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The 8th Taiwan-Swiss Biomedical Symposium, organized by Novartis Taiwan in conjunction with Academia Sinica and the National Health Research Institutes (NHRI), with guidance provided by the Science & Technology Advisory Group of the Executive Yuan, was held in Taipei on 10 September, with the aim to provide opportunities for biomedical industry cooperation between Switzerland and Taiwan. The topic for this year focused on translational medicine with the Novartis delegation from around the world assembling top translational medicine scientists from Novartis Institute for BioMedical Research (NIBR), Academia Sinica and other research institutes to seek the opportunities for mutual collaboration. Further, the Switzerland-based Novartis Venture Funds, an arm of Novartis International AG, has been seeking investment targets in Taiwan to invest US\$15 million and US\$20 million per company in the biotechnology sector. Five short-listed local companies (two for cancer drugs, one for diagnostic medical devices, one for medical equipment and the other as a research institute) were recommended by the Institute for Biotechnology and Medicine Industry. The funding company is looking for biomedical firms that can leverage the highly developed information technology industry in Taiwan. Before making a final investment, Novartis will form a research team to look at the potential targets and local partners. Cooperation between Novartis and Taiwanese entities have been strong over recent years, not only with this annual symposium as an example, but also with an annual 'Bio Leadership Camp' held in Taipei for the development of young leadership talent, a research fellowship program designed to help nurture local researchers, and a considerable number of clinical trials at local hospitals.

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## 1. Mushroom fighting-cancer found

(Taipei Times, 02 09 2013)

Scientists at Academia Sinica said they have cracked the mystery of how polysaccharides in the reishi mushroom act to activate the human immune system and fight against cancer, and have shared their discovery with the world. A research team headed by Academia Sinica President Wong Chi-huey and assistant research fellow Wu Chung-yi has proven that a crude extract of fucose-containing polysaccharides from reishi mushrooms named F3, can induce antibodies to recognize tumor-associated carbohydrate antigens on cancer cells and kill them.



赤芝  
(*Ganoderma lucidum*)

According to Academia Sinica, the nation's top academic research institute, the research on reishi polysaccharides' cancer-fighting effects was started by a group headed by National Yang-Ming University professor Hsu Hsien-yeh, which injected F3 into mice with lung cancer and discovered that the extract could slow tumor growth, although it did not know how the mechanism worked.

Thanks to a glycan array — a sample-screening method — designed by the Wong-Wu team, it was found that sera from mice immunized with F3 contained the antibodies that recognize the tumor antigens known as Globo H, as well as related structures. Moreover, the researchers also found that inhibition of tumor growth is directly related to the amount of these types of antibodies. In other words, the larger the amount of Globo H-recognizing antibodies, the smaller the tumor, Academia Sinica said. The team then separated F3 into a fucose-enriched extract called FMS for immunization and found that FMS can induce even more anti-Globo H antibodies and thus, more effectively inhibit tumor growth.

The study further demonstrated that the fucose residue is the key to the reishi mushroom's cancer-fighting ability, proven by the finding that the cancer-fighting activity was reduced dramatically when the fucose residue was removed. With assistance from other research teams, the effective structures of the fucose-containing saccharides were elucidated. The Wong-Wu team established the molecular mechanism of reishi polysaccharides with regard to their cancer-fighting activity. The results were published in the current issue of the US journal Proceedings of the National Academy of Sciences, under the title: "Immunization of fucose-containing polysaccharides from reishi mushroom induces antibodies to tumor-associated Globo H-series epitopes." The first authors of the paper are named as Liao Shih-fen, a doctoral student at the Institute of Biochemical Sciences of National Taiwan University, and Liang Chi-hui, who is conducting post-doctoral research at the Genomics Research Center of Academia Sinica.

<http://www.taipeitimes.com/News/taiwan/archives/2013/09/02/2003571168>

## 2. Tamkang University grabs three golds in FIRA robot event

(Central News Agency, 03 09 2013)

Tamkang University said that a team from the university garnered three gold medals in a robot competition in Malaysia last month. In the FIRA Roboworld 2103, held in Kuala Lumpur Aug. 24-29, the Tamkang team grabbed two gold medals, one silver and one bronze in the Robot Soccer (Robosot) category, and another gold in the Humanoid Tournament (HuroCup) category. The robots are equipped with high-speed cameras and hardware controls and operated by the team members, said Wong Ching-chang, a leader of the Tamkang team. Like regular soccer, robot-soccer has well-defined game rules. The FIRA Cup event is organized into several categories, including the Robosot, the Micro-Robot Soccer Tournament (MiroSot) and the HuroCup. The games are played under the watchful eyes of a human referee and the human participants, who are the robot players' managers and trainers.

