

# 2011

The Hebrew University of Jerusalem  
The Authority for Research and Development  
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June 2011

The Kaye Innovation Awards  
at the Hebrew University of Jerusalem

June 2011 תשע"א



The Authority for  
RESEARCH AND DEVELOPMENT

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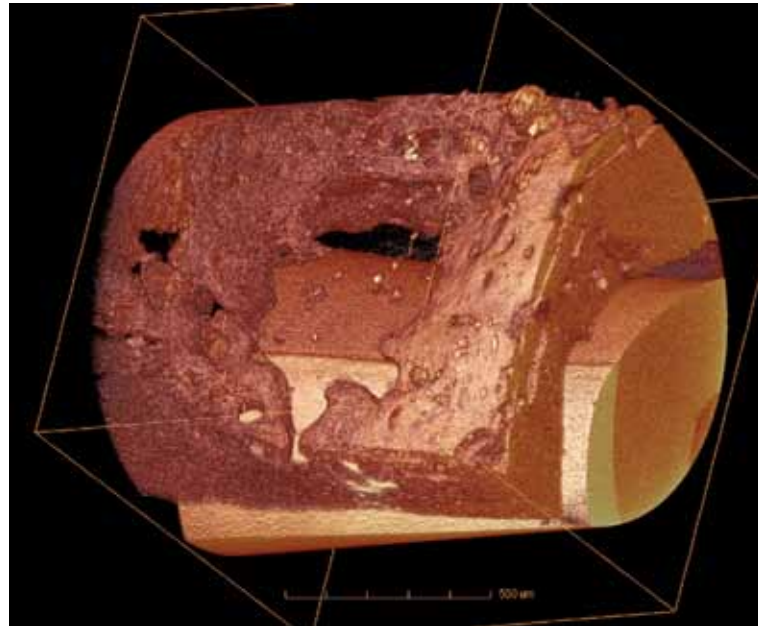


The Authority for  
RESEARCH AND DEVELOPMENT



# ISAAC KAYE

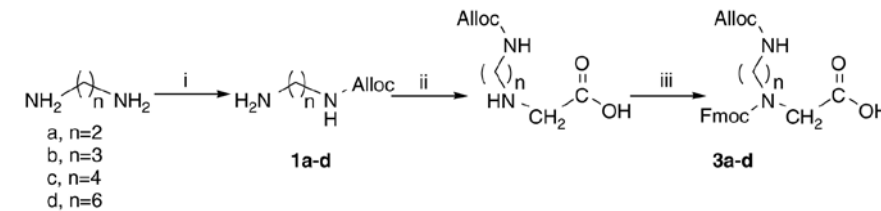
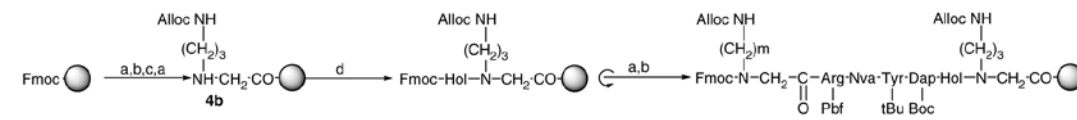
Isaac Kaye



Isaac Kaye is a pharmaceutical chemist who has become very successful in translating novel ideas into marketed profit-generating products. He established Norton Healthcare, a substantial generic pharmaceutical company in the UK, which later merged with the IVAX Corporation of the USA. Teva, Israel's biggest company completed its acquisition of IVAX in 2006, creating the world's largest generics company.

After retiring from IVAX, he turned his attention to venture capital and together with partners founded Israel Healthcare Ventures, or IHCV, a provider of capital to early and expansion stage Israeli companies. IHCV focuses exclusively on healthcare and life sciences. Since its inception in 2000, IHCV has become a leading life science venture capital business in Israel.

Isaac Kaye's passion for medical innovations that advance human healthcare is matched by a number of other interests including his love of Israel and its people and his enthusiasm and support for the Hebrew University of Jerusalem and the principles upon which it is based.

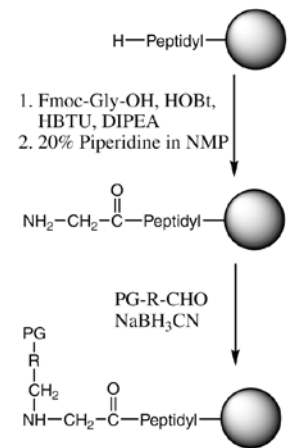


Fortunately for the Hebrew University, Isaac Kaye's interests in pharmacology, therapeutics, and medical devices are very much in line with areas in which the University has considerable expertise and which it is anxious to develop. In 1995 he established the Isaac and Myrna Kaye Chair in Immunopharmacology at our School of Pharmacy, which provides much needed research funds for this field. In 2005 he also established five annual fellowships for outstanding graduate and post-doctoral students. These fellowships, awarded as "The Einstein Kaye Fellowships" encourage recipients to continue their studies at the Hebrew University for a minimum of three years preventing the University's finest people from being recruited by other leading academic institutions. Last year, upon the completion of five years of the "Einstein Kaye Fellowships," a new five year programme of sponsorship for fifteen students began, called the "Kaye Scholarships."

Using a completely different approach to support research, Isaac Kaye established the annual Kaye Innovation Awards at the Hebrew University in 1993. The awards have earned a prestigious

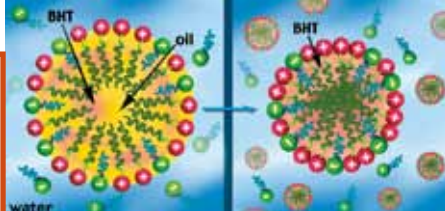
reputation since their inception. Prizes are awarded annually for any innovation that shows potential for bringing profit or savings to the University principally through royalties. Applications must be well focused and accompanied by recommendations, but unlike grant proposals, anyone from the most senior to the most junior staff may apply – in fact students are always encouraged to submit proposals. The winners demonstrate not only good science, but also a focus on commercial viability and the benefits this brings to the University.

In spite of his demanding and highly successful professional career, Isaac Kaye has always been active on behalf of the Hebrew University. He served as Chairman of the South African Friends organization and became an active member of the University's Board of Governors. Following his move to the UK, Isaac Kaye joined the British Friends and continued as a member of the Board of Governors of the Hebrew University. We are deeply indebted to both Isaac Kaye and his wife Myrna for their deep involvement and concern for the University.





# YISSUM



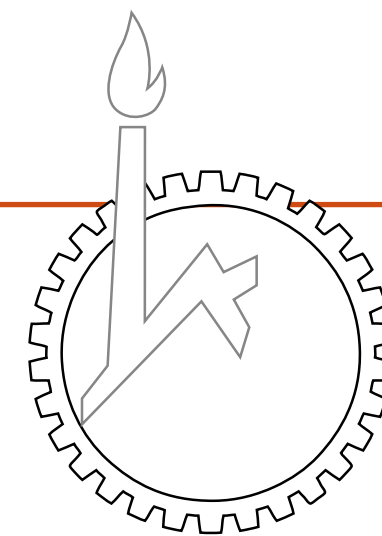
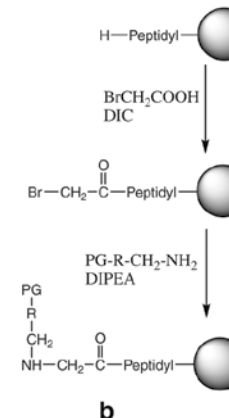
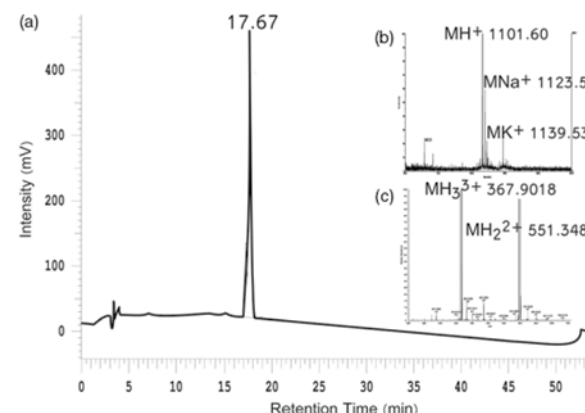
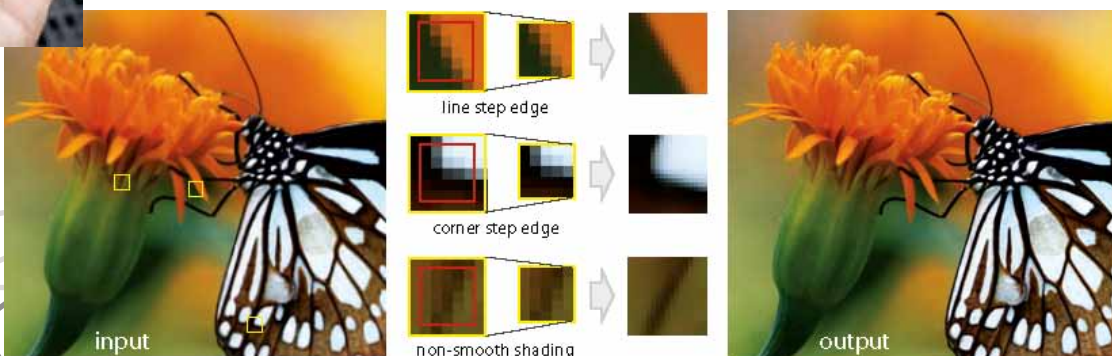
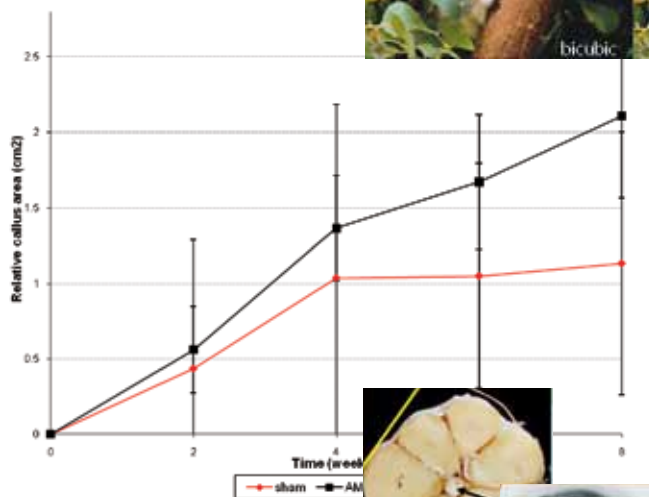
**Yissum**  
Technology Transfer Company  
of the Hebrew University



For the past 17 years, Yissum has been taking part in selecting Hebrew University faculty and students for the prestigious Kaye Awards, recognizing the important synergy of scientific excellence and commercial potential.

Yissum enjoys a prominent place among the world's leading technology transfer companies, with over two billion dollars annual worldwide sale of products originating at the Hebrew University and licensed by Yissum. Since its inception in 1964, Yissum has registered over 7,000 patents covering more than 2000 inventions, 530 of which have been licensed and 72 of them leading to the establishment of start-up companies. Many of the researchers behind these products and technologies have been acknowledged and awarded the Kaye Prize.

This year's first prize is awarded to Prof. Haim D. Rabinowitch of the Robert H. Smith Institute of Plant Sciences and Genetics in Agriculture, for his outstanding innovations in genetic and breeding technologies. These original developments formed the basis for the improved production of quality foods and contributed to the economic growth of leading international agricultural companies.



