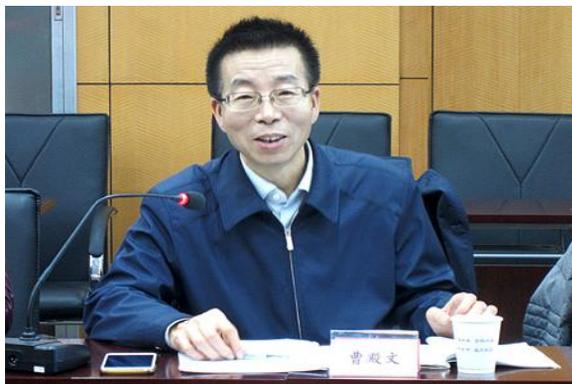




Spotlight

Cao Dianwen's visit to Wuhan Institute of Virology



The Vice Director of the Bureau of International Cooperation, Chinese Academy of Sciences Cao Dianwen visited Wuhan Institute of Virology on December 2nd morning and a symposium has been held.

Cao firstly visited Wuhan National Biosafety Level 4 (BSL-4) Laboratory. In the laboratory, he asked the details of the laboratory's functional layout, construction process, commissioning and operation situations, biosafety management and so on. He also communicated with the working team which is responsible for the laboratory's operation and maintenance.

A symposium was held later. In the symposium, Wang Yanyi, the Vice Director of Wuhan Institute of Virology reported the general situation of the institute, focusing on the Institute's key programs such as "One-Three-Five Plan" (one research and development orientation, three breakthroughs and five cultivating areas)

and the technical innovations. Song Donglin, the Vice Director of Wuhan National Biosafety Level 4 Laboratory, introduced the current development of the accreditation of the laboratory, the Sino-France cooperation background and summarized the achievements that have already been made through the Sino-France cooperation in areas such as science and technology, the construction of biosafety system and personnel training.

Cao highly praised the work done by Wuhan Institute of Virology. He introduced the plans and measures that the Bureau of International Cooperation made for improving the cooperation with Europe, Africa and etc. At last he wished Wuhan Institute of Virology, constructed on the basis of this laboratory, will be working according to the national strategic demands and playing a positive role in areas such as prevention and control of emerging infectious diseases and dealing with international public health emergencies.



Research Progress

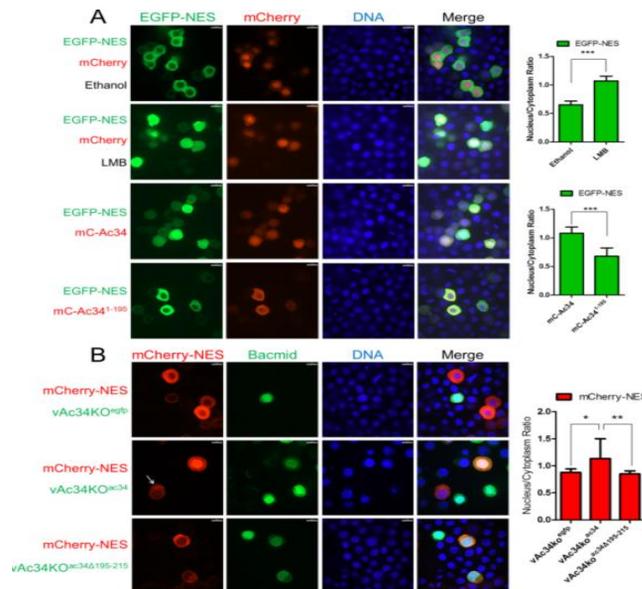
WIV finds Arp2/3 subcellular distribution is controlled by CRM1-dependent nuclear export under steady-state conditions

Actin, nucleation-promoting factors (NPFs), and the actin-related protein 2/3 complex (Arp2/3) are key elements of the cellular actin polymerization machinery. With nuclear actin polymerization implicated in ever-expanding biological processes and the discovery of the nuclear import mechanisms of actin and NPFs, determining Arp2/3 nucleo-cytoplasmic shuttling mechanism is important for understanding the function of nuclear actin. A unique feature of alphabaculovirus infection of insect cells is the robust nuclear accumulation of Arp2/3, which induces actin polymerization in the nucleus to assist in virus replication.

