

# ISRAEL HIGH-TECH & INVESTMENT REPORT

A MONTHLY REPORT COVERING NEWS AND INVESTMENT OPPORTUNITIES      JOSEPH MORGENSTERN, PUBLISHER  
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## Why is there only One Teva?

Why is there only one Teva with annual sales of more than \$4.0b? Why has Serono closed down InterPharm? What role do Government support programs play in nurturing a multinational?

Teva Pharmaceuticals was the result of the merger of three companies: Assia, Zori and Teva. The development of this group reflected the rise of the pharmaceutical industry in Israel. The first milestone was a warehouse for drugs established in Jerusalem in 1901 by Haim Solomon and Moshe Guttel Levin.

The initiative to establish a local pharmaceutical industry arose in the early 1930s. Nazi Germany was boycotted by the Jews in Palestine. As a result the main source of medical supplies was cut off. However, Jewish chemists began to arrive in Palestine from Germany and other European countries. One consequence being that expertise in pharmaceuticals rapidly accumulated. The pharmaceutical industry gained momentum when the Second World War broke out. Local manufacturing was almost the only source for drugs within the countries in the region.

Unlike Israeli companies like CheckPoint and Comverse that were formed to address global and international issues Teva Pharmaceuticals came about as a result of a critical need within the country.

The company was blessed with visionary management that foresaw the future emergence of the generic drug industry. Since generics were exact copies of "name" drugs their price was considerably lower. Major international pharmaceutical companies refused to license their products to Teva. Teva got around the limitations by synthesizing these drugs in their own laboratories. Inadvertently this marked the onset of generics.

As a result of a management decision Teva obtained the rights to produce Copaxone from the Weizmann Institute. In due course copaxone became a blockbuster drug whose annual sales are reaching \$1.0b. Copaxone lengthens the period between multiple sclerosis attacks.

Not known widely is that 2/3 of Ares Serono's, the Swiss Italian pharmaceutical giant annual sales are derived from Israeli laboratories. The company's leading product is bulk recombinant human interferon-beta-1a for the treatment of

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Stem cells as Heart "pacemakers"

Israelis' Overseas investment Jumped to \$737m.

DOCTORAL candidate Yaakov Benenson named one of the world's top young innovators

Israeli Technology Powers US Army Driving Simulator

Israeli Yo-Yo Playing Robot

Israeli Scientists Awarded Nobel Chemistry Prize

Multiple Sclerosis (MS). Manufactured by InterPharm and Serono, the product is marketed under the Rebif® commercial brand name. The second product came about from research dating from the 1960s by a young scientist named Aliza Eshkol, who worked at the gland research laboratories at Israel's Tel Hashomer Medical Center. The resulting product Gonal-F, generates 26% of Serono's annual revenues.

By a small stretch of the imagination, Serono's recent decision to close down InterPharm in Israel and to transfer it to Italy, is understandable.. By moving InterPharm to Serono, in due course, the Israeli origin and the drugs developed there will be erased. However, that does in no way detract from the remarkable technological capabilities of Israel's biotechnology researchers.

Government support programs in today's world are a must and should not be an issue for foreign companies seeking to gain a foothold in Israel. The research and development commercialization companies, affiliated with this country's major universities, have available billions of dollars of know-how. They are unable to find enough licensees in Israel and would be more than happy to license their patents to overseas groups.

Perhaps in the final analysis as to why there is only one Teva, can be gleaned from the company's history. Its products were desperately needed by a Middle Eastern population that could not obtain drugs from overseas. It is also likely that today's Israeli entrepreneur does not dream of being an Eli Hurwitz, but would be more likely to emulate the founders of Mirabilis or ICQ who built businesses in a few years and rapidly cashed out in the hundreds of millions of dollars.

### ***Russia Places First Defense Order with Israel***

Hebrew daily "Yediot Ahronot" reports that Russia has made its first defense purchase from Israel. Aeronautics Defense Systems has signed a contract with the Russian company Irkut, the manufacturer of the advanced fighter-bomber Sukhoi Su-30, for unmanned aerial vehicles (UAV) valued at several millions of dollars. Russia's Ministry of Civil Defense

approved the transaction. Defense Systems' Vice-President of marketing, Idan Shimon confirmed the report.

Aeronautics Defense Systems, located near Tel-Aviv will supply the company's Aerostar UAV. The product has also been sold to Angola, Ivory Coast and other African countries. Aerostar is used to defend oil installations and other facilities.

Aeronautics Defense Systems recently achieved a milestone when it signed a joint-venture agreement for UAVs with the General Dynamics Corp. (NYSE:GD). The agreement has already led to one contract: the US Navy has bought several of Aeronautics Defense Systems' products. The Aerostar is manufactured in the US, which Shimon says enables the IDF to use US military aid to buy the system.

In order to expand its share of the UAV market, Aeronautics Defense Systems bought most of the shares of Italian UAV engine-maker Zanzottera Technologies earlier this year. Zanzottera is now in the process of developing more powerful engines for Aeronautics Defense Systems larger UAVs, now under development.

