

Dr Clare Ray PhD

Lecturer in Cardiovascular and Respiratory Science

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About

Clare Ray is a lecturer in Cardiovascular and Respiratory Sciences. She is principally an *in vivo* physiologist and her research interests are in the area of cardio-respiratory integration and control. Clare's work has focussed on the control of oxygen delivery particularly in response to systemic hypoxia (acute, chronic and intermittent) and exercise, on which she has published a number of papers. Her current research is investigating the mechanisms underlying the cardiovascular and respiratory complications associated with chronic intermittent hypoxia (CIH) and obstructive sleep apnoea (OSA). She combines her research with teaching responsibilities on the College of Medical and Dental Sciences undergraduate programmes with particular focus on Phase 1 of the Medical programme.

Qualifications

- Fellow of the Higher Education Academy
- Post-graduate Certificate in Learning and Teaching in Higher Education 2011
- Associate in Learning and Teaching in Higher Education 2009
- School of Medicine's Award for Excellence in Teaching 2007
- PhD Cardiovascular Physiology 2004
- BMedSc (Hons) 2000

Biography

Clare Ray gained a BMedSc (1st Class Hons) in Medical Science, specializing in Cardiovascular Physiology, from the University of Birmingham in 2000. She went on to study for a PhD in the Department of Physiology, developing a novel technique for directly measuring the *in vitro* release of nitric oxide from blood vessels and elucidating the pathway by which adenosine evokes nitric oxide release during systemic hypoxia.

Her two post-doctoral research projects, both funded by the British Heart Foundation, allowed Clare to continue her research into the control of oxygen delivery in skeletal muscle at the University of Birmingham and it was during this time that she developed her interest in learning and teaching.

Whilst continuing with her research, Clare completed the Associate Module in Learning and Teaching in HE in 2009 and was appointed as a lecturer in Cardiovascular and Respiratory Sciences in January 2010. In 2011, she completed the PGCertLTHE and became a Fellow of the HEA. Clare is also involved with the University's widening participation schemes and programme of Masterclasses for local schools.

Clare's current research is centred around the control of the cardiovascular and respiratory systems in chronic intermittent hypoxia (CIH) and obstructive sleep apnoea (OSA). She is co-convenor of the Cardio-Respiratory Integration and Control (CRIC) research theme, which brings together basic scientists and clinicians from across the University with common interests, to foster translational research and collaboration.

Teaching

Clare is interested in the scholarship of learning and teaching and evidence-based approaches to education. She is currently investigating and evaluating the use of the flipped classroom and peer instruction in undergraduate medical education.

Medicine (MBChB)
Medical Science (BMedSc)
Biomedical Materials Science (BMedSc Biomaterials)
Dentistry (BDS)
Graduate Entry Medicine (GEC)
MRes (*in vivo*)

Clare is involved in the University's widening participation scheme, Access to Birmingham (A2B) and the multi-institutional widening participation scheme, Realising Opportunities (ROP) and has tutored over 100 students from local schools applying for courses in the College of Medical and Dental Sciences.

Postgraduate supervision

Clare currently co-supervises PhD students on the following projects:

- The roles of oxygen-dependent mechanisms in the cardiovascular changes associated with exercise in health and disease. Rehan Junejo.
- Influences on gene expression in muscles of patients with chronic obstructive pulmonary disease. Abucarr Gassama.

Research

Clare's current research is centred around the control of the cardiovascular and respiratory systems in chronic intermittent hypoxia (CIH) and obstructive sleep apnoea (OSA). With colleagues she has developed both an acute model of airway obstruction and a chronic model of intermittent hypoxia in order to investigate the mechanisms underlying the cardiovascular and respiratory complications of OSA. She also has an interest in Type 2 Diabetes as a co-morbidity of OSA and the interaction between hyperglycaemia and chronic intermittent hypoxia in the development of microvascular complications and the function of the autonomic nervous system.

Clare is also interested in chemoreception by the carotid body and is currently involved in a collaborative project investigating the role of the carotid body in glucose sensing and regulation.

Clare's other collaborations focus on the regulation of skeletal muscle blood flow and build on her previous research into the role of the local mediators adenosine, nitric oxide and prostaglandins in matching oxygen delivery to oxygen consumption during hypoxia when oxygen delivery is compromised and during exercise when oxygen consumption is increased. She currently co-supervises a PhD project investigating oxygen-dependent substances involved in exercise hyperaemia, which aims to look at how the mechanisms of vasodilatation during and after exercise may alter with age and in disease to limit exercise capacity. Clare has also recently supervised two MRes *in vivo* projects investigating the mechanisms of functional sympatholysis and how these are altered in a model of chronic hypoxia.

Other activities

- Member of The Physiological Society
- Fellow of the Higher Education Academy
- STEM ambassador
- Volunteer speaker for Understanding Animal Research
- Consultant for publishing company Quarto on their range of children's books about the human body

Publications

Thompson EL, **Ray CJ**, Coney AM and Kumar K (2013) Hypoglycaemia-induced hyperpnoea: a role for epinephrine and the carotid body? *The FASEB Journal* 27:1137-18

Ray CJ, Wallace R, Cook R and Coney AM (2013) Is functional sympatholysis (FS) altered in chronically hypoxic (CH) rats? *The FASEB Journal* 27:943.20

Marshall JM and **Ray CJ** (2012) Contribution of non-endothelium-dependent substances to exercise hyperaemia: are they O₂ dependent? *Journal of Physiology* 590:6307-6320

Ray CJ and Marshall JM (2009) Nitric oxide (NO) does not contribute to the generation or action of adenosine during exercise hyperaemia in rat hindlimb. *Journal of Physiology* 587:1579-1591

Ray CJ and Marshall JM (2009) Elucidation in the rat of the role of adenosine and A_{2A}-receptors in the hyperaemia of twitch and tetanic contractions. *Journal of Physiology* 587:1565-1578

Ray CJ and Marshall JM (2006) The cellular mechanisms by which adenosine evokes release of nitric oxide from rat aortic endothelium. *Journal of Physiology* 570:85-96

Broadley AJ, Korszun A, Abdelaal E, Moskvina V, Jones CJ, Nash GB, **Ray CJ**, Deanfield J and Frenneaux MP (2005) Inhibition of cortisol production with metyrapone prevents mental stress-induced endothelial dysfunction and baroreflex impairment. *Journal of the American College of Cardiology* 46:344-350

Ray CJ and Marshall JM (2005) Measurement of nitric oxide release evoked by systemic hypoxia and adenosine from rat skeletal muscle *in vivo*. *Journal of Physiology* 568:967-978

Ray CJ, Abbas MR, Coney AM and Marshall JM (2002) Interactions of adenosine, prostaglandins and nitric oxide in hypoxia-induced vasodilatation: *in vivo* and *in vitro* studies. *Journal of Physiology* 544:195-209

