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KATHIMERINI
NEW DIRECTIONS IN ANTIHYPERTENSIVE THERAPY: TRANSDERMAL DELIVERY

Research Team Rep:
MATSOUKAS MINOS-TIMOTHEOS

Hypertension and cardiovascular disease are the top causes of death worldwide. Elsartane (Hellas+Sartane) proved to be an effective agent that is economical to make, easy to manufacture and high-yield in lab experiments on animals. It may be administered percutaneously thanks to its lipophilic properties. Elsartane was discovered by ELDRUG SA, a company located at the Patras Park for Science in 2007. Its percutaneous administration (in the form of patches) helps improve compliance, as quite often patients are being treated with a cocktail of medication all at once, along with subsequently limiting side-effects and enhancing control of active agent release. Elsartane and its drastic analogues, which could develop into pharmaceutical products to be used for treating hypertension and cardiovascular disease, and which could possibly go global once the clinical trials are successfully complete, are actually protected by international patents. Elsartane is part of a new generation of Sartanes, which is a new generation of antihypertensive products that gets total revenue of 21 billion euro in countries they are produced at. The primary objective is now to have the first global clinical trial happen and then market this anti-hypertensive percutaneous high technology product which could prove beneficial for the field of Health, Society and the National Economy.

ELDRUG S.A.
Research Team Rep:
LOGOTHETIDIS SERGIOS

One of the fastest-growing fields of contemporary technology is linked to flexible organic electronic structures such as Flexible Organic PV. Operability and functionality thereof is based on use of organic polymers and getting flexible rolls, such as plastic film roll that can be hundreds of meters long, printed through techniques which are similar to those used in standard printing (e.g. publications or packaging). Flexible Organic PV can be placed on any surface whatsoever, be it flat or not, including facades of buildings, roof tiles, tents, clothes, umbrellas, bags and so on and thus help save energy and limit environmental pollution along with achieving energy autonomy. It is possible that such products be made in Greece as there is electromechanical equipment available thanks to printing and/or textile industries.

ARISTOTLE UNIVERSITY OF THESSALONIKI
Elmyelin (Hellas + Myeline) is a chemical compound by ELDRUG SA which proved effective in experiments that were carried out on animals. Its immunomodulation activity was in experimental pre-clinical disease models makes it a potential treatment vaccine. Elmyelin could be marketed worldwide once clinical trials are through. It is protected by means of international patents the copyright for which belongs to ELDRUG SA. Elmyelin was designed as an immunotherapeutic vaccine and has various advantages to offer compared to other types of interferon in the market, such as Avonex, Rebif, Betascheron or Glati-camer, that Teva makes in Israel. Altogether these generate 10 billion euro in annual revenue for countries they are produced at. The main objective is to have the first international clinical trial, develop an Immunotherapy Vaccine to treat MS and eventually market Elmyelin for the benefit of Health, Society and the National Economy.

ELDRUG S.A.
Brite Solar develops 3rd generation photovoltaic panel technology. It uses both organic and inorganic nanomaterials to create cells and panels which are transparent and therefore suitable for use as windows or glass walls in houses and office buildings. Brite’s solar technology is patented in Greece while respective patents are pending in both the United States and the European Union. The company’s vision is to have its technology widely used in windows, building facades, sun roofs and sound barriers for motorways. Brite’s technology allows solar panels to operate when the light source is on either side of the panel and regardless of the light being solar or artificial. The Brite focus is to achieve production cost for solar glass comparable to that of commonly used low-e glass window panes, thus paving new ways and opening new horizons in building energy efficiency. The brand name ‘PanePower™’ for Brite’s solar window is registered in the USA. The company’s vision is to have its technology widely used in windows, building facades, energy autonomous greenhouses, sun roofs and sound barriers for motorways.

