Rabies is considered a major communicable disease threat to animal and human health. The disease has one of the highest case-fatality rates of any infectious disease once clinical signs have appeared. The majority of rabies cases in animals and humans occur in sub-Saharan Africa, on the Indian subcontinent and in South-East Asia, but the disease is under-reported in many rabies-endemic countries. This fact alone demonstrates the need to build laboratory capability in rabies-endemic countries and ensure that systematic surveillance is undertaken and cases are reported accurately. Asia accounts for an estimated 31,000 human cases of rabies each year, most probably as a result of canine rabies. Of this estimated figure, China accounts for approximately 1,000 human rabies cases each year.

As rabies is one of the most important zoonotic infections of the 21st Century, the global elimination of rabies requires an interdisciplinary control strategy with the involvement of international organisations, working in collaboration with national governments. The principal goal, in order to reduce the human burden of rabies, is the elimination of rabies in dogs. If this goal were to be realised, it would result in a concomitant reduction of human mortality. In particular, it would have a demonstrable impact on childhood deaths, thus meeting one of the Millennium Development Goals of reducing child mortality.

The CVRI was established in 1949 and merged with the Academy of Military Medical Sciences in Beijing in 1953. In 1964, the entire institute was separated from the Academy of Military Medical Sciences and moved to Changchun, the capital city of Jilin Province, to merge with the Veterinary College of the People’s Liberation Army as its only affiliated institute. In 2004, the college was merged with Jilin University. To extend its veterinary services to disease prevention and control in livestock, poultry and wildlife, the CVRI joined the Chinese Academy of Agricultural Sciences (CAAS) in 2005 and is now affiliated to CAAS.

At the beginning of the OIE Twinning Project, the institute was located on the campus of Jilin University. In order to improve its infrastructural facilities and functions, and meet the growing demands for veterinary research and animal disease control at the national and international level, the national government has invested in constructing a brand new institute to replace the existing building. The new institute occupies a site on the outskirts of Changchun, close to other research facilities.
In 2004, the Diagnostic Laboratory for Rabies (DLR) and Wildlife Associated Zoonoses at the CVRI was established by the Ministry of Agriculture (MoA), China. This year marks the ten-year anniversary of the DLR. The laboratory plays a pivotal role in dealing with rabies outbreaks, laboratory diagnoses, surveillance and rabies control strategies.

In 2006 and 2010, following a request by the MoA, the DLR organised two National Training Programmes for Rabies Diagnostic Techniques. These workshops enabled laboratory technicians from all provincial Centres for Animal Disease Control and Prevention to receive training. Since 2009, the DLR has also provided annual rabies technical training for the Macao Special Administrative Region. As a demonstration of the successful outputs from the laboratory, it is estimated that more than 20,000 brain and saliva specimens of animals, including dogs, bats, cats, cattle, sheep, raccoon dogs, foxes and camels, have been tested. Over 60% of the research staff of the CVRI possess a PhD and DVM qualification. The institute therefore forms a very important part of the national veterinary network and has been granted qualification status by the Ministry of Education for postgraduate education in veterinary science. It also has postgraduate training programmes offering PhD and MSc degrees, and in addition is an authorised institute for the enrolment of post-doctoral fellowships.

The OIE Twinning Project began in 2009, with the United Kingdom Animal Health and Veterinary Laboratories Agency (AHVLA Virology Department) acting as the parent and hosting organisation. AHVLA has been recognised as an OIE Reference Laboratory for rabies since 2008.

The objectives of the OIE Twinning Project were:
- to increase knowledge and preparedness for rabies in China and Europe by sharing information, transferring technology and providing knowledge management skills
- to harmonise methods for rabies diagnosis in Chinese provinces, to comply with OIE standards.

Dr Changchun Tu commented that: ‘The OIE Twinning Programme has contributed to the persistent decline of human rabies mortality in China since 2009, and has significantly benefited the capability-building of our rabies laboratory and the successful application of diagnoses and mass dog vaccination in the endemic areas’.

