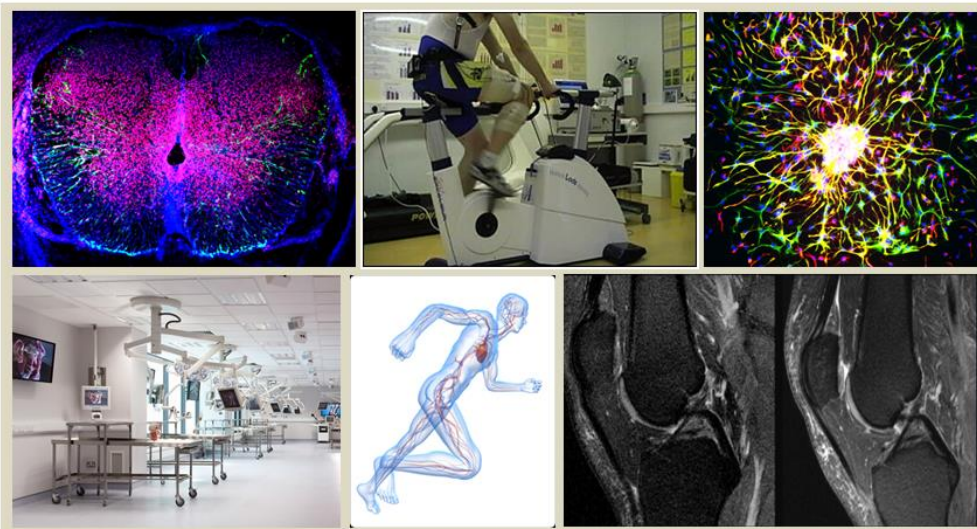


*Research at*

*The Department of Anatomy*

*Trinity Biomedical Sciences Institute*

*Trinity College Dublin*



<http://www.medicine.tcd.ie/anatomy>

## ***The Department of Anatomy, Trinity College Dublin***

Anatomy is the study and research of the various structures that make up the human body. It is a very complex subject including osteology, myology and neurology. The various structures may be considered as individual entities - systematic anatomy or the organs and tissues may be studied as they lie in relationship with one another in the different regions of the body - regional anatomy. The direct application of the facts of human anatomy to medicine and surgery constitutes the subject of applied anatomy.



At TCD, the Department of Anatomy teaches human anatomy to first and second year medical, first year dentistry, first and second year physiotherapy, first year occupational therapy, second and third year therapeutic radiation therapy and first year speech and language studies students. A module in neuroanatomy is taught to third year neuroscience students.

This is a landmark time for the Department as in 2011 it transferred all its teaching and research facilities to the Trinity Biomedical Sciences Institute. This state of the art facility provides huge potential for teaching excellence and research growth.

Research perspectives in the Department are rapidly expanding, and our major themes now span the health sciences, thereby facilitating diverse undergraduate and graduate research opportunities. These include musculoskeletal research, exercise science, sports medicine, neuroscience, muscle biochemistry and medical education research. Our focus on clinically relevant anatomy has also extended into research, with human biological samples now being incorporated into the Department's research portfolio.

## ***Dr Nicholas Mahony***



The aim of Dr Mahony's doctoral research was to evaluate the relationship of bone quantity, by DEXA measurement of Bone mineral Density, to the strength of bone. Using a large animal model of osteoporosis, he quantified bone density at five sites in the ovine skeleton and related areal bone density parameters and microarchitectural properties to mechanical and tests of bone strength in conjunction with colleagues in the Trinity Centre for Bioengineering, the Royal College of Surgeons Ireland and University College Dublin (UCD). Dr Mahony's other research interest is the field of Sports and Exercise Medicine. Dr Mahony is the course coordinator of the highly regarded TCD MSc Sports and Exercise Medicine program for doctors and physiotherapists; and an exercise physiology and sports physician service provider in the Human Performance Laboratory. Dr Mahony's Sports and Exercise Medicine research has included studies of rowing and kayaking ergometer performance and biomechanics, fatigue states in athletes such as underperformance / overtraining syndrome, and laboratory and field based testing of athletes with exercise induced asthma. In collaboration with the Irish Rugby Football Union, he has also conducted research into optimum carbohydrate protein composition of sports drinks for use in training recovery strategies of academy level rugby players.



Dr Mahony is currently conducting comparative studies of medical and questionnaire based pre-participation screening of athletes, profiling and monitoring of exercise responses to training in Triathlon, the effects of non-dominant limb training in GAA players, the effects of placebo interventions on laboratory and field based exercise performance tests, as well as anthropometric studies of collegiate athletes.

### ***Dr William Ryan***



Dr Ryan's research interests have been varied down the years, underlying his surgical training and anatomical expertise. Previously, his interests have centred on the use of ileal conduits in patients with bladder cancer and the epidemiology of peptic ulcer disease. He has also assessed the incidence of physical abnormalities in long stay psychiatric patients.

More recently Dr Ryan's research is linked with sports medicine. He has performed a prospective study of injuries sustained by rugby players over two years. He has also analysed the prevalence of injuries to the zygomatic arch, related to dentistry.

