

FINNISH HIGH-TECH STRONGHOLDS

# Life Science

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FINLAND  
*team*

 CHINA-FINLAND  
**GOLDEN BRIDGE**  
中芬金桥创新中心 INNOVATION CENTER

# Index

Introduction.....	3
1 Innovative Pharmaceuticals .....	4
2 Clinical Diagnostics .....	6
3 Imaging and Non-Invasive Measurement Technologies.....	8
4 Innovative Foods.....	10
5 Care Support Products and Technologies .....	12
6 Wearable Body Function Monitoring .....	14
7 Dental Health .....	16
Future Opportunities .....	18

# Introduction

Finland is known worldwide for its high quality of life, telecommunications industry as well as the excellence in education and academic research. Over the past decades, Finland has also invested heavily in research and development in the field of biotechnology and life sciences.

Close collaboration between companies, Universities and research institutes have provided a fruitful development environment for the Finnish life science industry. There are currently more than 15 life science-related Universities and institutions in Finland, feeding innovation into more than 150 companies operating in the Finnish life science sector.

A typical Finnish life science company is highly specialized, offering unique products for carefully selected market segments. Annually these companies invest an average of 10% of their revenue in research and development of new products.

In the medical technology field, Finland can be considered as a small giant since the country exports clearly more health care technologies than it imports. Health care industries in Finland are a strongly growing and diversified field. Health technology is the largest and most significant high-tech segment in Finnish industry, representing 47% of Finland's total high-tech exports. The value of Finnish health technology products export reached a new record of EUR 1.66 billion in 2013. A good benchmark of the strong exports is demonstrated by the fact that Finnish health care industry now has a trade surplus with Germany in medical equipment.

In this report we introduce a selection of seven Finnish life science core areas in more detail. The presented core areas are by no means the only strongholds of the Finnish life sciences sector, but they merely demonstrate the traditions and versatility of the Finnish life sciences know-how. For each core area we also introduce five companies of interest. Some of these example companies are already well-established ones, whereas some of them are in rapid internationalization and growth phase.

The Finnish life sciences core areas presented in this report are:

- 1 Innovative Pharmaceuticals
- 2 Clinical Diagnostics
- 3 Imaging and Non-Invasive Measurement Technologies
- 4 Innovative Foods
- 5 Care Support Products and Technologies
- 6 Wearable Body Function Monitoring
- 7 Dental Health

Despite the positive developments, Finland is not going to rest on its laurels. The life science industries have been recognized as a source of well-being for the population and future growth in Finland. There is a clear commitment by the state of Finland to maintain the fast growth. At the end of 2012 Ministry of employment and the economy published a report with a vision to continue this growth by expanding the private sector R&D 2.5 fold by 2020. This combined with the fact that there are a growing number of innovations made by scientists in the academic sector and SMEs will enhance Finland's position as a noteworthy player in the international life science business.

# 1 Innovative Pharmaceuticals

Finnish development of original pharmaceuticals and biological drugs is based on top-level research in the Finnish Universities and a tradition of globally successful products.

One of the most famous Finnish drugs is the globally marketed Entacapone (Comtess®/Comtan®, Stalevo®) that is used to treat Parkinson's disease. Entacapone was developed by Orion Pharma and is currently sold in 80 countries in cooperation with Novartis.

Another example of a successful product originating from Finland is levonorgestrel-releasing intrauterine contraceptive (Mirena, Levonova) launched originally by Leiras Oy, nowadays a part of Bayer. Mirena is used by more than 11 million women around the world, with major markets in Europe and USA.

## **Local ecosystem drives drug development**

Currently there is a growing generation of innovative drug discovery companies bringing Finnish science inventions into clinics. The drug discovery companies get their momentum from the excellent infrastructure: innovative animal diseases models, bioimaging systems and advanced high-throughput applications developed in Finland. Finnish GMP contract manufactures and CRO companies have the special know-how required for pharmaceutical research and development. Many drugs and vaccines invented in Finland are in preclinical or clinical phases at the moment.

## **CNS and oncology at the forefront**

There are more than 65 research studies on central nervous system (CNS) related drugs underway in Finland. Approximately 1,800 drug candidates have been involved in these studies. Orion, BioTie Therapies, Herantis Pharma and Medeia Therapeutics are central companies in utilizing the Finnish scientific expertise e.g. in Alzheimer disease, anxiety, brain trauma, depression, epilepsy, Parkinson's disease and schizophrenia

Within the area of cancer, Finland has an especially strong expertise in the field of hormonal cancers, such as prostate and breast cancer. Finns are developing biomarker-based cancer diagnostics and setting up biobanks that store samples donated by cancer patients. Finns are pioneers in using biotechnology to develop tailored measuring methods for biomarkers in order to be able to diagnose an individual patient's cancer type faster and select the most suitable therapy.

Oncos Therapeutics is currently working on the clinical development of oncolytic viruses for cancer therapeutics. Docrates Hospital, a private hospital specializing in oncological treatment, actively cooperates with research institutions and pharmaceutical companies in the development of new cancer treatments.

