

World Congress on Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (WCO-IOF-ESCEO 2021): ROS-IOF-ESCEO Symposium Abstracts

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ROS-IOF-ESCEO1

AN INTRODUCTION TO THE OSTEOPOROSIS AND BONE RESEARCH ACADEMY OF THE ROYAL OSTEOPOROSIS SOCIETY: ROS-IOF-ESCEO Symposium Abstracts

J. E. Compston¹

¹Cambridge Biomedical Campus, Dept of Medicine, Cambridge, United Kingdom

Presented by Juliet Compston on behalf of the Royal Osteoporosis Society and the Academy of Osteoporosis and Bone Research

The Osteoporosis and Bone Research Academy was launched in London in February 2019 as part of the celebration to mark the protected royal title granted to the National Osteoporosis Society by Her Majesty Queen Elizabeth. The Academy is the first of its kind in bone health, collaborating with leading researchers, clinicians and people living with osteoporosis, in the search for a cure for the disease. This aim is closely aligned with the Royal Osteoporosis Society's Strategic Direction published in January 2018, with its focus on prevention, care, support and cure.

The concept of a cure for osteoporosis is novel and involves a number of possible approaches throughout the normal life-course. These include optimising bone health during growth, preventing bone loss later in life, and restoring skeletal strength in those who already have the condition. The Academy addresses three broad areas of research: the causes of osteoporosis, technology to improve the management of osteoporosis, and strategies to improve real world effectiveness of fracture risk assessment and the diagnosis and treatment of osteoporosis. Three working groups have been set up to develop these themes. The Causes Working Group is chaired by Professor Stuart Ralston (University of Edinburgh), the Effectiveness Working Group by Professor Eugene McCloskey (University of Sheffield) and the Technology Working Group by Dr Ken Poole (University of Cambridge).

Public and patient involvement is a vital part of the Academy structure and there is strong patient representation in all three working groups to ensure that patient views are represented and used to inform research priorities. The Academy also has a key national role in the education, mentorship and development of high quality early and mid-career clinicians and researchers. With its community of leading healthcare professionals, scientists and patient advocates the Academy's aspiration is to ensure the best bone health throughout the lifecourse and to transform the hope of a cure for osteoporosis into a reality.

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THE ROYAL OSTEOPOROSIS SOCIETY RESEARCH ROADMAP: OUR JOURNEY TOWARDS A CURE

N. C. Harvey^{1,2}

¹MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton, United Kingdom, ²on behalf of the Royal Osteoporosis Society (ROS) and the ROS Osteoporosis and Bone Research Academy, Southampton, United Kingdom

As documented in the Royal Osteoporosis Society (ROS) Research Roadmap, the ROS Osteoporosis and Bone Research Academy has undertaken evidence reviews to identify gaps in osteoporosis research and patient care, and has generated a comprehensive programme of projects to address the resulting key priorities. The Academy's mission is to achieve a cure for osteoporosis through the development of novel strategies to optimise bone health across the whole lifecourse, and to implement new practices to ensure that every person at increased risk of fracture is identified, assessed and treated appropriately. Through this comprehensive programme of work involving internationally leading clinicians and scientists, linked with ongoing support for the development of younger investigators, and with patient

advocacy a key component at every stage, the Academy has identified these key gaps in research and clinical care across three phases of the lifecourse: early growth through development in the womb and during childhood until peak bone mass is achieved in young adulthood; maintenance of bone mass through adulthood; and minimisation of bone loss and fracture risk in older age. The three Academy working groups (Causes, Effectiveness and Technology) have thus generated an integrated workplan across these phases addressing three synergistic and closely interlinked research areas: Causes and mechanisms; Novel technology for skeletal assessment; Optimising effectiveness of assessment and treatment. The resulting projects will have the potential to achieve a step change in osteoporosis prevention and management through optimising population bone health and ensuring that all at high fracture risk are appropriately identified, assessed and treated. (Text adapted from Royal Osteoporosis Society Research Roadmap 2021).

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THE CAUSES AND MECHANISMS WORKING GROUP OF THE ROYAL OSTEOPOROSIS SOCIETY OSTEOPOROSIS AND BONE RESEARCH ACADEMY

