

The background of the slide is a light blue-tinted collage of medical-related images. It includes a stethoscope, several white pills, a human skeleton, and a hand holding a pill. The overall aesthetic is clean and professional, typical of a financial or healthcare report.

Medical Devices: Where we have come from and where we are going

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Cordis Global Medical Technology Fund

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The History of Medical Devices

Medical devices cover a wide range of products and equipment used in medical procedures that help to improve the quality of and extend life. From more accurate and timely diagnoses to increasingly precise and complete treatments, constant innovation in the MedTech sector has been evident for centuries and shows no signs of slowing down.






It was in the latter part of the 20th century that medical devices took front and center stage in the fight against chronic disease.

The first medical device was most likely what we now call a stethoscope, in 1819. Since then, the rate of improvement in medical devices has been remarkable. Diagnosis dominated the 19th century, with the ophthalmoscope (eye examiner) (1850), thermometer (1867) and sphygmomanometer (blood pressure cuff) (1896) improving the way patients were able to be diagnosed.

In the 20th century medical devices started to move from diagnosis to treatment. One of the first was the invention of a tank respirator in 1929, which created pressure vacuums to help patients with breathing difficulties. The next big breakthrough was the first artificial kidney, or dialysis machine, invented in 1944. But it was not until the latter part of the twentieth century that these devices took front and center stage in the fight against chronic disease.

One of the prime examples of the evolution of medical devices is the pacemaker. Heart failure has always been an issue of particular concern because of its debilitating, and often fatal, nature. The cardiac pacemaker was the first device proposed to treat the symptoms which drugs had been unable to cure. The development of the pacemaker began in the 1930s with Hyman's "artificial pacemaker", in which a hand crank drove a generator that provided electrical impulses to the patient's heart, through a needle electrode placed between the ribs. While this model was never commercialized, it engendered the first commercial model, manufactured in 1958 in Sweden. Arne Larsson was the fortunate recipient of the first implanted device, connected to a hockey-puck sized external pacemaker, to treat his Adams-Stokes syndrome. Adams-Stokes syndrome has a 50% mortality within a year when left untreated. With this new treatment Mr Larsson lived another 43 years, outliving 26 pacemakers on his way to 86 years old.

Subsequent incremental changes focused on improving a patient's quality of life and the device's performance, functionality and safety. These included reducing the current necessary for electrical capture of the heart (and thus improving patient comfort); allowing the pacemaker to adjust to a patient's activity and physical changes and thereby allow a more normal life; and allowing multiple chambers of the heart to be paced, improving patient survival and symptoms. The smallest pacemaker available today is smaller than a coin, completely leadless and has a 99.6% implant success rate.

1930s	1958	1990s	2000s	2020	Future
Hyman's artificial pacemaker was first used. An external, hand cranked device	First fully implantable pacemaker, roughly the size of a hockey puck	Microprocessor-driven pacemakers first appeared, allowing for miniaturisation	Another lead was added for bi-ventricular pacing	Leadless pacemakers – the entire device is now placed within cardiac chambers	Batteryless devices, which harvest cardiac motion to power pacing circuits
					

Pacemakers are just one remarkable example of medical device innovation. We now stand at a junction in time where these devices range from attachable prosthetic limbs to implantable computers, which are vastly improving and extending patients' quality of life.

Over the next few years numerous products with promise for revolutionizing healthcare are set to come into the medical marketplace

For example, Medtronic's "PillCam Genius", a camera no bigger than a vitamin capsule, is an innovative endoscopy solution using Artificial Intelligence to provide images of internal organs, reducing the need for invasive colonoscopies.



Another example is Senseonics' "Eversense", a Continuous Glucose Monitor which is improving the quality of life for patients with diabetes through its capsule-sized long-term implantable device, replacing external-body patches.

And Abbott continues to prove itself one of the best innovators in the sector, with their implantable Deep Brain Stimulator, "Infinity", which enables people with Parkinson's the ability to 'tune out' body tremors and restore a level of muscular control.

Over the next few years and decades, numerous products with promise for revolutionizing health care are set to come to market. Leading device companies, such as Boston Scientific and Medtronic, appear to have their most expansive pipeline in years, as we have seen R&D rise and M&A flourish in the last five years.

Predicting what the next decade will bring in terms of medical innovation is as hard as it would have been for Arne Larsson to imagine a pea-sized fully implantable pacemaker back in 1958. At Cordis, we are not inventors ourselves, but are excited about the ongoing opportunity to invest in the companies that provide these revolutionary devices that treat life-threatening chronic disease.

Cordis is a listed Australian Unit Trust that provides an active, global fund of listed equities targeting medical devices that provide treatments for life-threatening chronic disease.

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