## **Government officials committed to expertise**

Fimea, the Finnish Medicines Agency, is continuously developing its expertise in biological medicines. Fimea's experts have been in several key roles in committees and working groups preparing EU guidelines for biological and biotechnological products. Fimea evaluates 14% of all the biological medical products of the EU's centrally authorized products testing program.

## Showcase companies for Innovative Pharmaceuticals:

Company	Revenue class	Description
<b>Orion Corporation/ Orion Pharma</b>	€1-10bn	Orion is a globally operating Finnish company developing pharmaceuticals and diagnostic. Orion's pharmaceutical R&D focuses on central nervous system drugs, oncology and critical care drugs, and Easyhaler® pulmonary drugs. World leader in Parkinson care with Entacapone, with Comtess®/Comtan® and Stalevo® annual sales exceeding MEUR 250.
<b>Biotie Therapies Corp.</b>	€1-10m	Development of drugs for neurodegenerative and psychiatric disorders e.g. Parkinson's disease, Alzheimer's disease and other cognitive disorders, addictions and drug dependence, post-traumatic stress disorder, and inflammatory diseases. Biotie's products address diseases with high unmet medical need and significant market potential. Lead product received market approval in the end of 2012, several innovative small molecule and biological drug candidates at different stages of clinical development.
<b>Herantis Pharma</b>	<€1m	Herantis Pharma plc. is a specialty pharmaceutical company bridging the gap from bench to bedside, aiming to develop novel pharmaceutical products based on some of the leading scientific research in the world. Our focus is in indications of unmet clinical need such as Dry eye, Parkinson's disease, and Secondary lymphedema, where we intend to develop selected drug candidates through late preclinical and early clinical stages to reach a clinical Proof-of-Concept.
<b>Forendo Pharma</b>	<€1m	Forendo Pharma is a drug discovery and development company with core competence in tissue specific regulation of sex hormone effects. Its two first-in-class product candidates are progressing to offer significant therapeutic benefits in men's and women's health. Fispemifene is the first selective estrogen receptor modulator designed only for men. It will be developed for treatment of symptoms of low testosterone. 17HSD1-inhibitor is progressing into clinical development with a focus on endometriosis.
<b>Oncos Therapeutics Ltd.</b>	<€1m	Oncos Therapeutics is a clinical stage biotech company developing personalized cancer immunotherapeutics based on its proprietary oncolytic adenovirus technology. The Company has clinical experience on 10 engineered vaccines that have a direct oncolytic effect due to selective virus replication in tumor cells as well as systemic effects through vascular dissemination to metastases and induction of a strong immune response against tumor cells mediated by exposure of tumor antigens by oncolysis. The lead product CGTG-102 is currently in Phase 1 of clinical development in Europe and the United States.

### INDUSTRY HIGHLIGHTS

- A perfect infrastructure for drug development
- Research driven universities bringing new innovations forward
- High expertise in central nervous system and oncology

## 2 Clinical Diagnostic

Several clinical diagnostic companies have emerged in Finland during the past decades. At the moment there are about 30 diagnostic companies in Finland. About half of these companies have been established in the 1990s and they typically cover the entire value chain from R&D to production and sales & marketing. Almost all Finnish diagnostic companies export their products, providing to the global demands driven by aging population, personalized medicine and the pressure to reduce healthcare costs.

### **Medical diagnostic technology has successful reputation in Finland**

A great example of a global success has been the company Wallac. Their DELFIA® technology timeresolved fluorescence method for in-vitro diagnostic (IVD) analysis is sold worldwide. Wallac has step by step become one of the leading neonatal screening companies in the world. Wallac was purchased by PerkinElmer in 1993.

### **The Finnish diagnostic industry includes:**

- Diagnostic tests
- Diagnostic test raw materials and biomarkers
- Laboratory automation and measurement equipment
- Test result analysis
- Laboratory services

### **The test production of Finnish diagnostic industry is mainly focused on point-of-care (POC) based solutions**

The biggest Finnish in vitro diagnostics company is Orion Diagnostica which was established in 1974. Their products are sold worldwide in almost 60 countries. The product line includes e.g. QuikRead system for rapid CRP, Hb and Strep A measurements. There are also companies which are developing solutions e.g. for respiratory and hospital infection testing (MRSA). New innovations have also been made in detection of sepsis and gastric diseases.

Another good example of Finnish clinical diagnostic success stories is a recent (December 2012) acquisition of sister companies Ani LabSystems and Ani Biotech by an Indian investor. The companies are now called LabSystems Diagnostics and focus on developing and producing innovative diagnostic tests e.g. for neonatal screening, celiac disease testing, infectious diseases, food hygiene, cardiac marker tests and veterinary tests. The acquisition gave the new owner a quick access to existing products. During the past years the fastest growing market for the company has been China.

### **China is in the current focus for Finnish IVD**

Traditionally the Finnish diagnostic companies have been seeking growth opportunities in the EU and USA, but during the past few years there has been clear change in this thinking. More and more companies are actively seeking business partnerships in China. As a large country China is ideal for many Finnish companies due to the emphasis on POC diagnostics.