During the last 25 years, the novel results of Professor Rabinowitch's team's breeding efforts have resulted in the development of a lucrative seed industry in Israel, and increased seed exports (growing from two to four million dollars in the 1980s to over \$100M annually). For over 20 years, the export of tomato, onion and shallot seeds, developed by Prof. Rabinowitch's team, and totaling about \$50 M annually, have brought royalties to The Hebrew University from leading world and Israeli seed companies (such as Vilmorin, Syngenta, Nunhems, Zeraim Gedera and Hazera Genetics, as well as DYN Research & Development in the area of diagnostic kits).

Today, Prof. Rabinowitch continues his excellent research and commercialization success and is leading the development of a unique garlic breeding project, as well as the development of a revolutionary plant improvement technology, which allows seed producers to easily adapt any plant variety to changing conditions. Both technologies were recently licensed to start-up companies.

Prof. Dan Gazit, Director of the Skeletal Biotechnology Lab at the Faculty of Dental Medicine will receive the second prize for his team's nineteen year-long research that led to a breakthrough in the field of stem cell-based tissue engineering. TheraCell Inc., a California-based biotech start-up company, licensed the technology from Yissum in 2009. The company is currently developing two major products that are directly based on Prof. Gazit's patents: a single cell isolator and manipulator device for adult stem cell use in spine surgery and an oxygenated injectable hydrogel for stem cell transplantation.

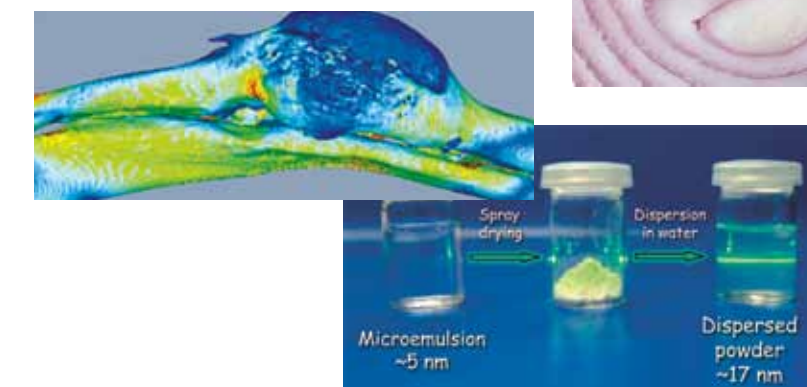
Dr. Raanan Fattal of the Benin School of Computer Science and Engineering, will receive the third Kaye Award for the development of Second-Generation Wavelet-based Image Enhancement. This promising resolution enhancement technology was licensed by world leader Adobe and is already incorporated in the company's leading Photoshop software.

The prize is also awarded to three promising students: Ms. Katy Margulis-Goshen for her research on "The Formation of Organic Nanoparticles from Microemulsions: Enhancing Water Solubility for Improved Biological Performance in Pharmaceuticals, Agriculture and Cosmetics." Mr. Yftah Tal-Gan for "The Development of New Peptide-based Inhibitors of Protein Kinase B (PKB/Akt) as Potential Drugs for Cancer," and Ms. Ada Grin for her research of "Novel Formulation of Barrier Membrane for Bone Regeneration." All of this research forms the basis for successful commercialization.

Yissum is proud to be actively involved in the successful commercialization of these and many other technologies. Our dedicated team is committed to bridging the ever-existing gap between academia and industry in order to bring the fruits of first-class academic research to society at large, and thus provide much-needed funding to support scientific research at the Hebrew University.

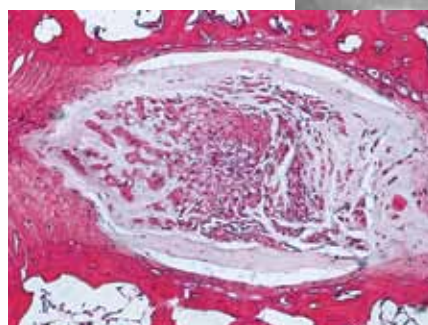
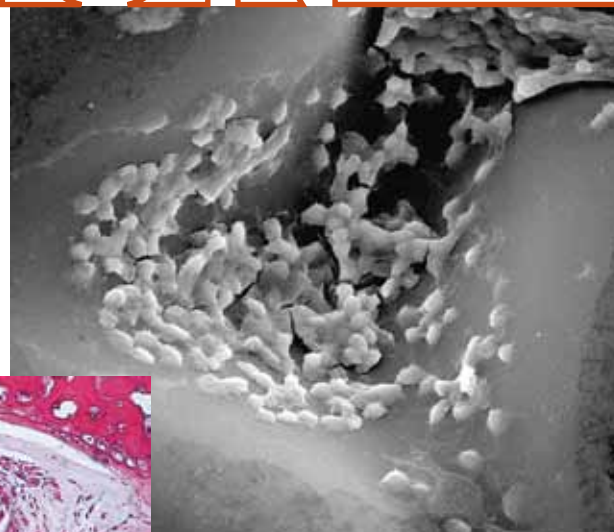
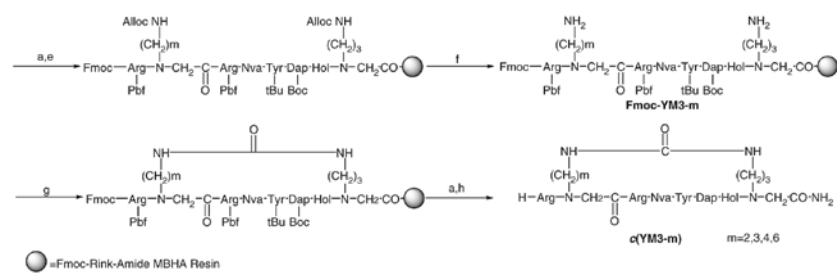
We are, as always, indebted to Mr. Kaye for his generosity and personal commitment to support the Hebrew University's researchers in their constant quest for innovation, and extend our sincere congratulations to this year's eminent prize-winners: Prof. Haim Rabinowitch, Prof. Dan Gazit, Dr. Raanan Fattal, Ms. Katy Margulis-Goshen, Mr. Yftah Tal-Gan and Ms. Ada Grin.

**Yaacov Michlin**  
President & CEO





# TRADITION

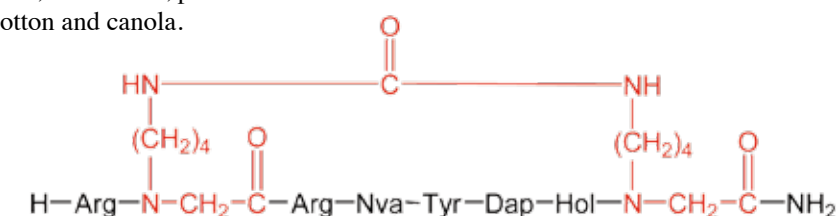
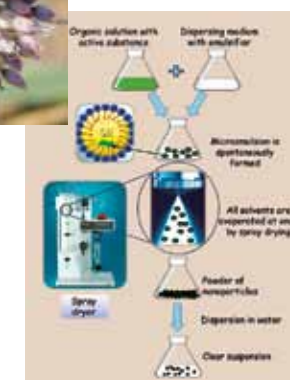


## The Kaye Prize Tradition of Success!

Last year's recipient of the Kaye Award first prize, Prof. Nissim Benvenisty, director of the Stem Cell Unit at the Hebrew University, continues his successful collaboration with Roche Pharmaceuticals. His was the first laboratory to genetically manipulate embryonic stem (ES) cells, achieving better reagents for transplantation, and allowing control of the cells even after their transplantation. Prof. Benvenisty was the first person to demonstrate differentiation of human ES cells in vitro, and the directed differentiation of the cells. The novel technologies developed for directed differentiation of human ES cells are at the center of its industrial applications.

Prof. Benvenisty's innovative technology is among the seven promising research projects in the fields of stem cells, biomarkers, and novel molecules for the treatment of metabolic diseases, initiated by Hebrew University researchers, in a long-term multi-project research and license collaboration agreement between Yissum, Ltd. and Roche since October 2009.

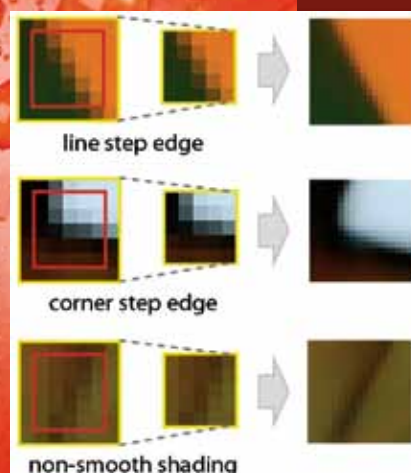
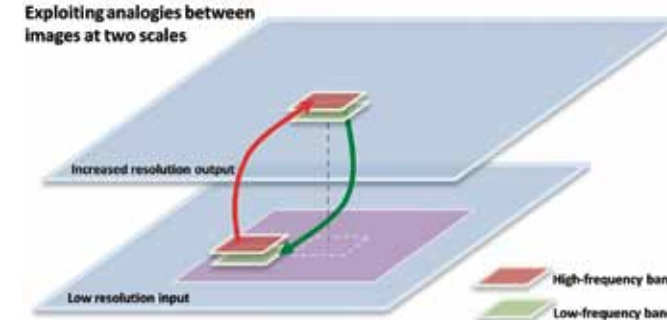
Prof. Alexander Vainstein, of the Hebrew University's Smith Institute of Plant Sciences and Genetics in Agriculture, another Kaye Prize recipient in 2010, has developed a novel, groundbreaking method for genetic modifications in plants that is precise, effective and applicable to all plants. The new technique, called MemoGene™, was invented by Prof. Vainstein and by Dr. Amir Zuker, Head of R&D at Danziger Innovations Ltd., an Israeli biotechnology company devoted to the discovery and manufacture of new advanced breeding solutions to improve traits in crops. The MemoGene technology has already proven to be efficient in a wide variety of monocot and dicot crops, including peppers, cucumbers, potatoes and tomatoes, as well as wheat, maize, cotton and canola.



c(YM4-4)  
IC<sub>50</sub> = 0.17 μM



Exploiting analogies between images at two scales





# RESEARCHERS

# STUDENTS

## Kaye Winners 2011

First Prize



### PROF. HAIM D. RABINOWITCH

Robert H. Smith Institute of Plant Sciences and Genetics in Agriculture  
Robert H. Smith Faculty of Agriculture, Food and Environment  
*Genetic Innovations in Vegetable Crops: The Cornerstone of Israel's Prominence in Hi-BioTech Seed Industries*

Second Prize



### PROF. DAN GAZIT

Skeletal Biotech Laboratory  
Faculty of Dental Medicine  
*Novel Technologies for Adult Stem Cell Manipulation and Applications in Tissue Engineering and Regenerative Medicine*

Third Prize



### DR. RAANAN FATTAL

Benin School of Computer Science and Engineering  
Faculty of Science  
*Second-Generation Wavelet-Based Image Enhancement*

First Prize



### KATY MARGULIS-GOSHEN

Casali Institute of Applied Chemistry  
Faculty of Science  
Supervisor: Prof. Shlomo Magdassi  
*Formation of Organic Nanoparticles from Microemulsions: Enhancing Water Solubility for Improved Biological Performance in Pharmaceuticals, Agriculture and Cosmetics*

Second Prize



### YFTAH TAL-GAN

Institute of Chemistry  
Faculty of Science  
Supervisors: Prof. Chaim Gilon and Prof. Alexander Levitzki  
*Development of New Peptide-Based Inhibitors of Protein Kinase B (PKB) as Potential Drugs for Cancer*

Third Prize



### ADA GRIN

Institute of Drug Research  
Faculty of Medicine  
Supervisor: Prof. Michael Friedman  
*Tissue Regeneration Membrane*



