally recognized as a major medical research organization, carrying out leading-edge research programmes in a wide range of disease areas. Beasley is a former winner of the American Thoracic Society's World Lung Health Award.
- Garth Cooper, who founded the company Amylin Pharmaceuticals (market cap US\$2.8 billion) which is listed in the US NASDAQ. He is now President and Chief Scientific Officer of Proteomix. He pioneered the development of proteomics in New Zealand.
- Peter Gluckman, one of New Zealand's outstanding scientists who is internationally recognized for his research in perinatal physiology. Gluckman established New Zealand biotech company Neuren Pharmaceuticals and founded the Liggins Institute at Auckland University, an international centre of excellence in medical research.

### Facts about New Zealand's biotech industry

The country's biotechnology strengths lie in large animal- and plant-based technologies, drug discovery, biocontrol and biosecurity, and innovative foods and health.

New Zealand's biotechnology sector comprises six public and 47 private core biotechnology companies. Almost 50% of these 47 companies were established in the past three years. New Zealand's biotechnology sector employs >2400 highly qualified people: 38% of these hold doctorates and a further 42% hold postgraduate or undergraduate qualifications. Spending on biotechnology is growing rapidly and was valued at NZ\$430 million (US\$281.9 million) in 2004, with income from biotech valued at NZ\$675 million (US\$442 million) in the same year. New Zealand biotechnology companies and research organizations were granted

348 biotech-related patents in the five years up to 2004, an increase of >120% over the previous five years (New Zealand Biotechnology Survey 2004, <http://www.stats.govt.nz/economy/innovation-and-science/default.htm>).

Biotechnology companies export to >60 countries with the major export markets being the USA, Europe and Australia. Annual export earnings are expected to reach NZ\$1 billion (US\$655.8 million) by 2013 (New Zealand Biotechnology Taskforce Report 2003, <http://www.nzte.govt.nz/section/13680.aspx>).

### Internationally focused

New Zealand's geographical isolation has ensured its scientific community has a natural inclination to be globally focused. This mindset is illustrated by the countless connections between its research scientists and biotech companies, and the international biotech industry. Many international companies and organizations are working in partnership with the New Zealand biotechnology industry. These include, from the USA, Genentech, the Walter Reed Army Institute of Research, Stanford University, the Albert Einstein College of Medicine, GE Healthcare and the Carnegie Mellon University, together with Nestlé in Switzerland and Starpharma in Australia.

Other examples of New Zealand's international connectedness include: cancer drugs developed in New Zealand and licensed for clinical development to pharmaceutical companies such as Xenova (now Celtic Pharmaceuticals in the UK) and Antisoma; shareholdings by global pharmaceutical companies in New Zealand biotechnology companies; a range of clinical trials being carried out in New Zealand by companies such as Roche and GSK; partnership investments from companies such as Roche and Genentech, which are providing series A funding to Proacta Therapeutics (Proacta has also attracted investment from three Australia–New Zealand venture-capital companies – GBS Ventures, No. 8 Ventures and Endeavour-iCap); and commercial relationships including that between AgResearch, one of New Zealand's nine government owned research institutes, and Pharming Group in the Netherlands, this partnership develops and produces recombinant human lactoferrin in New Zealand. The lactoferrin known as rhLF will be produced in the milk of a genetically modified herd of cows, and then extracted from the milk for use in medical applications.

A growing number of leading New Zealand biotechnology companies have established a strong presence in key international markets. For

example, Proteomix, Proacta Therapeutics, Neuren Pharmaceuticals and BrainZ Instruments all have offices in the USA.

At a government level, New Zealand has developed strong links with other nations in the Asia–Pacific region, particularly Australia, as a result of the complementary nature of the biotechnology sectors of both countries. Similar motivations are driving an increasingly close relationship with the US state of Iowa.

### Investment and partnership

New Zealand has adopted a public–private sector partnership approach to growth in the biotechnology sector, with the implementation of a joint strategy to ensure sustained development and global success. Together, the government and industry have set a target of a fivefold increase in the number of core biotechnology companies by 2013.

A growing number of international biotech players are investing in New Zealand's biotechnology industry or seeking collaborations and partnerships. New Zealand's key advantages include a rich pool of creative and commercially minded scientists, including expatriates returning from overseas and foreign scientists choosing to base themselves in New Zealand, world-class R&D facilities, a stable business environment, and R&D costs that are up to 50% lower than in Europe and the USA.

The biotechnology venture-capital market comprises angel investors and venture-capital funds, and is actively supported by the New Zealand government through the New Zealand Venture Investment Fund (NZVIF). Early-stage funds supported by NZVIF include No. 8 Ventures, Endeavour-iCap, iGlobe Treasury Management, TMT Ventures and the New Zealand Seed Fund. GBS Venture Partners, a major Australian fund with international connections, has also invested in New Zealand's biotech sector. The NZ\$12 million Australia–New Zealand Biotechnology Partnership Fund (managed by New Zealand Trade and Enterprise) is designed to support commercial biotech development, as well as marketing and manufacturing initiatives between New Zealand and Australia. To date, a total of NZ\$6.7 million (US\$4.39 million) from the fund has been invested in four significant projects.

Australasia's biggest life-science venture-capital fund, BioPacific Ventures, was launched in March 2005. The NZ\$150 million (US\$98.1 million) will invest exclusively in life sciences, with a principal focus on areas where the food and health sectors converge. The fund brings together several major biotechnology players – New

Zealand's premier venture-capital firm Direct Capital, and AgResearch, the largest government research organization, and Inventages, a Swiss venture-capital fund manager boasting a strong relationship with Nestlé. PGG Wrightson, one of Australasia's premier agribusinesses, is the largest local investor in BioPacific Ventures.

New Zealand is particularly suited to conduct clinical trials. It has high-calibre investigators and clinicians, competitive costs, and stringent ethics and regulatory standards. GSK's involvement in clinical trials in New Zealand began when it contributed financially to establishing the Medical Research Institute of New Zealand. The

institute is now involved in global trials of new GSK medicines.

Auckland Uniservices is the largest organization in Australasia commercializing university research. It commercializes technology developed at the University of Auckland and offers research opportunities to international partners through the university's institutes and centres of excellence. It has run many research collaborations and negotiated co-development and licensing agreements with global pharmaceutical companies. Uniservices has brought seven new cancer drugs to clinical trial status. Several successful biotech companies have been spun-out

through Uniservices, including Protelix, Proacta Therapeutics and Neuren Pharmaceuticals.

New Zealand's reputation as a world leader in primary production is well deserved. Along with world-class scientific expertise, a stringent regulatory framework, research and development infrastructure, and growing investment support, it underpins one of the world's fastest growing biotechnology sectors.

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