New group leader at MIMS: Anna Överby

Another young group leader will join MIMS soon! Anna Överby, currently working at the Institute of Medical Microbiology and Hygiene in Freiburg, Germany will start setting up her laboratory at MIMS in January 2011. Highly motivated post-docs and PhD students are strongly encouraged to contact her by email to anna.overby@mims.umu.se. The official job announcements will be published soon on the web pages of Umeå University and MIMS.

Tick borne encephalitis virus (TBEV)

Tick borne encephalitis virus (TBEV) is an important emerging human pathogen. The virus infection causes a broad spectrum of symptoms ranging from mild infections to more severe symptoms such as meningitis, encephalitis, and hemorrhagic fever associated with high mortality rates. The severity of the symptoms is strain dependent. Whereas TBEV strains from Central Europe often cause milder disease, strains from Siberia and Far Eastern frequently lead to more severe symptoms. The molecular mechanism underlying this virus strain dependency remains elusive. Therefore, we are interested in identifying potential molecular strain differences and correlating them with pathogenicity.

Specific antiviral drugs are still not available and treatment of patients is limited to supportive care only. Although an effective vaccine is available, the number of clinical TBE cases is increasing both in Sweden and all over Europe.

Research projects

TBEV is a positive-strand virus belonging to the family of flaviviruses. Clearance of other flaviviruses has been associated with a key player of innate immunity, the antiviral interferon system. However, the interactions of TBEV with the interferon system are only poorly characterized, which is exactly what Anna Överby will focuses on.

The lack of treatment options raises concerns, especially in the face of increasing cases of TBE both in Sweden and all over Europe. Interestingly, interferon (IFN) treatment has been shown to be effective against hepatitis C virus and other flaviviruses have been shown to be IFN sensitive in vitro. IFN treatment triggers the antiviral IFN system, a powerful and universal intracellular antiviral defence system. Following virus infection of the host cell, double stranded RNA, which is produced as a side-product of replication, is recognized by pattern recognition receptors (PRRs). This recognition subsequently leads to activation of the transcription factor IRF-3 which induces IFN production. Secretion of IFN causes the neighbouring cells to produce IFN-stimulated genes (ISGs) with a potent antiviral effect.
Inhibition of flaviviruses by specific ISG products has been shown for the flaviviruses WNV and HCV. Hence, pretreatment with type I IFN supresses growth of flaviviruses in cell culture. However, TBEV contains the NS5 protein, which efficiently counteracts IFN signalling, thereby rendering the virus insensitive to IFN treatment after infection. This resistance against IFN treatment calls for new strategies to inhibit TBEV after an established infection. Therefore, alternative antiviral approaches will be investigated in my group.

In conclusion, the objectives of Anna Överbys new research group will be

- to correlate potential molecular TBEV strain differences with pathogenicity
- to identify the specific ISGs which may affect TBEV growth,
- to identify new antiviral approaches to counteract TBEV.

**Relevant publication**


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