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A breakthrough development of LED bulbs was reported by Taiwan's Industrial Technology Research Institute (ITRI). The newly developed bulb has great potential to change the current market of energy-efficient bulbs with its half weight of a normal LED bulb. Academia Sinica, the nation's top research institute, has also identified cancer-initiating cells in KRASG12D mutant gene-induced lung adenocarcinoma, which could contribute to the search for lung cancer treatments. Moreover, the Centers for Disease Control has developed a new enterovirus 71 (EV71) screening reagent to receive the result immediately without an additional process of sending to an outside laboratory to get the result.

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## 1. Lung cancer study makes gain

(Taipei Times, 03 01 2012)

A research team in Taiwan has identified cancer-initiating cells in KRASG12D mutant gene-induced lung adenocarcinoma, one of the most common types of lung cancer, which may contribute to the search for lung cancer treatments, Academia Sinica, the nation's top research institute, said. The institute said lung cancer is the leading cause of cancer-related mortality worldwide and is also one of the most commonly diagnosed malignancies in developed countries, as well as a growing problem in developing countries. About 41,000 people died of cancer in Taiwan last year, 20 % of which were of lung cancer, the institute said, adding that lung cancer has been the leading cause of cancer-related deaths for Taiwanese women over the past 20 years. The research from a team led by John Yu, a distinguished research fellow at Academia Sinica's Institute of Cellular and Organismic Biology, was published in the journal *Cancer Research* last month.

The team said there are two common types of lung cancer — small-cell lung cancer (15 % of cases) and non-small-cell lung cancer (85 %) — and the medical field has found that the mutation on the KRAS oncogene's codon 12 (the 12th codon set on the gene) was found in 30 % of the non-small-cell lung cancer cases. The team established a new model of lung cancer in mice that enabled them to control the KRASG12D gene with a "molecular switch," which can turn the cancer gene on and off and thereby control the formation and progression of lung cancer. Team member Cho Huan-chieh, a doctoral student from the Graduate Institute of Microbiology and Immunology at National Yang-Ming University, used the model to identify the specific cell types from which non-small-cell lung cancer originates. The team discovered that most malignant tumors arose from bronchiolar Clara cells and that they have attributes consistent with cancer-initiating cells, in that the tumor not only renews itself, but can also differentiate into heterogeneous tissue types. Yu said tumors of bronchiolar origin are more malignant because the tumor cells can upregulate genes that activate cell growth and downregulate genes that inhibit cell growth, therefore bronchiolar cells are likely to be the origin of malignant lung cancers. Academia Sinica said the findings could contribute to the development of new methods to detect lung cancer in humans earlier and treat them more effectively.

<http://www.taipetimes.com/News/taiwan/archives/2012/01/03/2003522299>

[http://focustaiwan.tw/ShowNews/WebNews\\_Detail.aspx?Type=aTPS&ID=201201090021](http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aTPS&ID=201201090021)

## 2. Research center on pioneering power supply systems unveiled

(Central News Agency, 04 01 2012)

National Taiwan University of Science and Technology (NTUST) launched a research center on its campus Wednesday with the aim of developing pioneering power supply systems. In collaboration with LiteOn Technology Corp., one of the world's top three power supply manufacturers, the LiteOn and NTUST Power Electronics Center (LNPEC) will be a win-win development for both the two parties and the power supply industry, said the center's director, Lo Yu-kang, on the sidelines of a ceremony to unveil the facility. The center will carry out R&D in power supply systems with "low cost and high efficiency," including next-generation power conversion techniques, high performance server power and renewable energy power conversion. But it will mainly target intelligent power node management that can be applied to the power supply for cloud computing data centers, Lo added. "This is also a great opportunity for the students to gain some on-the-job experience," he said, adding that LiteOn will assign several veteran engineers to cooperate with them, in addition to providing annual investment of NT\$10 mio. Expecting to have commercial products ready for the market within two years, the company said it hopes to use this research center to cement or even boost its leading position in power supply technology, said Brady Jung, senior director of LiteOn's Product Competence Center. If the center works well, Jung said, his company will consider establishing similar research centers with National Taipei University of Technology in Taipei and National Cheng Kung University in southern Taiwan. Asked if the company's power supply technology could be of help to a cloud computing data center being planned by Rhythm & Hues Studios Inc., Chunghwa Telecom Co. and Quanta Computer Inc., Jung did not answer directly, but said without elaboration that Quanta is a client. Quanta is the world's largest notebook computer ODM service supplier.

