HONOURS PROJECTS IN VIROLOGY COMMENCING 2013
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Molecular biology of viruses: Viruses cause the majority of illness worldwide. Important projects in the Virology Research Laboratory are available in basic and applied molecular and cellular virology. All of these involve training in molecular methods, protein chemistry, statistics and sequence analysis. The studies are funded by the NHMRC, ARC, Cancer Council, charitable and industry grants.

Program 1: CMV pathogenesis, placental infection and stillbirth. 1 place available
Project leader: Prof Bill Rawlinson, 9382 9113, w.rawlinson@unsw.edu.au; Dr Jenna Iwasenko, 9382 9096, jenna.iwasenko@sesiahs.health.nsw.gov.au

Human cytomegalovirus (CMV) is now the leading viral cause of malformation and disease in newborns. CMV also causes significant morbidity and mortality in immunocompromised individuals such as transplant recipients receiving immunosuppressive therapy, and can be further complicated by the development of resistance to the antiviral agents used to treat these infections. We have studies of the pathways of CMV transplacental transmission in humans, factors influencing disease outcomes in infected individuals and viral mutations that confer antiviral resistance.

We have detected cytomegalovirus and other infectious agents in stillborn babies. This project will investigate the proportion of stillbirths where viruses, cell-wall deficient bacteria and anaerobic organisms are present, demonstrate the location of the infecting agent/s from the placenta and tissues from stillborn babies and investigate the host protein changes associated with CMV infection and transplacental transmission of CMV.

Selected articles:

Program 2: Enterovirus infections and type 1 diabetes. 1 place available
Project leader: A/Prof Maria Craig, 9113 3637, m.craig@unsw.edu.au; Dr Ammira Al-Shabeeb Ammira_k@unsw.edu.au, 9382 9096

Type 1 (insulin dependent) diabetes (T1D) is increasing in childhood and we do not know why. The rise has occurred rapidly, suggesting a major role for environmental factors in T1D aetiology. Enteroviruses (EV) are among the most common viruses affecting children and are strongly associated with T1D. We have found EV infections are more prevalent in children who develop islet autoantibodies (an early marker of diabetes) and at onset of T1D, compared with controls. This study will investigate the molecular epidemiology of EV isolates in children at risk of developing diabetes and at diabetes onset.

Selected articles:
• Craig ME, Howard NJH, Silink M, Rawlinson WD (2003) Reduced frequency of HLA DRB1*03-DQB1*02 in children with type 1 diabetes associated with enterovirus RNA. Journal of Infectious Diseases 187(10):1562-157

Program 3: Molecular mechanisms for enterovirus induced beta cell lysis. 1 place available
Project leader: A/Prof Maria Craig, 9113 3637, m.craig@unsw.edu.au; Dr Ammira Al-Shabeeb Ammira_k@unsw.edu.au, 9382 9096

Enterovirus (EV) infection is a major environmental factor in the aetiology of type 1 diabetes. Little is known about the mechanisms by which these viruses induce apoptosis and/or functionally impair pancreatic β-cells. We have recently shown that EV infection induces cytokine and chemokine production by β-cells and alter the abundance of microRNAs that are important for immune response to viral infection and cell signaling pathways. This project will apply a wide range of molecular techniques to investigate how enteroviruses induce cellular and functional damage to β-cells, using insulin producing human cell lines and human islets.
Selected articles:


Program 4: Respiratory Viruses. 1 place available  
Project leaders: Prof Bill Rawlinson, 9382 9113, w.rawlinson@unsw.edu.au and Dr Sacha Stelzer-Braid, sacha.stelzer-braid@sesiahs.health.nsw.gov.au

Respiratory infections are a common cause of illness and an important cause of death in the community. The recent H1N1'09 pandemic ('swine flu') showed there is much to be understood about the transmission and containment of respiratory viruses. Using novel methods developed in collaboration with researchers at The Woolcock Institute and The University of Sydney, we collect viruses from mucus and aerosols produced by patients with chronic respiratory diseases suffering respiratory infections, and detect these viruses using molecular PCR and real-time assays.

We are interested in examining:

- Bio-aerosol production over the time course of a natural respiratory virus infection
- The role of respiratory viruses in exacerbation of chronic airway diseases (e.g. asthma, cystic fibrosis)
- Mechanisms of respiratory virus transmission in the environment

Selected articles:


Program 5: Clinical molecular diagnosis of blood-borne virus transmission. 1 place available  
Project Leader: Dr Cristina Baleriola, 9382 9135, cristina.baleriola@sesiahs.health.nsw.gov.au

Research projects include the development and evaluation of real-time molecular techniques for the rapid characterization of blood-borne viruses (HIV, HCV, HBV and CMV) and use of these tests in investigating cases of transmission, particularly in health-care settings, and tissue and organ transplantation.

Selected articles: