

# Mathematicians help unlock secrets of the immune system

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A group of scientists, led by mathematicians, has taken on the challenge of building a common model of immune responses. Their work will radically improve our understanding of the human immune system by allowing all the scientific disciplines working on it to have a common reference point and language.

The mathematicians, funded by the Biotechnology and Biological Sciences Research Council (BBSRC), will investigate how the different cellular components of the immune system work together and devise a theoretical and computational model that can be used by immunologists, mathematicians, computer scientists, physicists and engineers.

The model promises to help a multi-disciplinary research community work together to bring about medical advances for patients. The project, the Immunology Imaging and Modelling (I2M) Network, is highlighted in the quarterly research highlights magazine of the Biotechnology and Biological Sciences Research Council (BBSRC) this week.

The immune system is one of the most fascinating and complex systems in the human body and scientists still do not fully understand how it works. Immunology has traditionally been a qualitative science, describing the cellular and molecular components of the immune system and their functions. However, to advance our understanding of how the body fights disease there is a pressing need to better understand how the components work together as a whole and provide this information in a quantitative format which can be accessed by the entire scientific

community.

Dr Carmen Molína-Paris, network co-ordinator and researcher at the University of Leeds, explains: “A multi and cross-disciplinary, cohesive and active approach is urgently required. The ability to track parasites and cells in real time using novel imaging techniques is allowing exciting new insights and will help us measure the interactions between the different parts of the immune system. This will provide a theoretical and computational model of the immune system, giving a complete picture that researchers from across all disciplines can refer to and draw upon.

“Mathematical immunology is maturing into a discipline where modelling helps everyone to interpret data and resolve controversies. Most importantly, it suggests novel experiments allowing for better and more quantitative interpretations.”

Steve Visscher, interim Chief Executive of BBSRC commented: “The new insight that this model will provide will naturally benefit the patient with the advances in healthcare it will lead to. BBSRC is committed to developing an active and cohesive cross-disciplinary community at the mathematics biology interface to enable a more quantitative and predictive biology.”

Source: Biotechnology and Biological Sciences Research Council

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