[http://focustaiwan.tw/ShowNews/WebNews\\_Detail.aspx?Type=aALL&ID=201201040026](http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aALL&ID=201201040026)

## 3. ZBRK1 Acts as a Metastatic Suppressor by Directly Regulating MMP9 in Cervical Cancer

(NCKU Research Express, 09 01 2012)

Cancer metastasis is the most common cause of death among cancer patients. It results from several highly organized sequential steps involving interactions between cancer cells and the host. However, details of candidate genes involved in other aspects of cancer metastasis/invasion processes remain less investigated. Precisely how



tumor cells become metastatic is still largely unknown, especially in terms of a transcriptional factor that serves as a repressor in metastasis/invasion.

Zinc finger and BRCA1-interacting protein with KRAB domain-1 (ZBRK1), which was first identified in a yeast two-hybrid screening for proteins associated with BRCA1. Two corepressors of RING members, BRCA1 and KAP1, were shown to interact with ZBRK1 in coordinating transcriptional regulation of diverse DNA damage response genes. Recently, ZBRK1 has been identified as cooperating with the CtIP/BRCA1 to repress angiopoietin-1 (ANG1) gene activation and may play a role in tumor angiogenesis, implying that it may act as a potential tumor suppressor. However, whether ZBRK1 plays a direct role in tumor progression, especially in metastasis, has yet to be shown.

A research team from the Institute of Biosignal transduction, College of Bioscience and Biotechnology, National Cheng Kung University, found that reduction of ZBRK1 expression was observed in highly malignant cervical cancer cells compared with the counterpart normal tissue. Increase of ZBRK1 expression in HeLa cells significantly inhibits its neoplastic phenotypes. It is first to report on this significant discovery in cervical cancer cells. The findings suggest that a reduction of ZBRK1 allows the growth of cancer cells, whereas an increase of ZBRK1 has been shown to inhibit cell growth both in vitro and in vivo, suggesting that ZBRK1 can act as a tumor suppressor. Interestingly, analyses of gene expression patterns of these cells revealed groups of genes not only critical for cell proliferation but also for cell motility being downregulated. Furthermore, exogenous expression of ZBRK1 inhibits HeLa cell migration, in part by directly repressing transcription of the MMP9 metastatic gene. This result also presents the first demonstration of the direct negative repression of the transcriptional regulation of the MMP9 gene. This molecular evidence was validated in cervical cancer specimens, in which loss of ZBRK1 expression is inversely correlated with the elevated expression of MMP9. Taken together, these results suggest that ZBRK1 plays a critical role in tumor progression, especially in metastasis, by directly modulating metastatic genes.

Significant discoveries: (A) an increase in ZBRK1 inhibited the growth of cancer cells in vitro and in vivo, which suggests that ZBRK1 can act as a tumor suppressor. (B) This paper is the first work linking ZBRK1 and cancer metastasis/invasion. ZBRK1 acts as a metastasis/invasion suppressor through regulating cellular movement-related genes. (C) ZBRK1 can bind to the promoter regions of the MMP9 gene, according to in vivo and in vitro DNA binding assays. This molecular evidence is further confirmed by revealing the expression patterns of ZBRK1 and MMP9 in cervical cancer samples. Therefore, the findings of the NCKU research team also first demonstrate the direct negative repression of transcriptional regulation of the MMP9 gene.

<http://web1.nsc.gov.tw/techwp.aspx?id=1010116001&ctunit=208&ctnode=287&mp=7>

#### **4. Taiwan develops way to grow pesticide-free chrysanthemums**

(Central News Agency, 11 01 2012)

Taiwan has developed a way to grow a type of chrysanthemum, often used to brew tea, without the help of pesticides, a breakthrough the country hopes will boost its competitiveness against China-grown flowers, the Council of Agriculture said. The effort to develop the pesticide-free chrysanthemum variety, known as chrysanthemum morifolium, was launched in response to frequent reports of chemical contamination of the flowers, the council's Tea Research and Extension Station said. It successfully experimented with the new method in Tongluo in Miaoli County, one of the two main areas in Taiwan where the flower is grown, Station Director Chen You-jen said.