## Showcase companies for Clinical Diagnostics:

Company	Revenue class	Description
<b>Orion Diagnostica Oy (Part of Orion Corporation)</b>	€10m-100m	Orion Diagnostica specialises in rapid and easy-to-use clinical diagnostics and hygiene monitoring solutions. Most of the company's products are designed to assist health care professionals in doctor's offices, healthcare centres and hospitals in diagnosing patients' conditions, making appropriate treatment decisions and following up treatments. Orion Diagnostica's products are sold worldwide through subsidiaries, sales offices and a distributor network covering more than 60 countries.
<b>Biohit Oyj</b>	€1-10m	A globally operating biotechnology company that develops, manufactures and markets diagnostic tests and analysis systems for the early diagnosis of gastrointestinal diseases, such as the blood-sample based GastroPanel examinations for the diagnosis of stomach illnesses and associated risks, quick tests for the diagnosis of lactose intolerance and Helicobacter pylori infection in connection with gastroscopy, and the ColonView examination for the early detection of fecal occult intestinal bleeding that indicates a risk of colorectal cancer. Subsidiaries in China and UK.
<b>ArcDia International Oy Ltd</b>	€1-10m	ArcDia Group is a company for development and sales of innovative immunoassay products based on the proprietary ArcDia™ TPX detection technology. mariPOC® (IVD CE) is a multianalyte respiratory infection rapid test for near-patient and point-of-care use. The test system has similar sensitivity and specificity as laboratory methods. mariPOC® test system is easy-to-use and has short hands-on-time. The analysis and result reading is automatic. mariPOC® test system is ideal in smaller units such as pediatric or occupational health care.
<b>Blueprint Genetics</b>	<€1m	Blueprint Genetics uses OS-Seq™, a targeted sequencing method developed at Stanford University to provide high quality sequencing at a very affordable cost level. Blueprint Genetics combines high quality targeted sequencing, state-of-art bioinformatics and a geneticist statement into an extremely easy and cost efficient diagnostics product. As there are vast amount of applications for sequencing, Blueprint Genetics helps research groups and diagnostics provider partners by delivering on custom sequencing projects and building custom sequencing platforms.
<b>Abacus Diagnostica Ltd.</b>	<€1m	Abacus Diagnostica's GenomEra CDX™ system takes DNA testing on a new level of convenience and simplicity. GenomEra makes it possible to perform high-performance DNA testing even outside a specialized laboratory environment and by personnel without experience in molecular biology. First CE-marked application for rapid identification of MRSA.

### INDUSTRY HIGHLIGHTS

- Long tradition in diagnostic industry
- Actively seeking business partners worldwide
- The diagnostic industry in Finland spans from raw materials to test making and analysis

## 3 Imaging and Non-Invasive Measurement Technologies

Finnish imaging infrastructure is highly developed, serving the needs of research from cells to humans. Finland is well-known as the leading country of telecommunication with Nokia as the flagship brand of Finnish industry. Advanced telecommunication technologies and strong focus to develop new applications utilizing modern digital technologies have enabled introduction of non-invasive and user-friendly medical technology products with state-of-art features to the world.

Medical imaging has been one of the strongest assets of Finnish medical technology industry for a long time and together with world-leading communication technologies has become the new Finnish technological asset. Finnish companies have been capable to utilize the most advanced technologies to create new medical imaging products and non-invasive technologies.

### **Success stories fuel the growth of the field in Finland**

Planmeca Group is established in 1971 and operating in the field of healthcare and medical device technology currently employs 2400 professionals with annual sales of 800 Million Euros. Planmeca has considerable market shares in the U.S., Japan, and several European countries and it has customers in over 100 countries.

One of the flagships of Finnish imaging know-how, Instrumentarium Group has developed number of globally successful medical imaging systems and became a part of GE Healthcare Group in 2003.

Healthcare industry of the modern society needs new tools to operate more efficiently and this is one of the fields to deploy state-of-art software technologies in order to support medical professionals. Mawell is an international provider of eHealth that improve workflow and efficiency in care systems. Mawell offers a suite of programs which streamline workflows and processes for clinical record management, particularly image, video, dictation, audio and scanned documents.

People are living longer than ever before and age-related diseases are increasing accordingly. One of these age-related diseases is glaucoma which is one of the major reasons for blindness. Glaucoma affects over 150 million people worldwide and only 75 million of them are diagnosed. Icare Finland develops intraocular pressure measurement devices to make the measurement procedure faster, easier and more comfortable for the patient than the traditional measurement methods and provides a tool to penetrate early stage diagnosis of glaucoma and it is the second largest player in this field with strong international sales.

Another internationally marketed successful ophthalmic medical device has been developed in Oulu, the capital of Northern Finland and internationally well-known as the city of advanced telecommunication and previously a major R&D center for Nokia Group. Optomed is Oulu-based digital imaging device company with internationally marketed digital visual inspection instruments that provide retinal, anterior, otoscopic and dermatoscopic imaging with one handheld device.

### **Setting new standards in neuroimaging**

Brain is the most complicated and vital organ of the human body and one of the most challenging medical fields. Nexstim offers revolutionary non-invasive Navigated Brain Stimulation (NBS) method for neuromodulation to the international market. NBS is noninvasive, which means it can be used for planning prior to neurosurgery. Using harmless magnetic fields, NBS is a comfortable and safe method for brain mapping in adults or children with a diagnosis of tumor or epilepsy. Using NBS enables more patients to be offered a surgical option and may lower risk of damage to eloquent cortex.

