WIV Newsletter
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Spotlight

China's top-level biosafety lab begins work

China has put its first level-four biosafety laboratory into operation, capable of conducting experiments with highly pathogenic microorganisms that can cause fatal diseases, according to the national health authority.

Level four is the highest biosafety level, used for diagnostic work and research on easily transmitted pathogens that can cause fatal diseases, including the Ebola virus. The Wuhan national level-four biosafety lab recently passed an assessment organized by the National Health and Family Planning Commission. After evaluating such things as the lab's management of personnel, facilities, animals, disposals and viruses, experts believed the lab is qualified to carry out experiments on highly pathogenic microorganisms that can cause fatal diseases, such as Marburg, Variola, Nipah and Ebola. "The lab provides a complete, world-leading biosafety system. This means Chinese scientists can study the most dangerous pathogenic microorganisms in their own lab," the Wuhan institute said. It will serve as the country's research and development center on prevention and control of infectious diseases, as a pathogen collection center and as the United Nations' reference laboratory for infectious diseases, the institute said. Previous media reports said the Wuhan P4 lab will be open to scientists from home and abroad. Scientists can conduct research on anti-virus drugs and vaccines in the lab.

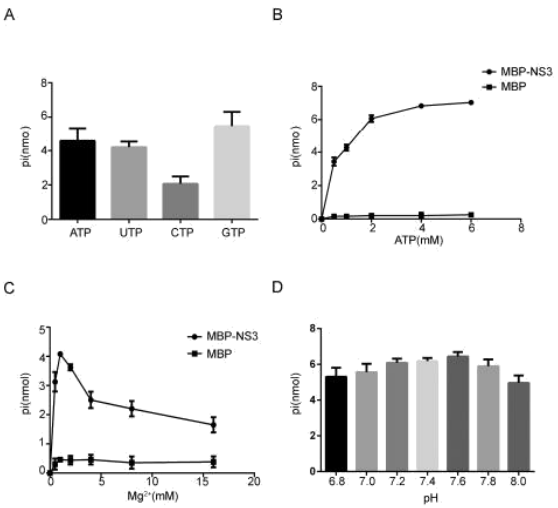
The lab is part of Sino-French cooperation in the prevention and control of emerging infectious diseases. The central government approved the P4 laboratory in 2003 when the outbreak of SARS spread alarm across the country. In October 2004, China signed a cooperation agreement with France on the prevention and control of emerging infectious diseases. With French assistance in laboratory design, biosafety standards establishment and personnel training, construction began in 2011 and lasted for three years. In 2015, the lab was put into trial operation.

Source: China Daily

Scientists highlight the functional significance of NS3 in noroviral life cycle

Noroviruses are a genetically diverse group of non-enveloped, positive-stranded RNA viruses belonging to genus Norovirus of the family Caliciviridae. They arefurther segregated into seven genogroups (GI-GVII), three of which cause diseases exclusively in humans (GI, GII, and GIV). Human noroviruses (HuNoVs) are now considered the leading cause of viral gastroenteritis in humans across the globe. However, despite its substantial burden and potential threat, there are still no vaccines or antiviral drugs available to prevent or treat norovirus infection.

In a present study by cooperation with scientists from University of Cambridge, Imperial College London and etc., the research group led by Prof. ZHOU Xi in Wuhan Institute of Virology of the Chinese Academy of Sciences showed that NS3 encoded by Norwalk virus (NV; genotype GI.1 HuNoV), the prototype strain of the genus Norovirus, also has NTP-dependent RNA helicase activity.



Moreover, the scientists demonstrate that NS3 can also act as an RNA chaperone that is able to remodel structured RNAs and facilitate strand annealing independently of NTP. They have also found that NS3 can facilitate the in vitro synthesis of vRNA by NV NS7/RNA-dependent RNA polymerase (RdRP) on the 3′ antigenomic template, suggesting that NS3 plays important role in norovirus RNA replication. Additionally, they have demonstrated that the guanidine hydrochloride (GuHCl), which is a U.S. FDA-approved small molecule drug and a well-known inhibitor of poliovirus 2CATPase 133, is able to inhibit the RNA helicase activity of NS3 in a dose-dependent manner. More importantly, GuHCl has been further determined to inhibit the replication of NV replicon in cultured human cells, which highlights the functional significance of NS3 in noroviral life cycle.

The results have been published in Journal of Virology entitled "Human Norovirus NS3 has RNA Helicase and Chaperoning Activities".

This work was supported by the National Natural Science Foundation of China-Excellent Young Scientists Fund, the Newton Advanced Fellowship from the UK Academy of Medical Sciences and NSFC, the NSFC grant, the Strategic Priority Research Program of Chinese Academy of Sciences, the National High-Tech R&D Program of China (863 Program), the National Basic Research Program of China (973 Program), and the Distinguished Young Scientists Fund of Hubei Province.