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## ***Radar Warns of Incoming Qassam Rockets***

Residents in Jewish settlements in the Gaza strip will soon begin to benefit from a novel technology that affords residents a 15 to 20 second warning of an incoming Qassam rocket fired from Gaza.

The system, which is connected to a public address system, was used recently for the first time and observers judged it to be successful.

Known as Maamin, Hebrew for "I believe", the system fixes the position from which a rocket is fired and issues a warning. Using electro-optic sensors and advanced computers, Maamin is capable of pinpointing both the location of the launch and the point where the missile will land, in a calculation lasting less than a second.

The missile division at Rafael Israel Armament Development Authority, developed the system and a prototype was built in six weeks following an emergency request.

Maamin was developed according to specifications of the ground forces for locating snipers. Success in the development stages led to an expansion of the specifications to locating the launch sites of Qassam rockets.

According to the IDF estimates, the average flight time of a Qassam is about 30 seconds, which is long enough to seek cover, according to military sources.

The IDF expects to expand the capabilities of the system to enable an immediate response against those firing the rockets.

Rafael CEO Giora Shalgi said the system is relatively simple. He said that with a small investment of less than \$10 million it would be possible to broaden the system to cover the northern border and the Gaza Strip. According to the police officers 101 Qassam rockets have been fired so far this year. Thirteen rockets were the upgraded Nasser 3, which has a longer range and larger warhead.

## ***Business Week: "Israel is Emerging from Financial Drought"***

"Israel's high-tech sector finally is emerging from a long financial drought... The global recovery has energized Israel's so-called 'silicon wadis'," stated Business Week in a recently published feature article.

"There is a buzz on the streets of Tel-Aviv about several of the major global technology players that are on the verge of cutting deals in the next few weeks."

"Why the renewed interest in Israel? First, for a small country, Israel has lots of start-ups. And start-ups, unlike Western tech giants, didn't have the luxury of cutting back R&D to get through the downturn. So the Israelis kept innovating, even as the global tech industry swooned, and fighting surged between Israelis and Palestinians," writes Business Week.

"Now there are lots of small survivors with leading-edge technology in areas such as Internet security, wireless broadband, and medical devices. No wonder acquisition activity is up by some 25% over the past year. Tech exports surged 20% in the first six months of 2004, to more than \$6 billion, and the Tel-Tech 15 index is up 48% in the past twelve months.

"Israeli high-tech companies are also returning to Wall Street, after a long hiatus. So far this year, three outfits Lipman Electronics Engineering (Nasdaq: LPMA; TASE: LPMA), which develops electronic payment systems; PowerDsine (Nasdaq: PDSN), a maker of integrated circuits for telecoms; and Syneron Medical (Nasdaq: ELOS) have joined the 70 plus local high-tech outfits traded on Nasdaq," Business Week points out.

"There are at least a half-dozen initial public offerings, and a number of follow-on offerings ready to go to market by the end of the year," Lehman Brothers managing director and head of Israeli business Leonard G. Rosen was quoted as saying.

The number of financing deals is increasing but 17 of 31 deals in the past year have been for less than \$10 million. Apparently a similar situation is developing with new public offerings.

## ***Ness Technologies Debuts on Nasdaq***

Tel Aviv-based software services Ness Technologies (Nasdaq:NSTC) completed one of the largest initial public offerings by an Israeli firm on Nasdaq in years. Its pricing phase was a bit disappointing for the company, which wound up raising less than expected. But it was still the most impressive offering by an Israeli company on Wall Street for a long time.

The final range was \$12 to \$14, meaning the company raised between \$90 million to \$105 million. The firm had hopes to raise \$120m. but settled for a lower than anticipated offering pricing.

Some of its shareholders, including the Wolfson family and Warburg Pincus, decided to participate in the IPO.

They registered to sell 4.1 million shares. The offering was handled by Lehman Brothers and Merrill Lynch. The underwriters have a green-shoe option to buy another 1.75 million shares. Altogether Ness and its shareholders should realize just under \$200 million from the offering, which prices Ness at almost half a billion dollars.

Ness Technologies is an amalgamation of Israeli and foreign software houses. Ness reported second-quarter revenues of \$73.9 million, an increase of 65% compared with the parallel quarter of 2003 and up 4% from the first quarter.

First-half sales totalled \$145 million, an increase of 57% from the same six months of 2003.

Second-quarter operating profit was \$4.3 million, versus an operating loss of \$17,000 in the parallel quarter of 2003. But in the first quarter, it had achieved operating profit of \$5.2 million.

It netted \$2.9 million in the second quarter of 2004, more than 200% its earnings in the parallel quarter and comparing with \$2.4 million profit in the first quarter of the year.

First-half net profit reached \$5.3 million, and cash flow from operations was \$8.8 million. At the end of the second quarter, Ness had \$43.5 million cash.

On the first day of trading the Ness shares gained 7% over their issue price.