## Showcase companies for Imaging and Non-Invasive Measurement Technologies:

Company	Revenue class	Description
<b>Planmeca Group</b>	€100m-1bn	Planmeca Oy is one of the world's leading manufacturers of high-tech dental units and cutting edge 3D digital imaging devices and software. Planmeca's imaging software and digital solutions have been the ones to lead the way globally. Planmeca's line of Cone Beam Computed Tomography (CBCT) devices for three-dimensional (3D) dental imaging in the dental practice and the unique combination of 3D intraoral scan, a CBCT 3D data and a 3D photo present distinguished design, ergonomics and safety.
<b>Mawell Oy</b>	€10-100m	Mawell is a fast growing Nordic healthcare and welfare IT company delivering innovative solutions nationally and internationally to public and private healthcare and welfare organizations and pharmaceutical companies. Mawell product portfolio includes state of the art products for image capture and viewing in most medical disciplines as well as integration platforms for Radiology PACS and RIS. In Digital Dictation and Speech Recognition they provide market leading technology with over 70 000 users.
<b>Icare Finland Oy</b>	€10-100m	Icare Finland is an advanced medical technology company with a product line consisting of specialized instruments for the measurement of Intra Ocular Pressure (IOP, eye pressure). Icare's unique patented tonometer has obtained worldwide official approvals (CE, US FDA, SFDA etc.) and satisfied users in over 50 countries. Clinical studies show that the data obtained by Icare are fully comparable to measuring results with the GAT.
<b>Optomed Oy</b>	€1-10m	Digital imaging devices for both human and veterinary medicine. Optomed manufactures and sells a unique product design of digital visual inspection instruments that provide retinal, anterior, otoscopic and dermatoscopic imaging. Optomed Smartscope® M5 represents a real breakthrough in digital hand-held imaging.
<b>Nexstim Oy</b>	€1-10m	Nexstim develops, manufactures and markets Navigated Brain Stimulation devices for clinical use and scientific research. NBS is a new technique for accurately and reliably mapping the brain's vital functions. NBS is noninvasive, which means it can be used for planning, prior to neurosurgery. Using harmless magnetic fields, NBS is a comfortable and safe method for brain mapping in adults or children with a diagnosis of tumor or epilepsy.

### INDUSTRY HIGHLIGHTS

- Capability to utilize the most advanced technologies to create new medical imaging products and non-invasive technologies
- International success in this area has fuelled further innovations
- Finns have particular expertise in developing user-friendly systems

Finland is one of the world leaders in functional foods and advanced food technology products. Many internationally well-established products with favorable health effects have been developed in Finland. Strong focus on clinical nutrition sciences ensures also forthcoming innovative functional food products for this growing industry sector.

Traditional food companies such as dairy and cereal product companies have developed significant functional food concepts for the global market. Also nutritional properties of Nordic ingredients such as various berries have been studied and processed to develop new food innovations to introduce unique health promoting effects to the international food industry.

### **The international flagship products of Finnish functional foods are Xylitol, Lactobacillus GG and Benecol**

Xylitol is a natural sweetener with beneficial impacts on dental health, clinically proven by Finnish scientists in 1970s; xylitol is nowadays widely used to prevent cavities.

Valio is the biggest dairy company in Finland and has been a significant player in functional food business for long time. Valio has several functional food product lines, of which Gefilus (LGG<sup>®</sup> probiotic bacteria) was the first functional food line introduced in 1990. Currently products containing LGG<sup>®</sup> bacteria are sold through more than 20 licensing partners around the world. Valio has continued to put strong effort in introducing innovative and tasty health promoting products for health problems in modern society such as obesity (Valio ProFeel<sup>®</sup>) and arterial hypertension (Valio Evolus<sup>®</sup>).

Benecol<sup>®</sup> is a brand of cholesterol lowering products owned by Raisio Group, which has a long history with cereal products. Benecol margarine was the first product launched in this line, in 1995. Currently a wide range of Benecol cholesterol lowering products are enjoyed in more than 30 countries.

### **Research for new health enablers**

There is strong research focus in Finland on e.g. probiotics, prebiotics, flavonoids, lignans and fibers. These state of the art innovations are successfully integrated into new innovative food products with favorable health effects. Many young companies have utilized these products and e.g. Bioferme has successfully introduced plant-based probiotic products without dairy ingredients as a result of close collaboration with academic groups. As a non-dairy-product, it is more ecological and consumers with lactose intolerance can enjoy it.

Awareness for environmental and ecological values is increasing in modern society and food productions and origins are important issues for consumers. The food industry need to respond to this demand. Soybean is a sustainable source of protein in human and animal diets and consumption of soy products are growing and replacing partly unsustainable sources of proteins. Modern technologies to process soy and new types of food products are developed by Finnprotein.

Successfully developed functional food products have promoted Finland to the world map of the global food industry. Both traditional and new Finnish food companies with the world leading academic groups continue to put strong effort in developing science based innovative food products to offer solutions and alternatives for the modern society with various health and ecological challenges.