# RESEARCHERS

## Genetic Innovations in Vegetable Crops: The Cornerstone of Israel's Prominence in Hi-BioTech Seed Industries

**Inventor:**  
**Prof. Haim D. Rabinowitch**



**Robert H. Smith**  
**Faculty of Agriculture,**  
**Food and Environment**

Born in Israel, Prof. Haim Rabinowitch earned all his academic degrees at the Hebrew University. In 1976, following postdoctoral training at the John Innes Institute, Norwich, UK, he joined the university faculty, serving as Dean of the Faculty of Agriculture (1997-2001), and then Rector (2001-2008). His basic research focuses on vegetable physiology, biochemistry and genetics. His research laid the foundations for a flourishing Israeli hi biotech seed industry. He has published over 120 papers in leading scientific journals, and edited the leading textbooks on alliaceous crops. He serves on the editorial boards of various scientific journals, was commissioned by UN agencies to advise developing countries, and has

Fast deterioration of food produce is a major reason for food shortages in many parts of the world. Ripening and aging are complex, genetically programmed processes that are characterized by marked changes in texture, color, firmness, flavor and nutritional values and culminate in tissues' spoilage. These processes are significantly enhanced by high temperatures, and facilitated by long-distance hauling. A variety of technologies have been developed for shelf-life extension, the major ones include picking unripe or 'half-ripe' fruit; storage and transport under low temperatures; inhibiting the synthesis of ethylene, the ripening hormone, by CO<sub>2</sub>, silver ions, and/or genetic engineering to slow down ripening, maintain quality and maximize product life.

trained thousands of experts worldwide. He chaired the Academic Committee of the Israeli Gene Bank, headed the International Genebank of Vegetatively Propagated Short Day Alliaceous Crops. He enjoys gardening and walking, theater and movies, cooking and good conversation over a glass of dry red wine; but above all, he loves his work and especially his family, his wife, Shoshanna, their children and grandchildren.



In tomatoes, the discovery of mutants that slow down ripening opened new avenues and provided novel powerful tools for basic research on fruit ripening. The central dogma at the time, however, was that the recessive nature of the mutants *rin* (ripening inhibitor) and *nor* (non-ripening) rule out their use in horticulture.

We (colleagues and students) at the Robert H. Smith Faculty of Agriculture, Food and Environment have challenged accepted dogmas to better understand produce aging and storage ability, and extend shelf-life, particularly of tomatoes. We launched a study on the modes of the physiological and biochemical actions of these genes in tomatoes, and consequently developed genetic means that for the first time enabled the utilization of these mutants in actual plant breeding. Israel, a subtropical country, benefited a lot from the development of a low cost alternative for preserving tomato quality. The rest is history: the Hebrew University's new approach became the standard of the fresh market tomato industry, cherry tomatoes and cluster tomatoes were developed into popular commodities.



The results of our efforts were shared with Israeli seed companies, and helped launch a flourishing seed industry in Israel, the hi-biotech of agriculture. Since then, Israel is listed among the top vegetable seed countries worldwide with an annual \$50M tomato seed export.

Similarly, we studied the physiology of bulb onion and of the vegetatively propagated shallot. The developmental habit of both is photoperiod dependent, i.e., green plants produce bulbs only when induced by the right day length, and varieties differ by their specific requirements for photoperiod signals. Excellent long-storage bulbs are common in temperate zones (long photoperiod) but not in the tropics and subtropics. We, for the first time, released high yielding quality bulb onion hybrids that store well under ambient conditions in the tropics and subtropics. Additionally, mean yields of the newly released hybrids in Israel went up from 50-60 to 90-100 ton/ha, and storage losses dropped significantly. Concomitantly, we introduced shallots to the Israeli market and produced for the first time seed propagated short-day hybrid shallots of excellent quality and long-keeping.



Garlic is sterile, thus only asexual propagation is possible, with a consequent low propagation rate and reduced yields due to transmission of pests and diseases from one generation to the next. Moreover, genetic variation is limited to mutations and transformations by genetic engineering. Numerous attempts to solve the thousands years enigma of garlic sterility resulted in rather unsatisfying answers. After yet another attempt and seven years of intensive efforts, we discovered a simple physiological explanation. It has to do with competition between the simultaneous development of the bulb and inflorescence. Thousands of years ago, selection by man for early production of big bulbs shifted the endogenous hormonal and nutritional balances in favor of bulbing with the consequent degeneration of the reproductive buds. The published results of our study were selected by the *Journal of the American Society for Horticulture Science* for its cover. Our discovery enabled us to restore fertility with the consequent production of seed, initiating a one-of-a-kind garlic breeding program, aimed at improved seed propagation of elite varieties with improved qualities and yields.

Modern breeding is assisted by molecular markers for a reliable selection of desired genotypes. My team has developed a number of such original markers and joined forces with a medical diagnostics company to set up a service company for breeders, seed companies and growers worldwide. We have extended the scope of these activities, developing a simple-to-use small size, unique but universal genetic key that allows an unambiguous identification of tomato genotypes, including breeding lines, open-pollinated and hybrid varieties. In Israel and other Mediterranean countries this key is being used routinely by breeders and industry for pre- and post controls in breeding and in hybrid seed production.



# RESEARCHERS



## Novel Stem Therapies for Skeletal Disorders

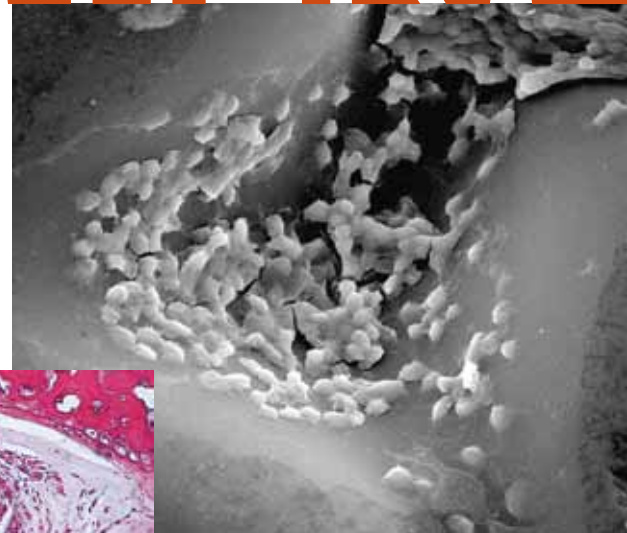
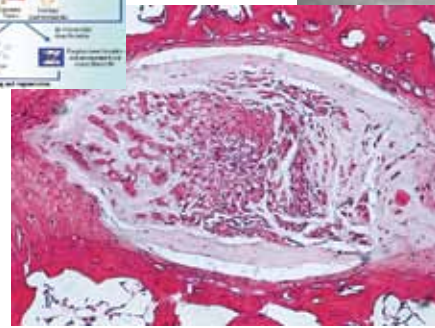
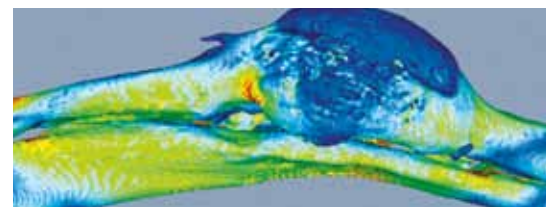
**Inventor:**  
**Prof. Dan Gazit**



**Skeletal Biotech Laboratory, Institute of Dental Sciences, The Hebrew University–Hadassah School of Dental Medicine**

*Prof. Dan Gazit is the director of the Skeletal Biotech Laboratory at the Hebrew University Faculty of Dental Medicine. Born and educated in Jerusalem, he earned his D.M.D. and Ph.D. degrees from the Hebrew University. Following a postdoctoral fellowship at the University of California at San Francisco he established his laboratory in the Faculty of Dental Medicine at the Hebrew University. Prof. Gazit has published 126 scientific papers and presented his studies in numerous leading scientific conferences. He is a member and chair of several national and international scientific committees and editorial boards.*

As we grow older, our body tends to fail us. As human life expectancy rises so does the number of patients suffering from skeletal disorders. For instance, low back pain, a result of intervertebral disc degeneration, is the cause of 149 million lost workdays in the USA, resulting in related costs of \$100 billion annually. Osteoporosis is another unsolved and highly prevalent health care problem. Roughly half of all women and a fourth of all men over 50 will sustain an osteoporosis-related fracture during their lifetime. Osteoporotic fractures can take several forms, such as vertebral compression fractures (VCFs) that occur at a rate of 700,000 per year. The economic burden of osteoporotic fractures is tremendous with an estimated cost of \$17 billion annually. Unfortunately, currently there are no treatments that can reverse the process of disc degeneration or regenerate bone, tendon or cartilage in cases of massive tissue loss. For example, when VCFs occur in patients with osteoporosis, treatment options are limited because open surgery with implants often fails. Recently, new therapies involving injection of cement into the vertebral body were developed. Unfortunately, recent publications in leading scientific journal question the effectiveness of those procedures. Therefore there is a clear need for novel biological therapies for skeletal tissue regeneration. During the last two decades, adult stem cells, the body's repair cells, have been considered promising candidates for the treatment of severely damaged skeletal tissues.



Prof. Gazit and his team have been investigating the use of adult stem cells for skeletal tissue regeneration for the past nineteen years. Their efforts have led to a series of breakthrough inventions supported by over 120 peer-reviewed scientific publications in leading journals and eight patents. These inventions cover a multi-step process that can be performed within hours as a bedside procedure. First, stem cells are isolated from bone marrow or adipose tissues of the patient using a specific antibody and a magnetic field. Then, unique genes are activated within the cells in order to trigger the formation of the required tissue. Finally, the modified stem cells are injected to the injured tissue within a specially designed matrix that provides a short-term oxygen supply to enhance cell survival in the body. Moreover, the group has patented a medical device that can perform all the required steps of stem cell isolation and manipulation in the operating room.

Prof. Gazit's stem cell technologies have been shown to be effective in repairing complex fractures in several sites including the vertebrae, skull, jaws and long bones. In addition, the group has demonstrated the repair of torn tendons and injured intervertebral discs using the same methods. Based on Prof. Gazit's inventions, a license agreement has been established with a US-based biotech company to develop these stem cell technologies for clinical use.

Recently, a human clinical trial, conducted at the Hadassah University Medical Center in Jerusalem, based on the Gazit group's inventions, showed promising results in complex fracture repair of twelve patients. These results could prove to be the dawn of a new era of stem cell therapies in modern orthopaedic medicine.

