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CHINA SCIENCE AND TECHNOLOGY

NEWSLETTER

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IN THIS ISSUE

INTERNATIONAL COOPERATION

China ś First Commercial Recombinant Cancer Drug

Chinese Ministry of Science and Technology announced on July 11, 2008 that thank to 8-year efforts and the support of National 863 Program, h-R3 (Nimotuzumab), China ś first recombinant cancer drug, has been approved by State Food and Drug Administration as a new drug for bulk production.

H-R3, developed by Biotech Pharma, a joint venture established by both China and Cuba, enjoys numerous merits, including strong target orientation, high specificity, enhanced treatment results, and low side effects. Representing a new direction for targeted molecular cancer treatment, the Chinese made H-R3 has registered a humanization degree

as high as 95%, in a leading position compared with its overseas counterparts. While meeting the domestic needs, the new drug has embarked on export.

Potential Targets for Cancer Treatment

XU Xingzhi, at Laboratory of Cancer Biology, part of Capital Normal University College of Life Science, and his coworkers at Harvard Medical School Immune Disease Institute, have recently published their findings on potential cancer treatment targets in the July 11 issue of journal *Molecular Cell*. XU and others found that Protein Phosphatase that plays an important role in passing signals is able to produce different functional complexes. For example, the PP4 complex they have tested is of a strong specific selection of base proteins, and effectively dephosphorylates ?-H2AX within mononucleosomes in vitro.

XU and others also found that PP4 can be overexpressed in human breast and lung cancers, which means it can be silenced to enhance the sensitivity of breast and lung cancer cells to chemotherapy, promising a new drug target for two cancers. Now the lab, led by XU, is working on the effect of some 100 Protein Phosphatase in human genome on cancerous cell growth.

RESEARCH AND DEVELOPMENT

General Mutation Mechanism Unveiled

Thanks to their many-year efforts, TIAN Dacheng, CHEN Jianqun, and their coworkers at Department of Biology, Nanjing University have worked out an Indel'theory to address biological puzzles using a common principle concerning genetic mutation. The finding was published in the June 20 issue of the journal *Nature*.

TIAN and his coworkers have been working on independent genome comparisons, including primates, rodents, fruitfly, rice, and yeast since 2005. They found that in each of these genomic comparisons, insertions/deletions (indels) of DNA would trigger up a range of mutations surrounding indels. Based on the findings, they hold that Indel can be a mechanism inducing mutations, and is the root cause of genetic mutations. The theory can be used to compare the genomes of different species, and has been supported by different test results.

It is believed that the finding has found a way to address numerous biological mysteries, including 1) the number and density of Indel determines spontaneous mutations in genome. One can spot more spontaneous mutations near Indel, than away from it. Indel itself makes a mutation, though occurring in a random manner, indicating the random

nature of mutations it induced; 2) Indel is a major root cause of spontaneous mutations, or the mutation inducing sources in biodiversity; 3) Mother Nature makes its own choice mostly through selecting an Indel, and hence the mutation rate is mostly a result of natural selection; 4) organisms adapt to the changing environment though mutations, to a larger extend than expected, indicating the large role played by mutation in the evolution.

New Bone Forming Mechanism Found

A study team, led by ZHANG Lingqiang, an associate research fellow at the Chinese Academy of Military Medical Sciences, has found a bone mass changing mechanism after wiping out negative regulating genes in rats. The rats without negative regulating genes recorded a noticeably increased bone mass, with apparently enhanced bone functions. The younger the rats, the more obvious the bone mass change. The finding has re-confirmed the negative regulating role played by the gene in bone development, and offered the first genetic evidence showing the gene's functions in the world. A further study also reveals that the negative regulating gene is able to enhance the activity of another important protein that also contributes to the development of bones. The protein sends a range of signals to other key proteins that are part of the bone development. The signals can be identified and cut into needed sections through protein degradation. Researchers also found that the protein has to be activated with the help of negative regulating genes. The rats without negative regulating genes have a greatly reduced activity of the protein, indicating a broken equilibrium for bone development. The negative regulating gene, on the other hand, can help the protein bind with other proteins that it needs to decorate or degrade. The finding was published in a recent issue of *Nature Cell Biology*.

Novel Chelant

Not long ago, a project to develop dual-direction chelant, undertaken by CAS Changchun Institute of Applied Chemistry, has passed the experts' verification. Researchers used rare earth as a substitute for the marker protein, in an effort to overcome the disadvantages of long half decay, short test kit life, and contaminated environment. By combining both organic and inorganic elements, researchers have worked out BTBCT, a dual direction chelant that can bind both rare earth and protein. A further test and analysis has confirmed the structure of BTBCT, and led to the establishment of a roadmap and method for synthesizing BTBCT. Researchers have also developed a range of intermediates for preparing the chelants with different structures and properties. BTBCT's dual direction binding function has been confirmed by tests, including Eu^{3+}ion, absorption, and florescence emitting.