<http://focustaiwan.tw/news/asoc/201309030025.aspx>

## 3. NTU team finds potential cancer killer

(United Daily News, 13 09 2013)

National Taiwan University researchers have helped unravel the mystery of the role proteolysis-inducing factor, Pif1, plays in cell DNA replication, which could lead to methods for preventing the growth of cancer cells. Associate professor Chi Hung-yuan of College of Life Science at NTU's Institute of Biochemical Sciences and his international team found that inhibition of the action of Pif1, which stimulates DNA synthesis during homologous and crossover recombinations, stops cancer cell replication, making cells die off naturally. The research was reported in the Sept. 11 issue of prestigious international science journal Nature. Healthy and cancerous cells both rely on Pif1 for repair. Foreign researchers have already found that injection of Pif1 inhibitors into breast cancer cell strains leads to a



10-fold reduction in cell growth. "Radiation and environmental pollutants can cause DNA double-strand breaks," Chi said. "Diseases can occur if the breakages are not repaired and the cells do not die. Pif1 plays an important role in gene repair, and this natural recovery mechanism allows life to continue." Researchers have long known that cells contain Pif1, but did not know what role it played in gene repair. An unusual aspect of the research is that it was conducted on yeast. Mice, frogs and yeast cells all contain Pif1, Chi said, but whereas it can take two years to conduct such experiments in mice, they can be done in two days on yeast, making it an ideal subject. The team spent more than a month conducting experiments on 13 proteins containing Pif1 in a lab cooled to 4 C. NTU President Yang Pan-chyr said the next stage will be clinical trials to determine what types of cancer are susceptible to treatment by Pif1 inhibitors.

<http://www.taiwantoday.tw/ct.asp?xItem=209610&ctNode=445>

#### **4. Taiwanese research team devises new needle for epidurals**

(Taipei Times, 19 09 2013)

A research team from National Yang Ming University and Taipei Veterans General Hospital introduced an invention they said would help increase the accuracy and safety of epidural anesthesia — an epidural needle with a high-frequency ultrasound transducer embedded in it. The leader of the National Science Council-funded project — Chiang Hui-hua, a professor at the university's Department of Biomedical Engineering — said epidural anesthesia is often used to reduce pain in labor, for lower body surgery and for postoperative pain relief. Epidural anesthesia is used in about 40,000 deliveries in Taiwan and million of deliveries worldwide annually, she said, adding that the team believes its invention can improve the process of giving epidurals, helping both anesthetists and less-experienced doctors. An epidural is given by inserting a long epidural needle through the bones in a patient's spine, through the ligaments and into the epidural space. A lumbar epidural catheter is then inserted into the body to deliver the anesthesia. Anesthetists and doctors have traditionally located the epidural space, which is only about 2mm to 7mm thick, by manual touch. "It [the procedure] has been described as piercing through darkness," she said, adding that anesthetists and doctors sometimes have difficulty finding the epidural space accurately because of the physical differences in people's bodies. Ting Chien-kun, an anesthesiologist at the hospital, said the risk of failure in giving an epidural is not particularly high, but in about 1 percent to 3 percent of the cases, the epidural needle goes in too far, causing cerebrospinal fluid leak out into the epidural space, which can cause a post-dural puncture headache. Describing their creation as the "eyes of the needle," the team said the invention can help practitioners determine the location of the needle by monitoring signals emitted by the transducer. Having conducted tests on pigs, the team hopes the new needle can be used in human clinical trials as soon as next year, after they are granted a patent for it.

<http://www.taipeitimes.com/News/taiwan/archives/2013/09/19/2003572512>

#### **5. 1st PV ammonia test lab opens in Taiwan**

(Taiwan Today, 24 09 2013)