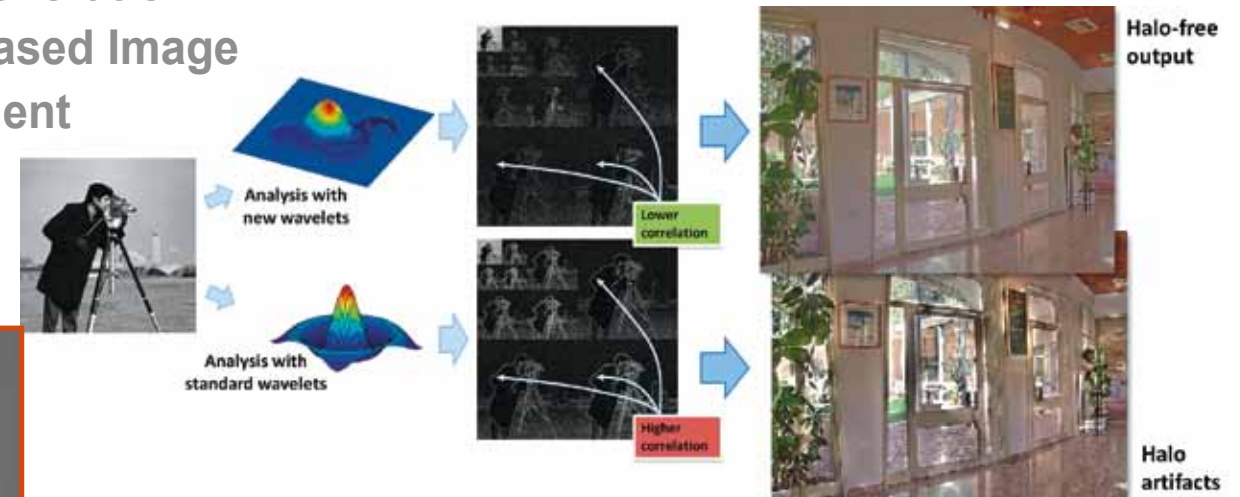
## Second-Generation Wavelet-Based Image Enhancement

**Inventor:**  
**Dr. Raanan Fattal**



**Benin School of Computer Science and Engineering, Faculty of Science**

*Dr. Raanan Fattal was born in Jerusalem and completed his academic degrees at the Hebrew University. Raanan spent three years at the University of California at Berkeley, where he did his post-doctoral work. He joined the faculty of the Hebrew University's Benin School of Computer Science and Engineering in 2008, and works on problems in image processing and computer vision with an applied mathematics approach. In his (little) spare time, Raanan plays the guitar in various styles including British rock-and-roll.*



The invention consists of new wavelet functions that are particularly suited for certain image processing applications. Wavelets are localized wave functions which are used extensively to analyze and synthesize digital signals including digital images. The first type of new wavelet functions adapts themselves to the content of the particular image they analyze. Unlike traditional wavelets, the new functions do not combine pixels from both sides of an edge in the image. This adaptation avoids the well-known halo artifacts that take place in traditional wavelet decomposition and undermine their role in image processing.

The new wavelets are useful for sharpening images, coloring black-and-white images, as well as reducing their dynamic range. Adobe licensed this technology and uses it in its recent Adobe Photoshop CS5. The second type of wavelets allows achieving finer scaling ratios than regular wavelets allow. This fine scaling enables better use of self-similarities in images - a property that is useful for increasing image resolution while preserving the sharpness of its edges. Thus, given a single input image, the new wavelets produce a higher resolution version of it with natural-looking edges and do so in real-time.





# STUDENTS

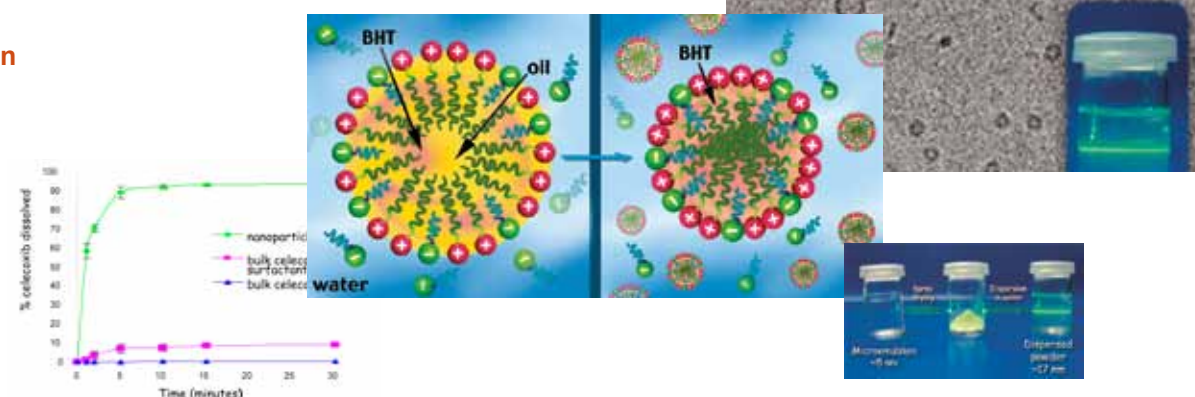
## Formation of Organic Nanoparticles from Microemulsions: Enhancing Water Solubility for Improved Biological Performance in Pharmaceuticals, Agriculture and Cosmetics

**Inventor:**  
Katy Margulis-Goshen



Casali Institute of Applied Chemistry  
Institute of Chemistry  
Supervisor:  
Prof. Shlomo Magdassi

Katy immigrated to Israel from Kharkov, Ukraine, in 1990. After acquiring her B.Pharm. degree from the Hebrew University's School of Pharmacy, Katy served in the IDF Medical Corps as the Southern District Chief Pharmacy Officer for three years. Following her army service, she worked in the pharmaceutical industry for additional three years and then decided to return to academic studies and currently is a doctoral candidate in the Casali Institute of Applied Chemistry. In her free time Katy enjoys skiing and travelling.



One of the main objectives of our research was to enhance the solubility of water-soluble substances used in pharmaceuticals, cosmetics and agriculture. By a simple process based on rapid conversion of oil-in-water microemulsion containing the insoluble substance into a freely water-dispersible dry powder composed of nanoparticles we succeeded in our objective. This process is of unique industrial importance, since it leads to a significant increase in aqueous solubility and dissolution properties of almost any active ingredient, without a high energy investment. Enhancing aqueous solubility is especially important in the field of pharmaceuticals, where nearly 50% of the newly discovered drugs cannot be administered or are very poorly absorbed due to their low aqueous solubility. Increasing solubility is also important in the field of agriculture, since the majority of insecticides are highly hydrophobic and their regular application requires the use of organic solvents, which are harmful to the farmer and the environment. In cosmetics, active cosmetic ingredients for dermal delivery are usually hydrophobic. Incorporating them into non-greasy, water-based formulations is of great importance. The new process that we invented can be also applied in many other fields, such as nutrition, the manufacture of printing ink and paint.

The nanoparticles are obtained from the spontaneously formed microemulsions, which contain droplets below 30nm. Microemulsions that are suitable for the new process are comprised of nanometric droplets of volatile oil (containing the dissolved active ingredient) in the continuous aqueous medium. Rapid simultaneous evaporation of the droplets and the water leads to conversion of the microemulsion droplets into nanoparticles, in the form of a dry powder. This powder is easily dispersible in water, biological fluids and other

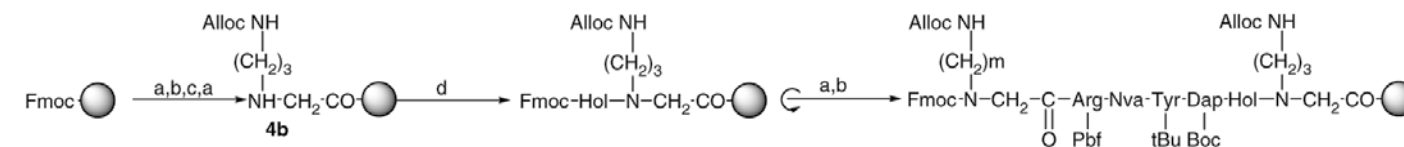
aqueous media. The powder is stable for prolonged time.

If the active ingredient is a hydrophobic drug, the powder may be injected or incorporated into capsules, tablets and other fast-dissolving drug formulations. Such dosage forms showed tremendous increase in dissolution rate in water and biological fluids. They are expected to improve bioavailability of the drug, minimize its side effects by reducing the total dose needed and allow drug targeting. We have recently shown the very significant improvement in drug dissolution for three drugs.

In agriculture, such a powder containing pesticides can be dispersed in water and applied in the field as an environmentally friendly pest control formulation. We have recently proven that the conversion of hydrophobic pesticides into such a powder allows at least six times reduction in the effective concentration of the pesticide and utilization of water instead of organic solvents as the dispersing medium. We have tested two hydrophobic pesticides.

In cosmetics, the powder containing active cosmetic ingredient may be incorporated into new stable water-based formulations.

So far, we have filed three patent applications based on this research. Two of them are related to the formation of nanoparticles of various substances by solvent evaporation from microemulsions, and the third relates to a unique microemulsion composition capable of preventing particle crystallization during the evaporation. The results of the research were also published in six scientific papers.



## Development of New Peptide-Based Inhibitors of Protein Kinase B (PKB) as Potential Drugs for Cancer

**Inventor:**  
Yftah Tal-Gan



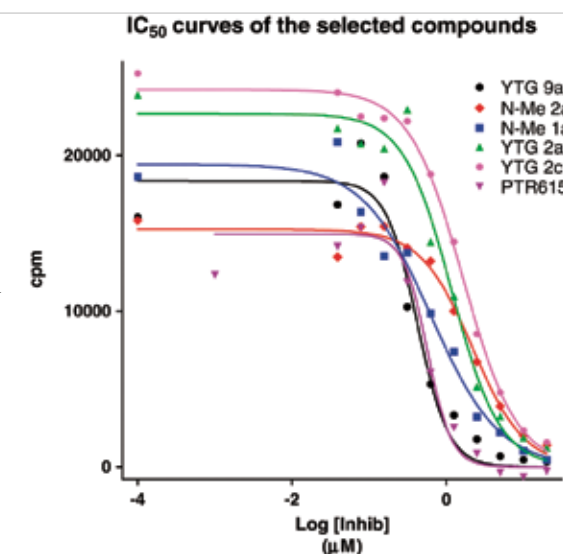
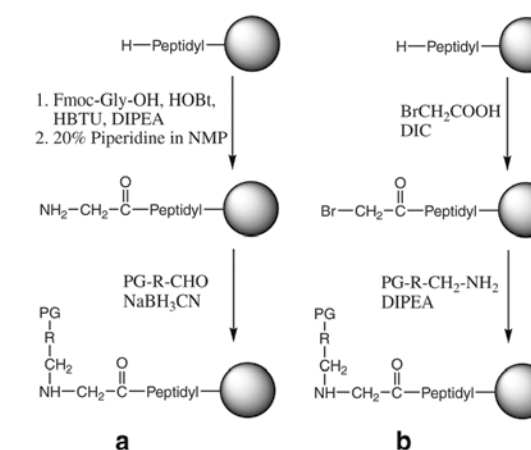
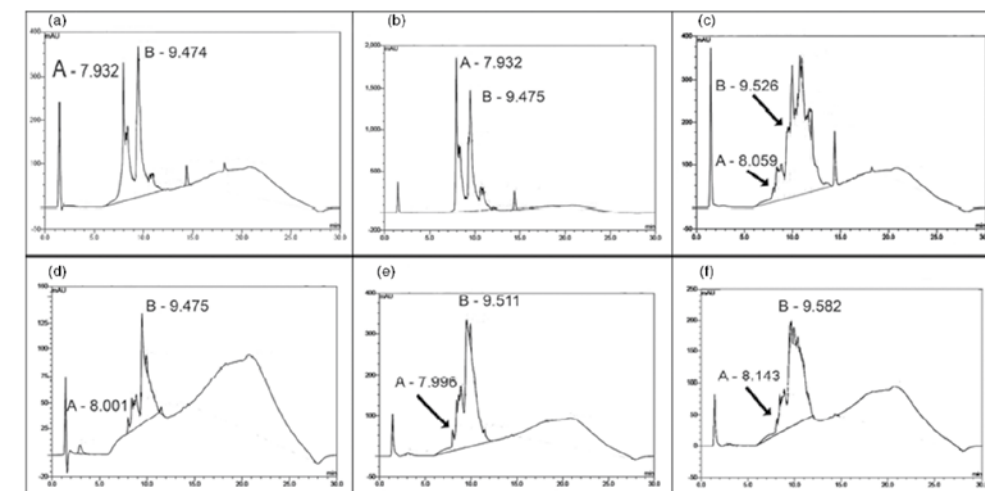
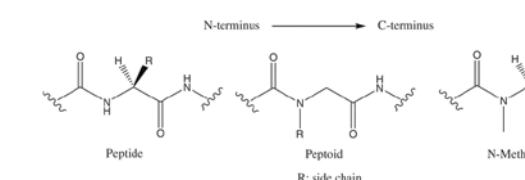
Institute of Chemistry  
Faculty of Science  
Supervisors:  
Prof. Chaim Gilon  
and Alexander Levitzki

Yftah Tal-Gan was born in Jerusalem, an eighth generation Jerusalemite. He has always been interested in sports, especially basketball, and has been on The Hebrew University basketball team for the past several years. Last summer he married Hila Marom, a human resource recruiter at Applied Materials, Rehovot. Even when in high school, he found chemistry so fascinating, that pursuing an academic career in this field was only natural. When not slaving away in the laboratory he spends his little free time traveling in Israel and tasting local culinary specialties.