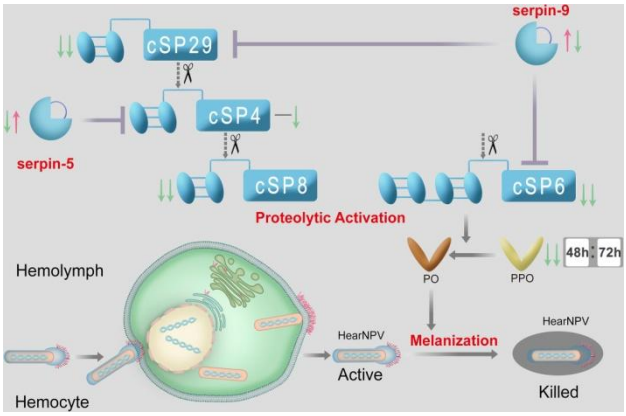
Link: *http://jvi.asm.org/content/early/2017/12/07/JVI.01606-17.full.pdf+html*

Natural insect virus baculovirus has evolved a distinct strategy to suppress the host immune system

Melanization is one of important modules in insect defense system. It consists of a cascade of clip-domain serine proteases (cSPs) that converts the zymogen prophenoloxidase (PPO) to active phenoloxidase (PO), which is negatively regulated by serpins. PO then catalyses the formation of melanin that physically encapsulates certain pathogens. Parasites and bacteria have evolved to produce specific proteins or antibiotic to suppress the melanization response of host insects for survival. However, the mechanisms by which virus persists in the face of the insect melanization are poorly understood.

In a present study by cooperation with the research group led by Prof. ZOU Zhen in Institute of Zoology of the Chinese Academy of Sciences, the research group led by Prof. HU Zhihong in Wuhan Institute of Virology of the Chinese Academy of Sciences showed that a DNA virus baculovirus infection of the cotton bollworm, Helicoverpa armigera, reduced the levels of most cascade members in the host hemolymph and PO activity.

By contrast, serpin-9 and serpin-5 were sequentially upregulated after the viral infection. Their results also revealed that melanization kills baculovirus in vitro. Serpin-5 and serpin-9 regulate melanization by directly inhibiting their target proteases cSP4 and cSP6, respectively and cSP6 activates PPO purified from hemolymph. Moreover, serpin-5/9-depleted insects showed resistance to baculovirus infection.

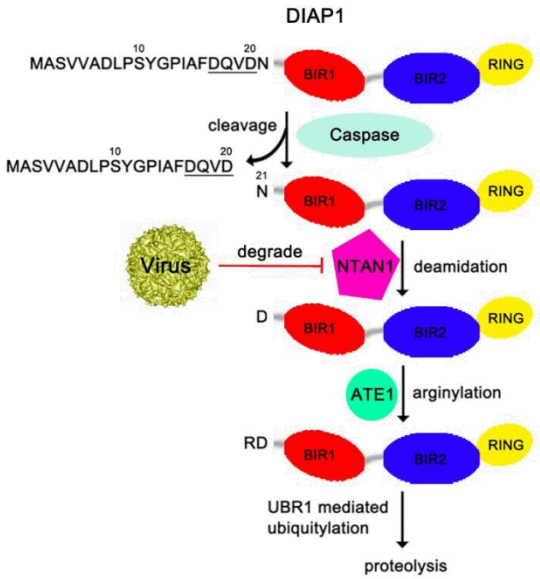


In summary, their findings have enriched the understanding of molecular mechanisms by which pathogens suppress the melanization response of host insect for survival. The scientists envision a mechanism whereby baculovirus overcomes host melanization. The viral infection induces the level of serpin-5 and serpin-9 in hemolymph. Serpin-5 specifically inhibits cSP4, and serpin-9 inhibits cSP6 and cSP29, resulting in a dramatic decline of PO activity to suppress the virucidal capacity of host melanization.

This mechanism, which involves baculovirus induced serpin-5 and serpin-9 and then inactivates the host immune system, suggests that these two negative regulators of immune response are important for baculovirus infection in insects. These findings improve our understanding of the interaction between HearNPV and its co-evolutionary host H. armigera. The results have been published in PLoS Pathogens entitled "Inhibition of melanization by serpin-5 and serpin-9 promotes baculovirus infection in cotton bollworm Helicoverpa armigera".

Link: *https://www.ncbi.nlm.nih.gov/pubmed/28953952*

Chinese Researchers demonstrated that a virus can suppress the N-end rule pathway



The N-end rule pathway is a proteasome dependent proteolytic system that recognizes and degrades proteins containing N-degrons, and has emerged as a key regulator of various processes. Viruses manipulate diverse host pathways to facilitate viral replication and evade antiviral defenses. However, it remains unclear if viral infection has any impact on the N-end rule pathway.

