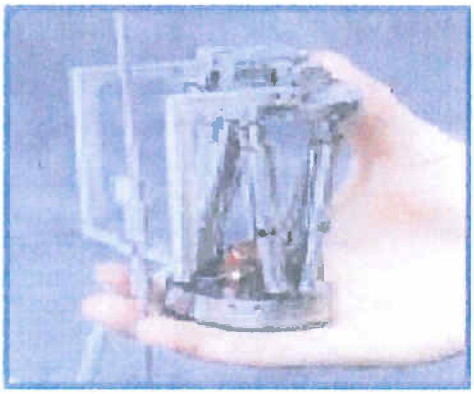
Technion Breakthroughs

Medicine

Biomechanical Engineering

Prof. Noah Lotan developed **"smart" stents,** used to open blocked blood vessels, that release – based on natural cues – medications **to prevent tissue from growing around stents.** (9/06)



"Spine Assist" Robot Surgeon

A miniature robot for fail-proof spinal surgery received FDA approval. The brainchild of mechanical engineering Professor Moshe Shoham, it offers surgeons improved accuracy while minimizing risks. (FDA approved 9/04)

A pill-sized swallowable camera, used around the world, was developed by Technion graduate Garriel Iddam of Given Imaging Company Ltd. as a diagnostic tool for the digestive system. (First available in 2001)

Sleep Disorders

Research by Prof. Peretz Lavie suggests that **sleep apnea sufferers in their 20s are more likely to die than those in their 30s, 40s and beyond.** (2/05)

Renowned sleep disorder expert Prof. Peretz Lavie creates the **"Sleep Strip," a disposable sleep apnea/hypoapnea screening device for home use.** (12/00)

Prof. Peretz Lavie and Itamar Medical Ltd. President (and Technion graduate) Israel Schreiber create **the "Watch-PAT" device for monitoring the blood pressure – and identifying cardiovascular problems – of patients with sleep disorders.** (4/00)

Miscellaneous

Prof. Eyal Zussman and Prof. Ari Admon, used **a common blood protein to create a strong, flexible biomaterial** to close wounds with minimal scarring and limited rejections by the immune system. (11/08)

Technion Lecturer Dr. Carmit Levy, the CEO of startup company Pneumedicare, developed **a device for monitoring respiration of premature babies.** (2/08)

Gelrin bone glue, developed by Prof. Dror Seliktar, fuses synthetic and biological materials and **greatly speeds bone regeneration.** (12/04)

The research of Prof. Nathan Karin could lead to **vaccines against inflammatory autoimmune diseases including rheumatoid arthritis, multiple sclerosis and Crohn's disease.** (10/02)

Technion Breakthroughs

Medicine

Cancer

Using cancer cells from an ovarian cancer patient and human embryonic stem cells, Prof. Karl Skorecki and Dr. Mati Tzukerman have created a cancerous tumor in a mouse that mimics the way the tumor would develop in the patient's body. The result is a pre-clinical experimental model for cancer research that could facilitate the development of personalized cancer therapies. (1/09)

Dr. Hossam Haick developed an electronic nose for sniffing cancer via breath samples. (8/08)

A study by Professor Emeritus Yoram Palti shows that low intensity electrical fields, delivered via insulated electrodes on the scalp, can more than double the survival rates for people with one of the most common types of brain tumor. A device developed by his company, Novocure, is in Stage III FDA trials. (6/07)

A team of researchers led by Prof. Yehuda Assaraf discovered new mechanisms developed by cancer cells to become resistant to various chemotherapy drugs. The findings could point the way to new approaches for fighting drug-resistant tumors. (12/05)

Distinguished Profs. Avram Hershko and Aaron Ciechanover were awarded the 2004 Nobel Prize in Chemistry for their discovery of the Ubiquitin system, the body's process for marking unnecessary proteins for destruction. The anti-cancer drug Velcade is based upon their work, and several other drugs are in development. (2004)

Prof. Israel Vlodavsky and his team have identified an enzyme called heparanase, which is secreted by tumors to attract blood vessels. This process, called angiogenesis, allows the cancer to infiltrate the blood and metastasize around the body. The researchers are working to inhibit the gene responsible for producing heparanse; shutting down that lifeline could be another way to shut down cancer once it begins. (2004)

Technion research has dramatically illustrated how the chemicals in tobacco smoke destroy the protective substances in human saliva – and in fact combine with the saliva to create a corrosive cancer-causing mix. (6/04)

Dr. Yoram Reiter and colleagues test a novel new cancer treatment to eliminate or shrink tumors in laboratory mice. The treatment causes anti-viral T cells – white blood cells that play a large role in the body's immune response – to recognize tumors as virus-infected cells, and thus attack them. (6/04)

Researchers led by Dr. Gera Neufeld identified the specific protein that makes breast cancer cells invade other tissues. The LOR-1 protein causes tumors to spread and also induces the large amounts of collagen fibers that are a hallmark of deadly breast cancers. The team believes that chemicals to inhibit LOR-1 could be developed as possible treatments. (7/03)

Prof. Marcelle Machluf is working to develop pinpoint delivery of chemotherapy drugs to cancer cells using nano-sized spheres.