Recently, in Wuhan Institute of Virology, the Research Group of Molecular Biology of Hepatitis Viruses and Gene Therapy led by Prof. Chen Xinwen, found that Ac34, a viral late gene product encoded by the alphabaculovirus *Autographa californica* multiple nucleopolyhedrovirus (AcMNPV), is involved in Arp2/3 nuclear accumulation

during virus infection. Further assays revealed that the subcellular distribution of Arp2/3 under steady-state conditions is controlled by chromosomal maintenance 1 (CRM1)-dependent nuclear export. Upon AcMNPV infection, Ac34 inhibits CRM1 pathway and leads to Arp2/3 retention in the nucleus.

Link: <http://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1005994>



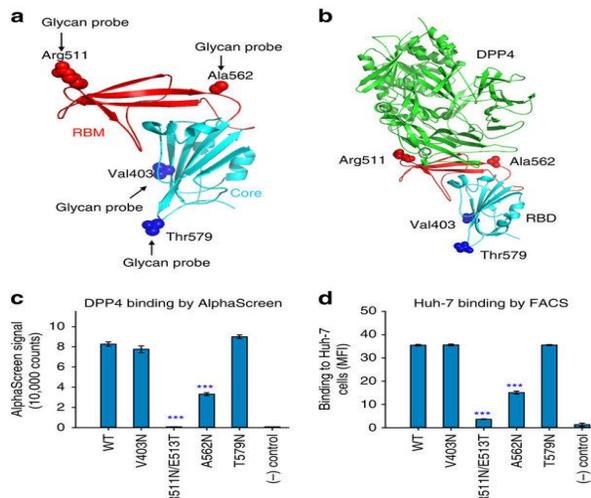
Scientists find new way to improve MERS vaccines

Since the Middle East Respiratory Syndrome (MERS) was identified in 2012, more than 1,800 people have been infected with the virus that causes MERS, and the fatality rate is a concerning 36 percent. There's still no approved MERS vaccine for humans. However, promising new research reported in *Nature Communications* this week may help pave the way for a human vaccine – and give hope for a new era of protection against

similar viral infections. The study was led by Fang Li, the Visiting Research Fellow in Wuhan Institute of Virology, also the associate professor in the Department of Pharmacology at the University of Minnesota Medical School, in collaboration with Lanying Du and Shibo Jiang from New York Blood Center; Yusen Zhou from Beijing Institute of Microbiology and Epidemiology; Chien-Te Tseng from the University of Texas; and Stanley Perlman from the University of Iowa.



Research Progress



Professor Li and colleagues identified a region on an existing MERS vaccine that causes the body's immune system to generate ineffective antibodies, which distract it from generating effective antibodies. In mouse models, this prevented the vaccine from working well. But, by blocking that region and stopping the distraction, the researchers could be one step closer to making a MERS vaccine viable for humans.

There are two types of commonly used viral vaccines. The first type uses whole particles of the virus that have been inactivated or attenuated to nearly harmless levels, which then spark an immune response when injected into a person or animal. By exposing the immune system to those particles, the body builds up virus-specific antibodies to prevent infection.

Another common type of vaccine is called a subunit vaccine. As the name suggests, this type only uses bits of virus proteins – not whole particles of the virus – to prompt the best response after injection. Because this type of vaccine uses only small bits of the virus, there's no chance of infecting the host.

“Subunit vaccines are a compelling method to protect humans from virus infections because there's no chance for inadvertent infections and they can be made and transported with relative ease.” said Li, “But they have shortcomings, too, and don't always work as well as we want them to.” Li and colleagues observed for the first time that when subunit vaccines are taken out of the context of the whole virus particles, these vaccine molecules created large exposed surface areas of the virus structure that were previously buried. These exposed areas on the subunit vaccines appeared to cause a reaction that distracted the immune system from leveraging the effective parts of the vaccines.

