

Inflammation and Inflammatory Disease

Chronic inflammation drives diseases from rheumatoid arthritis, atherosclerosis and obesity to immune mediated tissue destruction and scarring of the liver and kidney. It is thus a major cause of chronic disease, morbidity and mortality in the UK. In Birmingham we are elucidating the pathophysiological mechanisms through multidisciplinary translational research. Our internationally recognised research in immune regulation, including cross-cutting expertise in cell trafficking and cellular interactions within tissue microenvironments, underpins a process driven analysis of human disease pathogenesis. The work is integrated with and supported by clinical studies of well-characterised patient cohorts. Knowledge gained from our research is being used to improve the delivery of treatment through the application of biomarkers to characterise, monitor and treat disease and the identification of new therapeutic targets. Our focus is on inflammatory diseases of the joint, eye, liver and kidney.

Our strong collaborative partnerships with local NHS Trusts throughout the West Midlands allow for rapid translation of innovation into improved patient outcomes. Experimental medicine is facilitated by outstanding translational infrastructure in the Wellcome Trust funded Clinical Research Facility (CRF) and the Centre for Translational Inflammation Research in the newly built Queen Elizabeth Hospital Birmingham. This has allowed us to develop new cellular therapies and imaging techniques through the NIHR Liver Biomedical Research Unit and supported our successful application to become partners in the Government's flagship initiative, set up with support from Arthritis Research UK, the Medical Research Council (MRC) and the Association of the British Pharmaceutical Industry (ABPI), to promote early phase drug development. Thus we are studying inflammatory biology from cell biology and in vivo models through to experimental medicine and early phase human studies in clinical trials. This model is now being applied to new initiatives in ageing and regeneration through the Healing Foundation's Centre for Burns Research and the NIHR Centre for Surgical Reconstruction and Microbiology.

Going forward we will continue to use outstanding basic research within the MRC Centre for Immune Regulation to understand disease processes and develop novel therapies. Increasingly this will inform a stratified medicine approach in which we deliver more effective treatments to patients based on shared biological characteristics.

Our research is financed by significant investments from major funders including the Department of Health through the NIHR, the Wellcome Trust, the Medical Research Council (MRC) and the Arthritis Research UK. Grant funding includes £6.5m from the NIHR's Biomedical Research Unit scheme to support the Translation of our world-leading research into liver disease into early phase studies spanning experimental medicine, proof of concept studies and cutting-edge phase 2 trials. The research areas, underpinned by cross-cutting technologies, focus on therapeutic applications for different phases of liver disease:

1. Preventing liver injury/infection (viral hepatitis, obesity, autoimmunity)
2. Reversing persistent inflammation (chronic hepatitis)
3. Remodelling and repair of fibrosis (cirrhosis)
4. Treating aberrant responses to liver damage (cancer)

Funding from ARUK, MRC, NIHR and EU supports the Rheumatology Research Group (RRG) in Birmingham who have pioneered the concept that stromal cells are critical modulators of chronic inflammation that provide novel therapeutic targets to disrupt or prevent the organization of chronic inflammation. They have demonstrated the importance of dysregulated immune senescence in chronic inflammation providing an important mechanistic link between chronic inflammation and ageing with the potential for developing novel therapies. They have also pioneered the use of sophisticated biomarkers to allow therapy to be targeted appropriately in early disease thereby enhancing the chance of inducing remission.

The Renal Research group is underpinned by the largest renal unit in the UK. The group has been at the forefront of research defining the molecular pathogenesis of vasculitis with a particular emphasis on the role of pathogenic autoantibodies. It has strong collaborative links to cardiovascular sciences and rheumatology. Major interests of the Ophthalmology group relate to the balance between inflammatory and regulatory cells, hormone and steroid control of inflammation, and genetic polymorphisms in inflammatory genes. Scientists work closely with clinicians at Birmingham Midland Eye Centre (Bmec) at City Hospital N H S Trust.

Inflammation and Inflammatory Disease Groups

[Immune Mediated and Inflammatory Liver Disease \(/research/activity/mds/domains/immunity-infection/immune-system-dev-regulation/immune-mediated-and-inflammatory-liver-disease/index.aspx\)](/research/activity/mds/domains/immunity-infection/immune-system-dev-regulation/immune-mediated-and-inflammatory-liver-disease/index.aspx)

[Immunity and Ageing \(Immunosenescence\) \(/research/activity/mds/domains/immunity-infection/inflammation-inflammatory-disease/immunity-and-ageing-\(Immunosenescence\)/index.aspx\)](/research/activity/mds/domains/immunity-infection/inflammation-inflammatory-disease/immunity-and-ageing-(Immunosenescence)/index.aspx)

[Immunity and Inflammation in the Visual System \(/research/activity/mds/domains/immunity-infection/inflammation-inflammatory-disease/immunity-and-inflammation-in-the-visual-system/index.aspx\)](/research/activity/mds/domains/immunity-infection/inflammation-inflammatory-disease/immunity-and-inflammation-in-the-visual-system/index.aspx)

[Inflammatory Renal Research Group \(/research/activity/mds/domains/immunity-infection/inflammation-inflammatory-disease/inflammatory-renal-research/index.aspx\)](/research/activity/mds/domains/immunity-infection/inflammation-inflammatory-disease/inflammatory-renal-research/index.aspx)

[Rheumatology Research Group \(/research/activity/mds/domains/immunity-infection/inflammation-inflammatory-disease/rheumatology-research/index.aspx\)](/research/activity/mds/domains/immunity-infection/inflammation-inflammatory-disease/rheumatology-research/index.aspx)