University of Birmingham

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About

Stephen Young is a Senior Lecturer in the School of Immunity and Infection.

Stephen has published over 70 research papers in scientific journals as well as reviews and book chapters in the fields of iron metabolism, inflammation and arthritis research. He has received grants from Arthritis Research UK, the Wellcome Trust, the Medical Research Council, the Biotechnology and Biological Sciences Research Council and the National Institute for Health Research.

He is an enthusiastic communicator on the theme of arthritis research and has engaged with arthritis patient support groups locally. He has been a keen promoter of the World Wide Web for disseminating high quality patient-related information about disease.

He is a deeply committed teacher both at undergraduate and post-graduate level. He is actively engaged in teaching as well as in the development of new courses and new approaches to learning.

Qualifications

- Fellowship of the Higher Education Academy 2007
- PhD Haematology 1978
- BSc (Hons) Applied Chemistry 1973

Biography

Stephen Young qualified with a BSc (Hons) in Applied Chemistry from the Hatfield Polytechnic in 1973. A year out in Industry with Beecham's Pharmaceuticals enthused him for laboratory science and its potential, and he went on to study for a PhD in Haematology at University College London. He then moved to the Albert Einstein College of Medicine in New York for 3 years to work in the Dept of Biophysics and the Liver Research Centre. He returned to the UK to the Liver Centre at King's College Hospital in London before joining the Department of Rheumatology in Birmingham in 1985 as a lecturer. Stephen has continued to work in Birmingham studying the cellular and molecular basis of rheumatoid arthritis.

He has built on his background and in interest in chemistry to bring innovative new technologies to the School, in particular high-field NMR spectroscopy and surface plasmon resonance which he makes use of in his translational research into inflammatory human diseases with a particular focus on rheumatoid arthritis. He is a keen promoter of the need to provide good quality information about their condition to patients with chronic diseases and established the first comprehensive WWW service about arthritis.

Stephen has taken an active lead role in teaching at a number of levels. He developed and was lead on the MSc in Rheumatology and coordinated the MSc Immunology for a number of years. These courses have now been superseded by the MRes in Biomedical Research which Stephen was closely involved in establishing and which now forms the basis of the first year of our 4-year PhD programmes. He is a member of the Curriculum Committee for our highly-rated BMedSci course.

Teaching

Teaching Programmes

- BMedSci (/undergraduate/courses/med/medical-sci.aspx)
- BMedSci Clinical Sciences (/undergraduate/courses/med/medical-sci.aspx)
- MBChB (/undergraduate/courses/med/medicine.aspx)
- Clinical Oncology MSc/PG Dip (/postgraduate/courses/taught/med/clinical-oncology.aspx)
- Biomedical Research - Mollecular and Cellular Medicine MRes
- BSc Biosciences (/undergraduate/courses/biosciences/biological-sciences.aspx)

Postgraduate supervision

Stephen is interested in supervising doctoral research students in the following areas:

Gene/environment interactions promoting chronic autoimmune inflammatory diseases

Metabolomics of Inflammation

Immune dysregulation in chronic inflammation and ageing

If you are interesting in studying any of these subject areas please contact Stephen on the contact details above, or for any general doctoral research enquiries, please email: **dr@contacts.bham.ac.uk (mailto:dr@contacts.bham.ac.uk)** or call +44 (0)121 414 5005.

For a full list of available Doctoral Research opportunities, please visit our **Doctoral Research programme listings (http://www.bham.findaphd.com/?es=y&apl=y&aplt=&show)** .

Research

RESEARCH THEMES

Metabolomics of inflammation; immune cell signalling dysregulation in chronic disease; adverse responses to biological therapies.

RESEARCH ACTIVITY

Stephen's research centres on the complex processes that give rise to chronic inflammatory diseases in humans. In particular, he takes a molecular and cellular approach to understanding the factors which give rise to aberrations in signalling pathways that underlie the immune pathology associated with diseases such as rheumatoid arthritis, vasculitis and uveitis. He has been innovative in implementing and developing a number of novel technologies. These include analysis of signalling pathways at the level of the single cell, molecular interaction analysis using surface plasmon resonance and metabolite profiling using NMR-based metabolomics.