## Showcase companies for Innovative Foods:

Company	Revenue class	Description
<b>Valio</b>	€1-10bn	Valio is the market leader in all key dairy product groups in Finland and a world class pioneer as the developer of functional foods. Valio protects its inventions through patenting and commercializes them by selling licenses outside the company's home market. Valio's functional food lines support digestion and intestinal health, and help to lower cholesterol and control blood pressure.
<b>Raisio Oyj</b>	€100-1bn	Raisio Group is an international expert in plant-based nutrition. Raisio's operations are divided into two divisions: Brands and Raisioagro. Raisio's best-known brands are Benecol, Honey Monster, Elovena, Fox's, Dormen, Juicee Gumme and Nordic. Benecol® is the expert brand and a pioneer in the cholesterol-lowering food category. Plant stanol ester in Benecol products has been chosen as one of the ten most important nutritional innovations in the world.
<b>Bioferme Oy</b>	€1-10m	Bioferme Ltd. is a family owned company based in Kaarina where it develops, manufactures and markets a range of high quality plant-based food products and organic products for health-conscious consumers. To meet changing consumer needs, Bioferme carries out intensive research in cooperation with Universities and research institutes. Bioferme's key R&D areas are probiotics and weight management.
<b>Mekitec Oy</b>	€1-10m	Mekitec Ltd. provides the world's most innovative X-ray food quality inspection that prevents physical contamination in food products. Mekitec's product line is a high-performance, user-friendly X-ray technology system called MEKI. It is revolutionary as it provides 100% food quality control with high-precision X-ray inspection, that is designed to replace the simple metal detector without a higher investment. MEKI is so small and compact that it easily fits in every production line, thereby saving useful space in the factory. Mekitec Ltd. has grown fast during recent years, it is now present on three continents and will establish more Distribution Centers in the near future.
<b>Oy Verman Ab</b>	€10-100m	Oy Verman Ab is a Finnish family-owned pharmaceutical company providing high-quality products promoting health and wellbeing. Verman's product groups include OTC pharmaceuticals, prescription pharmaceuticals, food supplements and medical devices. Verman is a market leader in numerous consumer health product categories, such as probiotics, iron supplements, allergy medications, lactase enzymes, and digestive enzymes.

### INDUSTRY HIGHLIGHTS

- The vast nature of Finland delivers great raw materials the development of functional foods
- Our strong tradition in science has further aided this branch to become world leader
- Environmental values and sustainability will be highly regarded in modern society. This will make sure functional food will be of high interest also in the future

## 5 Care Support Products and Technologies

Finland is known for a high-quality healthcare system and state-of-art medical and care technologies in both primary care chains and specialized hospitals. Finns have developed a number of widely-used user-friendly hospital products and Finland enjoys long-term growth of the global export of health technology products. Furthermore, Finnish professionals possess strong expertise in diagnostics, signal processing technology, mobile and materials technology to be combined to create unique solutions to ensure high-quality care environment.

### **Innovative and easy-to deploy solutions to improve quality of life of patients**

Finnish companies are excellent in providing premium solutions in both devices and disposable products for the hospital market. Serres is the market leader of suction bag and tube products for operations rooms and hospital environment in the European market and is growing its presence outside Europe too. Innovative products have ensured the rapid and significant growth of business in the competitive hospital market.

Finland develops healthy environment for patients and healthcare professionals on many levels and many companies focus on developing smart solutions. Genano air purifying systems are used in hospital buildings and other critical indoor environments. By purifying the smallest particles and gases from the air it is possible to protect people in healthcare facilities, e.g. in isolation wards with challenging conditions to manage the air quality.

Medical furniture development has a long history in Finland. One of the key players Merivaara was established in 1901 to provide well-designed multi-functional medical furniture such as operation tables and hospital beds for the global market. Merivaara's daily operation includes active product development to accommodate needs in modern hospital environment. As the results of strong input to provide high quality medical furniture products, Merivaara's products are marketed in more than 120 countries all over the world.

### **Celebrating life through innovation**

Primary care environment and logistic chain of the care process have a remarkable input in the patient care process. Telespro Finland Ltd. develops innovative products for emergency care, ambulance environment, rescue situations and hospitals. For example, highly functional materials have been developed to protect patients during the transportation to medical care. Telespro Finland products enable and support to keep body functions stable in challenging environments.

Another primary care area is to ensure that people and especially the elderly adhere to their medicines as prescribed. Manual medicine dispensing is very prone to errors, which can cause adverse drug events and endanger the patient safety. Issues in medicine taking are overuse and underuse of medicines. Evondos® Automatic Medication Service helps to resolve the irrational use of medicines. Irrational use of medicines is a major health care problem worldwide.

Strong motivation to promote well-being of patients, integration of modern technologies such as wireless telecommunications, material science and of healthcare sciences will continue to bring new technologies and solutions from Finland to the global market.