This project focuses on the inhibition of the protein, Protein Kinase B (PKB; also called Akt). The activation of PKB is associated with cancer. Therefore, selective inhibition of PKB is an attractive strategy for targeted cancer therapy. PKB adds a phosphate group to many substrate proteins. By mimicking the interaction of PKB with its substrate(s), one can inhibit PKB activity.

Peptides are built from the same amino acid building blocks as proteins. Peptides can thus be used as protein mimics. However, peptides lack important pharmacological properties, such as stability. Peptide mimics (peptidomimetics) are peptide analogs designed to combine biological activity and favorable pharmacological properties.

We developed novel procedures for the preparation of a variety of peptidomimetics. The modifications used to form these peptide mimics included N-methyl peptides, Aza peptides, peptomers and backbone cyclic peptides. The modified peptides were evaluated for their ability to inhibit PKB activity as well as for their pharmacological properties. Our peptide analogs were used to convert an active peptide, named PTR6154, into a potential anti-cancer drug by enhancing the potency of the parent linear peptide and dramatically improve its metabolic stability. So far, we have filed a patent application based on this project as well as published five papers.





# STUDENTS

## Tissue Regeneration Membrane

Inventor:  
Ada Grin



Institute of Drug Research, School of Pharmacy, Faculty of Medicine  
Supervisor:  
Prof. Michael Friedman

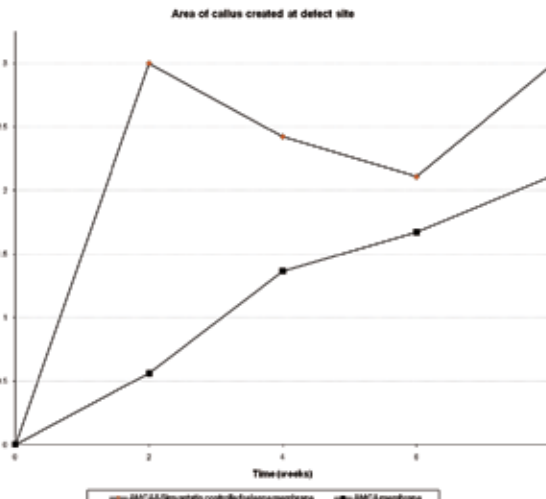
Ada Grin was born in the former USSR. At the age of 12, she immigrated to Israel in 1991. After serving in the IDF (Navy), she started her studies at the Hebrew University's School of Pharmacy in 1998, receiving her B.Pharm. in 2002 and M.Sc. in 2005.

Ada is married to Vladimir (who holds a M.Sc. in Computer Science from Hebrew University) and mother to Ruby (Reuven).

Large segmental bone defects are frequently encountered in the treatment of high-energy fractures, osteomyelitis, revision arthroplasty, and following tumor resection. The use of autograft is hampered by many variables, including limited availability, unpredictable incorporation, and donor site morbidity. Allograft materials require procurement, storage, and processing, and still exhibit variable incorporation, structural weakness, high sepsis rates, and the potential for infectious disease transmission. Distraction osteogenesis techniques are limited by their expense, cumbersome apparatus, poor patient tolerance, prolonged duration of treatment, and high complication rates. Similarly, osteogenic and osteoconductive substances suffer from variable biologic activity and incorporation rates, poor structural properties, limited availability and their high expenses.

Bone can be regenerated through one of the following strategies: Osteogenesis - the transfer of cells; Osteoinduction - the induction of cells to become bone; Osteoconduction - providing a scaffold for bone forming cells; or Osteopromotion - the promotion of bone healing and regeneration by encouraging the biologic or mechanical environment of the healing or regenerating tissues. Ideally, the triangle of osteoconduction, osteoinduction and osteogenesis should be available for clinical use, i.e., one device should be able to perform all functions. In this case, a membrane should be able to transfer the cells, induce them to osteoblastic lineage differentiation and provide scaffold for osteoblasts. With this goal in mind, we designed an Ammonio Methacrylate Copolymer type A (AMCA) membrane system.

The AMCA membrane system supports human mesenchymal stem cell (hMSC) adherence,



proliferation and differentiation, thus enabling transportation of cells and providing a scaffold for cell growth, due to the permanent cationic charge of the AMCA polymer. AMCA membrane system is also able to release simvastatin in a controlled manner, which induces hMSC to differentiate to osteoblasts and to produce extracellular matrix and bone.

Simvastatin is well known as a 3-hydroxy-3-methylglutarylcoenzyme A (HMG-CoA) reductase inhibitor. It blocks conversion of HMG-CoA to mevalonate, a rate limiting step in cholesterol synthesis. Apparently this pathway is also connected to the expression of bone anabolic factors. Mundy et al. (1999) first reported that statins stimulated *in vivo* bone formation in rodents and increased new bone volume in cultures from mouse calvaria. Recently, Maeda et al. showed that statins stimulate BMP-2 expression, which promotes osteoblast differentiation at early and middle stages of the culture.

Simvastatin and lovastatin are two of the most effective statins with regard to bone regeneration. Yet, high first pass effect and subsequent low systemic absorption significantly limit their oral delivery as osteoinductive agents. When delivered locally, however, to the site of bone defect simvastatin dramatically enhances the area and density of callus formed at the target site (unpublished data from AMCA system studies *in vivo*).

Hence, AMCA membrane system is a device able to guide bone regeneration through osteoconduction, osteoinduction and osteogenesis strategies. The invention holds great promise as an aid in the bone healing process. A patent application was filed in 2010. A company, REGENECURE Ltd., was established last year in Jerusalem with state-of-the-art development and manufacturing facilities.

# KAYE WINNERS

## PRIZE-WINNERS KAYE INNOVATION AWARDS AT THE HEBREW UNIVERSITY OF JERUSALEM

### Kaye Winners 2010

Inventor:	PROF. NISSIM BENVENISTY Silberman Institute of Life Sciences, Faculty of Science	2011
Invention:	Technologies to Enable Directed Differentiation of Human Embryonic Stem Cells	2010
Inventor:	PROF. ODED SHOSEYOV The Robert H. Smith Institute of Plant Sciences and Genetics in Agriculture The Robert H. Smith Faculty of Agriculture, Food and Environment	2009
Invention:	Molecular Farming of Human Recombinant Collagen in Transgenic Tobacco Plants	2008
Inventor:	PROF. SHMUEL PELEG Benin School of Computer Science and Engineering, Faculty of Science	2007
Invention:	Video Synopsis: Summarizing and Indexing Surveillance Video	2006
Inventor:	PROF. ALEXANDER VAINSTEIN The Robert H. Smith Institute of Plant Sciences and Genetics in Agriculture The Robert H. Smith Faculty of Agriculture, Food and Environment	2005
Invention:	Towards Tailor-Made Crops and Compounds	2004
Inventor:	MS. MICHAL ISAACSON PhD student of Dr. Noam Shoval Department of Geography, Faculty of Social Sciences	2003
Invention:	A Novel System for Tracking and Analyzing Human Spatial Behavior by Monitoring People's Mobility for Tourism, Town Planning and Healthcare Applications.	2002
Inventor:	MR. AVIAD HAI PhD student of Prof. Micha Spira Department of Neurobiology Alexander Silberman Institute of Life Sciences Faculty of Science	2001
Invention:	In-cell Recordings and Stimulation: A Fundamental Breakthrough Concept and Technology for Neuroprosthetics	2000
Inventor:	MR. EZEQUIEL WEXSELBLATT PhD Supervisor: Prof. Jehoshua Katzhendler Institute for Drug Research, School of Pharmacy, Faculty of Medicine	1999
Invention:	MR. ROEE VIDAUSKI PhD Supervisor: Prof. Gad Glaser Department of Developmental Biology and Cancer Research Institute for Medical Research Israel-Canada (IMRIC), Faculty of Medicine	1998
Inventor:	MR. MICHAEL GROUCHKO PhD student of Prof. Shlomo Magdassi Casali Institute of Applied Chemistry, Institute of Chemistry Faculty of Science	1997
Invention:	Air Stable Copper Nanoparticles: Conductive Inks for Printed Electronics	1996
		1995
		1994



# KAYE WINNERS

## Kaye Winners 2009

<b>Inventor:</b>	<b>PROF. ABRAHAM HOCHBERG</b> Department of Biological Chemistry, Faculty of Science
<b>Invention:</b>	From a Noncoding Oncofetal RNA to Cancer Therapy: Personalizing Medicine with H19
<b>Inventor:</b>	<b>PROF. SHLOMO SASSON</b> Department of Pharmacology & Experimental Therapeutics, School of Pharmacy
<b>Invention:</b>	Novel D-Xylose Derivatives: A New Class of Antihyperglycemic Compounds
<b>Inventor:</b>	<b>PROF. DAPHNE ATLAS</b> Department of Biological Chemistry, Faculty of Science
<b>Invention:</b>	Development of Small Molecules for the Treatment of Neurodegenerative Diseases
<b>Inventor:</b>	<b>PROF. ARIEH GERTLER</b> Institute of Biochemistry, Food Science and Nutrition, Robert H. Smith Faculty of Agriculture, Food and Environment
<b>Invention:</b>	Development of Leptin Antagonists and their Potential Use as Therapeutic Modalities
<b>Inventor:</b>	<b>MR. SHAY SELA</b> PhD student of Prof. Eli Keshet, Institute for Medical Research, Israel-Canada, Faculty of Medicine
<b>Invention:</b>	The Identification of a Novel Prognostic and Diagnostic Marker of Preeclampsia
<b>Inventor:</b>	<b>MR. DIMA LIBSTER</b> PhD student of Prof. Nissim Garti and Prof. Gil Shoham, Casali Institute of Applied Chemistry, Faculty of Science
<b>Invention:</b>	Lyotropic Hexagonal Liquid Crystals as Carriers of Therapeutic Peptides for Transdermal Administration: Solubilization and Structural Characterization
<b>Inventor:</b>	<b>MR. SHAUL LAPIDOT</b> PhD student of Prof. Oded Shoseyov, Smith Institute for Plant Sciences and Genetics in Agriculture Robert H. Smith Faculty of Agriculture, Food & Environment
<b>Invention:</b>	Compositions Comprising Fibrous Polypeptides and Polysaccharides
<b>Inventor:</b>	<b>MS. NETA PESSAH</b> PhD student of Prof. Meir Bialer and Prof. Boris Yagen, School of Pharmacy
<b>Invention:</b>	$\alpha$ -Fluoro and $\alpha$ -Chloro 2,2,3,3 -Tetramethylcyclopropylcarboxamide: Two Novel Chemical Entities for the Treatment of Epilepsy and Other Disorders