### ***Israel Debuts "Down Under"***

Denx, a Jerusalem based a surgical technology company, chose the Australian Stock Exchange for its recent stock market debut, a backdoor listing through the investment company Helm Corporation.

Helm is associated with Graeme Holt, an Australian investor. The founder and chief executive of Denx, Alon Hayka, says its listing in Australia could trigger similar moves by other Israeli technology companies. He says Israeli companies struggling with the downturn in the technology industry are searching the world for finance, and the listing in Australia offered Denx the opportunity to widen its shareholder base.

"Our story has not received much attention in Australia to date but it certainly got attention in Israel," he says. "Israeli technology companies have always looked to NASDAQ or specialist European technology markets for capital. This is the first time anyone from Israel has tried Australian equity markets. We have had dozens of inquiries from other technology companies and venture capital groups concerning our listing."

Denx employs 70 people, making proprietary surgery navigation technology. It is used by specialist dentists

and in dental training schools. "In essence, the technology allows dentists to see their location in the bone in which they are drilling," says Hayka, who established Denx in 1994 and owns 9% of the company.

### ***Israel Promoting Venture Capital Fund with India***

The Government of Israel is in talks with the Indian Government to set up a joint Venture Capital fund to aid Indo-Israeli technology ventures.

Mouneer Agbariya, the First Secretary, of Economic Affairs, Embassy of Israel speaking to the media in Bangalore said: "We have had a series of discussions with the Government of India to set up this fund which will focus on technology companies based on collaboration between Indian and Israeli companies." He further added that with India's software services expertise and Israel's high-tech background, companies formed with this partnership, will become a potent force in the industry.

Stressing the need for such a fund, he said that Israel has a leading edge in information and telecommunication technologies, continually attracting the world's attention and attaining a position among the top three competence centers worldwide.

He also highlighted the fact that Indian technology companies could benefit from participating in the forthcoming 'Telecom Israel 2004', a bi-annual telecom exhibition and conference.

### ***Bear Stearns to Buy 50% of Migdal Capital***

According to Haaretz's business magazine The Marker, Migdal Insurance (TASE: MGD) is about to sign an agreement to sell 50% of Migdal Capital Markets to Bear Stearns. The transaction will apparently price Migdal Capital Markets at about \$22.3 million.

The insurance giant is preparing the groundwork for the banks' anticipated, and forced, sale of their provident and mutual funds holdings.

Migdal Capital Markets provides portfolio management and trading services, investment advice and underwriting services. It also engages in management of provident and mutual funds, and is considered one of the biggest mutual fund managers outside the banking system.



Bear Stearns, the sixth-biggest investment bank in the U.S., has previously been active in Israel in arranging investments.

### **Lip-reading on Mobile Phones**

Israel's largest mobile phone operator Cellcom and Israeli start-up SpeechView have launched a worldwide-patented software that will allow the deaf and hard of hearing to communicate verbally through mobile phones.

Raising the level of lip reading is achieved by creating



is achieved by creating cued speech which can be thought of as enhanced lip-reading -- signs are made around the face that appear on the computer screen to provide vital additional information about some of the phonemes being

uttered. A company executive points out that lip-reading is usually a practical means of communication, but is not perfect-- typically, a person who is lip-reading only recognizes 30 per cent of the words being uttered. For example, b and p cannot be told apart -- and thus "cued speech" indicates which phoneme is being uttered. The enhancement of the moving lips is achieved with algorithms, and in the final software, allows for the deaf person to maintain conversation, nearly seamlessly, a conversation which begins with the speech of the caller and its understanding by the handicapped person, as he visually observes and reads the conversation that has been converted into a lip readable format. The software product trade named LipCcell, is installed in the user's computer and connected with a cable to a cellphone. When the deaf person receives a call, the software translates the voice on the other side of the line into a three-dimensional animated face on the computer, whose lips move in real time synch with the voice allowing the receiver of the call to lip read.

A company executive said he knows of no such technology in the world, and added that SpeechView was in touch with mobile phone operators in Great Britain, Belgium and the Netherlands to further distribute the product.

"There is no language limitation," he said, adding that

all phonemic languages can be translated by the software.

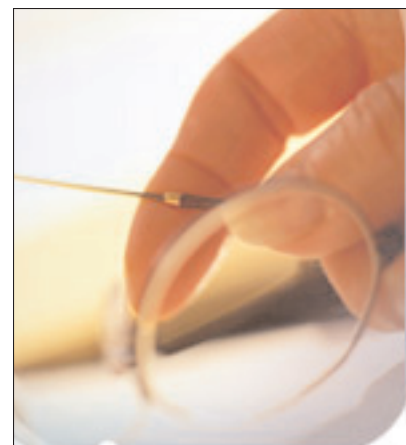
The technology was created by Nachshon Margalio, an Israeli information systems specialist, who stumbled upon the need for the product while working with a hard of hearing colleague.

"I couldn't understand how the communication world had forgotten the hard of hearing and why there was no comprehensive solution," Margalio said.