In a present study led by Prof. ZHOU Xi in Wuhan Institute of Virology of Chinese Academy of Sciences, the researchers report that the infection by a picorna-like virus can induce apoptosis in infected Drosophila cells, and the apoptotic pathway plays an antiviral role in Drosophila. Intriguingly, they found that the viral infection promoted the accumulation of caspase-cleaved, smaller form of DIAP1, which is potent for apoptosis inhibition, by inhibiting the N-terminal Asn deamidation of the cleaved DIAP1.

Moreover, they uncovered that the viral infection could induce the degradation of NTAN1, which catalyzes the N-terminal Asn deamidation of the cleaved, smaller DIAP1. And the virus-induced NTAN1 degradation is independent of polyubiquitylation but dependent on proteasome. Furthermore, their study revealed that the virus-induced N-end rule pathway suppression could efficiently block apoptosis and facilitates viral replication.

In summary, their findings demonstrate for the first time that a virus can suppress the N-end rule pathway, and uncover a new mechanism for virus to evade apoptosis. Given the high conservation of the N-end rule pathway from prokaryotes to eukaryotes, it opens up the possibilities that this mechanism can be also employed by other viruses, particularly picornaviruses, to evade apoptosis and/or modulate other cellular processes, which are the targets of N-end rule pathway, in mammals or other organisms.

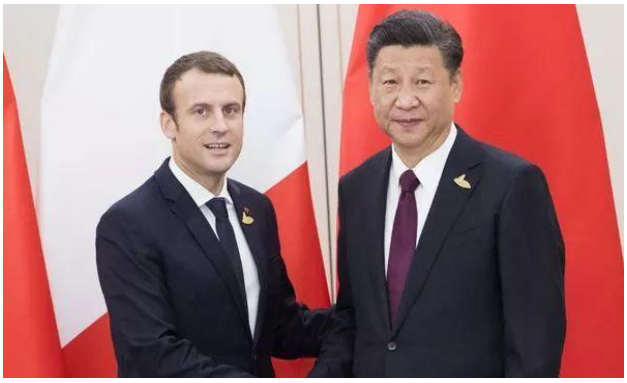
This work was supported by the National Natural Science Foundation of China - Excellent Young Scientist Fund, the NSFC grant, the Newton Advanced Fellowship from the UK Academy of Medical Sciences and NSFC, the Strategic Priority Research Program of Chinese Academy of Sciences, the National Basic Research Program of China, the National High-Tech R&D Program of China, the Natural Science Foundation of Hubei for Distinguished Scientist, and the National Science Foundation for Post-doctoral Scientists of China.

Link: *https://elifesciences.org/articles/30590*

China and France will conduct advanced joint research by using the Wuhan P4 laboratory

At the invitation of Mr. Xi Jinping, President of the People's Republic of China, Mr. Emmanuel Macron, President of the French Republic, made a state visit to the People's Republic of China from 8 to 10 January 2018. The two heads of state had in-depth exchanges of views on bilateral relations and major international issues and decided to bring the close and enduring comprehensive strategic partnership between China and France to a new level, based on the principles of trust and mutual and reciprocal benefit.

In the joint declaration, the two heads of state welcome the creation of a China-France Hospital Alliance and the strengthening of the partnership on the theme of healthy aging. They decide to hold regular China-France health meetings from 2018 and encourage exchanges and cooperation between institutions and companies in the health sector. Furthermore, China and France declare to conduct advanced joint research on emerging infectious diseases, using the Wuhan P4 laboratory.



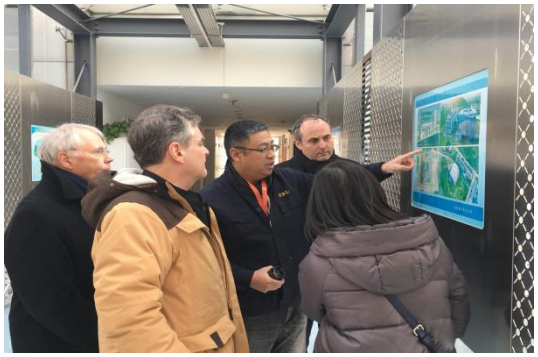
According to Wuhan Institute of Virology, Wuhan P4 Laboratory, as one of the mega scientific cooperation programs under the Sino-French Cooperation Framework Agreement, was designed by French and Chinese design units, and was installed and built by Chinese part. The P4 Laboratory is a specialized core facility for studies on highly contagious and fatal diseases like Ebola virus disease. Therefore, the facility must provide the biosafety protection to the investigators and environment at the highest standard possible on earth. Only a few developed countries have P4 laboratories. China started to build such a facility ever since SARS outbreak. Chinese and French engineers and workers worked together to have accomplished the complex.