Taiwan's first testing laboratory for photovoltaic equipment's resistance to ammonia corrosion, constructed by Taipei City-based Industrial Technology Research Institute, has become operational, ROC Ministry of Economic Affairs said Sept. 23. The system will help local PV manufacturers ensure their products conform to the latest EU regulations, expedite certification, reduce costs for testing and boost sales in overseas markets, an MOEA official said. PV installations are becoming more widespread globally under the drive to reduce carbon emissions and they are often installed on agricultural land, boosting farmers' earnings and land utilization, the official said. But livestock and their waste produce a good deal of ammonia, which has a corrosive effect on the non-metallic components of PV installations, affecting their operational efficiency and life expectancy. The EU tests PV equipment's resilience to ammonia emissions, with new guidelines issued in June in line with the International Electrotechnical Commission's latest IEC 627160 standard, the MOEA added. In view of global trends toward stricter standards, the MOEA Bureau of Energy commissioned ITRI to build the testing laboratory to the standards of U.S.-based National Renewable Energy Laboratory, Japan-based National Institute of Advanced Industrial Science and Technology, and Germany-based Fraunhofer Institute for Solar Energy Systems. The facility has been recognized by the Certification Body Test Laboratory of the IEC. Local testing to international standards allows manufacturers to avoid the time and expense of sending equipment to laboratories abroad, making their products more competitive, a BOE official said. The system is has certified domestically produced PV units to IEC 62716 standard, allowing manufacturers to smoothly enter the European market. The bureau is continuing to develop a range of PV equipment testing facilities to bring local products in line with IEC safety, performance and reliability standards with one-stop testing, the official said, adding that the system has already provided more than 232 testing equipment evaluations and product tests.

<http://www.taiwantoday.tw/ct.asp?xItem=209853&ctNode=445>



## 6. ROC private sector R&D hits record high in 2012

(Taiwan Today, 24 09 2013)

R&D spending by Taiwan's private sector increased 6.46 percent to an all-time high of NT\$324.5 billion (US\$10.96 billion) in 2012, a key factor in sustaining local technology prowess. National Science Council statistics released Sept. 23 showed that private sector R&D budgets accounted for 75.24 percent of the nation's total, also the highest on record. "Despite challenging conditions at home and abroad, Taiwan firms continue to invest heavily in R&D to ensure their global leadership," an NSC official said. "The government will keep mapping out policy measures and creating an environment conducive to promoting private efforts in this regard." According to the NSC, the local electronic component and part sector invested \$154.5 billion in R&D activities last year, or 48 percent of the private sector's total expenditure. Computers, electronics and photovoltaic sectors contributed an additional 25 percent. But spending by the public sector, which was impacted by tighter government budgets, inched down 1.57 percent year on year to NT\$106.8 billion, marking the third decline in a row since 2009. The public R&D weighting of 24.76 percent was also a record low. Total R&D spending as a percentage of Taiwan's gross domestic product was a high point, reaching 3.07 percent last year, a gain of 0.05 of a percentage point from 2011. According to the NSC, local researchers published 26,360 and 20,729 papers on journals covered by the Science Citation Index and Engineering Index, respectively, making Taiwan the world's 16th and 11th most productive countries in these areas. In addition, the NSC said the number of patents granted by the U.S. Patent and Trademark Office to Taiwan individuals and organizations reached 10,646, the fifth highest in the world.

<http://www.taiwantoday.tw/ct.asp?xItem=209850&ctNode=445>

## 7. Quake center launched in eastern Taiwan

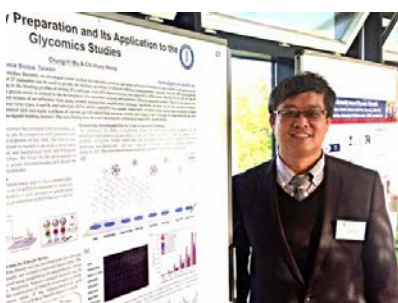
(Taiwan Today, 25 09 2013)

The Eastern Taiwan Earthquake Research Center was inaugurated Sept. 24 at Hualien County-based National Dong Hwa University, highlighting government efforts to strengthen disaster prevention and response capabilities. The E-TEC was established in cooperation with the Central Weather Bureau, National Center for Research on Earthquake Engineering and Central Geological Survey under the Ministry of Economic Affairs. National Science Council Deputy Minister Mou Chung-yuan said eastern Taiwan is a good location for an earthquake research facility as frequent temblors are most common in the East Taiwan rift valley. The center can collect intensive real-time data and strengthen monitoring mechanisms and research on the region's seismic activity. To boost the ability to predict earthquakes, the center contains the nation's first laboratory devoted to studying quake precursors. The station also serves as a regional center for data collection, early warning and disaster prevention education. According to E-TEC director Chang Wen-yen, the quake-prone region will give researchers abundant material to work on. The study of precursors will focus on eight predictors, including measurements of the ionosphere, groundwater studies, and geoelectric fields. Anomalies will be recorded as reference material and shared with research labs in the rest of the country. It is hoped that an overall picture will eventually emerge to make the prediction of temblors possible, Chang said. "Earthquake prediction is very hard," NDHU President Wu Maw-kuen said. "So far no reliable theory or system has been established. Eastern Taiwan is the focal point of the collision between the Philippine Sea and Eurasian tectonic plates and highly suited to monitoring. The NSC has established many recording stations over the years and collation of the data can give researchers a much deeper understanding of seismic issues and develop early warning measures." In the wake of the magnitude-7.3 temblor that struck Nantou in central Taiwan Sept. 21, 1999, Taiwan has invested a lot of money and resources in seismic research, the NSC said. The Taiwan Earthquake Research Center at Academia Sinica in Taipei City has been operation for more than a decade, and nationwide monitoring networks have been in place. Foreign institutions from Europe, Japan, the U.S. and mainland China have already expressed an interest in establishing cooperative research projects with the E-TEC, hoping to use the East Taiwan rift valley as a natural laboratory to deepen understanding of quakes and tsunamis, the NSC said.