A spokesman for SpeechView said that 10 percent of the world population had different levels of hearing difficulties, of which half were suited to use the software.

### **Eli Lilly invests in Startup Remon Medical**

In July 2003 IHTIR featured Caesarea based Remon Medical Technologies as a highly interesting medical startup. The company recently announced that it has completed a \$16 million financing round, led by Lilly Ventures, the investment arm of Eli Lilly, and KBL Healthcare Ventures. The Ofer Brothers and existing shareholders, including the U.S. fund Polaris Venture Partners and Concord Ventures of Israel, also



participated in the financing.

Remon has pioneered the first human use of an implantable intra-vascular wireless telemetric communication system. Former Israeli naval officers, who applied ultrasound

sonar concepts in submarines, developed the company's technology.

The Remon ImPressure™ offers on-demand, non-invasive means to monitor intra-vascular pressures, following endo-vascular graft procedures. The company says it has finished enrolling patients for clinical trials of its system. The device was developed in collaboration with Guidant Corporation, which focuses on technology for treating cardiac and vascular diseases.

Remon was established in 1999 in the Ofer Brothers'

technology incubator. In 2001 Remon raised \$10 million at a post-money company valuation of \$30 million.

### ***UltraSPECT Enters U.S. Market***

Haifa-based UltraSPECT has announced 15 installations of its systems in top-tier U.S. and Israeli hospitals. In Israel, its products have been installed at Hadassah Medical Center in Jerusalem and the Carmel Medical Center in Haifa. The contracts for its devices are valued at about half a million dollars.

The company's technology enables gamma cameras to provide greater productivity and superior image quality.

Sales, of its key products Xact.bone and Xpress.bone which began in June, according to company reports, exceed expectations. Both products shorten the duration of the imaging process, for the convenience of the patient and improve the efficiency and turnover of the highly expensive imaging devices.

Both devices have received United States Food and Drug Administration clearance.

UltraSPECT says its wide beam reconstruction technology improves the detectability of lesions, and reduces scan times by as much as 50% without compromising imaging quality. Contrast and resolution can be improved by a factor of two, compared to the current available technologies, the company stated.

UltraSPECT, a privately held company established in late 1999, was founded by Dr. Shuli C. Shwartz (CEO) and Dr. Israel Ohana.

UltraSPECT has three patents pending. It was one of three companies nationwide that won "The best technology incubator project" for the year 2003.

Since its founding UltraSPECT has raised about \$4 million in venture financing from Veritas, Giza, and private investor including Jonathan Adereth, and Hillel Bachrach, a co-founder of Lumenis (Nasdaq:LUME.PK). The company is presently in preliminary talks alliances with leading medical imaging companies including GE Medical, Philips, and Siemens.

### ***Churches in Mexico Silence Mobile Phones***

Some Mexican churches are using state-of-the-art technology developed by Israeli electronic warfare experts to silence phones that ring during mass.

Four churches in the northern Mexican city of Monterey are using equipment made by Israeli telecoms equipment firm Netline Communications Technologies to block calls during services.

The Tel Aviv-based company was set up in 1998 by former military and defense industry specialists to develop a hand phone jamming system, primarily for the security industry.

Mr. Bulmaro Carranza, a caretaker at the city's Baroque-style Sacred Heart church, was quoted as saying: 'Before we had the system, it was very uncomfortable hearing calls coming in during the celebration of mass. 'Now, it's 95 per cent quiet.'

The signal-jamming equipment is packed into two wall-mounted boxes the size of small hi-fi speakers, with one next to the altar and the other at the church entrance.

Switched on just before the start of every service, the system causes a 'no signal' message to be displayed on worshippers' phones, but causes them no lasting damage.

"We believe that we were the first church in Mexico to use this technology," Mr. Carranza said.

"Now, we are getting calls from all over the country to see how it can be installed in other locations," he added.

### ***Predix Pharmaceuticals Raising \$15m***

Predix Pharmaceuticals a US-Israeli start-up has announced the completion of two Phase I clinical studies, for its proprietary investigational drug, for the treatment of anxiety, depression and hyperactivity. The company plans to launch Phase II clinical trials for the drug. Predix uses proprietary 3D computational chemistry technologies with traditional medicinal chemistry, to create a drug discovery platform.

Predix was founded by Dr. Silvia Noiman, Dr. Oren Becker and Dr. Haim Aviv in 2000. Its main investors are Israel's Yozma and Orbimed Advisors of the US. Predix has raised \$27 million to date and is currently raising \$15 million. Predix's drug, PRX-00023, is one

of a new group of serotonin receptors discovered using proprietary technology developed by Becker at Tel Aviv University.

### ***Siliquent raises \$21 million***

The U.S. venture capital fund, Thomas Weisel Ventures, was the lead investor in a \$21 million financing round just completed by Israeli startup Siliquent. The company develops high-speed communications processors for storage networks. Its technology achieves speeds from 4 to 10 gigabits per second. Its solutions are applicable to iSCSI, RDMA and TCP/IP protocol, and are embedded in a single chip.