A nutritional spray was provided to replace pesticides that farmers were using to deal with a problem they thought related to pests but in fact was because of a lack of iron in the soil, Chen said. The station also taught farmers to cut off the flowers' buds where insects were most likely to appear and then dry the collected buds under the sun to kill the worms, preventing them from affecting the flowers or spreading around the farm. These methods have helped reduce the use of pesticides by more than 90 %, Chen said. Since the station and the Taitung District Agricultural Research and Extension Station began working together to help farmers use new fertilizers last year, most locally grown flowers have met food safety standards. Chen said that most problematic chrysanthemum morifolium, now come from China, which have about a 70 % share of the Taiwanese market. The official did not expect the new growing techniques would lower farmers' costs despite cutting down on the use of pesticides. But he expected consumer acceptance of the flowers would improve because they are insecticide-free flowers, which could lead to more land being devoted to growing the variety. At present, Taiwan grows a total of 50 hectares of chrysanthemum morifolium in Miaoli and Taitung, according to Chen.

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## 5. CDC develops new enterovirus 71 screening reagent

(Central News Agency, 18 01 2012)

The Centers for Disease Control has developed a new enterovirus 71 (EV71) screening reagent that can detect the virus from a drop of blood in 30 minutes, health officials said. The new test is far more efficient than traditional screening methods because the blood sample does not have to be sent to an outside laboratory to get a result, said Wu Ho-sheng, director of the CDC's Research and Diagnostic Center. Traditional screening methods require at least 3-5 c.c. of blood and can take 1-2 weeks, as the blood serum needs to be separated and tested by machines, Wu explained. The new screening reagent works along the same principle as a pregnancy test kit. If a line appears 30 minutes after a drop of blood is dipped onto the test plate, it indicates the person is enterovirus positive, Wu said. Though it may be quick, the test is still only 70 percent accurate and cannot be done until a person has had a fever for 2-3 days, Wu said. From June 27, 2011 to the present, a total of 57 severe cases of the dangerous stomach bug have been reported and three children have died from it, CDC Deputy Director-General Chou Jih-haw said. In 1998, when Taiwan suffered one of its most severe EV71 epidemics, a surge of cases was observed in March and the number of cases peaked in May, Chou said. But from late last year, even as the incidence of other types of enterovirus infections has declined, the virus has been resilient against cold weather as seen by the rising number of EV71 cases, which could point to a major outbreak in the spring, Chou said. There has not been a major outbreak of the disease in the last three years, but one could occur in March to April this year, possibly infecting 100,000-200,000 children, CDC officials warned. They hoped the new screening reagent could be commercialized and help screen for severe cases in their early stages, enabling authorities to take active preventive measures to help control the spread of the disease.

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## 6. ITRI Succeeds in Developing Rewritable E-paper

(RTI Radio Taiwan International, 27 01 2012)

ITRI makes some breakthrough and succeeds in the development of a type of plastic rewritable e-paper "i2Re-Paper." With simple thermal writing device, words or images could be easily printed on the e-paper. This new-generation environment-friendly display technique will be applied to e-signage, e-id card, electric tickets, etc. Soft electronic products have the features of low weight, low cost and bendability. The field is regarded as a rising star industry succeeding to semiconductor and flat panel display. E-paper is one of the recent popular soft electronic products.

ITRI's "i2R e-Paper" uses recycled plastic bottles, and this kind of e-paper is as thin as a plastic slide. Besides, the device advances in its simplified mechanism. Simply with a thermal writing device, the texts or images can be easily input, unlike traditional e-papers that need to be "written" using complicated electronic systems and devices.

In addition, the content displayed can stay without consuming extra power, while the content can be erased and updated at once via the thermal writing machine.

<http://web1.nsc.gov.tw/techwp.aspx?id=1010127012&ctunit=208&ctnode=287&mp=7>

## 7. ITRI develops wide beam angle LED bulb

(Central News Agency, 31 01 2012)

Taiwan's Industrial Technology Research Institute (ITRI) reported a breakthrough in light-emitting diode (LED) technology by having developed a lightweight LED bulb with a beam angle of 330 degrees. The newly developed bulb weighs less than 100 grams, which is only half the weight of a normal LED bulb, and it has great potential to overtake other energy-efficient bulbs in the Japanese market this year, the government-funded institute said. The ITRI said it has always been a goal for international companies, such as Koninklijke Philips Electronics N.V., to develop the technology to overcome the problem of an LED bulb's narrow beam angle, as it places LED lights at a disadvantage when compared with traditional incandescent bulbs. The new innovative product has provided the solution and advanced LED technology, the ITRI added. The ITRI said the low-cost unbreakable plastic bulb could also improve the competitiveness of the LED industry in Taiwan.

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