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Vitamin D3 metabolites, lysophosphatidic acid and human osteoblast maturation

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The simplest signalling lipid Lysophosphatidic acid (LPA) elicits pleiotropic actions upon most mammalian cell types. Although LPA has an established role in many biological processes, particularly wound healing and cancer, the function of LPA for human osteoblast (hOB) biology is still unravelling. Early studies, conveyed in this presentation, identifies reliable indications that LPA, via. binding to one of several transmembrane receptors, stimulates multiple intracellular signalling networks coupled to changes in cell growth, fibronectin binding, maturation and survival. The majority of studies exploring the actions of LPA on hOB responses have done so using the lipid in isolation. Our own research has focussed on the co-operation of LPA with the active vitamin D3 metabolite, 1α25,dihydroxycholecalciferol (calcitriol), in light of a serendipitous discovery that calcitriol, in a serum-free culture setting, was unable to promote hOB maturation. We subsequently learnt that the serum-borne factor co-operating with calcitriol to enhance hOB differentiation was LPA bound to the albumin fraction of whole serum. Recent studies from our laboratory have identified that LPA and calcitriol are a potent pairing for securing hOB formation from their stem cell progeny. Greater understanding of the ability of LPA to influence, for example, hOB growth, maturation and survival could be advantageous in developing novel strategies aimed at improving skeletal tissue repair and regeneration. Herein this presentation provides an insight into the diversity of studies exploring the actions of a small lipid on a major cell type key to bone tissue health and homeostasis.

Biography

Jason Peter Mansell is a Senior Lecturer in Biomedical Sciences within the Department of Biological, Biomedical & Analytical Sciences. He took up this post in September 2013. In 1991 he obtained a first class BSc (Hons) degree in Applied & Human Biology (with professional training) at The University of Aston, Birmingham. In 2006, he discovered that a serum-borne lipid, lysophosphatidic acid (LPA) co-operated with active vitamin D3 in securing the mature human osteoblast phenotype. He is the current lead in research exploring the biological actions of LPA on human osteoblasts, recognition of which has led to his invitation to write reviews and present at international meetings. In January 2010, he took up the post of Senior Bone Biologist at the Musculoskeletal Research Unit, Southmead hospital, Bristol. Jason's research focus is on human osteoblast biology with emphasis on discovering novel routes to securing their maturation in a bone regenerative context.

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