Amit Oren and Dan Arazi established the company, in October 2000. To date the startup has raised \$40 million, including money from IBM. It has 40 employees at its Ramat Gan, Israel development center and at its California headquarters.

### ***Transtech Raise an Additional \$19m***

Giza Venture Capital, Accel Partners, and Formula Vision Technologies (TASE:FVT) are investing \$19 million in airfield management systems company Transtech Control, in return for 47% of the company. Giza Venture Capital led the financing round.

Transtech's system, the Intelligent Airport, provides tower controllers, airline ramp managers and airport operators with a real time display of traffic across the airport operating area. The system tracks actual vehicular movements against planned taxi routes and operational boundaries, providing timely alerts of irregular activity, addressing safety, capacity and security challenges. The company has systems operational at some 120 airports worldwide, including New York's JFK International, San Francisco International, Los Angeles World Airport, Beijing Capital Airport, Sao Paulo International, Denver International, and Taipei International. Transtech has a fully owned subsidiary, Transtech Airport Solution Inc., based in Connecticut.

### ***Dotomi Completes \$10.5m. Financing***

Dotomi is an Israeli company developing technology for companies to message clients online. The company has finished raising \$10.5 million from a group led by the Growth Capital Fund. Velocity Equity Partners and U.S. Venture Partners also contributed funding.

The company has developed a communications platform allowing companies and brands to transmit messages through their CRM - customer relations marketing - software systems, to advertising space on the Internet. These messages replace regular banners on websites.

Surfers who sign up for the service receive messages about special sales, coupons and discounts from companies with which they want to be in touch.

The messages are transmitted during surfing on Israeli websites such as Walla, Nana, Ynet, Ma'ariv, Tapuz, Globes, TheMarker and ONE, without exposing the surfer to additional advertising.

Dotomi launched its pilot personalized-ads service in October 2002. Some 160,000 Israeli surfers have signed up so far, as have major companies and brands including Isracard, Steimatzky, Isrotel Hotels, Bank Hapoalim, Yes, El Al, Orange, Supersol-Supercard, Blockbuster, Issta, Pizza Meter, American Express and AIG.

In June 2003 Dotomi raised \$5 million from U.S. Venture Partners.

### ***CyOptics Raises \$10m.***

Startup company CyOptics has completed its fourth round of financing, raising \$10 million. Up to the current round, the company, which develops, designs and manufactures optical engines for broadband metro and access communications solutions, had raised \$77 million since beginning operations in 1999. The latest financing round was led by JVP (Jerusalem Venture Partners) and joined by existing investors including Soros Private Equity Partners, The Sprout Group, Eurofund, Ventech, Innovacom and a new investor.

"CyOptics has weathered the downturn in the communications marketplace and emerged stronger, more focused and innovative company", said Glen Schwaber, general partner at JVP and a CyOptics board member.



The \$10 million raised will be used to support the development of new products and to boost marketing and sales operations.



CyOptics' wafer/chip fabrication operations are located in Yokneam Illit, while its automated packaging and testing operations are located in Pennsylvania's Lehigh Valley, in the US.

### ***InSightec Raising \$21m. from its shareholders***

Elbit Medical Imaging (Nasdaq:EMITF) says it and other shareholders in InSightec have invested another \$21 million in the company.

Elbit Medical owns its 55% interest in InSightec through a fully-owned Dutch company. Its partners are GE Medical and the MTA fund.

Of the total, \$10.5 million will be invested immediately after InSightec receives FDA approval for its product, which is expected imminently.

InSightec is developing and marketing an advanced ultrasound device to noninvasively remove tumors. Its ExAblate 2000 is already being sold, but the real breakthrough is expected to arrive after the device receives FDA confirmation.

After the fundraising Elbit Medical, which belongs to Motti Zisser, will own 52.16% of InSightec's shares. GE Medical will own 20.6%. MTA will have 6.8%. The rest belongs to the company's founders and employees.

Elbit Medical president Simon Yitzhaki said InSightec will be using the proceeds of the financing round to accelerate product development of several ExAblate applications in parallel, including treatments for cancer of the liver, bones, and brain.



### ***NICE Video Solution Secures Statue of Liberty***

NICE Systems (Nasdaq:NICE; TASE:NICE) announced that its smart video solutions were chosen to secure the newly reopened Statue of Liberty.

The NICE solution delivers video recording and advanced analytics applications to the United States Park Police in charge of the security of the Statue of Liberty National Monument. "Currently deployed at a large number of high-profile government facilities,

NICE video solutions have become the preferred choice for government officials at both the operating and directive levels. The continuing preference of NICE by this market is a testimony to our quality and reputation," says Ian Ehrenberg a NICE executive.

### ***Gteko raises \$10m from Pitango, Intel Capital***

Start-up Gteko Ltd. (formerly Gtek Technologies) is raising \$10 million in a financing round led by Pitango Venture Capital and Intel Capital. Sources close to Gtek confirmed that the company would close the round soon. Gteko CEO Joshua Glazer declined to comment on the report.