## Kaye Winners 2008

<b>Inventor:</b>	<b>PROF. DANIEL COHN</b> Casali Institute of Applied Chemistry, Institute of Chemistry, Faculty of Science The Hebrew University of Jerusalem
<b>Invention:</b>	Tailor-made Biodegradable Polymers for the Prevention of Post-surgical Adhesions
<b>Inventors:</b>	<b>PROF. HERMONA SOREQ</b> Department of Biological Chemistry, Silberman Institute of Life Sciences Faculty of Science
<b>Invention:</b>	Engineered Human Cholinesterases and RNA-targeted Agents to Suppress Their Functioning
<b>Inventor:</b>	<b>DR. ARIE DAGAN and PROF. SHIMON GATT</b> Department of Biochemistry, Faculty of Medicine
<b>Invention:</b>	Development of Novel Anti-cancer Drugs
<b>Inventor:</b>	<b>MR. YANIV SEMEL</b> PhD student under the supervision of Prof. Dani Zamir The Robert H. Smith Institute of Plant Sciences and Genetics in Agriculture Faculty of Agricultural, Food and Environmental Quality Sciences
<b>Invention:</b>	Phenom Networks: A Web-based System for the Analysis of Quantitative Phenotypes on Both Plants and Animals for Breeding and Research
<b>Inventor:</b>	<b>MR. NADAV KIMELMAN-BLEICH</b> PhD and DMD student under the supervision of Prof. Dan Gazit Skeletal Biotechnology Laboratory, Faculty of Dental Medicine
<b>Invention:</b>	Scaffolds with Oxygen Carriers and Their Use in Tissue Engineering
<b>Inventor:</b>	<b>MR. DIMA SHEYNI</b> PhD student of Prof. Dan Gazit, Skeletal Biotechnology Laboratory, Faculty of Dental Medicine
<b>Invention:</b>	Ultrasound-based Non-viral Gene Delivery Induces Bone Formation <i>in Vivo</i>
<b>Inventor:</b>	<b>MR. MATAN RAPOPORT</b> PhD student under the supervision of Prof. Haya Lorberboum-Galski Department of Cellular Biochemistry and Human Genetics, Faculty of Medicine
<b>Invention:</b>	Enzyme Replacement Therapy for Mitochondrial Disorders: Lipoamide Dehydrogenase Deficiency as a Proof-of-principle

## Kaye Winners 2007

<b>Inventor:</b>	<b>PROF. DANNY ZAMIR</b> Smith Institute of Plant Sciences and Genetics in Agriculture, Faculty of Agricultural, Food and Environmental Quality Sciences	<b>2011</b>
<b>Invention:</b>	Improving Plant Breeding Using Exotic Genetic Libraries	
<b>Inventors:</b>	<b>PROF. MEIR BIALER and PROF. BORIS YAGEN</b> Departments of Pharmaceutics, and Medicinal Chemistry and Natural Products, School of Pharmacy, Faculty of Medicine	<b>2010</b>
<b>Invention:</b>	Design and Development of Valnoctamide: A New Drug with Stereoselective CNS Activities	
<b>Inventor:</b>	<b>PROF. LEO JOSKOWICZ</b> School of Engineering and Computer Science, Faculty of Science	<b>2009</b>
<b>Invention:</b>	An Image-guided System with a Miniature Robot for Precise Positioning and Targeting in Keyhole Neurosurgery	
<b>Inventor:</b>	<b>MR. YANIV LINDE</b> Student of Prof. Chaim Gilon, Department of Organic Chemistry, Faculty of Science	<b>2008</b>
<b>Invention:</b>	A Novel Oral Anti-obesity Drug Candidate: Reduction of Food Consumption by Melanocortin-4 Peptide Agonist	
<b>Inventor:</b>	<b>MR. EREZ PODOLY</b> Student of Prof. Hermona Soreq, Department of Biological Chemistry, Faculty of Science	<b>2007</b>
<b>Invention:</b>	A Natural Brain Protein Protection from Alzheimer's Disease	
<b>Inventor:</b>	<b>MR. MORAN FARHI</b> Student of Prof. Alexander Vainstein and Dr. Hagai Abeliovich Smith Institute of Plant Sciences and Genetics in Agriculture, Faculty of Agricultural, Food and Environmental Quality Sciences	<b>2006</b>
<b>Invention:</b>	Engineering <i>Saccharomyces cerevisiae</i> for the Production of Methylbenzoate and Resistance to Benzoic Acide for Uses in the Food Industry	
<b>Inventor:</b>	<b>MR. YUVAL AVNIR</b> Student of Prof. Yechezkel Barenholz, Department of Biochemistry, Faculty of Medicine	<b>2005</b>
<b>Invention:</b>	Liposomal Glucocorticoids for Treating Inflammatory States	

## Kaye Winners 2006

<b>Inventor:</b>	<b>DR. YONATAN ELKIND</b> Smith Institute of Plant Sciences and Genetics in Agriculture, Faculty of Agricultural, Food and Environmental Quality Sciences	<b>2002</b>
<b>Invention:</b>	Breeding of Pepper Varieties Adapted for Protected Cultivation under Mild Winter Conditions	
<b>Inventor:</b>	<b>PROF. ELKA TOUITOU</b> Department of Pharmaceutics, School of Pharmacy, Faculty of Medicine	<b>2001</b>
<b>Invention:</b>	Ethosome Innovative Technology	
<b>Inventor:</b>	<b>PROF. MOSHE KOTLER</b> Department of Pathology, Faculty of Medicine	<b>2000</b>
<b>Invention:</b>	A Prophylactic Vaccine Preventing a Mortal Viral Disease of Koi Fish and Carps	
<b>Inventors:</b>	<b>PROF. MEIR BIALER AND PROF. BORIS YAGEN</b> Departments of Pharmaceutics, and Medicinal Chemistry and Natural Products, School of Pharmacy, Faculty of Medicine	<b>1999</b>
<b>Invention:</b>	Design and Development of a New Drug with Enantioselective CNS Activities – Propylisopropyl Acetamide (PID)	
<b>Inventor:</b>	<b>MS. ELENA KHAZANOV</b> Student of Prof. Yechezkel Barenholz, Department of Biochemistry, Faculty of Medicine	<b>1998</b>
<b>Invention:</b>	Tumorsuppressive Therapy by Liposome Containing both Doxorubicin and Ceramide	
<b>Inventor:</b>	<b>MR. YEHOSHUA MAOR</b> Student of Prof. Raphael Mechoulam, Department of Medicinal Chemistry and Natural Products, School of Pharmacy, Faculty of Medicine	<b>1997</b>
<b>Invention:</b>	Novel Anti-hypertensive Agents based on Cannabis Constituent with Anti-inflammatory Properties-synergistic Beneficial Cardiovascular Effects	
<b>Inventor:</b>	<b>MR. NIR QVIT</b> Student of Prof. Chaim Gilon, Department of Organic Chemistry, Faculty of Science	<b>1996</b>
<b>Invention:</b>	SIB: Small Integrated Building Blocks	
<b>Inventor:</b>	<b>MS. KHULOUD TAKROURI</b> Student of Prof. Morris Srebnik Department of Medicinal Chemistry and Natural Products, School of Pharmacy, Faculty of Medicine	<b>1995</b>
<b>Invention:</b>	Synthesis and Anti-microbial Activity of a Novel Series of Alkyldimethylamine Cyanoboranes and their Derivatives	

**1994**



# KAYE WINNERS

## Kaye Winners 2005

<b>Inventors:</b>	<b>PROF. SHLOMO MAGDASSI and DR. YELENA VINETSKY</b> Casali Institute of Applied Chemistry, Faculty of Science
<b>Invention:</b>	Ceramic Ink Jets for Digital Printing on Glass
<b>Inventor:</b>	<b>DR. ZEHAVA UNI</b> Department of Animal Sciences, Faculty of Agricultural, Food and Environmental Quality Sciences
<b>Invention:</b>	Enhancement of Development of Oviparous Species by <i>In Ovo</i> Feeding – Feeding Eggs with Natural Nutrient Supplements before They Hatch to Produce More Robust Chicks
<b>Inventor:</b>	<b>PROF. SIMON BENITA</b> Department of Pharmaceutics, School of Pharmacy, Faculty of Medicine
<b>Invention:</b>	Cationic Emulsions for Ophthalmic Drug Delivery
<b>Inventor:</b>	<b>PROF. URI BANIN</b> Department of Physical Chemistry and Center for Nanoscience and Nanotechnology, Faculty of Science
<b>Invention:</b>	Semiconductor Nanocrystals for Optical, Electronic, Imaging and Biological Applications
<b>Inventor:</b>	<b>MR. TALEB MOKARI</b> Student of Prof. Uri Banin Department of Physical Chemistry and Center for Nanoscience and Nanotechnology, Faculty of Science
<b>Invention:</b>	Semiconductor Nanocrystals with Conductive Zone
<b>Inventor:</b>	<b>MR. ADEL JABBOUR</b> Student of Prof. Doron Steinberg and Prof. Morris Srebnik Department of Medicinal Chemistry and Natural Products, School of Pharmacy and Institute of Dental Sciences, Faculty of Dental Medicine
<b>Invention:</b>	Interfering in Bacterial Cross-talk: A Novel Means to Influence Pathogenicity of Biofilms
<b>Inventor:</b>	<b>MS. NATALYA KOGAN</b> Student of Prof. Raphael Mechoulam, Department of Medicinal Chemistry and Natural Products School of Pharmacy, Faculty of Medicine
<b>Invention:</b>	Cancer Drug – Use of Quinoid Derivatives of Cannabinoids and Such Novel Compounds in the Treatment of Malignancies
<b>Inventor:</b>	<b>MR. RANI POLAK</b> Student of Prof. Eran Goldin and Dr. Eitan Israeli, Faculty of Medicine
<b>Invention:</b>	GOURMED – Cooking school that will develop recipes and run a course for people with dietary limitations due to chronic diseases
<b>Inventors:</b>	<b>STAFF OF PROF. MICHA WEISS</b> Department of Computerized Information Systems, Computerized Student Course Registration Project Team
<b>Invention:</b>	Computerized Student Course Registration Project Team“Smart Raffle”

## Kaye Winners 2004

<b>Inventor:</b>	<b>PROF. AMNON SHASHUA</b> School of Engineering and Computer Science, Faculty of Science
<b>Invention:</b>	Monocular Visual Processing for On-board Driving Assistance
<b>Inventors:</b>	<b>PROF. ITAMAR WILLNER, DR. EUGENII KATZ, DR. FERNANDO PATOLSKY and MR. YOSSI WEIZMANN</b> Institute of Chemistry, Faculty of Science
<b>Invention:</b>	Optoelectronic Detection of Telomerase in Cancer Cells: Development of a Screening Test for Urinary Bladder in Urine Samples
<b>Inventors:</b>	<b>PROF. MICHAEL FRIEDMAN and PROF. AMNON HOFFMAN</b> Department of Pharmaceutics, School of Pharmacy, Faculty of Medicine
<b>Invention:</b>	<b>DR. ERAN LAVY</b> Koret School of Veterinary Medicine, Faculty of Agricultural, Food and Environmental Quality Sciences Novel Gastro-retentive Dosage Form (GRDF) – A Means for Sustained Administration of Drugs with Narrow Absorption Window at the Upper Gastrointestinal Tract
<b>Inventors:</b>	<b>MR. AVIRAM SPERNATH and MS. IDIT YULI-AMAR</b> Students of Prof. Nissim Garti, Casali Institute of Applied Chemistry, Faculty of Science
<b>Invention:</b>	New Nanosized Vehicles for Triggering and Targeting of Phytochemicals
<b>Inventor:</b>	<b>MS. AVITAL TORRES-KERNER</b> Student of Prof. Morris Srebnik, Department of Medicinal Chemistry and Natural Products, School of Pharmacy
<b>Invention:</b>	New Natural Sunscreens: UVR Absorbing Compounds from Lichens and Cyanobacteria
<b>Inventor:</b>	<b>DR. HIJAZI ABU ALI</b> Student of Prof. Morris Srebnik, Department of Medicinal Chemistry and Natural Products, School of Pharmacy, Faculty of Medicine
<b>Invention:</b>	Novel Organoboron Compounds – Synthesis and Biological Activity