## Showcase companies for Care Support Products and Technologies:

Company	Revenue class	Description
<b>Merivaara</b>	€10-100m	Merivaara provides a wide range of hospital-grade furniture such as operating tables, medical lights, examination tables, trolleys and stretchers for transportation and day surgery, as well as birthing and patient beds. Merivaara's patient beds, surgical tables and trolleys are highly appreciated by users in more than 100 countries. The company's recently launched Merivaara INTEGRA™ is a revolutionary new concept to integrate operating room functions and help healthcare providers improve workflows and increase efficiency. With the OpenOR™ system, the core of the Merivaara INTEGRA™ concept, the surgical team can easily manage images and video from several sources, and edit and archive these through a touch-screen panel.
<b>Lojer Oy</b>	€10-100m	Lojer Groups is a great example of the Finnish medical furniture specialist. The steel parts of Lojer's products are made using Finnish raw material. Different subsidiaries of the Lojer Group are used for manufacturing parts. They are the only hospital equipment manufacturer in Finland making our products entirely in-house, using our own foundry and the latest technologies such as computer-controlled laser cutting, machining, robot welding and automatic painting lines.
<b>Serres</b>	€10-100m	A highly specialised plastics manufacturer focusing on developing, manufacturing and marketing innovative suction bag and suction tube systems for hospitals. Today, Serres is the largest European manufacturer of suction systems for hospitals and its suction system is used in more than 35 countries.
<b>Genano</b>	€1-10m	Genano specializes in clean air technology developing, manufacturing and marketing sophisticated air purifiers for hospitals, laboratories and pharmaceutical industries. Genano has developed a unique air purification method that removes even nano-sized particles from the air, protecting both people and lifeless objects from impurities found in indoor air.
<b>Evondos</b>	<€1m	Evondos Oy develops innovative device and service solutions which will ease the daily life of people under long term medication. Solutions will bring remarkable cost benefits for healthcare and medical service sectors.

### INDUSTRY HIGHLIGHTS

- Finland enjoys long-term growth of the global export of health technology products
- Care support products will be of utmost importance when taking care of the growing population of elderly
- Medical furniture development has a long history in Finland

## 6 Wearable Body Function Monitoring

Finnish technology in measuring body function has long traditions. Finnish researchers in the field believes tomorrow's generation will be more than comfortable with devices that constantly monitor and provide instant feedback on their health, and can also provide instant access to medical data in case of emergencies.

The society of today is used to a more and more advanced telecommunication technology. There is an increasing need to be in continuous contact with different external system during daily activities as well as extreme and risk-full hobbies. The need is both social and technologically-driven. This is due to the rising costs of assistance, the need to improve preventive disease detection and medical intervention.

Wearable body function monitoring is also cost-effective in providing assistance, e.g. in rehabilitation from cardiac disease, in the prevention of acute crisis, and for the monitoring of professional workers engaged in extreme environmental conditions. Wearable technology is likely to be more sophisticated than hand-held technology on the market today because it can provide sensory and scanning features normally not seen in mobile and laptop devices, such as biofeedback and tracking of physiological function.

Minimally invasive monitoring systems represent the latest of health care instruments. These systems are based on flexible technologies which are comfortable to human body, easy to use and powered with a monitoring system customizable to each user.

### **Monitoring the heart**

Since the first Polar heart rate monitor was developed in 1982, Polar Electro has been committed to conducting innovative physiological and sports medical research. All of the features in Polar products are based upon scientific work and are in accordance with recommendations from the world's leading sports medicine authorities. In addition to its own in-house research and development, Polar Electro is also involved in co-operation with a number of research institutions worldwide, the results of which have been presented in many scientific congresses and published in international scientific papers.

PulseOn's patented innovation based on their optical sensor includes different wavelengths of light which illuminate the skin in different depths and a photodetector to detect the tiny modulations of light intensity caused by pulsatile flow of blood in the tissue. With their unique sensor design and algorithms, they can dynamically always select the optimal signal in different depths of skin to get the heart rate reliably in a wide range of conditions. This combined with highly sophisticated algorithms, allows them to monitor the heart rate continuously during training and beyond.

Spektikor saves time by making it easy to monitor the patient's heart rate under all circumstances. Spektikor visualizes the heart beat with an LED light so the patient's condition can be monitored from a distance and several patients can be monitored at once. Spektikor is a very light and small disposable ECG-indicator for use by first aid professionals. With the numeric display in DHBI-2 it is possible to monitor even smaller changes in the patient's heart rate.

### **More than heart rate**

Myontec's products contain technology that measures the electric impulses produced by muscles and transmits the data wirelessly to a mobile phone or a computer for analysis. The products can measure, e.g. the load on the muscles or alert the user if the muscles are being overstrained. This is world's first and only muscle sensing smart shorts, with mobile app and real-time monitoring, online sports diary with versatile exercise analysis and follow-up features