In 2011, AHVLA organised an ethics workshop, which included the subject of ethical use of animals in research. The issue of welfare standards for animals under experimentation has improved significantly throughout China over the last five years, with legislation now in place to govern such issues. The ‘3Rs’ principles – to replace animals used in research with non-animal alternatives wherever possible; to reduce the number of animals used to the minimum needed to achieve the results sought; and, for those animals which must be used, to refine the procedures as much as possible to minimise their suffering – have now been established in Chinese law, with which institutes are legally required to comply.

During the past three years, through training workshops, laboratory visits and mentoring, the scientists at the CVRI laboratory have been trained in the following diagnostic techniques for rabies virus:
- the removal of brain samples using the straw technique
- the preparation and storage of RNA from tissue samples
- reverse-transcription polymerase chain reaction (RT-PCR), including an introduction to reverse-transcription loop-mediated isothermal amplification
- technology transfer of OIE-prescribed tests, particularly the cell culture test and the fluorescent antibody test (FAT)
- detecting antigen in fixed tissue using in-situ hybridisation
- an introduction to antibody detection using pseudotype viruses
- participation in international rabies ring trials and proficiency tests
- the establishment of OIE standard methods
- improvements to ethics, safety and quality standards.

Since 2012, the DLR has been providing technical assistance, support and international consultancy, and it effectively and actively carries out the tasks assigned by the OIE and its regional representatives in Asia.
In 2012, the DLR hosted a workshop on rabies diagnostic techniques for scientists from the Rabies Vaccine Production Laboratory in Nepal. In addition, serological testing for measuring rabies-specific antibodies in animals has been instigated at the DLR. As a result, the DLR is now testing increasing numbers of canine sera samples, and was recently requested to test antibody titres against rabies for vaccinated giant pandas. Vaccination certificates for two giant pandas (Xinghui and Haohao), now living in Belgium, were issued. At present, the DLR receives approximately ten dog serum samples per week for serological testing.

With the initiation of the OIE Twinning Project, and the move to the new campus, the institute has now begun the process of national quality accreditation, overseen by the China National Accreditation Service. Administrators and staff in the institute, in particular those working in the area of rabies diagnostic veterinary services, have taken on various responsibilities aimed at achieving quality accreditation. Many areas of the work undertaken at the DLR are progressing towards compliance with the ISO9001:2008 and ISO17025 quality standards. The institute is progressing towards national quality accreditation, which should be achieved by 2015.

In 2012, the DLR passed an international laboratory comparison test organised by the European Union Reference Laboratory for rabies Serology (Nancy, France) and demonstrating proficiency in rabies serological testing.

In 2013, Dr Changchun Tu participated in an FAO/OIE mission as the laboratory specialist to assist Vietnam with the prevailing rabies situation. He also gave assistance and presentations on rabies at meetings organised by the OIE Sub-Regional Representative for South-East Asia and the Regional Representative for Asia and the Pacific, at their request.

At the request of the OIE Sub-Regional Representative for South-East Asia, a regional rabies diagnosis workshop for participants from all ten Member Countries of the Association of Southeast Asian Nations (ASEAN) was held in Changchun from 18 to 22 August 2014.

Since 2012, when the CVRI was accredited as an OIE Reference Laboratory for rabies, the surveillance and rabies investigation studies undertaken there have been more in line with international standards, while still asking pertinent scientific research questions that address important national and regional issues.

Prof. Anthony Fooks, Head of the AHVLA National Rabies Laboratory and an OIE expert for rabies, concludes: ‘The OIE twinning experience has benefited both laboratories and has enabled a strong collaborative relationship of mutual trust, friendship and cooperation to flourish’.

Dr Huancheng Guo, setting up a PCR reaction

Changchun Veterinary Research Institute, OIE Reference Laboratory for rabies