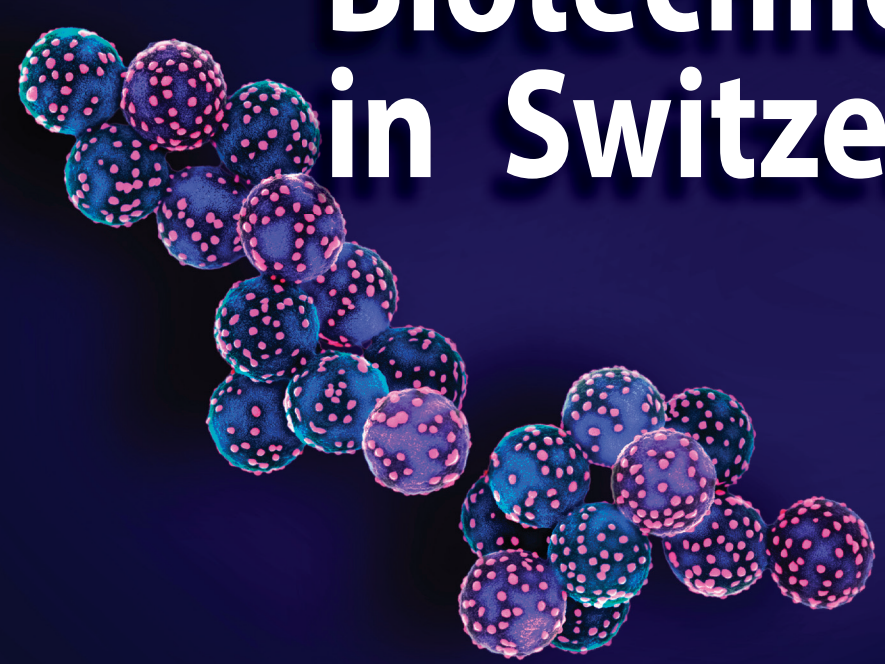
Biotechnology in Switzerland



Using Nanotechnology to Identify Viruses

(UNIBAS, February 20, 2013)

Researchers from the University of Basel and the University of Applied Sciences and Arts Northwestern Switzerland (FHNW) have developed a method to identify viruses using a new nano-technological process. The process could be used to create new viruses, however it also enables the diagnosis and therapy of various illnesses. The big advantage of the new method is, that the scientists can recognize relatively big biomolecules with an increased accuracy. This is achieved by creating particles who have the pattern of the virus imprinted on the surface. This material is then able to identify and bind viruses with the same chemical properties.
http://swissinnovation.org/news/web/2013/03-130220-7c.html

swissnex boston

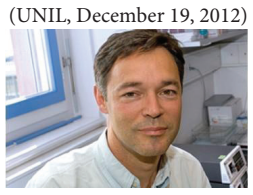
Stabilised Cell Fibres Prevent Cancer Cell Division

(PSI, January 03, 2013)

Drugs used in chemotherapy prevent cells from dividing. As the cells in a growing tumour divide more frequently than in normal tissue, tumour cells become a target of chemotherapeutic agents. Scientists at the Paul Scherrer Institute and ETH Zurich have now elucidated the mechanism of action for an entire class of these drugs. The scientists have shown in detail how these drugs are incorporated into a recess in the building blocks of microtubules, and reinforce the cohesion between these units. It has been shown that structurally dissimilar drug molecules could bind to the same site and act in a similar manner. The information obtained about these structures is so accurate, that it opens the possibility to develop targeted drugs that are better adapted to fulfil their task.
http://swissinnovation.org/news/web/2013/03-130103-8d.html

HIV Uses a Trojan Horse to Penetrate Immune System

(UNIL, December 19, 2012)