Gteko provides solutions and support for improving remote control of customer support and services systems. Its customers include Hewlett-Packard (NYSE:HPQ), America Online (AOL), Canon (NYSE:CAJ; JSE: 7751) and NEC Corp.. (TSE:6701; Nasdaq:NIPNY; LSE:NEC; XETRA; AEX:NIPN), which provide support services for millions of customers worldwide. Gteko's product is aimed at a wide range of enterprises, computer manufacturers, Internet services providers (ISPs), software developers, and companies with large support systems.

Founded 12 years ago, Gteko has about 100 employees in Israel, the US and Japan. Deloitte Touche Tohmatsu included Gteko in its 2003 rankings of the 50 fastest growing companies.

Gteko has not raised capital from venture capital funds before, but only from NEC Europe and private investors, including Yossi Vardi, Dov Freund and its CEO, Joshua Glazer. AOL has an option to acquire 5% of the company.

### ***Stem Cells Found to Help Heart Rhythm***

Stem cells, plagued with political controversy because they are harvested from human embryos, have found separate experimental uses in helping the heart and eyes, the Washington Post reported recently.

In the first instance, Israeli researchers showed that the cells -- which scientists can coax into forming cells of some 200 bodily organs and tissues -- can serve



as "bodily pacemakers" when injected directly into failing animal hearts. The researchers at the Technion-Israeli Institute of Technology in Haifa reported that the versatile cells were able to correct faulty heart rhythms in pigs when used this way.

Ultimately scientists hope this technology could replace the electronic pacemakers currently used to treat humans with irregular heartbeats, .

The Israeli team from Technion-Israel Institute of Technology, along with US colleagues, took the stem cells from donated human embryos.

The process is described in the journal *Nature Biotechnology*.

In healthy hearts, groups of special heart cells make the organ beat regularly by stimulating the heart muscle cells to contract.

In people where this mechanism fails, an electronic, battery-powered pacemaker is implanted to keep the heartbeat going.

These devices may need replacing and some electrical equipment, such as certain mobile phones, can interfere with the way they work.

In comparison, "natural" pacemakers made from the body's own cells would need no power source and would become part of the heart.

Dr Lior Gepstein and his team took embryonic stem cells and used chemicals to coax them to grow into standard heart muscle cells.

Some of these cells were seen to beat spontaneously in the same way as healthy heart muscle.

The scientists isolated these cells and injected them into the hearts of pigs with abnormally slow heart rates. In 11 out of 13 pigs, the injected cells produced their own heart rhythm. In five of the pigs, this was limited to short bouts, but in six of the pigs the beat was sustained and resembled the pattern of a normal beating heart.

The researchers said their research provided evidence that the same technique could potentially be used to make a "biological pacemaker" to treat human patients with heart conditions.

"Our proof-of-concept study suggests the use of excitable cell grafts as a biological alternative to implantable devices," they said.

But they added: "Nevertheless, several obstacles must be overcome before this strategy can reach the clinic."

There is a theoretical risk that the cells could become cancerous or that the body would reject the cells.

But, on the positive side, the embryonic stem cells have the advantage over other cell candidates for repairing hearts of being able to be made in unlimited numbers, the scientists said.

Dr Tim Bowker, Associate Medical Director of the British Heart Foundation, said: "This study provides interesting findings about human heart cells grown from stem cells, and used in laboratory experiments on animal heart tissues.

"The BHF supports stem cell research, but the use of the techniques described is a long way from clinical application in humans.

"Use of stem cells in the treatment of heart disease has been proposed for a range of heart conditions, and this research adds to this list of potential future applications for stem cells in treating Britain's biggest killer."

### ***Israelis' Overseas Investment Jumped to \$737m***

Overseas investment by Israelis has risen sharply. Overseas investment by Israelis totalled \$737 million in August, including \$116 million in financial investment in negotiable securities, show Bank of Israel figures.

Foreign direct investment in companies and income-producing real estate by Israelis totalled \$550 million. This figure includes strategic investment in apartments and land by Israeli companies active overseas.

Foreign investment in negotiable securities totalled \$339 million in August. Direct foreign investment in Israel, including in companies and real estate, totalled an additional \$163 million.

Foreign investment in Israel totalled \$4.1 billion in January-August 2004, 74% of the \$5.5 billion in foreign investment in 2003 as a whole.

Foreign direct investment in Israel, including companies and real estate, totalled \$1.52 billion in January-August, 40% of the total foreign direct investment in 2003 as a whole.

Foreign financial investment in Israel totalled \$3.26 billion in January-August, 33% more than in 2003 as a whole. Foreign investment in the Tel Aviv Stock Exchange (TASE) fell by \$491 million, compared with an increase of \$372 million in 2003 and \$46 million in 2002.