To reduce this unintended immune system response, Li and colleagues identified and then masked one of the most unfavorable regions of the vaccine that distracted the immune system. They then measured the resulting immune response in mice and noted significantly enhanced efficacy of vaccination. By masking this unfavorable region, the immune system could focus on producing large amounts of effective antibodies. They believe this concept can be replicated in other subunit vaccines to boost efficacy, improving protection against diseases like HIV, Ebola and influenza.

“The finding can potentially facilitate the design and development of vaccines against other life-threatening viruses,” said Li. “In a world where new viruses keep emerging and re-emerging, this study holds the promise to making subunit vaccines a valuable tool to combat virus infections.”

Link: <http://www.nature.com/articles/ncomms13473>
Source: University of Minnesota



International Cooperation

Three high standard international conferences were organized by Wuhan Institute of Virology

In the past two months, Wuhan Institute of Virology had organized three high standard international conferences, which is a significant milestone for academic exchanges in the institute.

Wuhan Institute of Virology, launched the International Symposium on Emerging Viral Diseases in 2004. Up to now, 6 International Symposiums on Emerging Viral Diseases Control have been held. The 7th ISEVD was held on October 19 to 21 in 2016, aiming at sharing latest findings, engaging in stimulating discussions and establishing collaborations with leading fellow scientists on emerging viral diseases all over the world. The conference focused on four topics: virus discovery, epidemiology and evolution; antiviral and vaccine; virus-host interaction, and viral replication.



On Oct 21-23, 2016 by cooperating with *Nature Microbiology*, the Nature Conference on Viral Infection and Immune Response, brought together leading international scientists to explore emerging themes in viral infections and immune dysregulation, and providing promising venues for immune interventions. This conference mainly discussed the epidemiology of emerging



viral disease, persistent viral infection and immune dysregulation, Viral pathogenesis, immune intervention and prevention of disease, innate antiviral immunity and Induction of systemic adaptive immunity.



The 4th International Symposium for Herpes Virus, Associated Diseases and Antiviral Development was held on November 5 to 7. The symposium focused on the following themes: 1.the pathogenesis of herpes virus associated diseases; 2.the antiviral strategies in herpes virus associated diseases; 3.the function of herpes virus genes; 4.mechanisms of herpes virus persistence infection, latency, and reactivation; 5.immune escape and host antiviral immune response during herpes virus infection; 6.screening, development and application of antiviral drugs.



International Cooperation

China Technology Survey Delegation from Korea paid a visit to Wuhan Institute of Virology

On Nov. 22, 2016, the China Technology Survey Delegation from Korea, which consisted of Mr. Oh Pan-Dong, Mr. Kim Eung-Bok and Mr. Kim Kyung-Hyun from Ministry of Science, ICT & Future Planning, Mr. Ko Chi-Bum from Ministry of Health and Welfare and Mr. Lee Keun-Hwa from Jeju University paid a visit to WIV. On the conference, the representatives from Wuhan Institute

Of Virology and experts from Korea discussed actively. Both of them wished the two parts can develop the scientific cooperation in more depth. Then the participants from both sides exchanges their experiences and understandings in the infectious diseases study, the reservation and transportation of virus recourses, vaccine development, and the possibilities for further collaboration.

Prof. Shi Zhengli attended the Workshop on Strategies to Control Viral Hemorrhagic Fever held in Pakistan



The Department of Microbiology, University of Veterinary and Animal Sciences, Lahore organized a three-day international workshop on “Devise Strategies to Control Emerging Viral Hemorrhagic Fever in Pakistan”. Vice Chancellor Meritorious Prof. Dr. Talat Naseer Pasha chaired the concluding session of the workshop and distributed certificated among participants. Prof. Shi Zhengli from Wuhan Institute of Virology attended.

Prof. Pasha said the workshop was aimed to share innovative knowledge, work and experience to eradicate ticks. He said University of Veterinary and Animal Sciences will enhance cooperation with China for the quality education and capacity building of students and faculty. Prof. Zhengli Shi gave a presentation on the epidemic, animal tracing and diagnostics of the respiratory syndrome coronavirus in the Middle East .