BRITE HELLAS S.A.
INVERTER TUNING FOR LIFTS INCLUDING EMERGENCY RESCUE SYSTEM

Research Team Rep:
MICHALODIMITRAKIS NIKOLAOS

Inverter is high technology electronic equipment for contemporary traction lift installations that multinational companies normally offer. It helps make elevator rides smooth and their stops precise while enhancing energy efficiency. Though most energy-efficient elevators are indeed conventional ones that include Inverter systems, they have nonetheless encountered various difficulties as in many cases reliable tuning is quite difficult if not impossible to achieve and so lift function is replete with problems. Our Inverter gets past such problems as it tunes itself during the first 4-5 regular rides, guaranteeing reliability and regularity from that point onwards. This is what we managed to do by developing an original math model to control inverter motor, a fact which resulted in exceptional performance, credibility, stability and compatibility through self-tuning during the standard movement and motions of the lift car. This Inverter application may be optionally accompanied by a rescue system which is battery-powered and can be used in case of power failure.

N. MICHALODIMITRAKIS - P. NEOFOTISTOS R&D SERVICES
CONSTRUCTION OF ELECTRONIC CIRCUITS
Coronary balloon angioplasty stenting is a method used to help manage obstructed or narrowed arterial lumens by introducing and inflating a balloon within, the main objective of this operation being the treatment of ischemic heart disease. However, the thread of the balloon catheter through the coronary plaque and abrupt balloon inflation is linked to technical and procedural difficulties, which in many cases impose great risk to the coronary patient. Our team, partnered with a German company, designed and manufactured a superelastic stenting device, made of a special combination of nickel and titanium, which achieved slow, non-flow occlusive, controllable opening, thus helping to overcome all such problems.

SAES GETTER GROUP, MARQUET CARDIOVASCULAR, UNIVERSITY OF PATRAS, MANCHESTER UNIVERSITY & PHILIPS HEALTHCARE HELLAS
The quality of air in closed indoor areas, where according to estimates an average resident of any city gets to spend 90% of their time, is very important for our health. With a view to improving indoor air quality a group from FORTH (Foundation for Research & Technology-Hellas) researchers in Crete managed to successfully synthesise innovative photo-catalytic nano-materials which, activated by visible radiation (interior lighting), are capable to decompose pollutants such as NOx, VOCs etc. Moreover, the team developed an integrated system for indoor air sterilizing and cleaning which is compatible with all standard air-conditioning pieces of equipment found in the market.

Both the joint application, the individual segments thereof and case-by-case use of the aforementioned technologies provide an integrated, cost-effective solution with a view to improving indoor air quality.
Strikesorb 30-DRM effectively and permanently protects electronic equipment from transient overvoltage. Its durable case makes it appropriate for din rail mounting and allows easy installation in electrical panels. Strikesorb surge protection technology benefits a wide range of applications, from protection of residences to protection of mission critical industrial operations. Strikesorb 30-DRM ensures a high degree of reliability and operational availability for organizations and enterprises by averting the risk of potential damages or financial loss to the operation. Strikesorb’s unique qualities guarantee seamless and optimal protection by withstanding multiple overvoltage/surge events. The technology operates safely and effectively without fuse, eliminating the need for periodic checks, maintenance and/or replacement.

RAYCAP CORPORATION
EMULATION IN INTELLIGENT MANAGEMENT SYSTEMS: THE GLOBAL OPTIMUM APPROACH

Research Team Rep:
VARELAS PANAYIOTIS

If simulation, on the one hand, is a luxury that information technology can afford for trainees with a view to helping them familiarize themselves with problem-solving, for they will eventually be called upon to manage such problems in real life, and so gets them to practice in a virtual framework while they still lack experience in the field, emulation, on the other hand, ventures to have such terms and conditions reversed in an innovative, subversive and complementary manner. The intelligent stimulation of live management systems, by means of an inconspicuous, transparent virtualization in real time having no negative repercussions on entrepreneurship, helps identify weaknesses, offers a means to mitigate negative impact or directs business operations towards a global optimum instead. Indices of hibernation, reaction and feedback, objectivity, transparency and cooperativeness are co-assessed. The model supports the learning process, helps clarity in public administration and maximizes self-assessment in business activities.