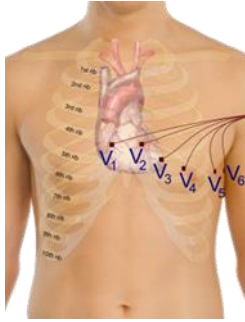
Dr Ryan also maintains an interest in the pathology of nerve compression syndromes at the head of the fibula. He is currently initiating a study on the anterior compartment of the leg to assess the role of the tibialis anterior muscle in compartment syndromes.

### ***Dr Paul Tierney***

As Head of Department in Anatomy, TCD, Dr Tierney embarked on a change of direction in how the Department prioritized its goals. He took the opportunity to hire science graduates rather than medical graduates, and to work with them to start building the department's research base. As pressure on academic staff to produce peer-reviewed publications increases inexorably, every committed academic looks for ways whereby the efficiency of information transfer during and outside contact hours is optimized. One area of perennial difficulty for Health Science students is reading ECG strips. In conjunction



with colleagues within the School of Medicine, Trinity College, and the Institute of Art, Design & Technology, Dun Laoghaire, Dublin Dr Tierney is developing an interactive App that students will use to become familiar with common variations in ECG lead deflections, based on visual association only. To date models of the beating heart and thoracic cage



have been produced by the students of IADT, and the next step is amalgamating the two, and building in interactive ECG leads, with the deflections associated with each, in health and disease. This group have also produced brain images with associated arteries, into which physical and psychiatric deficits associated with

common occlusive insults will be incorporated.

Dr Tierney also currently collaborates with Athlone Institute of Technology to model the dimensions of the articular surfaces of the human knee, the intra-articular menisci, and pathology thereof with a view to mimicking the mechanical forces acting on both which lead to premature ageing of cartilaginous surfaces.

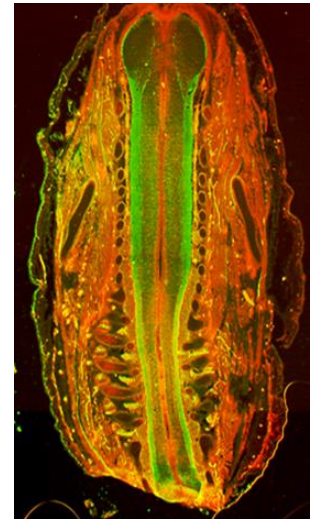
Many aspects of musculoskeletal function in health and disease are surprisingly poorly understood, especially for a discipline such as Anatomy that is hundreds of years old. Driven initially by the desire to teach clinical anatomy in a coherent, holistic manner, Dr Tierney is investigating the biochemistry of deeply placed muscle groups, using flash frozen human muscle, as a means of elucidating more about their function prior to death. Ideally, this novel approach to investigating human muscle function will suggest better regimes for injury avoidance and rehabilitation. There are currently huge gaps in our understanding of how specific muscles groups function in humans, as available animal models are of very limited use. This deficit has consequences for injury, treatment and rehabilitation of these muscles groups. These in turn have significant implications for health care costs, and patient quality of life.



## ***Dr Denis Barry***



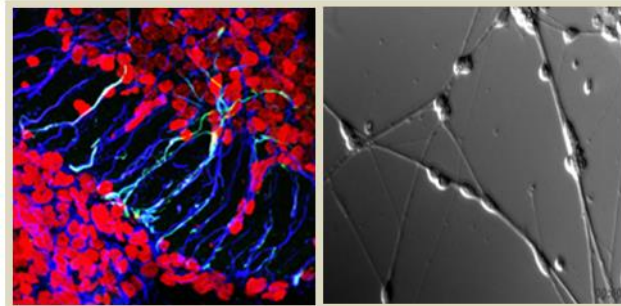
Dr Barry completed his PhD in developmental neuroscience in the Department of Anatomy and Neuroscience, University College Cork (UCC). He subsequently undertook a postdoctoral research position in the Department of Pathology in Columbia University, New York, researching genetic metabolic disorders affecting brain development, in particular Zellweger Syndrome. Dr Barry was then appointed as a postdoctoral fellow in the Centre for Research in Infectious Diseases in UCD, where his research focused on identifying candidate biomolecules that block HIV-1 infection. This was followed by a postdoctoral fellowship in the Conway Institute of Biomedical and Biomolecular Science in UCD, researching the underlying causes of atherosclerosis and related immunological disorders. From here, Dr Barry took a position as a lecturer in the Department of Anatomy and Neuroscience, UCC, where he returned to neuroscience research. He subsequently moved to his current position as assistant professor in the Department of Anatomy, TCD.



Dr Barry's present research at TCD mainly focuses on central nervous system development. He is particularly interested in the lineages and functions of neural precursor cells, and is currently investigating their roles in axon tract formation. This work is centred on the use of animal models and transgenic mice with deficits in the normal pattern of white matter formation. It is hoped that this research will contribute to our understanding of regeneration potentials of neural precursor cells after axon tract damage.

In addition, Dr Barry is interested in medical education research and in particular the use of learning aids in anatomy education, including audience response systems and video learning platforms. He is currently

investigating the extent of video usage among medical students as a learning aid for anatomy. By assessing student opinion on the effectiveness of video based learning in their understanding of anatomy, its use as a response tool for student queries regarding anatomical concepts will be more clearly realised. Dr Barry maintains collaborative research links with TCD, Columbia University, UCC and UCD in the areas of neuroscience, metabolic diseases, medical education and virology.



*Trinity Biomedical Sciences Institute, Trinity College Dublin*