<b>Inventor:</b>	<b>MR. TAREQ JUBETH</b> Student of Prof. Abraham Rubinstein and Prof. Yechezkel Barenholz, Departments of Pharmaceutics and Biochemistry, Faculty of Medicine	<b>2011</b>
<b>Invention:</b>	Targeting the Intestinal Mucosa by Charged Liposomes	<b>2010</b>
<b>Inventor:</b>	<b>MR. OMRI BEN-ZION</b> Student of Prof. Amos Nussinovitch Institute of Biochemistry and Nutrition, Food Science and Nutrition Faculty of Agricultural, Food and Environmental Quality Sciences	<b>2009</b>
<b>Invention:</b>	Novel Method and Apparatus for Testing the Rolling Tack of Pressure-sensitive Adhesive Methods	<b>2008</b>

## Kaye Winners 2003

<b>Inventors:</b>	<b>PROF. NISSIM GARTI and DR. ABRAHAM ASERIN</b> Casali Institute of Applied Chemistry, Faculty of Science	<b>2007</b>
<b>Invention:</b>	Nano-sized Self-assembled Structured Liquids	<b>2006</b>
<b>Inventor:</b>	<b>DR. ABDULLAH HAJ-YEHIA</b> Department of Pharmaceutics, School of Pharmacy, Faculty of Medicine	<b>2005</b>
<b>Invention:</b>	Design, Synthesis and Biological Activity of Novel Hybrid Drugs	<b>2004</b>
<b>Inventor:</b>	<b>DR. JONATHAN MIRVIS</b> Melton Centre for Jewish Education, School of Education Florence Melton Adult Mini-School: A Social Franchise Model	<b>2003</b>
<b>Invention:</b>	“TOMATO” Computerized System, Breeding Hybrid Varieties	<b>2002</b>
<b>Inventor:</b>	<b>MS. DRORA BALAGA</b> Smith Institute of Plant Sciences and Genetics in Agriculture, Faculty of Agricultural, Food and Environmental Quality Sciences	<b>2001</b>
<b>Invention:</b>	“TOMATO” Computerized System, Breeding Hybrid Varieties	<b>2000</b>
<b>Inventor:</b>	<b>ENG. TOM KOEVARY</b> Casali Institute of Applied Chemistry, Faculty of Science	<b>1999</b>
<b>Invention:</b>	The Centre for Process Development: A Platform for Thousands of “Inventors to Order” for Industry	<b>1998</b>
<b>Inventor:</b>	<b>PROF. ZICHRIA ZAKAY-RONES</b> Institute of Microbiology, Faculty of Medicine	<b>1997</b>
<b>Invention:</b>	Anti-cancer Therapy by Newcastle Disease Virus (NDV)	<b>1996</b>
<b>Inventor:</b>	<b>MR. ARIE GRUZMAN</b> Student of Prof. Shlomo Sasson, Department of Pharmacology and Experimental Therapeutics, School of Pharmacy, Faculty of Medicine	<b>1995</b>
<b>Invention:</b>	Novel Anti-hyperglycemic Drugs	<b>1994</b>
<b>Inventor:</b>	<b>MS. AVIVA JOSEPH</b> Student of Prof. Eli Kedar and Prof. Yechezkel Barenholz, The Lautenberg Center for Immunology and Department of Biochemistry, Faculty of Medicine	<b>1993</b>
<b>Invention:</b>	INFLUSOME-VAC, 3 Novel, Highly Efficient Influenza Vaccines	<b>1992</b>
<b>Inventor:</b>	<b>MR. HADI ASLAN</b> Student of Prof. Dan Gazit, Skeletal Biotechnology Laboratory, Faculty of Dental Medicine	<b>1991</b>
<b>Invention:</b>	Novel Methods for Stem Cells Based Therapy	<b>1990</b>
<b>Inventor:</b>	<b>MR. SHAI SHALEV-SHWARTZ</b> Student of Prof. Yoram Singer, School of Engineering and Computer Science, Faculty of Science	<b>1989</b>
<b>Invention:</b>	A Query Melody System	<b>1988</b>
<b>Inventor:</b>	<b>MR. MICKEY KOSLOFF</b> Student of Prof. Zvi Selinger, Silberman Institute of Life Sciences, Faculty of Science	<b>1987</b>
<b>Invention:</b>	Drug-assisted Catalysis, Novel Cancer Therapeutics	<b>1986</b>
<b>Inventor:</b>	<b>MR. ABED AL-AZIZ QUNTAR</b> Student of Prof. Morris Srebnik, Department of Medicinal Chemistry and Natural Products, School of Pharmacy, Faculty of Medicine	<b>1985</b>
<b>Invention:</b>	The Synthesis of Novel Di- and Tri-Vinylphosphonates	<b>1984</b>



# KAYE WINNERS

## Kaye Winners 2002

<b>Inventor:</b>	<b>PROF. SHMUEL BEN-SASSON</b> Department of Experimental Medicine and Cancer Research, Faculty of Medicine
<b>Invention:</b>	Kin-Ace Technology – A Broad Platform Technology for Disease Control via the Interception of Intracellular Signaling
<b>Inventors:</b>	<b>PROF. MICHAEL SELA and DR. DORON STEINBERG</b> Department of Oral Biology, Faculty of Dental Medicine <b>PROF. MICHAEL FRIEDMAN</b> School of Pharmacy, Faculty of Medicine <b>PROF. W. AUBREY SOSKOLNE</b> Department of Periodontics, Faculty of Dental Medicine
<b>Invention:</b>	Periochip-sustained Release Treatment for Periodontal Diseases
<b>Inventor:</b>	<b>PROF. GERSHON GOLOMB</b> Department of Pharmaceutics, School of Pharmacy, Faculty of Medicine
<b>Invention:</b>	Nanoparticulate Drug Delivery Systems for Restenosis Therapy
<b>Inventor:</b>	<b>PROF. SHMUEL PELEG</b> School of Engineering and Computer Science, Faculty of Science
<b>Invention:</b>	OMNISTEREO: Capturing and Viewing 3D Stereoscopic Panoramic Images
<b>Inventor:</b>	<b>DR. SHLOMO YITZCHAIK</b> Department of Inorganic and Analytical Chemistry, Faculty of Science
<b>Invention:</b>	Molecular Layer Epitaxy (MLE)
<b>Inventor:</b>	<b>DR. WILLIAM (BILL) BREUER</b> Department of Biological Chemistry, Faculty of Science
<b>Invention:</b>	A Test for the Detection of Toxic Forms of Iron in Human Plasma
<b>Inventor:</b>	<b>DR. ITSHAK GOLAN</b> The Lautenberg Center for Immunology, Faculty of Medicine
<b>Invention:</b>	Novel CD44 Variant: Potential Target in the Therapy of Rheumatoid Arthritis
<b>Inventor:</b>	<b>MR. EYTAN KLAUSNER</b> Department of Pharmaceutics, School of Pharmacy, Faculty of Medicine
<b>Invention:</b>	Novel Gastroretentive Dosage Forms
<b>Inventor:</b>	<b>MS. NINA ISOHERRAREN</b> Department of Pharmaceutics, School of Pharmacy, Faculty of Medicine
<b>Invention:</b>	New Anti-epileptic Drug
<b>Inventor:</b>	<b>MR. ALEXEI SHIR</b> Department of Biological Chemistry, Faculty of Science
<b>Invention:</b>	Targeted dsRNA Brain Cancer Therapy
<b>Inventor:</b>	<b>MR. FERNANDO PATOLSKY</b> Institute of Chemistry, Faculty of Science
<b>Invention:</b>	Creating Multi-stress Resistance in Arabidopsis
<b>Inventor:</b>	<b>MR. ALEXANDER MAZEL</b> Department of Plant Sciences, Faculty of Science
<b>Invention:</b>	Creating Multi-stress Resistance in Arabidopsis Plants
<b>Inventor:</b>	<b>MS. LITAL ALFONTA</b> Institute of Chemistry, Faculty of Science
<b>Invention:</b>	An Electronic Sensor to Identify Drug Resistance in HIV Patients
<b>Inventor:</b>	<b>MR. YOSSI GAFNI</b> Skeletal Biotechnology Laboratory, Faculty of Dental Medicine
<b>Invention:</b>	Vascular Tissue Engineering
<b>Inventor:</b>	<b>DR. GADI PELLED</b> Skeletal Biotechnology Laboratory, Faculty of Dental Medicine
<b>Invention:</b>	Engineering of Complex Hybrid Tissues

## Kaye Winners 2001

<b>Inventor:</b>	<b>PROF. EDUARDO MITRANI</b> Silberman Institute of Life Sciences, Faculty of Science	<b>2011</b>
<b>Invention:</b>	Micro-organ Technology for Genetically Engineered Bio-pumps	
<b>Inventor:</b>	<b>PROF. SIMON BENITA</b> Department of Pharmaceutics, School of Pharmacy, Faculty of Medicine	<b>2010</b>
<b>Invention:</b>	Drug Delivery through Positively Charged Submicron Emulsions	
<b>Inventors:</b>	<b>MR. DANNY VINITSKY and MR. EITAN RAZ</b> Department of Computerized Information Systems <b>MR. YEHAVI BOURVINE</b> Computation Center	<b>2009</b>
<b>Invention:</b>	Short Message Service (SMS) Supplied by All Cellphone Operators Sending Short Text Messages to Students' Phones	
<b>Inventor:</b>	<b>DR. ANDREW SHIPWAY</b> Institute of Chemistry, Faculty of Science	<b>2008</b>
<b>Invention:</b>	Novel Technology for the Generation of Electronic Circuits Using a Novel Computer-assisted Printing Method	
<b>Inventor:</b>	<b>PROF. YONA CHEN, PROF. YITZHAK HADAR and MR. AMIR TOAR</b> Department of Soil and Water Sciences, Faculty of Agricultural, Food and Environmental Quality Sciences	<b>2007</b>
<b>Invention:</b>	"RollCom" – A Novel, Simple and Easy to Operate Composting Apparatus	
<b>Inventor:</b>	<b>PROF. ITAMAR GATI</b> Department of Psychology, Faculty of Social Sciences, and School of Education	<b>2006</b>
<b>Invention:</b>	"Future Directions" Internet Site to Facilitate Career Decision Making	
<b>Inventor:</b>	<b>MS. MIRIAM V. KOTT-GUTKOWSKI</b> Silberman Institute of Life Sciences, Faculty of Science	<b>2005</b>
<b>Invention:</b>	MDRTL Ex-Vivo Kit Measure and Select Effective Multi-drug Resistance Blocker	
<b>Inventor:</b>	<b>MS. SUSANNA TCHILIBON</b> School of Pharmacy, Faculty of Medicine	<b>2004</b>
<b>Invention:</b>	HU-320 Anti-inflammatory Drug	
<b>Inventor:</b>	<b>MR. YEHUDA GIL</b> The Center for Multimedia-Assisted Instruction	<b>2003</b>
<b>Invention:</b>	The Mobile Smart Table-MST Combining Various Multimedia Accessories	
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# KAYE WINNERS