<http://www.taiwantoday.tw/ct.asp?xItem=209875&ctNode=445>

## 8. Taiwanese scholar wins American Chemical Society award

(Central News Agency, 26 09 2013)



An associate research fellow at Academia Sinica has won an award sponsored by the American Chemical Society (ACS) to honor outstanding young carbohydrate scientists, the prestigious academic institution announced. Wu Chung-yi, who works at the institution's Genomics Research Center, has been elected winner of the 2014 David Y. Gin New Investigator Award, Academia Sinica said in a statement. The award was established by the ACS's Division of Carbohydrate Chemistry in 2003 to "recognize a younger carbohydrate scientist who has demonstrated excellence in the field and



shows promise continuing to make quality contributions to carbohydrate chemistry and biochemistry," the statement said. Candidates for the award must be in their first seven years of an independent career. Wu, the first Taiwanese academic ever to receive the award, has dedicated himself to research into the development of novel and efficient methodologies for the preparation of biologically potent oligosaccharides, including designing new sugar arrays to address oligosaccharide bio-function, Academia Sinica said. Oligosaccharides, which are carbohydrates composed of a small number of simple sugars, are being investigated by several groups at Academia Sinica for potential use in carbohydrate-based vaccines. Wu started his primary investigation career as an assistant researcher in the Genomics Research Center in 2006.

<http://focustaiwan.tw/news/ast/201309260009.aspx>

## 9. Taiwan gears up for biotech promotion

(Taiwan Today, 26 09 2013)

The ROC government will create five to 10 business models for Taiwan-based biotech firms to adopt over the next three years as part of plans for the sector's global expansion. "Biotech is one of Taiwan's six designated emerging industries that are expected to shape the future of the country's industrial landscape," ROC Premier Jiang Yi-huah said Sept. 25. "All relevant agencies have been instructed to assist in expanding the sector's output and strengthening its international competitiveness. These efforts will also help promote smart and healthy living for the country's citizens." Jiang's remarks follow a briefing by Minister without Portfolio Chang Shan-cheng on implementation results to date of a biotech promotion project launched in 2009. Chang Chia-juch, minister of economic affairs, Chiu Wen-ta, minister of health and welfare, Cyrus C.Y. Chu, minister of the National Science Council and Chen Chien-liang, deputy minister of the Council for Economic Planning and Development, also outlined their respective policy measures at the briefing. According to the premier, the first stage of the initiative, implemented between 2009 and 2012, saw Taiwan's biotech and pharmaceutical sector double its output to more than NT\$260 billion (US\$8.78 billion). "Beginning 2013, the second stage of the project is turning out products, services and business models focusing on the development of new medicine, medical devices and innovative management services," Jiang said. As part of this undertaking, construction of the national biotech research park in Taipei City under the auspices of Academia Sinica is expected to begin by the end of the year. Once operational, the facility will become a key incubator for the country's pharmaceutical R&D. Taiwan's medical device sector is also on the growth track, Jiang said. Official statistics showed sector sales growing 10 percent to NT\$109.2 billion in 2012, with blood sugar glucose meters, contact lenses and mobility equipment for the disabled main earners. Exports also grew 10 percent to NT\$46 billion. "The government will coordinate public and private sector resources to develop Taiwan into a major exporter of turnkey solutions in medical management services," the premier said, adding that the MOHW is set to launch a national sector promotion office Oct. 3. Given Taiwan's advanced medical technology and quality services, the premier expects the output of such top-end offerings to reach NT\$6 billion to NT\$10 billion per year.



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