Scientists from Germany, Spain and Switzerland from the team of Prof. Amalio Tenti of the Institute of Microbiology, University of Lausanne, have discovered how the HIV enters the cells of the immune system, allowing it to spread in the body. This mechanism remained a mystery to the scientific community up to now. The virus does this by hijacking dendritic cells without infecting them, to be brought to the main target of the virus, the T cells. Since the dendritic cells play an essential role in the activation of the immune response by patrolling the human body and capturing the infectious agents before delivering them to the T cells for destruction, the HIV remains undetected until it infects the T cells.
http://swissinnovation.org/news/web/2012/03-121219-47.html

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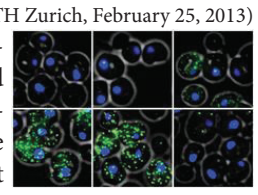
Modelling the Dynamics of Gene Regulation

(ETH Zurich, February 25, 2013)



An international team of systems biologists at ETH Zurich D-BSSE institute and MIT in Boston has developed a new computer model based on real gene response measurements that can accurately predict how often yeast cells transcribe certain genes in specific stressful situations. This important step in understanding complex biological systems has been published in the journal "*Science*". When subjected to stress, yeast cells activate a specific set of genes. These genes are linked to a signaling pathway initiated by transcription factor Hog1, which is transported within a stressed cell to its nucleus where the gene is transcribed. Hog1 activates certain genes that code for proteins, enabling the yeast cells to cope with salt-induced stress.
http://swissinnovation.org/news/web/2013/03-130225-2f.html

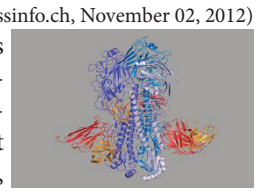
Super Hormone Cure for Metabolic Syndrome

(ETH Zurich, December 18, 2012)

Metabolic syndrome encompasses several common characteristics, including high blood pressure, high cholesterol, insulin resistance, and abdominal fat. This syndrome is increasingly common due to lifestyles without enough exercise and with too much unhealthy food. However, researchers at ETH Zurich have made progress on a cure that solves all the problems at once. A synthetic signaling pathway is used to generate a super hormone that inhibits the feeling of hunger and reduces blood sugar levels. The mechanism is started by the drug "*guanabenz*", which is approved to treat hypertension. The principle was shown to work in diseased mice and with some modification could work in humans as well.
http://swissinnovation.org/news/web/2012/03-121218-a3.html

Super Antibody for Universal Influenza Treatment

(swissinfo.ch, November 02, 2012)



Antibodies that attack the influenza virus attack one of its proteins called haemagglutinin, which is a trimer, or a three molecule group with a stem. Specifically, most antibodies attack the head of the protein, which mutates as protection for the virus from antibodies. Recently, a small research group in Bellinzona, Switzerland, the Institute of Research in Biomedicine (IRB), has discovered a super antibody that attacks the stem instead, making it universal against all strains of influenza A. The technology to produce this antibody has been licensed to Humabs BioMed SA, a spin-off of the IRB which is developing it for a preclinical trial and then for sale to a large pharmaceutical company.
http://swissinnovation.org/news/web/2012/03-121102-97.html

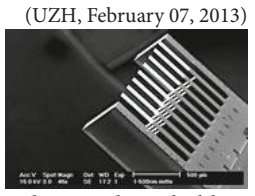
Improved Plant Disease Resistance

(UZH, November 02, 2012)

Diseases on food crops threaten our food supply and especially affect small farmers in developing countries who can't afford pesticides. Researchers at the University of Zurich have obtained a grant from the Bill and Melinda Gates Foundation to increase disease resistance in rice and millet by reproducing the resistance found in wheat plants. A specific gene in wheat has mutated to give the species resistance to fungal diseases. Rice and millet have the same gene, albeit without the beneficial mutation. The goal of the project will be to bring the improved gene from wheat to rice and millet and then deliver the improvements to farmers.
http://swissinnovation.org/news/web/2012/03-121102-22.html

Key Melanoma Gene Discovered

(UZH, February 07, 2013)