### ***Israeli Voted One of the World's Top Young Innovators***

The Weizmann Institute of Science announced that Yaakov Benenson, doctoral student under Prof. Ehud Shapiro of the Departments of Computer Science and Applied Mathematics and of Biological Chemistry, The Weizmann Institute of Science, has been named to the 2004 list of the world's 100 Top Young Innovators by Technology Review, MIT's Magazine of Innovation. The TR 100, chosen by the editors of Technology Review and an elite panel of judges, consists of 100 individuals under age 35 whose innovative work in technology has a profound impact on today's world and will shape the future of the way we live and work. This year's nominees are recognized for their contributions in transforming the nature of technology and business in industries such as biotechnology and medicine, computing, and nanotechnology. Benenson was selected from nearly 650 candidates worldwide to be among the 100 Top Young Innovators. He is the first and only Israeli-based recipient.

Inspired by Prof. Shapiro's vision of a "doctor in a cell", Benenson joined the Weizmann Institute of Science in 1999 at age 24 and began to tackle the challenges of DNA-driven computing solutions for disease diagnosis and treatment. Benenson co-invented the world's smallest biological computing device – a bio-molecular finite-state automaton made from DNA strands and DNA-manipulating enzymes. The automaton was listed in the 2004 Guinness Book of World Records as the smallest biological computing device – it is about a trillionth the size of a drop of water. Recently, this device was enhanced to detect and diagnose molecular symptoms of cancer in vitro and, in response, to release a drug to treat the cancer. Benenson's breakthrough in this area of research exceeded earlier progress predictions by Shapiro and others. His efforts in the development of cutting-edge biotechnologies such as this "smart drug" have put him among the world's 100 Top Young Innovators.

Shapiro states that Benenson "was a key innovator and leading experimentalist in the biological computer team, and it is very gratifying to have his contributions acknowledged by MIT's Technology Review editors and the distinguished panel of judges for the 100 Top Young Innovators of 2004 award."

"Nature invented intricate molecular tools to detect and repair malfunctions in cells and organisms. Ultimately, our research may lead to the use of biomolecular computers to supplement and enhance existing natural defenses," says Benenson.

Benenson received the Wolf Foundation Prize for Excellence in Graduate Studies in 1998, and is currently on the Dean's List of the Feinberg Graduate School at the Weizmann Institute of Science for his achievements in PhD studies and research.

Benenson and his innovative peers will be honored September 29 - 30 at Technology Review's 2004 Emerging Technologies Conference at MIT. Benenson is also a candidate for "TR100 Innovator of the Year" and the "TR100 Humanitarian Award" which will be announced at the conference. The 2nd Annual conference is expected to draw 1,000 participants representing business, technology and science from over 40 countries.

### ***Israeli Technology Enables images Beamed from Mars***

Research by three scientists from the Haifa Technion made the transmission of video pictures from Mars by the NASA explorer "Spirit" possible, according to HP (Hewlett Packard) Labs, which was responsible for the image transmissions.

The ability to transmit the images was feasible thanks to a unique algorithm developed by Technion graduates living in the US as a continuation of work launched by two other Technion professors a quarter of a century ago.

Shortly after landing on the surface of the red planet earlier in the week, NASA's explorer began sending black-and-white photographs of Mars' rocky surface back to Earth, 106 million miles away. The sparkling clear images have been called "remarkable" by NASA officials and amateur astronomers.

The achievement was made possible by highly efficient data compression. "Because of the great distance between Earth and Mars, the signals are very weak, thus data can be transferred very slowly. Thus the way to speed it up is to compress the data and translate it into another form with many fewer bits without harming the quality of the image," Ziv explained. "NASA adopted the algorithm originally developed by our graduates, who are the second generation of our original work."

### ***Israeli Technology Powers US Army Driving Simulator***

U.S. Defense Secretary Donald Rumsfeld underwent a simulated driving test on a new Israeli-developed driving simulator during a recent visit to a U.S. army

base in Fort Leonard Wood, Montana.

The driving simulator is one of over 50 installed at the military training base by FAAC, a company that specializes in Operator Driving Simulators (ODS). The Israeli-designed simulators are interactive devices that apply state of the art simulation in order to train vehicle operators for all types of driving conditions. The ODS enable students to learn proper operational techniques under all terrain, weather, road, and traffic conditions.

### ***Technion Discovers Vitamin E Helps Restore Hearing***

Researchers at Israel's Technion Institute of Technology have discovered that Vitamin E can help restore hearing for people who suffer from sudden, unexplained deafness.

"Sudden Hearing Loss (SHL) occurs quite frequently. It happens suddenly, you can wake up in the morning and feel a loss of hearing in one or both ears. Because of that suddenness, it's a very dramatic and stressful disease," Dr. Henry Z. Yoachims said. Yoachims works in the Department of Otolaryngology and Head & Neck Surgery at Rambam Medical Center and is a member of the Faculty of Medicine at the Technion.

"In about two thirds of occurrences there's a spontaneous recovery, but with the other third, the hearing loss can continue indefinitely. Generally, these patients are hospitalized and given some kind of treatment. Every hospital has its own regiment, because no single treatment has been found to be effective. We're constantly seeking new solutions to the problem because antioxidants are very popular right now for treatment of heart disease and other problems, we decided to see if it could be helpful with SHL."

