CBMNet
CROSSING BIOLOGICAL MEMBRANES NETWORK, A BBSRC NIBB

The University Of Sheffield.

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BBSRC

Optimization of influenza vaccine manufacturing through modification of cellular membrane organization

The Challenge

Influenza (flu) is a very common, highly infectious disease caused by a virus, with an average of 600 people a year dying from complications of flu in the UK. In addition, flu leads to hundreds of thousands of GP visits and tens of thousands of hospital stays a year.

Flu is a vaccine preventable disease., however, the flu virus is very variable and changes over time. Each year there are different strains around, and a new vaccine has to be prepared to deal with them. One of the difficulties in the production of Influenza virus vaccines is that the virus is pleomorphic, capable of forming both spherical and filamentous virions.

Viral morphology has a pronounced effect on vaccine development, as filamentous virions are not amenable to existing purification methodologies and thus the morphology of a vaccine candidate can result in significant costs and delays in vaccine manufacturing.

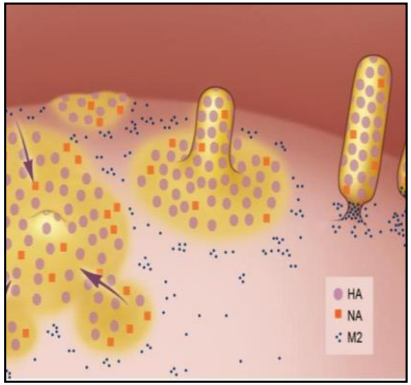
The challenge is to develop a system in which influenza vaccines can be produced with a defined morphology, thus enhancing manufacturing efficiency.

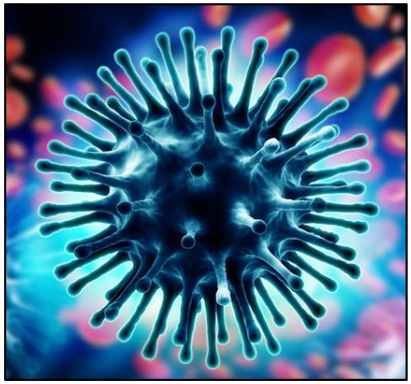
The Research

Dr Jeremy Rossman is a Senior Lecturer in the School of Biosciences at the University of Kent. The research in his laboratory focuses on understanding the interactions of viruses with host cell membranes. He uses a wide range of biological systems in order to better understand how viruses are formed in artificial models and cellular membrane systems.

MatTek Corporation is at the forefront of tissue engineering and is a world leader in the production of innovative 3D reconstructed human tissue models

Dr Rossman was awarded a Business Interaction Voucher with MatTek, based in Massachutes, USA. This project used 3D differentiated human airway cell models in order to investigate the effects of cell differentiation and membrane organization on viral morphology.





CBMNet Business Interaction Voucher

The Result

This research was completed by Dr Rossman and a recent PhD graduate from the School of Biosciences, Dr Agineska Martyna.

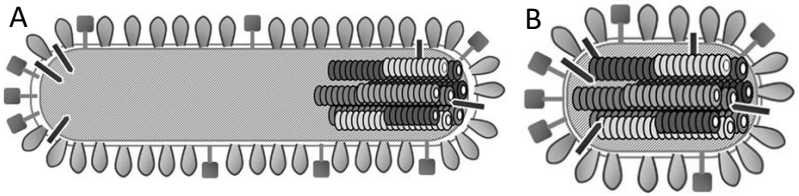
Dr Rossman's results showed that 3D differentiated airway model cells can be infected with multiple strains of influenza virus. It was observed that the morphology and replicative capacity of influenza virions is dependent on the type of human airway cells.

These results suggest that it may be possible to grow influenza vaccines in a defined cellular environment that prevents the formation of filamentous virions.

The Future

The results received from this project will lead to further collaboration between Dr Rossman and MatTek, for example further funding may be sought from the Medical Research Council funding in order to develop and optimize new human cell lines for the growth of influenza vaccines.

Dr Rossman and scientists from MatTek are continuing their investigation of cell-dependent viral morphology and are preparing their research results for submission to a peer-reviewed scientific journal.



Flu virions:
(A) Filamentous
(B) Spherical

This project was funded through the Crossing Biological Membranes Network (CBMNet) by the Biotechnology and Biological Sciences Research Council (BBSRC)

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"A BIV from CBMNet has enabled me to solidify a new collaboration and to generate the preliminary data necessary to apply for a full RCUK Investigator Award"

Dr Jeremy Rossman
University of Kent

"Funding from CBMnet has facilitated the building of a new industry-academic partnership and allowed us to expand the applications of our tissue models."

Dr Anna Maione
MatTek Corp