## Showcase companies for Wearable Body Function Monitoring:

Company	Revenue class	Description
<b>Polar Electro</b>	€10-100m	Valio is the market leader in all key dairy product groups in Finland and a world class pioneer as the developer of functional foods. Valio protects its inventions through patenting and commercializes them by selling licenses outside the company's home market. Valio's functional food lines support digestion and intestinal health, and help to lower cholesterol and control blood pressure.
<b>Suunto</b>	€10-100m	Suunto was founded by Tuomas Vohlonen, a Finnish orienteer and inventor of the liquid-filled field compass. Since then Suunto has been at the forefront of design and innovation for sports watches, dive computers and instruments used by adventure seekers all over the globe. From the highest mountains to the deepest oceans, Suunto physically and mentally equips outdoor adventurers to conquer new territory.
<b>Spektikor</b>	<€1m	Spektikor is company that specializes in single use first aid and other medical electronic devices. Spektikor's story began with the commercialization of an innovation that visualizes the heartbeat. In the future Spektikor's expertise and know-how will be seen in various single use medical device solutions. Spektikor is a very light and small disposable ECG-indicator for use by first aid professionals. With the numeric display in DHBI-2 it is possible to monitor even smaller changes in the patient's heart rate.
<b>PulseON</b>	<€1m	The company is a spin-off from Nokia by five individuals with world-class expertise in all functional areas to be able to make their vision of the world's easiest heart rate monitoring reality. Their groundbreaking wrist device will bring continuous heart rate monitoring available to you for training and beyond, with our mobile application transforming the accurate heart rate data into meaningful feedback on the effect of training on your body, making it truly personalized.
<b>Myontec</b>	<€1m	Myontec Ltd develops and manufactures clothing with embedded devices that measure muscle activity during sports performance. Smart shorts are one application of the intelligent clothing developed by Myontec. Myontec is the first ever, fully integrated product which combines modern biosignal sensory and electronics into a comfortable and fashionable sportswear selection extended by mobile devices and versatile cloud services to display and analyse sports performance. The product is also easy to use in the field and provides comprehensive information about muscle activity in addition to conventional data like heart rate, speed, altitude etc.

### INDUSTRY HIGHLIGHTS

- Finland is world leader in heart rate monitoring personal devices
- Our strong knowledge in telecommunication makes sure that innovation in functional body monitoring is bringing new products to the market
- Health monitoring market is booming and will assure future growth for high end technological companies in this area

Finnish health technology companies are highly specialized, and several rank among the largest in their field globally. Products developed in Finland are well-known for being innovative, as well as safe and effective. Finnish designers have enjoyed worldwide fame for decades. Thus Finnish companies have particular expertise in developing and designing user-friendly healthcare products.

One of the distinguished health technology groups is dental health technology with internationally well-established companies and brands. Dental companies in Finland have successfully combined world-leading medical imaging and wireless technologies, user-friendly concept development and highly functional industrial design to create attractive and highly performing instruments for dentists and patients.

Finland has a long history with medical imaging equipment development which has enabled successful product development also for dental applications. Finland's expertise in dental imaging is world-renowned. Panoramic dental imaging was invented in Finland and Finnish companies have become leaders in this industry. Today, half of the "high-end" 3D and 2D digital dental imaging devices are made in Finland – virtually all for export.

### **Imaging and dental units**

Planmeca is a globally well-known dental health company with innovative solutions for imaging and dental office products. It was the first company to combine three different types of 3D data with one X-ray unit. The Planmeca ProMax® 3D family brings together a Cone Beam Computed Tomography (CBCT) image, 3D face photo and 3D model scan into one 3D image using the same advanced software.

LM-Instrument has a long history in hand-held dental instrumentation business. The company is among the European leaders in hand and ultrasonic instrumentation for dental applications. Innovative M-ProPower ultrasonic concept is designed for demanding professional use in modern dental treatments. LM-ProPower hand held instruments are equipped with impressive LED lights which enable optimal visibility and reduction of eye strain.

Stylish and ergonomic Scandinavian design culture together with user-friendly concept development philosophy has created many internationally successful dental chair products from Finland. There are several Finnish medical furniture companies dedicated to developing and manufacturing functional dental chair products. These companies have a significant export business. Finland is strong in electronic engineering and modern dentist chairs are developed to be embedded with modern wireless features to offer clean, safe, efficient and comfortable environment in dentist's offices in the world.

Finnish companies are also active in dental material development. In the field of biomaterials and some of the most significant recent innovations originate from research and development efforts in Finland.

## Showcase companies for Dental Health:

Company	Revenue class	Description
<b>Planmeca Group</b>	€100m-1bn	Planmeca is one of the world's leading manufacturers of high-tech dental units and cutting edge 3D digital imaging devices and software. Planmeca's imaging software and digital solutions have been the ones to lead the way globally. Planmeca's line of Cone Beam Computed Tomography (CBCT) devices for three-dimensional (3D) dental imaging in the dental practice and the unique combination of 3D intraoral scan, a CBCT 3D data and a 3D photo present distinguished design, ergonomics and safety.
<b>PaloDEX Group</b>	€100m-1bn	PaloDEX is a global leader in the design and production of state-of-the-art digital and analog dental imaging equipment for both intra and extra-oral applications. In addition, the business offers innovative software enabling superior image management capabilities. The company was a pioneer in bringing the first dental panoramic x-ray, Orthopantomograph®, to the market in 1961, and in the use of computed radiography (CR) systems for indirect digital image capture in dental since 1994.
<b>Fimet</b>	€1-10m	Fimet provide dental products for international markets and have dealers in more than 50 countries. Our wide distribution network handles sales, installation and service. Fimet produces dental units in compact sizes. The dentist's working area is optimized to ensure comfortable, ergonomic working positions. The equipment is designed to make treatments as comfortable and easy to perform as possible by making all equipment, surfaces and controls, as well as the patient's mouth, easily and comfortably accessible by the dentist at all times. With a unique cordless foot switch for controlling both the chair and the unit. A cordless environment also improves hygiene by making cleaning easier and use of space more efficient.
<b>Finndent</b>	€1-10m	FINNDENT develops and manufactures beautifully designed high performance dental units and patient chairs that are designed to last. FINNDENT products are elegant designer pieces of modern dental technology. And they are built to last. The product is crafted using the most durable materials that are proven to effectively stand the test of time. The products are manufactured in Finland with workmanship that has been perfected over more than three decades.
<b>LM-Instruments</b>	€1-10m	LM-Instruments Oy develops, manufactures and markets dental hand instruments, ultrasonic and air polishing devices. The company is the fastest growing manufacturer of hand instruments in Europe and the market leader in the Nordic countries. LM joined Planmeca Group by company acquisition in 1999. In 2003 LM acquired Swedish Amdent AB, now LM Dental AB, the manufacturer of ultrasonic scaler instruments and systems. Together LM-Instruments Oy and LM Dental AB form LM Group, the first manufacturer in the world to offer high-quality tools for both manual and mechanical instrumentation.