The study examined 66 patients who experienced sudden hearing loss. All of the patients involved in the study had been admitted to hospital within the previous eight days for sudden hearing loss of an unknown cause.

The patients were given standard treatments, which include bed rest, steroid drugs and an oxygen mask. Half of the patients also received 400mg tablets of vitamin E, administered twice daily.

Although a similar number of patients in both groups experienced recovery, patients in the group that received vitamin E were more likely to have an improvement in their hearing of 75 percent or more by the time they were discharged from hospital, and had even greater improvement at later follow-up.

### ***Israeli Yo-Yo Playing Robot***

The world's first robot able to play with a yo-yo - a complicated exercise in dexterity - has been created at the Technion in Haifa. A visiting Chinese doctoral student, Dr. Holyang Jin, created the robot over the course of four years, under the guidance of Dr. Miriam Zaksenhois of the faculty of mechanical engineering, as part of his doctorate.

### ***Economist: Israel Just behind Singapore in Developing Markets***

Israel ranks high in the rating of per capita gross domestic product in emerging markets presented by "The Economist". The rating is based on latest estimates by the World Bank.

The chart displayed on the magazine's website ranks Israel in third place after Singapore, with gross domestic product per capita of approximately \$19,000. After Israel in descending order come states like South Korea, Czechoslovakia, Hungary, Saudi Arabia, Poland and South Africa.

Hong Kong still leads the rankings of developing markets which the magazine monitors, with per capita income of \$28,810 in 2003 compared to \$37,500 in the United States. On this basis, Hong Kong ranks higher than the developed markets of Japan and Germany.

Per capita income in China for 2003 was near \$5000, according to the magazine. The variables are calculated according to purchasing power parity taking into account fluctuations in the currency exchange.

### ***Starling Completes \$5 million Financing***

Israeli company Starling Advanced Communications, a developer of airborne broadband connectivity, has completed fundraising of \$5 million. This funding round included the participation of previous investors in the company RDC, the development company of the Israel Armament Development Authority which is

co-owned by Elron, who also invested in Starling directly.

Starling, which was founded in 2001, has developed a small and easily installed antenna which enables flight passengers to surf the internet, watch television and video as well as have access to e-mail – as is available in an office environment.

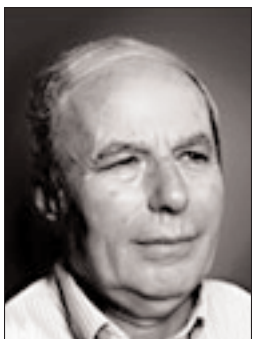
## Israeli Scientists Awarded Nobel Chemistry Prize



Professor A. Ciechanover

Two Israelis and an American won the 2004 Nobel Prize for Chemistry for helping to understand how the human body gives the "kiss of death" to faulty proteins to defend itself from diseases like cancer.

Israelis Aaron Ciechanover, 57, Avram Hershko, 67 - the first Israelis to win a chemistry prize - and Irwin Rose, 78, were honored by the Royal Swedish Academy of Sciences for their work in the 1980s that discovered one of the cell's most important cyclical processes, regulated protein degradation.



Prof. Avraham Hershko

Paradoxically, Prof. Avraham Hershko doesn't hold any patents for one of his greatest discoveries, the ubiquitin system of regulated protein degradation - a fundamental process that

influences vital cellular events, including the cell cycle, the appearance of cancerous cells, and responses to inflammation and immunity.

"Nobody else seemed interested in this then, but I thought it was important. Proteins have a set lifespan, after which they break down in a process called proteolysis. Many people knew how the body produces proteins, but not how they were destroyed," said Hershko.

"Proteins provide ways to moderate the body's machinery."

It was more than 20 years ago that Hershko and his then-student - now Technion biochemistry professor Aharon Ciechanover - were intrigued by how cells go about discarding proteins and what impact the process has on disease. Working with proteins from bacteria and other organisms, they finally succeeded in purifying the agent that caused this degradation. They named it APF-1 (for ATP-dependent proteolysis factor 1) or ubiquitin.

While at the Massachusetts Institute of Technology for a post-doctoral degree, Ciechanover worked with another research team, uncovering the ubiquitin system and its role in DNA repair, the cell cycle, and the understanding that cellular protein turnover is vital to understanding how cells malfunction and cause disease.

Ubiquitin also seems to have a role in inflammation of tissue, so that applications of the team's basic scientific discoveries could eventually be developed for chronic inflammatory diseases such as asthma and autoimmune diseases such as rheumatoid arthritis and multiple sclerosis. The biochemical mechanism of ubiquitin could also help improve the efficacy of chemotherapy drugs.

The scientists found that proteins that could cause disease are "labeled" for destruction with a molecule called ubiquitin which dispatches them to the body's "waste disposal" units, called proteasomes.

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