

Current Research

Meningitis UK's focus is to develop a vaccine to eradicate all forms of meningitis and associated diseases through research based exclusively in the UK. Established Research Groups at Institutions across the country are invited to apply for Grant Aid on an annual basis.

Since the charity's inception in 1999, Meningitis UK has invested over £2 million into meningitis research. Our Scientific Medical Advisory Panel, made up of top scientists within the field, use their expertise to assess applications for funding and provide advice on policy and strategy.

Meningitis UK is also a member of the Association of Medical Research Charities (AMRC) - the leading umbrella organisation representing medical research charities. We are also a member of the Confederation of Meningitis Organisations, which consists of over 20 member organisations worldwide and provides an excellent opportunity to learn and share best practices.

New Research Projects

Since we launched our Search 4 a Vaccine Campaign last April, we have committed to funding three new ground breaking research projects which will take us closer to our goal:

Identification of meningococcal antigens associated with development of cross-reactive immunity following colonisation and infection

December 2007 to December 2009 - Prof. John Heckels, University of Southampton

Professor John Heckels and his team at the University of Southampton are fortunate enough to have rare blood samples taken from individuals 'before and after' they become carriers of the meningitis bacteria. They plan to compare these to identify the antigens which trigger the successful production of antibodies, which in most people provide immunity when exposed to the Meningitis B bacteria. This will provide information about which fragment of the meningococcal bacteria could be used in a vaccine to protect against Meningitis B in the future.

Total cost £117,627

Vaccine potential of meningococcal secreted proteins

January 2008 to January 2010 - Dr Karl Wooldridge, The University of Nottingham

At the University of Nottingham, Dr Karl Wooldridge will use microbiology methods to discover more about a tiny protein secreted by the Meningitis B bug which collects on its surface and is accessible to antibodies. Dr Wooldridge and his team have already proved through previous studies that these proteins not only provide immunity against the infecting strain, but also against other strains.

Their experience of vaccine candidates based on single proteins shows that no single antigen is likely to protect against all strains of Meningitis B, so they expect future vaccines to consist of several proteins which, between them, will generate cross-protective immunity against all strains. The main objective of their research is to assess the potential of secreted proteins as components of future multi-component vaccines.

Total cost £148,726

Dr Karl Wooldridge in the laboratory



Research Assistant Jenny Williams, Prof. John Heckels and Dr Myron Christodoulides



Meningitis can KILL in under 4 hours

Microserological determination of *N. lactamica* induced cross-protective meningococcal immunity

January 2008 to January 2010 - Dr Nigel Saunders, University of Oxford

We are delighted to be working with a team at the University of Oxford, where Dr Nigel Saunders will utilise cutting-edge technology. With previously available sampling methods, the concentrations of antibodies were too low to be measured but Dr Saunders and his team have developed a new method which is up to 10,000 times more sensitive and will therefore measure the antibodies. The research team plan to use this to investigate blood samples from current clinical trials delving deeper into them than was previously possible, and hopefully discovering new proteins which were previously too small to detect.

Total cost £156,512

Dr Richard Capper, Postdoctoral Research Assistant, Dr Ray Owens, Collaborator and Head of the Oxford Protein Production Facility, and Dr Nigel Saunders, Lead Investigator



Dr Richard Capper working with one of the two highly-sensitive protein array printers in Dr Pollard's laboratories



Ongoing Research Projects

The following projects are also making great strides and the Chairman of our Scientific Medical Advisory Panel, Dr Paul Langford, will report on the progress they have been making, during his speech.

A protein vaccine against serogroup B meningococcal disease: from first proof in principle to phase I clinical trials

June 2007 to June 2009 - Dr Andrew Pollard, Dr J Derrick, Prof Ian Feavers and Prof M Maiden, University of Oxford

After the great success of their recent study into the development of a Meningitis B vaccine, Dr Pollard and his colleagues aim to progress their research in this project, to find a suitable vaccine to protect against the most prevalent strain of meningococcal bacteria currently in the UK - Group B.

Previous investigations into creating a Meningitis B vaccine have included the use of protein molecules which can be found on the outer surface of the meningococcal bacteria, but unfortunately, these studies have been hampered as the molecules vary between the different families of the meningitis B bacteria. Dr Pollard, and his co-workers have, however identified one protein which has limited variability within the families, suggesting that this protein might be a good vaccine candidate.

In the last study funded by Meningitis UK, the team were able to manufacture these proteins and although challenges had to be overcome in this process, they have now produced the proteins which can stimulate the production of antibodies against them, and which kill serogroup B meningococci. This is an important advancement in the development of a vaccine, as a successful vaccine candidate is thought to have to stimulate the production of antibodies that kill the bacteria. In addition to evaluating the suitability of this protein in creating a vaccine, important questions on how these proteins affect our immune cells can also be addressed.

Dr Pollard said: "We have now come to some very exciting and positive outcomes, our research has brought us to a point where we can see real progress being made. The data so far from the research and pre-clinical studies have been incredibly positive and have already shown it to be a promising candidate for a vaccine which is a major breakthrough.

