

Basics of bone and joint biology and disease, November 23 and 24 2017, Student's Union, Sheffield, UK

Organised jointly by the Bone Research Society and the British Orthopaedic Research Society

Who is the course for:

Postgraduate students (basic and clinical), postdocs and research fellows (basic and clinical).

Those who are starting out in this field and those who want to catch up in preparation for their postgraduate viva.

What is the course format:

Course over 2 days. Lectures given by experts in the field, mostly members of the BRS and BORS.

Learning objectives:

- To understand the basics of bone and joint biology (including development, anatomy, cell biology, physiology and endocrinology)
- To understand the composition of bone and joint tissue and its response to external stimuli
- To be familiar with the most common bone and joint diseases, their pathophysiology and their treatments
- To acquire knowledge about rarer bone and joint conditions
- To develop an understanding of similarities and differences between the biology of different mineralised tissues (bone, cartilage, dentine, vascular plaques)
- To be familiar with commonly used experimental systems to investigate bone and joint biology and disease

Tutors will recommend one key paper/bookchapter or review before the course to help students to prepare for the course. Lecture slides may be made available to course participants for their personal use at the discretion of the tutor. Additional reading will be signposted during the lectures.

Tutors will consider:

- What are the key facts that a researcher in this field should know?
- The historical context (how do we know what we know?)
- What are the current questions in this area (limits to our current knowledge)?
- Which current approaches can be used to study the tissue, or cell type, the metabolic pathway, or disease?
- What is the knowledge expected from a candidate during a thesis defense?

Time	Topic	Confirmed speaker	Description of lecture content
Day 1			
12.00	Registration, lunch, meet and greet		
13.00	Formation of bones and joints, chondrogenesis	Cosimo de Bari, Aberdeen	Endochondral and intramembranous bone formation, joint development, cell biology of chondroblasts and chondrocytes including in <i>in vitro</i> models used in regenerative medicine. Mention <i>in vivo</i> lineage tracing models to understand origin of bone and joint cells.
13.40	Osteogenesis and bone tissue maintenance	Rob van 't Hof Liverpool	Formation of bone by osteoblasts. Methodologies to measure osteoblast activity (biomarkers) and measure bone volume <i>in vivo</i> . Cell biology of osteoblasts. Studying osteoblasts in culture and using cell lines (Pros and Cons).
14.20	Osteocytes	Bronwen Evans, Cardiff	Cell biology and function of osteocytes. Model systems for study in vivo and in vitro.
15.00	BREAK		
15.30	Osteoclasts and bone resorption	Miep Helfrich, Aberdeen	Cell biology of osteoclasts. Process of bone resorption, links with tooth resorption. Studying resorption in vivo and in vitro (biomarkers). Link also with talk from Alastair Sloan and mechanobiology in the alveolar bone.
16.10	Mineralisation	Colin Farquharson, Edinburgh	The process of tissue mineralisation, the genes and pathways involved. Inhibitors of mineralisation. Mineralisation of bone tissue, pathological mineralisation. Models for study.
16.50	Tooth formation and dental pathology (peri-implantitis, osseointegration)	Alastair Sloan, Cardiff	TBC
17.30	Panel discussion about stem cells for mineralising tissues	Alastair Sloan, Cardiff and Cosimo de Bari, Aberdeen	TBC
17.45	CLOSE OF DAY		

19:00 Dinner	Speed networking “knowing me knowing you”	Katherine Staines, Edinburgh & Shelly Lawson, Sheffield	Short introductions to other participants.
DAY 2	Coffee/tea on arrival		
9.00	Calcium and phosphate metabolism	Richard Eastell, Sheffield	Overview of the endocrine pathways that regulate serum calcium and phosphate and the pathology resulting from dysregulation e.g., through kidney disease (link to vascular calcification).
9.40	Mechanobiology of bone	Kate Ward, Southampton & Alex Ireland, Manchester,	Response at whole bone level to external stimuli, such as exercise. Changes in these responses during bone growth and ageing. Model systems for study.
10.20	BREAK		
10.40	Cartilage and bone mechanobiology in the evolution of osteoarthritis	Debbie Mason, Cardiff	An overview of joint structures and associated cell types. Responses of cartilage and bone to external stimuli such as exercise or other forms of loading and how this leads to osteoarthritis. Model systems for study.
11.20	Common bone diseases and their treatments	Eugene McCloskey, Sheffield	Osteoporosis, Paget’s disease of bone. Etiology and pathology. Pharmacology of current and new treatments in development, overview of latest clinical trial results.
12.00	LUNCH		
13.00	Rare bone & cartilage diseases and their treatments	Jim Gallagher, Liverpool	Importance of studying rare bone and joint diseases.
13.40	Joint diseases and their treatments	Mark Wilkinson, Sheffield	Osteoarthritis, etiology, pathology, treatments. Host responses to joint prostheses.
14.20	Bone cancers	Shelly Lawson, Sheffield	Primary bone tumours and metastatic bone disease. Pathophysiology, treatments, model systems for study.

15.00	BREAK		
15.20	Modelling and studying human bone and joint disease in mouse models	Duncan Bassett, London	The rationale for using mouse models to find new genes that regulate bone and joint tissue. Summary of methodologies for screening, (being aware some have been covered before). Making links to what has been covered during the course, while giving examples of new findings.
16.00	Final Q & A for whole course over coffee/tea	Several tutors present to answer final questions	
16.15	End		