## Kaye Winners 2000

<b>Inventor:</b>	<b>PROF. MARTA WEINSTOCK-ROSIN</b> Department of Pharmacology, School of Pharmacy, Faculty of Medicine
<b>Invention:</b>	Development of Exelon: A Drug for the Treatment of Alzheimer's Disease (AD)
<b>Inventor:</b>	<b>PROF. MEIR BIALER</b> Department of Pharmaceutics, School of Pharmacy, Faculty of Medicine
<b>Invention:</b>	Valproyl Glycinamide (TV 1901): A New Anti-epileptic (AED) and CNS Drug for the Treatment of Migraine, Neuropathic Pain and Mania
<b>Inventors:</b>	<b>PROF. AVNER ADIN and DR. NICOLAI VESCAN</b> Assistants: Ms. Rivka Kalbo and Ms. Luba Rubinstein Division of Environmental Sciences, School of Applied Science, Faculty of Science
<b>Invention:</b>	"Electro-Flocculation" for Water Treatment and Reuse
<b>Inventor:</b>	<b>DR. BARUCH SCHWARZ</b> School of Education
<b>Invention:</b>	The "Kishurim Project"
<b>Inventor:</b>	<b>MR. ITAI PELES</b> Computer Authority, Ein Kerem
<b>Invention:</b>	IBTS-Internet Based Testing System to Replace Traditional Questionnaires and Written Tests
<b>Inventor:</b>	<b>MR. REUVAN AMAR</b> Computer Authority, Mount Scopus
<b>Invention:</b>	HUDAP-Hebrew University Data Analysis Package
<b>Inventor:</b>	<b>MR. MEIR GLICK</b> Department of Medicinal Chemistry, School of Pharmacy, Faculty of Medicine
<b>Invention:</b>	Novel Stochastic Algorithm for Use in Life Sciences, Physics, Telecommunications and Economics
<b>Inventor:</b>	<b>MR. GIL RONEN</b> Department of Genetics, Silberman Institute of Life Sciences, Faculty of Science
<b>Invention:</b>	Novel Plant Gene "B" and Methods to Genetically Manipulate Color Formulation in Plants
<b>Inventor:</b>	<b>MR. NIR SITVANI</b> Department of Animal Sciences, Faculty of Agricultural, Food and Environmental Quality Sciences
<b>Invention:</b>	Antelope-like Stimulating Device to Reduce Stress of Wild Animals in Captivity

## Kaye Winners 1999

<b>Inventor:</b>	<b>DR. ODED SHOSEYOV</b> Department of Plant Pathology and Microbiology, Faculty of Agricultural, Food and Environmental Quality Sciences
<b>Invention:</b>	CBD Technology – Using the CBD Protein to Bind Various Molecules to Cellulose
<b>Inventor:</b>	<b>PROF. ELISHA TEL-OR</b> Department of Agricultural Botany and Otto Warburg Center for Biotechnology in Agriculture Faculty of Agricultural, Food and Environmental Quality Sciences
<b>Invention:</b>	Azolla Biofilter for Waste Treatment
<b>Inventor:</b>	<b>PROF. HERMONA SOREQ</b> Department of Biological Chemistry, Faculty of Science
<b>Invention:</b>	Antisense Technology – To Treat Various Neurodegenerative Syndromes
<b>Inventors:</b>	<b>MR. YARON BEN-ETZION</b> Head of Manpower and Payroll <b>MS. CHAVA SPRUCH</b> Head of Payroll System, Department for Computerized Information Systems
<b>Invention:</b>	A Solution for BUG 2000
<b>Inventor:</b>	<b>MR. LEON MARGOLIN</b> Department of Anatomy and Cell Biology, Faculty of Medicine
<b>Invention:</b>	A Mask for the Treatment of Headaches
<b>Inventor:</b>	<b>MR. GADI TURGEMAN</b> Bone Gene Therapy and Molecular Pathology Laboratory, Faculty of Dental Medicine
<b>Invention:</b>	The Reciprocal Differentiation System, Controlling the Level of BMP2 Expression

## Kaye Winners 1998

<b>Inventor:</b>	<b>PROF. ITAMAR WILLNER</b> Institute of Chemistry, Faculty of Science	<b>2011</b>
<b>Invention:</b>	Layered Electrically-Contacted Enzyme-Electrodes and Antigen/Antibody Assembles for Electrochemical and Piezoelectrical Biosensors and Immunosensor Devices	
<b>Inventors:</b>	<b>PROF. NISSIM GARTI</b> Casali Institute of Applied Chemistry, Faculty of Science <b>DR. YURI FELDMAN</b> Department of Applied Physics, Faculty of Science	<b>2010</b>
<b>Invention:</b>	Time Domain Dielectric Spectrometer (TDDS) for Investigation of Advanced Materials and Medical Systems	<b>2009</b>
<b>Inventors:</b>	<b>PROF. MICHAEL SCHIEBER, DR. JACOB NISSENBAUM, DR. LEONID MELKHOV and MS. ASAF ZUCK</b> School of Applied Science, Faculty of Science	<b>2008</b>
<b>Invention:</b>	Polycrystalline Hg 12 X-Ray Detector Plates for Digital Radiology	
<b>Inventors:</b>	<b>PROF. DAVID AVNIR</b> Institute of Chemistry, Faculty of Science <b>PROF. SERGEI BRAUN</b> Silberman Institute of Life Sciences, Faculty of Science <b>PROF. OVADIA LEV</b> Division of Environmental Sciences, Faculty of Science <b>PROF. MICHAEL OTTOLENGHI</b> Institute of Chemistry, Faculty of Science	<b>2007</b>
<b>Invention:</b>	Reactive Organic Sol-gel Ceramic Materials	<b>2006</b>
<b>Inventor:</b>	<b>PROF. JOSEPH HIRSCHBERG</b> Silberman Institute of Life Sciences, Faculty of Science	<b>2005</b>
<b>Invention:</b>	Genetic Engineering of Astaxanthin Production in Transgenic Plants	
<b>Inventor:</b>	<b>MR. AMIR ZUKER</b> Kennedy-Leigh Centre for Horticultural Research, Faculty of Agricultural, Food and Environmental Quality Sciences	<b>2004</b>
<b>Invention:</b>	Transgenic Carnation Plants with Novel Characteristics	
<b>Inventor:</b>	<b>MR. GALEN MARQUIS</b> Institute of Jewish Studies, Faculty of Humanities	<b>2003</b>
<b>Invention:</b>	Production of the Hebrew University of Jerusalem Bible Project	
<b>Inventor:</b>	<b>MR. JEHUDA BASNIZKI</b> Silberman Institute of Life Sciences, Faculty of Science	<b>2002</b>
<b>Invention:</b>	Novel Seed-planted Hybrid Varieties of the Globe Artichoke	
<b>Inventor:</b>	<b>MR. ALEXEY KAMYSHNY</b> Casali Institute of Applied Chemistry, Faculty of Science	<b>2001</b>
<b>Invention:</b>	Form III Aspartame	



# KAYE WINNERS

## Kaye Winners 1997

<b>Inventors:</b>	<b>PROF. YECHEZKEL BARENHOLZ and DR. RIVKA COHEN</b> Department of Biochemistry, Faculty of Medicine
<b>Invention:</b>	<b>PROF. ALBERTO GABIZON and DR. DORIT GOREN</b> Hadassah University Hospital
<b>Invention:</b>	DOXIL – Liposomal Doxorubicin for Cancer Treatment
<b>Inventor:</b>	<b>PROF. DAPHNE ATLAS</b> Department of Biological Chemistry, Faculty of Science
<b>Invention:</b>	A New Anti-Parkinson's Drug
<b>Inventors:</b>	<b>PROF. NAVA BEN-ZVI</b> Center for Multimedia Assisted Instruction
	<b>MR. DAVID RASHTY</b> Computation Center
	<b>MR. ELI KANAI</b> Snunit Educational Information System, Faculty of Science
<b>Invention:</b>	Snunit Educational Information System
<b>Inventor:</b>	<b>MR. YOAV SMITH</b> Faculty of Medicine
<b>Invention:</b>	The Dermal Imaging System
<b>Inventor:</b>	<b>MS. VARDA HERSHKO</b> Institute of Biochemistry, Food Science and Nutrition, Faculty of Agriculture
<b>Invention:</b>	Hydrocolloid Coatings for Food and Agricultural Products
<b>Inventor:</b>	<b>MR. SHMARYAHU EZRAHI</b> Casali Institute of Applied Chemistry, Faculty of Science
<b>Invention:</b>	Fire-resistant Hydraulic Fluids

## Kaye Winners 1996

<b>Inventor:</b>	<b>PROF. SHABTAY DIKSTEIN</b> School of Pharmacy, Faculty of Medicine
<b>Invention:</b>	Development of Topically-applied Drugs for the International Market
<b>Inventor:</b>	<b>PROF. ABRAHAM SZTEJNBERG</b> Department of Plant Pathology and Microbiology, Faculty of Agriculture
<b>Invention:</b>	AQ10: A Novel Biofungicide for the Control of Plant Diseases
<b>Inventor:</b>	<b>PROF. DAN DAVIDOV and DR. MICHAEL GOLOSOVSKY</b> Racah Institute of Physics, Faculty of Science
<b>Invention:</b>	High-resolution Millimeter-wave Scanning Microscope
<b>Inventor:</b>	<b>PROF. CHAIM GILON</b> Institute of Chemistry, Faculty of Science
<b>Invention:</b>	Backbone Cyclization and Cycloscan TM: Novel Technologies for the Fast Discovery of New Peptide Based Drugs
<b>Inventor:</b>	<b>MR. MICHAEL HOICHMAN</b> Computer Programmer, Faculty of Medicine
<b>Invention:</b>	The "Maestro" Program for Controlling Auditory Experiments
<b>Inventor:</b>	<b>MR. BARAK HERSHKOVITZ</b> Faculty of Medicine
<b>Invention:</b>	"Biochem Thinker": A New Computer Program to be used by Biochemistry Students as a Tutorial Tool

## Kaye Winners 1995

<b>Inventor:</b>	<b>PROF. ITAI BAB</b> Bone Laboratory, Faculty of Dental Medicine
<b>Invention:</b>	Osteogenic Growth Peptide (OGP)
<b>Inventor:</b>	<b>PROF. NISSIM GARTI</b> Casali Institute of Applied Chemistry, Faculty of Science
<b>Invention:</b>	New Emulsifiers
<b>Inventor:</b>	<b>PROF. YECHEZKEL BARENHOLZ</b> Department of Biochemistry, Faculty of Medicine
<b>Invention:</b>	A Novel Approach to Obtain Efficient and Stable Remote Drug Loading of Liposomes for Clinical Use
<b>Inventors:</b>	<b>DR. EUGENII KATZ, MS. AZALIA RIKLIN and MS. RON BLONDER</b> Institute of Chemistry, Faculty of Science
<b>Invention:</b>	Development of Biosensor and Immunosensor Devices

## Kaye Winners 1994

<b>Inventors:</b>	<b>DR. B. SCHWARZBURD and DR. MARCELLO CHAFFER</b> Department of Animal Sciences, Faculty of Agriculture
<b>Invention:</b>	Membrane Vesicles of <i>E. coli</i> as a Potent Non-toxic Vaccine Against Colibacillosis in Poultry
<b>Inventor:</b>	<b>MR. DUDU RASHTY</b> Computation Center, Faculty of Science
<b>Invention:</b>	Hebrew University Information Retrieval System
<b>Inventors:</b>	<b>PROF. HAIM RABINOWITCH and PROF. NACHUM KEDAR</b> Department of Field and Vegetable Crops, Faculty of Agriculture
<b>Invention:</b>	Development of Long Shelf-life Tomatoes

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