DANAOS MANAGEMENT CONSULTANTS S.A.
A METHOD TO DETECT UNKNOWN MUTATIONS WHICH CAUSE THE PREMATURE END OF PROTEIN SYNTHESIS

Research Team Rep: CHRISTOPOULOS THEODOROS

THE METHOD’S STAGES

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
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<tr>
<td>DNA or RNA isolated from tissue or blood sample</td>
<td>Amplification</td>
</tr>
<tr>
<td>Normal sequence copies</td>
<td>(Photo-protein) aequorin DNA</td>
</tr>
<tr>
<td>Outcome of fusion</td>
<td>In vitro transcription/translation - aequorin production</td>
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<tr>
<td>Luminescence</td>
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<td></td>
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<tr>
<td>DNA or RNA isolated from tissue or blood sample</td>
<td>Amplification</td>
</tr>
<tr>
<td>Mutated sequence copies</td>
<td>(Photo-protein) aequorin DNA</td>
</tr>
<tr>
<td>Outcome of fusion</td>
<td>In vitro transcription/translation - NO aequorin production</td>
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This is an in-vitro method useful for diagnosis, prognosis and monitoring of patients suffering from diseases due to mutations that cause the premature end of protein synthesis. Such diseases include colon cancer, breast cancer, thalassemia, fibrocystic disease, muscular dystrophy, polycystic kidney disease, nodular sclerosis, neurofibromatosis, ataxia telangiectasia, Rubinstein-Taybi syndrome, Tay-Sachs etc. Standard methods to detect such mutations use radioisotopes, electrophoresis in polyacrylamide gel and auto radiography. **This particular method is innovative in that detection no longer requires use of radioisotopes and protein electrophoresis.** Instead the strong luminescence properties of a photo-protein (aequorin, a jelly fish protein) are taken advantage of: they make detection possible within 3 seconds and ensure increased sensitivity.

UNIVERSITY OF PATRAS, DEPARTMENT OF CHEMISTRY
AQUASZERO: AN EFFICIENT GRANULAR SOLID ADSORBENT FOR THE REMOVAL OF BOTH TRIVALENT [AS(III)] AND PENTAVALENT ARSENIC [AS(V)] FROM POTABLE WATER

Research Team Rep:
MITRAKAS MANASSIS

In addition to its improved removal capacity against pentavalent arsenic, AquAsZero also adsorbs the highly toxic trivalent one even five times higher than the corresponding commercial iron oxy-hydroxides. Its effectiveness arises from the increased oxidation capacity of the binary iron-manganese oxy-hydroxide which it consists of. AquAsZero’s application as a filling material of adsorption beds/filters allows complete removal of both As3 and As5 resulting in the supply of potable water free from pentavalent arsenic, as well as from the highly cancerous trivalent arsenic met at many places of Greece and worldwide. Furthermore, the application’s simplicity and its environmentally safe disposal as it is an inert waste as well as the low production cost of AquAsZero mean water at lower prices for the consumer. This research venture was supported by European Commission FP7/Research for SMEs.

ARISTOTLE UNIVERSITY OF THESSALONIKI
DEPARTMENT OF CHEMICAL ENGINEERING, ANALYTICAL CHEMISTRY LAB
FROM THE “CLASSROOM OF THE FUTURE” TO THE “SCHOOL OF THE FUTURE”

Research Team Representative: KONSTANTINOS DOUKAS, CEO

“School of the Future” expresses the creation of a school that is more... creative, pleasant, useful and productive. It is an “open” school with a student-centered approach to teaching. It is compatible with the vision of educators and, at the same time, addresses the concerns of parents. This innovative effort began with the implementation of the “Classroom of the Future”. The first such digital classroom was piloted in 2007, using all necessary infrastructure (interactive whiteboards, audio-visual equipment, educational software and tools, wireless networking and tablet PCs, touch-screen laptops for every student and teacher). Applying collaborative teaching models led to students participating both actively and creatively in everyday school life. Since 2010, all students from Grade 4 (Primary School) to Grade 8 (Junior High School) have been benefiting from using computers as part of the curriculum as well as for school activities. Doukas School has put into practice the “1:1” model of education (one student:one computer).
SECOND-GENERATION BIODIESEL FUEL PRODUCTION THROUGH THE CATALYTIC CONVERSION OF WASTE COOKING OIL

Research Team Rep: BEZERGIANNA STELLA

The National Center for Research and Technological Development (EKETA) developed a new technology to produce biodiesel from oils used for frying, providing a solution to not just the problem of climate change but also to that of disposing waste fried oils. This technology counts on the catalytic processing of waste cooking oil and the conversion of fatty acids to paraffin and naphthen. The entire procedure has a high conversion rate which is in excess of 90%. The new biofuel is a type of light and clean diesel that bears impressive properties. Compared to standard (fossil fuel) diesel, its ketone rates are higher; the same goes for the biofuel’s heat generating power which guarantees a drop in average consumption per kilometer. The aforementioned technology is currently being tried on a pilot basis with a view to producing 2 tons of biofuel for demonstration purposes in a Municipality of Thessaloniki garbage truck while this initiative is co-financed through LIFE+, an EU Program.