Source: *University of Veterinary and Animal Sciences, Lahore*



Science Tips

West Nile virus may be deadlier than thought



Since West Nile fever first appeared in the United States in 1999, more than 45,000 people have been infected, and nearly 2000 of them are known to have died, for a roughly 4% fatality rate. But a new study, reported today here at the annual meeting of the American Society of Tropical Medicine and Hygiene, suggests that the fatality rate may be much higher. That's because people infected with the virus may still die years after recovery, because it leaves them more vulnerable to other infectious diseases and kidney problems like renal failure. "This is exciting work," says Gregory Ebel, a virologist at Colorado State University in Fort Collins, who was not involved in the study. "It's really strong support for a case that has been building for almost 10 years now."

West Nile fever was long thought to be a manageable public health problem. The mosquito-borne virus—a relative of the Zika and yellow fever viruses—causes symptoms in just one out of every five infected people. Most of those experience fever and a flulike illness. But in some patients, the virus also infects the central nervous system, which can be fatal. Patients who survive tend to do worse later in life, according to some

anecdotes. What's more, two small studies, one in Israel in 2005 and one in Colorado in 2012 also suggested that overall mortality might be higher than acute cases suggest. But good data have been lacking.

In an effort to change that, Kristy Murray, a researcher at the Baylor College of Medicine in Houston, Texas, and her colleagues went through all 4162 cases of West Nile virus reported to the Texas Department of State Health Services for the more than 10 years between July 2002 and December 2012. They found that 557 patients had died: 289 of them in the first 90 days after infection, and 268 people after. Not all the later deaths resulted from West Nile. But patients who had neurological infections had a higher risk of dying of some other diseases than the general population. For instance, they were almost five times as likely to die of kidney problems and more than twice as likely to die from an infectious disease, Murray found. The effect was particularly pronounced in patients younger than 60. "This shows in a large population size that mortality does increase greatly in the first 6 years after infection," Murray says.

How exactly the virus leads to longterm health problems is still unclear. It may simply persist in the kidney after the patient has recovered, says Murray, barely replicating but slowly damaging the organ. And other viruses like measles are also known to make the immune system less able to defend against other infections for years. The neurological symptoms may simply be a marker of a particularly severe infection.

Source: Science-<http://www.sciencemag.org/news/2016/11/west-nile-virus-may-be-deadlier-thought>



Express News

Speakers on "Ge Hong Colloquium"

George Stark, the professor from Lerner Research Institute, gave an excellent talk on "New insight into how cells respond to type I interferons". He mainly introduced that unphosphorylated STAT1 prolongs the expression of a subset of interferon-induced genes to prolong the antiviral response. These proteins also mediate the resistance of cancer cells to DNA damaging therapies, suggesting that blocking the response to endogenous interferon in cancers may sensitize them to such therapies.



Prof. Guo Peixuan, the Endowed Chair in Ohio State University, paid a visit to Wuhan Institute of Virology. On the Gehong Colloquium, he reported his discovery of a third type of biomotor using revolution mechanism and application in the development of potent antiviral drug. Prof. Guo's focus on nanobiotechnology, or the biological study and application of extremely small (between 1 to 100 nanometers) elements, has opened doors to new discoveries.

Call for Applications – 2017 CAS-TWAS President's Fellowship Programme for Doctoral Candidates

According to an agreement between CAS and The World Academy of Sciences (TWAS) for the advancement of science in developing countries, up to 200 students/scholars from all over the world will be sponsored to study in China for doctoral degrees for up to 4 years. Under this Programme, students who are non-Chinese citizens have the opportunity to pursue doctoral degrees at the University of Chinese Academy of Sciences (UCAS), the University of Science and Technology of China (USTC) or Institutes of CAS



around China. For the further information about the general conditions, financial support and application, please contact Ms. Pei Pingping in The Graduate Office through yjs@wh.iov.cn.