Signalling aberrations in inflammatory disease

Abnormal function of peripheral blood T lymphocytes is characteristic of rheumatoid arthritis (RA); diminished proliferation and secretion of cytokines following in vitro mitogen stimulation are observed. Stephen was the first to demonstrate that a TCR-linked signalling abnormality underlies this and since then he has further characterised these pathways and shown that extrinsic factors can lead to signalling dysregulation. In particular TNF, acting through acid sphingomyelinase, suppresses plasma membrane calcium signals and oxidation leads to inactivation of protein tyrosine phosphatases (PTP). He has also found that this occurs in the healthy elderly, partially explaining the depressed signalling and function of lymphocytes in ageing. This has led to investigations of the interactions between a variant PTP N22 gene known to associated with arrange of autoimmune disease and the extrinsic factors such as hypoxia, inflammatory mediators and cigarette smoking, as an exemplar for environmental/genetic interactions in driving autoimmune arthritis.

He has extended this work to studies on endothelial cells in an attempt to explain the increase in cardiovascular disease associated with rheumatoid arthritis. He has shown that the earliest stages of the atherosclerotic process, the induction of endothelial cell dysfunction, can be mediated by TNF-induced sphingomyelinase, which in turn can be regulated by oxidative stress.

Metabolomics

This dysfunction in lymphocyte and endothelial function may result from a complex interaction between factors including genes, lifestyle, nutrition and infection. Metabolomics is a powerful new approach to the analysis of the overall metabolic activity of an organism, which may allow generation of a composite picture resulting from these many factors. Stephen has established NMR-based Metabolomics to study human inflammatory disease and this has proven to be a powerful tool for stratifying patients with complex diseases such as Uveitis and Rheumatoid Arthritis, and neurological diseases.

Antibodies to biological therapeutics

The new biological therapies have revolutionised the treatment of rheumatoid arthritis, other inflammatory diseases and cancer. However, antibodies to the biological therapeutics are a common feature of autoimmune diseases and as many as 30% of patients fail on these therapies as a result of these anti-drug antibodies. Stephen has developed new approaches using flow cytometry and Surface Plasmon Resonance to characterise these antibodies. His work on therapeutics and affinity analysis lead to the submission of a patent "Heterobifunctional low-affinity antibodies for therapy" which was supported by a small West Midlands Spinner grant. Further work is needed to bring this to commercial realisation.

Other activities

- Chair West Midlands Group of the British Society for Immunology
- External Examiner London School of Hygiene and Tropical Medicine MSc Immunology of Infection

Publications

Sinclair AB, Viant MR, Ball AK, Burdon MA, Walker EA, Stewart PM, Rauz S, Young SP., (2010), NMR-Based Metabolomic Analysis of Cerebrospinal Fluid and Serum in Neurological Diseases - A Diagnostic Tool?, NMR Biomed, 23: 123-32.

Wilson AS, Bacon PA, Young SP, Carruthers DM., (2010), Vasculitis integrated clinical assessment database: a data management system to support studies into systemic vasculitis., J Clin Rheumatol, 16: 10-4.

Wilson AS, Young SP. The rise of the computer as an assistive technology for education in chronic musculoskeletal disease. In: Demir O, Celik C, editors. Multimedia in Education and Special Education.Hauppauge, New York: Nova Science Publishers; 2009.

Young SP, Nessim M, Falciani F, Trevino V, Banerjee SP, Scott RAH, Murray PI, Wallace GR., (2009), Metabolomic analysis of human vitreous humor differentiates ocular inflammatory disease., Molecular Vision, 15: 1210-7.

Young SP, Wallace GR., (2009), Metabolomic analysis of human disease and its application to the eye., Journal of Ocular Biology, Disease and Informatics, 2: 235-42.

Arrol HP, Church LD, Bacon PA, Young SP., (2008), Intracellular calcium signalling patterns reflect the differentiation status of human T cells., Clin Exp Immunol, 153: 86-95.

Church LD, Hessler G, Goodall JE, Rider DA, Workman CJ, Vignali DA, Bacon PA, Gulbins E, Young SP., (2005), TNFR1-induced sphingomyelinase activation modulates TCR signaling by impairing store-operated Ca2+ influx., J Leukocyt Biol, 78: 266-78.

Church LD, Goodall JE, Rider DA, Bacon PA, Young SP., (2005), Persistent TNF- exposure impairs store operated calcium influx in CD4+ T lymphocytes., FEBS Lett, 579: 1539-44.