EKETA (NATIONAL CENTRE FOR RESEARCH AND TECHNOLOGICAL DEVELOPMENT)
This is an original and innovative apparatus to measure bone metabolic diseases such as osteoporosis. Fundamental research along with the design completed, accompanied by successful clinical trials. Measurements and tests have also been performed on both animals and women while comparisons were made to all other existing conventional methods. This method’s advantages, in comparison to conventional methods are:

1. Duration is short (it takes 2-3 minutes)
2. No radiation/painless/noninvasive
3. Simple and easy use
4. Portability
5. Low cost
6. High sensitivity and accuracy, objectivity, repeatability
7. Osteoporosis is detected much earlier compared to conventional methods
8. The method’s results are correlated with the results of all conventional methods, something that does not happen among them
9. Data can be tele-transferred, enabling diagnosis in main medical centers for patients living in distant areas. Possibility for elderly care without necessary patient travel

**Conclusion(s):** this is the most competitive evaluation tool there is to assess bone quality, monitor and follow-up on osteoporotic patients as well as evaluate the treatment impact.

**MACHINE ELEMENTS LAB,**
**DPT. OF MECHANICAL & AERONAUTICAL ENGINEERING, UNIVERSITY OF PATRAS**
A biological filter was developed for the simultaneous removal of hydrogen sulphide, ammonia, iron and manganese from potable water. It is an attached growth system where water-indigenous microorganisms are attached on the surface of silicic gravel. As they grow, they create biofilms that provide very high biomass density and resistance to high pollutant concentrations and hydraulic loading. Moreover, no external mechanical aeration is necessary because natural aeration takes place due to the temperature difference between the ambient air and the treated water. Thus, the proposed system can treat simultaneously all four pollutants without operating cost. The prototype filter has been in operation since June 2008 at Neo Vouprasio, a village in western Greece. This technology has caught the attention of the technical world and many municipalities in Greece. It has caught the attention of developing countries like Bolivia (Centro de Aguas y Sanemiento Ambiental, Cochabamba) and Egypt (National Research Center, Cairo), which are facing serious problems with potable water quality. The long-term goal is transfer of know-how to those countries.
LENTHY ELECTRONIC ECG RECORDER (HOLTER MONITOR)

KATSIYIANNIS CHRISTOS

The ECG tape Electrocardiogram recorder (HOLTER) is a small portable device used for continuous recording of a patient’s heart rate. It is the only available diagnostic approach towards the diagnosis of temporary arrhythmias occurring in a sporadic manner. However, in its current application, it cannot achieve recording for long time periods (>24h) due to power supply and memory capacity limitations. By introducing specific software algorithms into the cardiograph, we detect electrocardiogram abnormalities in an intermittent manner so that only abnormalities get recorded. This saves a lot of processing time and energy and consequently allows monitoring and following up on patients for even longer. With further combination of Wi-Fi and GPS devices, it can achieve both: Allocate a collapsed or risky patient, plus easily generate an automatic alert signal, to the respective on-call medical team which can eventually decide whether the immediate patient’s admission is necessary.

