

**The Role of the Australian Biosecurity Cooperative Research Centre (AB-CRC)
in combating Emerging Infectious Disease threats in the Pacific Basin**

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Australian Cooperative Research Centres

- **An Australian Government initiative which commenced in 1991**
- **Designed to encourage collaboration between research providers and users**
- **Core government funding of approximately \$20M over a 7 year period with the opportunity for extension for some**
- **Intended that research centres would eventually stand alone or terminate**
- **Originally only for science based research**
- **Currently 48 CRCs one of which is the AB-CRC which was established 6 years ago**

The AB-CRC Mission

To protect Australia's public health, livestock and wildlife from new and emerging infectious diseases through research and education and in doing so strengthen national capability to:

- * Develop rapid and accurate detection and identification systems**
- * Understand how emerging infectious diseases spread and the role of vectors and wildlife**
- * Have available tools for efficient and effective surveillance**
- * Assess the extent and impact of emerging infectious diseases**
- * Improve the predictability of disease entry and establishment**

Distinguishing features of the AB-CRC

- **Built upon the one health concept**
- **Strong international network**
- **Rapid and successful application of research outcomes**
- **Harmonious and enduring research collaboration**
- **Large portfolio of post graduate students**
- **Positive interaction between research providers and users**

Four examples of research outcomes relevant to the Pacific Basin

- **Influenza**
- **Severe Acute Respiratory Syndrome (SARS)**
- **West Nile Virus (WNV)**
- **Henipavirus (Nipah and Hendra)**

Influenza

- In 2004 a highly pathogenic strain of type A avian influenza (H5N1) occurred in Asia
- Concern that this virus could combine with human influenza and cause serious epidemic
- The AB-CRC developed a rapid diagnostic PCR test for type A influenza viruses which was adopted by all Australian states and some South East Asian countries
- The same test was used to diagnose Equine influenza when it entered Australia in 2007 and was instrumental in achieving quick eradication
- The PCR test is currently being used for surveillance for Influenza type A in Australia and certification of disease freedom

Severe Acute Respiratory Syndrome (SARS)

- SARS was the first major human infectious disease of the 21st century (2003) and is caused by a newly emerged coronavirus
- Early studies suggested the virus was not of human origin but the source was unknown
- The AB-CRC developed a diagnostic test which involved using a part of the virus protein incorporated into a bacterial system which not only was able to be used to screen a wide range of animal species but also avoided having to use live virus
- This test established that the most likely source of the coronavirus was bats

West Nile Virus (WNV)

- **WNV is a mosquito borne virus which has recently become endemic in north America and has caused significant disease in humans, wild birds and horses**
- **WNV has not been recorded in Australia although the mosquito vector (Culex and Aedes) is present**
- **Corvidae (ravens and crows) in North America are especially susceptible to WNV**
- **The AB-CRC tested a local corvid (little raven) for susceptibility and although infection did occur there was no clinical disease**
- **Other avian species in Australia may be more susceptible and provide a source of virus buildup.**

Henipavirus (Nipah and Hendra)

- **Two new and closely related henipaviruses (Nipah and Hendra species) have been identified in the last 10 years.**
- **Nipah was recorded in Malaysia in 1999 and resulted in human(105) and pig mortalities. Bangladesh and India have also recorded outbreaks**
- **Hendra was recorded in Australia in 1994 and there have since been 11 outbreaks with human (4) and horse mortalities.**
- **Fruitbats (flying foxes) are symptomless carriers for both Nipah and Hendra**
- **Transmission to humans from bats is via pigs (Nipah) and horses (Hendra)**
- **The AB-CRC has identified risk factors associated with henipavirus infection and is also developing a diagnostic test to distinguish between the Nipah and Hendra species**

The future of national collaborative biosecurity research

- **A need for an on-going biosecurity research organisation has been established**
- **International linkage important**
- **An emphasis on zoonotic new and emerging infectious diseases**
- **A strong predictive element**
- **Driven by user needs**
- **Training and application essential component**
- **Harmonious partnership between research users and providers**