Despite intensive research into this disease that affects mainly light-skinned people in industrialized countries, no effective therapy is currently available for advanced-stage black skin cancer. Now new therapeutic opportunities have opened up. Olga Shakhova, a postdoctoral student at the University of Zurich's Institute of Anatomy, has been awarded the *2013 Pfizer Research prize* for identifying the Sox10 gene underlying black skin cancer. Collaboration between researchers and clinicians has revealed that tumors are a mix of harmful cancer stem cells and less aggressive tumor cells. Promising therapy should target primarily the cancer stem cells, particularly the Sox10 gene that controls their cell division and survival. Switching this gene off in mice prevents the formation and spread of melanoma.
http://swissinnovation.org/news/web/2013/03-130207-26.html

Protein Activity Monitored in Living Cells

(EPFL, January 07, 2013)

For the first time, scientists have used a near-infrared, light-sensitive biocompatible molecule to mark and observe the activity of proteins inside living cells. Proteins are the building blocks of all life, responsible for innumerable functions in cells, including communication, structural maintenance and mobility. But they're quite difficult to study. One method is to observe their distribution and work they do inside living cells. Now EPFL scientists have used a molecule that can easily penetrate the cell membrane, dock to proteins and then be visualized when exposed to near-infrared light. This development will make it possible to probe living tissues without damaging them and will reveal, in real time, the biochemical processes that are taking place.
http://swissinnovation.org/news/web/2013/03-130107-07.html

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New Biotechnology Facility by Novartis in Singapore

(Novartis, October 31, 2012)

Novartis announced today the construction of a new state-of-the-art biotechnology production site in Singapore with an investment valued at over USD 500 million. The new facility will focus on drug production based on cell culture technology. It will be co-located with the pharmaceutical production site based in Tuas, Singapore. In the future, Singapore is expected to be a technological competence center for both biotechnology and pharmaceutical manufacturing at Novartis. The investment decision underlines the long-term strategy of Novartis to establish a worldwide manufacturing network of technology centers of excellence.
http://swissinnovation.org/news/web/2012/03-121031-fc.html

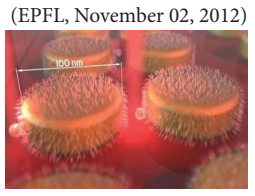
An Encyclopedia of Human Genetic Variation

(UNIGE, October 31, 2012)

The "1000 Genomes" is the first large-scale project which has enabled the sequencing of 1092 human genomes in patients worldwide. After several years of work, researchers have finally developed a genetic database of reference that will enable the scientific community to study rare genetic variants responsible for diseases such as cancer, cardiovascular diseases, the diabetes or multiple sclerosis. The project brought together nearly a hundred institutions, including the University of Geneva (UNIGE), who worked together to sequence human genes. The database that results will allow researchers to interpret genetic mutations in patients with diseases, by country. This is the largest study ever conducted on individuals from 14 populations in Europe, America, East Asia and Africa.
http://swissinnovation.org/news/web/2012/03-121031-cb.html

Early Cancer Detection

(EPFL, November 02, 2012)



It may soon be possible to test a person for cancer with just a drop of blood and a small device. As part of a European research project, scientists have developed a device for detecting the HSP70 protein, which is over-expressed in patients with many types of cancer. The objective is to make an early stage diagnosis possible, thereby improving outcomes for patients. As part of the "Spedoc" European Research Project, an EPFL team is developing an extremely sensitive, easy-to-use HSP70 detection platform. The device, which will be no bigger than a small suitcase, is expected to be on the market in 2014.
http://swissinnovation.org/news/web/2012/03-121102-4d.html

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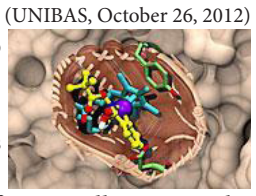
Artificial Metallic Enzyme

(UNIBAS, October 26, 2012)



Enzymes are nature's catalysts, helping to accelerate many different kinds of reactions. However, synthesizing them artificially is a difficult tasks that researchers at the University of Basel have been undertaking. They successfully created the first metallic enzyme by combining a streptavidin-biotin protein with a rhodium fragment, and exchanging two amino acids in the protein. Not only does this enzyme accelerate a reaction better than any naturally occurring catalyst, it is also more selective, leading to greater efficiency.
http://swissinnovation.org/news/web/2012/03-121026-ea.html

