

# Racing Deathly Ebola

By SONG Jianlan (Staff Reporter)

The stern situation of the current outbreak of Ebola hemorrhagic fever has caught intensive attention from the leadership of CAS. With great concern, repeated instructions have been given, urging the CAS staff to actively provide S&T support for emergency responses to potential invasion of this epidemic, drawing on its buildup in research on emerging and infectious diseases.

## Targeting Key Problems

Leaders of multiple CAS institutes, including the Wuhan Institute of Virology, the Institute of Microbiology, the *Institut Pasteur* of Shanghai under the Shanghai Institutes for Biological Sciences, the Kunming Institute of Zoology, the Institute of Biophysics and the Beijing Institutes of Life Science, were convened in early August to discuss proper deployment of R&D activities at the Academy. Subsequently a tentative plan for emergency research projects were formed aiming at tackling key problems existing in the prevention and control of this deadly disease, and submitted to an expert panel for consideration and appraisal.

The plan involves aspects of Ebola virus research, including detection of the virus, therapeutic antibodies, infection and immunology, anti-virus medicine, and structure of viral proteins. After careful consideration and discussions, the panelists suggested in mid-August that after further improvement, it should be put into action as soon as possible.

## New Battle in Wuhan

Wuhan Institute of Virology (WIV), CAS, is an important arena of this life-and-death battle against Ebola. According to Prof. CHEN Xinwen, Director of WIV, as part of this emergency plan the institute will devote itself to establishing and optimizing the detection techniques of antigens and antibodies of Ebola virus.

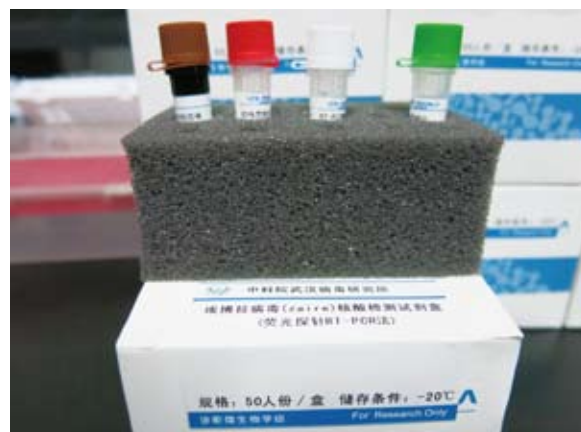
As the result of these efforts, they are expecting to successfully develop antigen test kits suitable for field screening and IgM/IgG antibody test kits suitable for

lab diagnosis of infection. Also, they are developing a type of test kits for general detection, targeting the RNA of the Zaire and five other strains, based on fluorescent quantitative PCR technique.

Meanwhile, they will also develop a system of pseudoviral particles, a novel system of infectious virus-like particles and a minimum replicon for Ebola virus. Subsequently an expression system based on VEEV replicon will make it possible for them to express the GP and VP40 proteins of Ebola virus, and produce pseudoviral particles free of viral genes. They will also be able to construct a cell line for stable expression of Ebola GP proteins. From these proteins virus-like particles with single-infectivity can be assembled. They are also eager to succeed in observing the minimum replicon's replication in the cell, to apply it in the high throughput screening of anti-virus drugs.

## "We Are Ready"

Actually, WIV has already compiled a set of RT-PCT technical standard for detection of Ebola virus and successfully developed the EBOV nucleic acid test kits. Both have been sent to the ports in Guangdong, China to test their efficacy in the local inspection and quarantine practice. Meanwhile, WIV has established a series of techniques for



Nucleic acid test kits developed by WIV for detection of the Zaire strain of Ebola virus.



virus detection, including serological detection methods for Zaire and Reston strains, TaqMan RT-PCR methods aimed at detecting the nucleic acid of highly infectious viruses like Ebola and Marburg viruses, and a technique for antibody detection capable of detecting the virus' nucleoprotein. Moreover, they have succeeded in expressing solvable antigens *in vitro*; based on this they have prepared single/multiple antigenic peptides and further obtained monoclonal antibodies of Ebola and Marburg virus with good specificity and high affinity. Also, WIV has programmed a species of yellow fever virus that can express Ebola GP proteins, and accordingly conducted immunity experiments in mice.

Notably, WIV researchers detected antibodies of Ebola-like virus in a number of bat species when conducting epidemiological studies on emerging virus carried by bats in 2012. Given the theory that bats could be possible natural hosts of Ebola virus, the researchers warned that this might suggest that bats in China could carry filiform virus related to Ebola.

### Temporary Barriers

Due to its formidable fatality rate, Ebola virus is listed among the most dangerous viruses, therefore any operation on living Ebola virus has to be conducted in a biosafety level-4 (BSL-4) facility, which is, at least for the time being, not available for WIV scientists.

“On the other hand, clinical samples like Ebola-positive blood serum and a team of well-trained staff for research,



PCR and analysis equipment at WIV for the development of diagnosis techniques.

supportive activities and management, are both of vital importance for effective and safe research on Ebola virus,” Director CHEN adds: “Shortage of special supplies of necessary clinical samples, lack of experienced researchers, supporting staffs and managers, and absence of continuous financial support are major difficulties we are now facing.”

Encouragingly, a new CAS Key Lab has been approved to set up at WIV. Taking advantage of a cluster of high-BSL R&D platforms, this Key Lab will endow WIV with further enhanced forces for research in identification of antigens, development of new diagnosis techniques, infection and pathogenic mechanisms, animal models, anti-virus medicine and vaccines, and biosafety evaluation.