Blue Tongue Virus Test Kit

Chinese Academy of Military Medical Sciences has recently rolled out two blue tongue virus test kits (RT-PCR and florescent RT-PCR) that have been approved by Ministry of Agriculture for clinical trials.

Researchers have applied for national invention patents for the core technologies used in the two test kits. Clinical trials will eventually allow a fast, specific, and sensitive test of blue tongue viruses, which will not only make massive screening of the viruses possible, but will also provide a reliable technical support for monitoring and effective control of the viruses. Meanwhile, it will become an effective tool for testing blue tongue virus in animal born bioproducts.

Blue Ear Disease Control Technique

Based on two decade painstaking efforts, the Chinese Academy of Agricultural Sciences Haerbin Institute of Veterinary has established a technical platform for curbing blue ear disease, or PRRS. The platform has produced inactivated PRRS vaccines for commercial applications, with a success rate of 90%.

Researchers separated CH-1a strains using a low temperature in-vitro technique, and obtained desirable CH-1R strains, a key component of the inactivated PRRS vaccine. The new vaccine has demonstrated a fine immune result. During the period of 2007-2008, the Institute has provided some 30 million vaccines to the marketplace. Researchers also had an in-depth study of the structure genes of PRRSV CH-1a, and obtained the expression of eukaryotes and prokaryotic cells in different structures. Eventually, they screened out the needed PRRSV antigens, based on the monoclonal antibodies established for different proteins.

NEWS BRIEFS

South Pole Protection

Not long ago, the 31st Antarctic Treaty Consultative Meeting (ATCM) approved China's initiative to set up a conservation zone in the South Pole. China will make the middle part of the Grove Mountains (74 °53'~75 °12' east longitudes and 72 °51'~72 °57' south latitudes) a conservation zone 12 km long and 10 km wide, in an irregular quadrangle shape. Some 400km away from China's Zhongshan Station in the South Pole, the conservation zone is featured with hilly terrains dominated by ice plains and peaks running north-north-east and south-south-west. The area has kept traces of ice cover lifting and descending, and the typical and vulnerable ice and wind erosion terrains that are rarely seen in the natural world, which makes it a desirable site for scientific study, and a rare wild

beauty that should be protected from human activities.

Subsurface Buoys in Arctic Ocean

It is reported from the source of China's third Arctic expedition team that China will deploy a set of deep sea subsurface buoys in the Arctic Ocean to observe the changes of major marine elements for a year, and to understand the impacts of the changing Arctic environment on global climate, especially on China's climate change. The buoys will be deployed near 75° north latitude.

According to a briefing, the subsurface buoy system is equipped with an array of instruments that are able to collect sea temperature, salinity, and current speed data. The buoy also has a biological captor to collect marine organism specimens on a regular basis. The buoys will be deployed in the sea by China's third Arctic expedition team in due time, and will be recovered by another Chinese expedition team that will be in the Pole in 2009

New Anticancer Drug into Clinical Trials

Fudasaiyin, a Chinese made anticancer photosensitizer, has recently been approved by State Food and Drug Administration for clinical trials. The proprietary novel anticancer drug has been granted with two national invention patents.

Fuzhou University Institute of Functional Materials has been working on both basic and applied studies of phthalocyanine since 1994. The 14-year efforts have resulted in a range of novel materials, especially a dual-substituted phthalocyanine able to kill cancerous cells and tissues in a targeted manner. Experimental results show that the novel compound is of an enhanced capability to kill cancerous cells with the help of light.

Rare Plants Resources Protected

CAS Kunming Institute of Botany has been working on the geographical distribution and ecological environment of rare and endangered plant species in Yunnan since the mid-1990s, based on the past survey results of rare and endangered plants. Researchers have collected huge amount of data concerning the current status of rare and endangered plants in the Province, and published a number of monographs, including *Rare and Endangered Plants in Yunnan, China*, and *Rare Plants in China*, introducing and describing the value, status quo, shape, geographical distribution, ecological environment, biological properties, reproduction, and growing technique, and allowing people to have a better understanding and protection awareness of these plants.

Researchers have also created a migration park for rare and endangered plants in the

Kunming botanic garden, which has so far kept some 180 rare and endangered plants and some plants enjoying important scientific or economic values, allowing some 500 plants under protection. Researchers have also made long term observation of the adaptability of the plants in the park, in an attempt to understand their growing processes.

Advanced Hollow Ingot Making Technique

National Material Science Lab in Shenyang and China Erzhong have jointly worked out a technique to produce quality hollow ingots at a 100-ton level, using mixed gas based large temperature difference technique.

Researchers developed the technique based on computer aided simulation, which effectively reduced macro bias. The technique has demonstrated its efficiency and reliability in producing hollow ingots at a 100-ton level, after a solid test to produce hollow ingots at a 50-ton level. The lab will continue to work on the techniques to produce heavier hollow ingots at 200-ton and 300-ton levels, in collaboration with China Erzhong.

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