EPFL and Harvard Join Forces to Diagnose Hearing Loss

(EPFL, October 17, 2012)

Researchers at EPFL and Harvard Medical School have joined forces to develop an imaging technique that can provide in situ observations of the internal ear, an area which has until now been inaccessible. This may finally make it possible to understand the mechanisms underlying hearing loss. The team's new optical method is groundbreaking in that it provides extremely clear images of inner ear tissue without any need for fluorescent labeling of the cells with antibiotics, proteins and other fluorescent markers that are usually used to "color" the targeted cells.
http://swissinnovation.org/news/web/2012/03-121017-f4.html

Multiple Biochemical Analyses on a Single Device

(EPFL, September 24, 2012)

Scientists at EPFL and the University of Geneva have developed a microfluidic device smaller than a domino that can simultaneously measure up to 768 biomolecular interactions. In traditional methods, it is generally possible to determine if an interaction takes place or not. The new device goes much further, because it can measure the affinity and kinetics of the interaction. The strength of the device lies in a sort of "push-button" in its microreactors. The push-button is activated at regular intervals of a few milliseconds, trapping protein-DNA complexes that form on the surface of the device. In addition to that, it can also be used to synthesize proteins in vitro, with a massive reduction in time and number of manipulations compared to the traditional method.
http://swissinnovation.org/news/web/2012/03-120924-29.html

First Mammalian "Cell Phone"

(ETH Zurich, September 17, 2012)

Researchers from ETH Zurich have quite literally created a "cell phone": they have reprogrammed mammalian cells in such a way that they can "phone" each other via chemical signals. The researchers used suitable signal molecules and constructed "devices" out of biological components that receive, process and respond accordingly to the signals. The devices consist of suitable genes and their products, proteins, which are linked to each other logically. Although other scientists have already developed synthetic communication networks for bacteria and yeast cells, it is the first network for mammalian cells as this cell type is far more complex.
http://swissinnovation.org/news/web/2012/03-120917-ce.html

Roche Ranks First in Sustainability Index

(Roche, September 13, 2012)

Roche took the first place for the healthcare industry in the *Dow Jones sustainability index* for the fourth time in a row. The index rates enterprises on the basis of their ecologic, social and economic development. The basis of this evaluation were the recent strategic decisions of Roche, such as the focus on medical innovation and personalized medicine as well as the programs for the development of future executives and the decision to have special pricing strategies for developing companies.
http://swissinnovation.org/news/web/2012/03-120913-7f.html

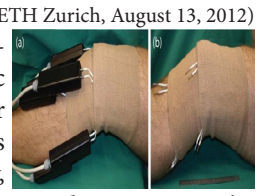
Artificial Genetic Code

(UNIGE, August 20, 2012)

Professor Matile at the University of Geneva wants to change how organic chemists synthesize molecules. Rather than building them one atom at a time, he wants to encode a structure like DNA, but in two dimensions, with instructions to build the molecule. As an initial test, Matile wants to build organic solar cells that mimic photosynthetic processes. He realizes that the proposed effort is difficult and very theoretical, but he hopes to introduce a new tool to the organic chemistry community.
http://swissinnovation.org/news/web/2012/03-120820-0d.html

First Wearable Detector for MRI

(ETH Zurich, August 13, 2012)



Scientists from ETH Zurich have developed the first elastic detector for magnetic resonance imaging (MRI). The detector in the form of an elastic bandage moulds itself to the shape of the patient's body, which also enables body parts to be examined in motion. The novel detector provides better images and greater patient comfort during the scan. In the latest prototypes the magnetic field is allowed to wobble thanks to measurement and control technology that handles even substantial field fluctuations. It should also be possible to examine body parts in motion, which is important to discern what the kneecap does while bending or whether the meniscus is torn partially or fully, for instance.
http://swissinnovation.org/news/web/2012/03-120813-01.html

