Griffith UNIVERSITY
Institute for Glycomics
Queensland, Australia

# Development of Novel Therapeutics for Parainfluenza

## Potent lead drug candidates to treat the major causitive agent of potentially deadly human parainfluenza.

Human parainfluenza virus types 1 to 3 (hPIV-1, 2 and 3) are the leading cause of upper and lower respiratory tract disease in infants and young children. It is estimated that hPIV may cause at least one-third of the five million cases of lower respiratory tract infections that occur each year in children below 5 years in the United States. Symptoms of parainfluenza can be similar to that of other lower respiratory tract infections. Commonly paediatric patients present with fever, laboured breathing and a rough barking cough (croup).

Apart from being significant childhood pathogens, hPIV-1 and hPIV-3 also cause severe respiratory symptoms in the elderly and immune-compromised patients, with mortality rates reaching ~50%. Infections attributed to hPIV represent a substantial socioeconomic burden to health systems around the world. **There are currently no antiviral therapies available to treat hPIV infections.**

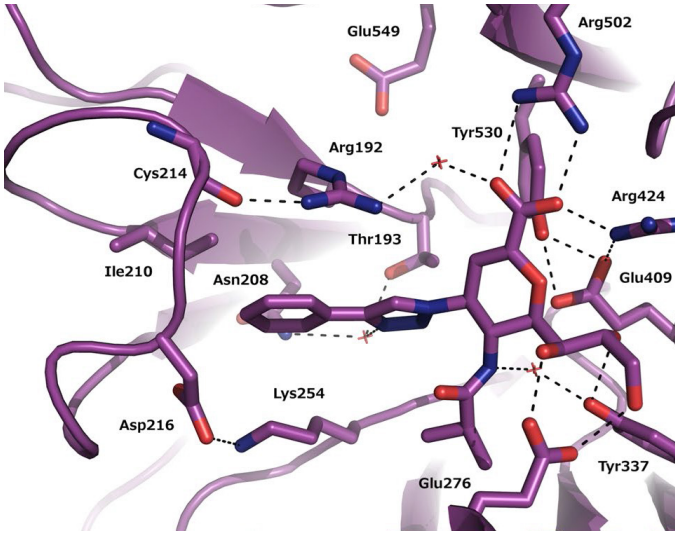
The parainfluenza virus surface glycoprotein, haemagglutinin–neuraminidase (HN) plays a role in binding to *N*-acetylneuraminic acid-containing glycoconjugates on the surface of host cells, initiating fusion and facilitating the release of progeny virus. The essential triple role of HN in viral pathogenesis makes it an ideal target for the development of hPIV-specific therapeutics.

## *The Technology*

At the Institute for Glycomics, we have successfully used structure-informed design, synthesis, biological evaluation and structural biology to develop novel inhibitors of human parainfluenza virus HN. Using our significant experience in carbohydrate chemistry, we have synthesised, in less than 10 steps, a large suite of patented novel inhibitors from commercially available starting materials in very good overall yield. **We have lead compounds an order of magnitude more active than the most potent published inhibitors of hPIV.**

## *hPIV Market*

Infections of the respiratory tract remain the deadliest communicable disease worldwide, causing more than 3.2 million deaths in 2015 alone. Yet therapeutics for viruses that mainly cause lower respiratory tract infections are drastically underrepresented in the pharmaceutical market. With no hPIV treatment currently on the market,




Through a comprehensive structure-guided design and synthesis program, we have developed a potent suite of hPIV inhibitors.

there is a clear unmet clinical need and market opportunity for a hPIV therapy.

By age 5, all children have been infected with hPIV and the virus is the root cause of 11% of paediatric hospitalisations from respiratory tract infection. In China, up to 15% of acute respiratory infections are attributed to infection with hPIV. Overall the incidence rate of parainfluenza has been estimated to be 979 cases per 10,000 people.

A first-to-market treatment for hPIV would capture a considerable market within the paediatric healthcare setting. Extrapolating the confirmed cases of hPIV to the population in the developed world and assuming treatment of one third of patients, estimates suggest that peak sales of a hPIV therapeutic may reach blockbusters status.

## *Intellectual Property*

Griffith University has filed a PCT application on a unique hPIV inhibitor template, which has been granted in the USA and is currently being examined in other jurisdictions.

Title: Antiviral Agents and Uses Thereof, WO2016/033660A1

## *Partnering Opportunity*

**We are now seeking a partner to co-develop and license this technology.** A 2-year co-development program would be conducted by the parties with the option for a 1 + 1-year extension. The program would constitute lead optimisation with the view to progress a lead candidate molecule to clinical evaluation. The technology is offered on an exclusive global licence arrangement.

## *RESEARCH LEADER*

**Professor Mark von Itzstein** 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. Prof. 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 worldwide 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 230 multidisciplinary researchers and support staff, the Institute for Glycomics is well positioned to deliver tangible clinical solutions for infectious diseases and cancer.

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