CHRISTOS KATSIYANNIS ABI
Micro2Gen is a company that develops solutions and offers services for Molecular Diagnostics and more specifically Genetic Analysis. The genetic tests are performed in an innovative microsystem of the type Lab-On-a-Chip and the whole process is automated and managed by a programmable instrument that reads and processes the test results of the analysis. Each microsystem (biochip) is disposable and chemically prepared to identify selected DNA mutations associated with certain diseases or predispositions, such as cancer, hereditary but also some infectious diseases. **On this biochip three different processes are integrated that are nowadays realised by three different sections of a genetic laboratory following complicated steps involving expensive and bulky analysing equipment.** These three processes are: 1) preparation of the biologic sample (e.g., a blood drop, or saliva etc.) in order to isolate the DNA to be analyzed, 2) amplification of this extracted DNA to become detectable with the use of appropriate reagents and 3) detection of possibly present selected mutations.
PRODUCING A PROBIOTIC MULTI-PURPOSE STARTER CULTURE USING WHEY AS RAW MATERIAL

Research Team Rep:
KOUTINAS ATHANASSIOS

This is an innovative approach using cheese whey to produce a starter culture suitable for feta cheese aging and hard-cheese ripening as well as for the mass industrial production of kefir, bioethanol, dried yeast for bread-making in sachets, and protein animal feed. It is the combined outcome of a 12-year-long research, 27 international scientific articles and publications as well as three doctorate theses and it is ready and mature for industrial usage and applications. The culture is resistant to changes and molding, appearance of holes, and improves flavor and aroma. It is low-cost for a simple thermal drying method is used thus making its potential investment cost highly appealing to investors and it entails commercial benefits while increasing quality and competitiveness. According to estimates, the first stage of the investment should require about 1 million euro in capital.

UNIVERSITY OF PATRAS-DEPARTMENT OF CHEMISTRY

[Diagram of the production process]

[Images of the process steps]
EPICURE focuses on developing intelligent rehabilitation systems for trauma patients, opting for dynamically controlled, personalized physical exercise. Exercise intensity and resistance levels may be pre-determined by the attending physician and dynamically vary throughout the exercise session. An electronic control system collects motion and resistance data via electronic sensors and constantly adjusts electro-mechanical feedback. The control system implements a modular design and can easily be adjusted to fit various types of physical exercise equipment. The system is innovative with respect to the incorporated pneumatic feedback, multi-parametric sensor data feedback, seamless transition capability between active and passive exercise modes, telemetry monitoring and remote programming by either a physician or a physiotherapist, as well as the modular design of its component parts. EPICURE innovates based on existing, proven technologies and off-the-shelf components, making proof-of-concept prototyping both rapid and economical.

ARISTOTLE UNIVERSITY OF THESSALONIKI
Lavipharm has developed an innovative technology for the intra-oral delivery of pharmaceutical active agents in the form of thin films. The company has applied its proprietary pharmaceutical technology in two patent protected Intra-Oral Delivery Systems (IODS) which offer a controlled release drug delivery for a pre-defined period of time. Both Quick-Dis™ and Slow-Dis™ thin film systems offer competitive advantages:

- Are discreet and easy to use, simply placed on the tongue, without need for water
- Allow accurate dosing and controlled dissolution time
- Ideal for absorption through the mucosa avoiding first pass effect to a great extent
- Mask the drug’s unpleasant taste.

The objective of this innovative technology is to facilitate drug administration to patients facing swallowing difficulties or compliance with their therapy issues, such as children, seniors, mentally ill, epileptic, cancer patients, people suffering from stomach disorders, pharyngeal or mouth infections, AIDS-HIV patients and people under such treatments that make it imperative for prescription drugs to be exclusively administered and absorbed through the oral mucosa.

LAVIPHARM
AN INTEGRATED PROGRAM TO OPTIMALLY MANAGE PARKINSON DISEASE PATIENTS (“PERFORM”)

Research Team Rep:
FOTIADIS DIMITRIOS

PERFORM is a system consisting of two accelerometers/gyroscopes attached to the patient’s chest and belt: a) front, b) side view

Recorded shots of Parkinson disease patients clinical exams

This integrated program for the optimized management of Parkinson’s disease patients aims at providing individualized treatment by seamlessly and continuously monitoring and collecting data that objectively depict daily expression of symptoms such as tremor, slowness in movement and chorea. This integrated system consists of two sub-systems: an ambulatory system for the patient and one for the clinic that treats them. The project is well-grounded on international, long-term scientific and technological expertise. This is an innovative system the world over as it helps upgrade and promote state-of-the-art technology. This is the very first time such type of constant monitoring is provided to prop up patient treatment. PERFORM has been used in the past three years thanks to EU funding.

UNIVERSITY OF IOANNINA