"It means that human trials could take place in around three years. If all the testing goes well in these early trials in adults, it would still take some years to complete large scale studies in children to show that the vaccine could be used"

Total cost £105,941



Dr Andrew Pollard, Senior Lecturer in Infectious Diseases & Honorary Consultant Paediatrician at the University of Oxford



Looking at meningococci bacteria growing on an agar plate in Dr Pollard's laboratories

Meningitis can KILL in under 4 hours

Mechanisms of mucosal immunity to systemic immunisation with a meningococcal serogroup B outer membrane vesicle vaccine

January 2007 to January 2010 - Professor Robert Heyderman, University of Bristol

Professor Heyderman and his team are studying people's natural immunity to meningitis-causing bacteria. They hope that by understanding this, they will then be able to mimic the body's natural response to make a successful vaccine against Meningitis B.

The success of existing vaccines, for example the one which protects against Meningitis C, is in part due to their ability to produce 'herd immunity', so even people who have not received the vaccine are protected because carriage rates are reduced across the whole population.

Professor Heyderman's team believe that a successful Meningitis B vaccine not only needs to stop the harmful bacteria invading the body but also to reduce the carriage rates of the bacteria which normally live harmlessly in our noses and throats.

Professor Heyderman and his team will be looking specifically at mucosal immunity as it is this naturally acquired immunity which is believed to reduce carriage rates by preventing the bacteria from living in people's noses and throats. Through this research they hope to develop a vaccine which not only protects individuals from Meningitis B - but whole communities.

Total cost £200,000



Professor Robert Heyderman (back left) with his co-researcher Professor Neil Williams (back right), along with other staff at the laboratories

Human immune response to experimental colonisation with *Neisseria lactamica*

October 2006 to October 2008 - Professor Robert Read, University of Sheffield

Professor Robert Read and his team are looking at how harmless bacteria which live in the noses and throats of babies and young children might help the immune system to develop antibodies to protect against Meningitis B.

At any one time, the majority of the population is naturally immune to the meningitis-causing bacteria *Neisseria meningitidis*, with one in 10 of us having it living harmlessly in our noses and throats. This natural immunity is thought to be thanks to a harmless relative of *Neisseria meningitidis*, *Neisseria lactamica* which also colonise in people's noses and throats.

Previous studies suggest that a high prevalence of *Neisseria lactamica* is associated with a low incidence of meningococcal disease. Professor Read's team are going to inoculate *Neisseria lactamica* into the noses of healthy adults and then measure their immune response.

Although Professor Read thinks *Neisseria lactamica* is unlikely to be a vaccine candidate on its own, he and his team are confident that what they learn about how it stimulates the body's immune response will be invaluable in the search for a successful vaccine.

Total cost £205,062



Ciarad Evans, Clinical Research Fellow in the laboratory at the University of Sheffield



The *Neisseria lactamica* bacteria, which is a harmless relative of the meningitis-causing *Neisseria meningitidis* bacteria

Characterisation of serogroup CN meningitidis strains resistant to killing by anti-capsular antibodies

June 2006 to June 2008 - Professor Christoph Tang, Centre for Molecular Microbiology and Infection, London.



Analysing tissue in Professor Tang's laboratories

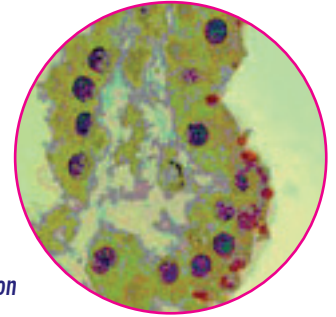
Professor Tang is looking at new strains of Meningitis C causing bacteria which may in time become resistant to the current vaccine. The Meningitis C vaccine introduced across the UK in 1999 for everyone aged under the age of 20 has been hugely successful, resulting in a 90 per cent reduction in cases.

But, as with all bacteria, the bacteria responsible for causing Meningitis C may change and develop new strains. Such changes may mean that the vaccine is no longer effective. Professor Tang hopes to identify any new strains which may exist and look at ways to prevent them spreading.

Total cost £93,717

An area of the brain responsible for the production of cerebrospinal fluid, which shows the meningococcal Group C bacteria (stained in red) adhering to the surface of cells

Picture courtesy of Imperial College, London



Developing new techniques to assess the nature and duration of protection immunity to pneumococcus after vaccination

November 2006 to October 2008 - Dr Helen Baxendale, Institute of Child Health, London

Dr Baxendale and her team are developing new techniques to measure how effective existing meningitis vaccines are, as well as how effective new vaccines might be.

In order to do this, Dr Baxendale's team are looking specifically at the new pneumococcal vaccine which has just been introduced into the Childhood Immunisation Programme across the UK. While the vaccine is known to protect young children from pneumococcal disease including pneumococcal meningitis - a very deadly form of the disease - it is not known exactly how long this immunisation lasts.

By developing new laboratory techniques, Dr Baxendale and her team will measure how a person's immune system responds over time to pneumococcal bacteria following immunisation by refining the technology used to analyse blood samples from children and adults. This will enable them to measure the duration of effective immunity and to understand why in rare cases immunisation may fail to protect someone from pneumococcal disease.

This information will enable better, longer lasting vaccines to be developed.

Total cost £99,989



Dr Helen Baxendale, Clinician Scientist of Infectious Diseases, Institute of Child Health, London

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