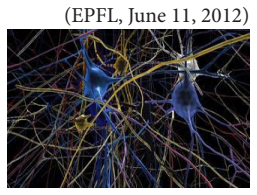
Three-Dimensional Cell Culture

(EPFL, June 25, 2012)

EPFL spinoff *QGel* is developing a new three-dimensional cell culture that is an improvement of traditional petri dishes. The system allows three-dimensional effects to be studied. For example, tumors become deprived of oxygen as they grow in three dimensions. The gel used in the system emulates an extracellular matrix, creating conditions similar to those seen by in vivo cells. It provides a realistic enough environment that the system can be used to replace in vivo experiments with in vitro ones. Lastly, the cell culture system is easily used with robots, allowing for quick large-scale tests.
http://swissinnovation.org/news/web/2012/03-120625-f0.html

Neuroscience Center

(EPFL, June 11, 2012)



EPFL and the universities of Lausanne and Geneva, together with the financial support of their respective cantons, the Swiss Confederation, and Rolex, are launching a new project named NEUROPOLIS, which aims to promote neuroscience research in the region. Two research centers will be built; one in Lausanne and one in Geneva. They will include areas for the general public interest to make neuroscience accessible. The Geneva center will house the new Institute of Translational Molecular Imaging. The three host universities are already home to several neuroscience research projects.
http://swissinnovation.org/news/web/2012/03-120611-f5.html

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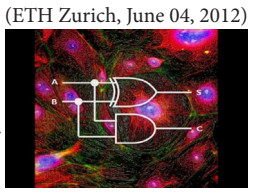
Cellular Calculator

(ETH Zurich, June 04, 2012)



Researchers at ETH Zurich were able to create a cellular calculator using a complex genetic network in a mammalian cell. They created a biological version of an AND gate, which is a common component in electronic circuitry and which allows for performing basic mathematical operations. The logic gate takes the apple molecule phloretin and antibiotic erythromycin as input signals and generates an output if both inputs are present. In the future, such a mechanism could be used for smart therapeutic treatments that monitor cell metabolism for diseases and release treatment substances. At the time, this research is still new and needs much more development to reach such an advanced stage.
http://swissinnovation.org/news/web/2012/03-120604-63.html

Recovery After Spinal Cord Injury

(EPFL, May 31, 2012)

Scientists managed to wake up a dormant spinal column and restore voluntary lower body movement when stimulated. Rats with spinal cord injuries and severe paralysis are now walking (and running) thanks to researchers at EPFL. Published in the journal Science, the results show that a severed section of the spinal cord can make a comeback when its own innate intelligence and regenerative capacity is awakened. The study, begun five years ago at the University of Zurich, points to a profound change in our understanding of the central nervous system. According to lead author Grégoire Courtine, it is yet unclear if similar rehabilitation techniques could work for humans, but the observed nerve growth hints at new methods for treating paralysis.
http://swissinnovation.org/news/web/2012/03-120531-c8.html

Innovative Parasite Treatment

(UNIBAS, May 10, 2012)

Swiss researchers received a grant from the Bill and Melinda Gates Foundation to study an innovative treatment against trypanosomes, parasites that cause African sleeping sickness. When in the human bloodstream, this parasite protects itself with a shell of glycoproteins. It sheds the protection only when entering the Tsetse fly. The proposed treatment method tricks the parasite into shedding its protection while still in the human bloodstream, thus allowing the immune system to respond appropriately. Around 100,000 substances will be tested as triggers to make the parasite shed its protection.
http://swissinnovation.org/news/web/2012/03-120510-0b.html

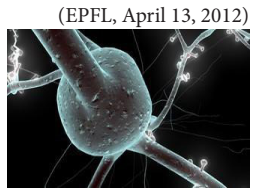
Enzyme-Sensing Paper

(ETH Zurich, May 07, 2012)