Technion Breakthroughs

Medicine

Stem Cells and Tissue Engineering

There are more than 25 ongoing stem cell-related projects at the Technion.

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Profs. Shulamit Levenberg and Lior Gepstein **use embryonic stem cells to create new heart muscle with a built-in network of blood vessels.** According to the researchers, such vascularization would greatly improve the survival of the tissue when transplanted in a human heart. (1/07)

Prof. Shulamit Levenberg, together with a team from MIT, grew **new muscle complete with its own network of blood vessels in the laboratory, and implanted the new muscle in a living mouse.** The accomplishment is a first for tissue engineering, and could make possible the repair and replacement of damaged muscle tissue when needed. (6/05)

Dr. Lior Gepstein and colleagues have coaxed **embryonic stem cells to develop into** heart cells and subsequently into beating heart muscle. They have also demonstrated that heart cells grown from human embryonic stem cells can integrate into the host heart and help regulate its activity, a breakthrough that may lead to the development of a **biological pacemaker** and to the use of heart cells to repair heart tissue destroyed by heart attacks. (9/04)

Researchers, led by Prof. Joseph Itskovitz-Eldor, **induced stem cells to form into blood vessels.** (12/03)

Stem Cells

Prof. Joseph Itzkovitz-Eldor and his team demonstrated the creation of **tendons from stem cells.** These tendons have been successfully implanted in mice. The researchers are learning how to control the length, width and other options in the process before beginning clinical tests. (4/06)

Profs. Karl Skorecki and Joseph Itskovitz-Eldor **have grown insulin-secreting cells,** for a new approach to treating diabetes. (8/01)

Prof. Joseph Itskovitz-Eldor of the Faculty of Medicine was on the international team that **first discovered the potential of stem cells to form any kind of tissue and pioneered stem-cell technology.** The breakthrough garnered headlines around the world. (1998)

The Technion is at the forefront of embryonic stem cell (ESC) research. It is **one of just 10 academic institutes and companies worldwide and the only one in Israel approved by the NIH for federally funded stem cell research.**

Technion Breakthroughs

Medicine

Parkinson's and Alzheimer's Diseases

A study by Teva Pharmaceuticals has demonstrated that the drug **Rasagiline – first developed by Technion Profs. Moussa Youdim and John Finberg – can slow the progression of Parkinson's disease.** The drug first received FDA approval in 2006. (6/08)

Prof. Yoram Baram created a **virtual reality device that combines auditory and visual feedback to improve walking speed and stride length in patients suffering from Multiple Sclerosis (MS) and Parkinson's.** (4/07)

Prof. Moussa Youdim and colleagues received patents for **three new drugs to treat and perhaps prevent neurodegenerative diseases including Alzheimer's, Parkinson's and ALS.** The trio of drugs mop up excess iron before it can trigger a "brain rust" chemical reaction, a hallmark of many neurodegenerative diseases. (11/04)

Food, Vitamins and Nutrients

Prof. Andrew Levy shows that **dual therapy with vitamin E and statins** is shown to be more effective than statin therapy alone (1/08)

Research by Prof. Andrew Levy concludes that **40% of diabetics would benefit from vitamin E.** (11/07)

Dr. Yoav Livney and colleagues have engineered **a way to deliver health-promoting nutrients using protein particles** naturally present in milk as carriers. The breakthrough could lead to low fat or non-fat foods that contain nutrients now present only in fat-containing foods, and could be used to enrich foods with other important nutraceuticals like vitamins and antioxidants. (2/07)

Pomegranate

Research by Prof. Michael Aviram shows that **pomegranate juice may provide important health benefits for diabetic patients.** (8/06)

A study by Prof. Ehud Keinan shows the **inhalation of limonene, the main component found in the essential oil of citrus, prevented asthma symptoms in animals.** (12/04)

Technion researchers, including Prof. Michael Aviram and Prof. Silvia Mandel, are renowned for their **research on antioxidants from sources that include pomegranates, wine, onions, tomatoes and green tea.** The benefits of antioxidants include the lowering of cholesterol oxidation and arteriosclerosis levels.