The French Delegation paid a visit to WIV

On January 29, 2018, M. Christophe-Andre FRASSA, the French Senator who is responsible for the overseas civic affairs visited Wuhan P4 Laboratory to discuss about the cooperation in prevention and control of emerging infectious diseases between China and France, accompanied by Mr. Olivier GUYONVARCH, the new Consul General of France in Wuhan and Mr. Philippe MAURIN, the Science and Technology Attaché in Consulate General of France in Wuhan.

During the visit, Dr. Xiao Tong introduced the achievements and progress made by China and France in building Wuhan P4 laboratory in terms of laws, regulations and standards for biosafety, prevention and control of emerging

Cooperation



infectious diseases, and personnel training. He hoped that in the future, with the support of the French Ministry of Foreign Affairs, Ministry of Science and Technology and other departments, Wuhan P4 Laboratory can further strengthen the scientific cooperation with Lyon P4 Laboratory to establish a good partnership. Then they visited the interior laboratory.

The French Delegation spoke highly of the progress and the achievements made by two sides in the field of the prevention and control of emerging infectious diseases. French government attaches great attention to the cooperative agreement of the two sides. It is our common wish that the two countries can continue to work closely together to enhance the strategic cooperative partnership in all round, thus, making greater contributions to humankind in the field of the prevention and control of emerging infectious diseases.

Science Tips

Can You Get the Flu Twice in 1 Season?

This flu season is a particularly severe one, and it's not over yet—health officials say flu activity will likely remain elevated for at least several more weeks. But if you already caught the flu, are you in the clear for the rest of the season?

Unfortunately, no. Experts say it is possible to catch the flu twice in one season. That's because there are multiple strains of flu viruses circulating at any one time, said Dr. William Schaffner, an infectious-disease specialist at Vanderbilt University Medical Center in Nashville. So getting sick with one strain of flu won't necessarily protect you from a different strain.

But the good news is that it's pretty rare to catch the flu twice in a single season. Having this happen would be "quite a stroke of bad luck," Schaffner told Live Science.

Most people who get the flu this season are getting sick with the H3N2 strain. But a smaller portion of people (around 10 to 15 percent) are getting the H1N1 strain or the influenza B virus, according to data from the Centers for Disease Control and Prevention. (H3N2 and H1N1 are both strains of influenza A.)

Seasonal flu shots contain three to four

Science Tips

strains of flu virus, because there isn't much "cross protection" between strains, Schaffner said. It's possible that getting sick with one type of influenza A virus would offer some modest protection against another type of influenza A, but it probably wouldn't give you any protection against the influenza B virus, Schaffner said.

If you do catch the flu, and you haven't received the flu vaccine for the season, doctors generally recommend that you still get a flu shot after you're no longer sick, particularly if it's early on in the flu season, Schaffner said. The CDC recommends the flu vaccine for everyone ages 6 months and older.

This flu season is turning out to be one of the worse since the 2009 "swine flu" epidemic, CDC officials said last week. Health officials are seeing "widespread' flu activity across the entire country.

For the past five flu seasons, health officials found that flu activity was elevated for around 16 weeks. So far this season, flu activity has been elevated for nine weeks, meaning that the flu season may be only about halfway over, the CDC said.

Source: *Scientific American*
Image Credit: *Getty Images*

Express News

WIV gains supports from CAS President's International Fellowship Initiative

In 2018, WIV has been approved a program application from Chinese Academy of Sciences(CAS) President's International Fellowship Initiative (PIFI). Under the program, an international scientist will work in WIV for 2 months for carrying out collaborative research. As a visiting scientist under PIFI, Prof. William J. Britt from University of Alabama at Birmingham will visit the Research Group of Prion Cell Biology led by Prof. Minhua Luo in WIV. They will elucidate the mechanism of fetal brain maldevelopment caused by CMV infection/IE1 protein via the induced Sox2 downregulation, so that to bridge the gap between CMV infection and fetal brain maldevelopment.

The PIFI program set by CAS aims to support highly-qualified international scientists and postgraduate students to work and study at CAS institutions and strengthen their scientific collaboration with CAS researchers. The PIFI program is available for four categories of international researchers and students: distinguished scientists, visiting scientists, postdoctoral researchers and international PhD students.

For more details:
http://english.cas.cn/cooperation/fellowships/201503/t20150313_145274.shtml

新年大吉

HAPPY NEW YEAR

Wuhan Institute of Virology
Chinese Academy of Sciences