Researchers at ETH Zurich have invented a new type of nanocomposite paper made of layers of graphene and protein fibrils. The paper, made of alternating layers of the two substances, is made using vacuum filtration. Graphene is electrically conductive and hydrophobic, while protein fibrils are hydrophilic and can be digested by enzymes. These properties allows the material to have shape memory effects and to be used to measure enzyme activity. In the latter case, protein breakdown by enzymes changes the electrical conductivity of the material, which can be measured in a circuit.
http://swissinnovation.org/news/web/2012/03-120507-95.html

Predictive Neuroscience

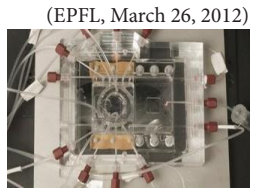
(EPFL, April 13, 2012)



Researchers at EPFL have discovered rules that relate the genes that a neuron switches on and off to the shape of that neuron, its electrical properties and its location in the brain. The discovery, using state-of-the-art informatics tools, increases the likelihood that it will be possible to predict much of the fundamental structure and function of the brain without having to measure every aspect of it. By combining a classification scheme based on the neuron's morphology, its electrophysiological properties and its position within the brain with a limited set of genetic data relating to ion channels, the scientists were able to predict the ion channel pattern of the neurons with high accuracy.
http://swissinnovation.org/news/web/2012/03-120413-2f.html

Artificial Intestine Analyzes Food Quality

(EPFL, March 26, 2012)



EPFL researchers have developed a miniature on-chip gastrointestinal tract in order to observe the effects of various nutrients on health. The NutriChip is a miniature artificial intestinal wall that can be used to identify foods that cause inflammation in the human body. Once a given food has been digested and absorbed by the intestine, it carries certain molecules into the body. These molecules trigger an immune response, in the form of slight, temporary inflammation. This is a normal phenomenon, but it must be monitored because it can set the stage for inflammatory chronic illnesses. The NutriChip compares different foods in terms of their ability to lower the concentrations of inflammation biomarkers.
http://swissinnovation.org/news/web/2012/03-120326-9b.html

New Virtual Molecule Modification

(ETH Zurich, March 16, 2012)

New software developed by ETH Zurich researchers has learned important rules of chemistry. Whereas in the past chemists carried out a computer-aided active ingredient search, mainly by combing through data bases containing a limited number of candidate molecules to find which of them was most suitable, ETH Zurich researchers led by Gisbert Schneider, Professor at the Institute of Pharmaceutical Sciences, are now going one step further: they have developed a program that has memorized important rules of organic chemistry and can use it to build new active ingredient molecules from first principles. The researchers call it "de-novo design". Schneider's computer program can assemble and modify molecules virtually on the modular principle and can compare them with existing molecules to calculate how well they fulfill the conditions defined by the researchers.
http://swissinnovation.org/news/web/2012/03-120316-0e.html

Microdrop Printing of Hydrogel Bioinks into 3D Tissue-Like Geometries

(EPFL, January 12, 2012)

The group of Prof. Juergen Brugger demonstrates an optimized 3D inkjet printing process for structuring alginate into a tissue-like microvasculature, capable of supporting physiological flow rates. Optimizing the reaction at the single-droplet level enables wet hydrogel droplets to be stacked, thus overcoming their natural tendancy to spread and coalesce. Live cells can be patterned using this process and it can be extended to a range of other hydrogels.
http://swissinnovation.org/news/web/2012/03-120112-88.html

Wireless Body Sensor Network to Monitor Heart

(EPFL, October 19, 2011)

Researchers at EPFL have developed a new device that helps detect the onset of cardiac anomalies at a very early stage. High-precision body sensors applied to the skin, a radio module and a chip that's optimized for analyzing and processing biological signals form a wireless body sensor network (WBSN) that consumes very little electricity. Connected to a wireless network, it monitors users' heart rates remotely and in real time. By means of complex algorithms, anomalies can be detected and analyzed. When a problem is detected, information is sent to the user's smartphone, then by text message or e-mail to medical professionals, who can intervene if necessary. It has batteries that can last for 3-4 weeks.
http://swissinnovation.org/news/web/2011/03-111019-5d.html