

DEVELOPMENT OF NOVEL THERAPEUTICS FOR HAND, FOOT AND MOUTH DISEASE

A novel treatment for hand, foot and mouth disease by blocking the binding of enterovirus to human cells.

Hand, foot and mouth disease (HFMD) is caused by several members of the Picornaviridae family, primarily by members of the Enterovirus genus such as enterovirus 71 (EV71).

EV71 infects mainly young children under 5 years of age, causing mild rashes on the hands, feet and mouth. In some cases, more frequently seen in the Asia-Pacific region, EV71 can invade the central nervous system (CNS) and cause severe neurological infections such as polio-like flaccid paralysis, encephalitis and aseptic meningitis.

There are currently no drugs on the market to treat HFMD caused by EV71.

The Technology

Researchers at the Institute for Glycomics have now developed potent small molecule inhibitors of the EV71 virus which could be used as a potential treatment for HFMD.

These innovative drug candidates are the first EV71 inhibitors to be based on a carbohydrate template. Initial studies suggest they have an excellent toxicology profile and are relatively easy and cheap to produce. More importantly, our most potent lead compound is able to block EV71 binding to cells at clinically relevant nanomolar concentrations, making it an exciting therapeutic prospect.

Potential HFMD Market

Hand, foot and mouth disease has a significant impact on the community, with EV71 causing sporadic outbreaks in developed and developing nations.

In China alone, there were some 9 million cases of HFMD reported between 2008 and 2013, with nearly 2,500 confirmed deaths. A recent study estimated that the annual economic burden in China of mid EV71-associated HFMD is about US\$161-323 million. Additionally, that does not account for the costs associated with severe and fatal illness, long-term sequelae, and cases managed outside of the healthcare system.

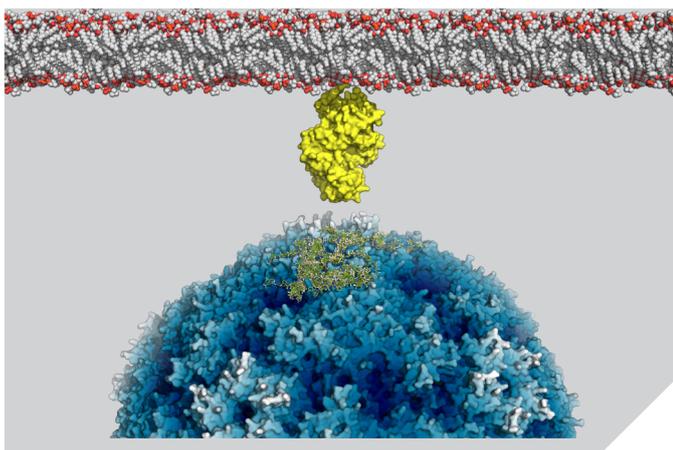
The China 2030 Health Blueprint has identified children as a priority group that are in need of improved healthcare services. HFMD is a significant and common disease that effects millions of Chinese children every year.

Intellectual Property

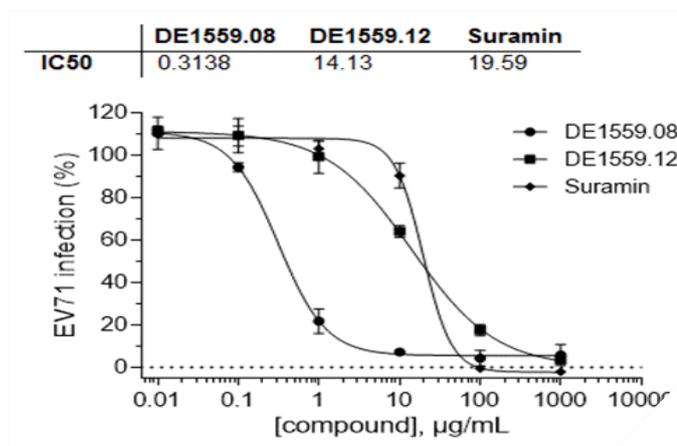
We have developed a suite of inhibitors of EV71, which remain proprietary and confidential at this stage, with the view to patent in the near future.

Technology Development Status

With a strong lead series of potent molecules in hand, the immediate next steps of the project are to conduct lead optimisation, animal efficacy and preclinical toxicology. Our research team has the capacity to undertake pilot scale-up and



Carbohydrate inhibitors (green) block the EV71 virus (blue) from being able to bind to the SCARB-2 receptor (yellow) on the cell surface.



Lead drug candidate DE1559.08 inhibits the EV71 virus from entering human endothelial cells some 60-times more effectively than the published drug suramin.

have the expertise to manage technology transfer of chemistry processes to GMP manufacturing facilities en route to clinical trials.

Opportunity for Partnership

The Institute for Glycomics has a track record of technology translation.

For many years it has been strongly engaged with Chinese organisations including the Chinese Academy of Sciences in Beijing and Shanghai. Professor von Itzstein AO and Professor George Gao (CAS) have participated in a long-term collaboration on influenza research.

The Institute has existing commercial relationships with Chinese biopharmaceutical companies including the co-development of a vaccine technology with a Chengdu-based industry partner.

We are now seeking partners to co-develop and license this HFMD technology.

Contact us

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Research Leader

Professor Mark von Itzstein AO is widely recognised as a world leader in antiviral drug discovery, glycobiology and glycochemistry.

He led the discovery of the world's first influenza drug Zanamivir, now marketed by GSK with sales reaching US\$1.1 billion per annum.

Professor von Itzstein's use of a carbohydrate template to make an anti-viral drug was revolutionary and he continues to publish in leading journals such as *Nature Chemical Biology*.



About us

The Institute for Glycomics is a flagship biomedical research institute at Griffith University's Gold Coast campus in Queensland, Australia.

The Institute is one of only six of its kind in the world and has a strategic focus on translating drug and vaccine discovery research into clinical outcomes.

We have a strong track record in commercialisation and industry engagement, and our research leaders and business personnel have extensive experience in developing technologies for the commercial market.

With over 200 multidisciplinary researchers and support staff, the Institute for Glycomics is well positioned to deliver tangible clinical solutions for infectious diseases and cancer.