### INDUSTRY HIGHLIGHTS

- Dental companies in Finland have successfully combined world-leading medical imaging and wireless technologies, user-friendly concept and highly functional industrial design
- Finland's expertise in dental imaging is world-renowned and for a good reason because panoramic dental imaging was invented here
- More than half of the world's "high-end" 3D and 2D digital dental imaging devices are made in Finland and practically all for export

# Future Opportunities

Finland can be considered as a small giant in medical technologies. Finnish exports clearly exceed imports. Health care industries in Finland are a strongly growing and diversified field. Finland has more than 15 medical or life science-related universities and institutions with world-class know-how in life science and clinical research. A close collaboration between companies and universities has led to a fruitful environment for the Finnish life science industry. The collaboration has produced innovations which have led to products and services successfully being offered for export in a range of areas. Some of these can be seen as promising future opportunities for Finland and for example the following can be mentioned.

- Intelligent bone health
- Medical Equipment design & solutions
- Food Production Solutions
- Wellbeing technologies

Osteoporosis is a condition not only affecting the individual but is also a social factor causing high costs that will grow globally as the population is ageing. In the field of osteoporosis diagnosis Finland has interesting companies working on developing this area and as example Bone Index Finland and Oscare Medical is worth mentioning. Onebone has developed and is marketing an innovative and user-friendly Woodcast products for orthopedic and traumatology use.

Being one of the most demanding product development sectors, life science and medical technology products require a combination of precision and knowhow for example in engineering and wireless technologies. These are areas where Finnish companies have special expertise which has created new exports and growing future business. Companies such as Innokas Medical and Lewel Group are dedicated to offering customised product development and manufacturing services.

Consistent with the rising trend of health technology and fuelled by innovations many companies in Finland are frontrunners in this area. Valkee health technology company has introduced the world's first bright light headset that alleviates the symptoms of seasonal affective disorder (SAD). The category of bright light devices is growing at an increasing pace. HUR fitness equipment is designed to accommodate the fact that every body is different. It uses a pneumatic system called Natural Transmission™ that matches the body's natural muscular movement.

Environmental issues have long been a focus of the Finnish industry and this is also true within in the life science area. Finland has several innovative companies that aid in the sustainable development of food production. Ductor has developed the first industrial scale ammonia and phosphate production technology, based on a biological process leveraging organic waste stream. Biolan manufactures and sells products for ecological farming and green area management as well as environmental products.





## Contact info

China-Finland Golden Bridge is a service platform for Chinese investors and high-tech companies looking for investment and expansion opportunities in European market. Golden Bridge supports VCs in lead generation, in transaction process as well as in partnering and syndication.

Golden Bridge is headquartered in Finland and has a collaboration and allocated resources e.g. in Shanghai, Shenzhen and Beijing. Golden Bridge is supported by MOFCOM, Chinese Ministry of Commerce and MEE, Finnish Ministry of Employment and Economy. Golden Bridge is part of Helsinki Business Hub.

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Mr. Marko Vänskä (HELSINKI, FINLAND)

**General Manager**

MOBILE: +358 50 588 5856

EMAIL: marko.vanska@goldenbridge.fi

Ms. Marika Mäkelä (HELSINKI, FINLAND)

**Customer Operations Director**

MOBILE: +358 40 523 4530

EMAIL: marika.makela@goldenbridge.fi

Ms. Jie (Jessica) Wei (HELSINKI, FINLAND)

**Customer Operations Manager**

MOBILE: +358 45 119 3889

EMAIL: jie.wei@goldenbridge.fi

Mr. Ching-Yi Wang (HELSINKI, FINLAND)

**Business Development Manager**

MOBILE: +358 40 743 3658

EMAIL: ching-yi.wang@goldenbridge.fi

Ms. Shi Ting Chen (HELSINKI, FINLAND)

**Customer Operations Manager**

MOBILE: +358 45 263 1612

EMAIL: shiting.chen@goldenbridge.fi

Mr. Bin Zhu (SHANGHAI, CHINA)

**Chief Representative, China**

MOBILE: +86 1360 1790 666

EMAIL: bin.zhu@goldenbridge.fi

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[www.goldenbridge.fi](http://www.goldenbridge.fi)