S. H. Ralston¹

¹Professor of Rheumatology, University of Edinburgh, Edinburgh, Scotland

The remit of the Causes and Mechanisms Working Group of the Royal Osteoporosis Society Osteoporosis and Bone Research Academy is to identify and promote avenues of research which will lead to a greater understanding of the mechanisms of osteoporosis and loss of bone strength that lead to fragility fractures. The outputs of this working group will be combined with those of the Technology and Effectiveness Working Groups to work towards the aim of preventing and curing osteoporosis. Since a large number of risk factors for osteoporosis have already been identified and researched, the Causes group considered that it would be most appropriate to focus efforts on identifying new and emerging areas of research where evidence was incomplete, as opposed to concentrating on areas of established knowledge. The group also considered the most appropriate areas to focus upon would be on the factors which regulated bone density, bone structure and bone quality as opposed to factors that influence the risk of falls which the group felt would be more appropriately addressed by other research efforts. The group identified four areas where further research was likely to be fruitful in creating new knowledge that might underpin a cure of osteoporosis; studies of the genetic and epigenetic basis of osteoporosis, pregnancy osteoporosis and early onset osteoporosis; interactions between diet, the microbiome and susceptibility to osteoporosis; and exploring the role of senescence and osteoporosis with a view to identifying new therapeutic

targets. The Causes group have hosted two workshops, each of which was attended by a panel of international experts to explore research opportunities. The recommendations from a workshop on functional genomics of osteoporosis hosted by Prof Jon Tobias in October 2020 have now been published [1] and the recommendations from a workshop on the microbiome and osteoporosis hosted by Prof Sue Lanham-New and Dr Owen Cronin have been submitted for publication. The causes group has also initiated a UK-wide research study on the presentation, clinical features and treatment of pregnancy associated osteoporosis led by Professor Stuart H Ralston with initial results expected by the end of 2021. The vision of all of these activities is to generate a new roadmap for research which will advance understanding of key drivers of osteoporosis and to collaborate with the Technology and Effectiveness groups to work towards cure.

1. Tobias JH, Duncan EL, Kague E, Hammond CL, Gregson CL, Bassett D, Williams GR, Min JL, Gaunt TR, Karasik D, Ohlsson C, Rivadeneira F, Edwards JR, Hannan FM, Kemp JP, Gilbert SJ, Alonso N, Hassan N, Compston JE, Ralston SH (2020) Opportunities and Challenges in Functional Genomics Research in Osteoporosis: Report From a Workshop Held by the Causes Working Group of the Osteoporosis and Bone Research Academy of the Royal Osteoporosis Society on October 5th 2020. *Front Endocrinol (Lausanne)* 11:630875

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THE EFFECTIVENESS WORKING GROUP OF THE ROYAL OSTEOPOROSIS SOCIETY OSTEOPOROSIS AND BONE RESEARCH ACADEMY

E. V. McCloskey¹

¹Department of Oncology & Metabolism, Centre for Integrated research in Musculoskeletal Ageing, University of Sheffield, Sheffield, United Kingdom on behalf of the Effectiveness Working Group of the Royal Osteoporosis Society Osteoporosis and Bone Research Academy

With the goal of seeking a cure for osteoporosis, the Royal Osteoporosis Society Osteoporosis and Bone Research Academy has initially decided to focus on three key areas of research, namely the causes of osteoporosis, technology to improve the management of osteoporosis, and strategies to improve real world effectiveness of osteoporosis management. The latter is the remit of the Effectiveness Working Group, with effectiveness being defined as the ability of an intervention to have a meaningful effect on patients in normal clinical conditions. The goal of the Effectiveness Working Group is to bring best practice, that is all of the knowledge, technologies and therapies, to the widest range

of individuals at risk of fracture as possible, thereby closing a wide and persisting treatment gap in the management of those most vulnerable to osteoporosis.

The Effectiveness Group is now working within three key areas; a) to increase access to fracture risk assessment and management in primary care, b) to improve treatment adherence and management follow-up in primary care, and c) to improve secondary fracture prevention. The first area, explored by a sub-group led by Eugene McCloskey, directly assesses the treatment gap by working with patient representatives, primary care staff, primary care researchers, digital health IT experts and NHS foundation IT providers (e.g. GP electronic patient record systems) to identify barriers and opportunities to embedding fracture risk assessment in routine care. The solution seeks to minimise the impact on primary care workloads but to also address the needs of individual patients. Targeting and initiation of treatment is just an early step in the process as successful management, for the patient and society, requires long term adherence and monitoring to ensure the best outcome. Under the leadership of Dr Zoe Paskins, a sub-group is initially undertaking a realist evidence synthesis to define what works for who, when and why and how practically to implement interventions. Such rapid realist reviews are helpful for informing policy and the work is supplemented by the on-going NIHR-funded Improving uptake of Fracture Prevention Treatments (iFRAP) study. The third sub-group, led by Kassim Javaid, seeks to improve the function and effectiveness of Fracture Liaison Services (FLS) by undertaking a series of inter-linked analyses to better understand the determinants of an effective and efficient secondary fracture prevention service model in real-world healthcare settings. Given the remit of the Effectiveness Working Group, there is an understandable and productive overlap with the other ROS Research Academy, particularly the Technologies Working Group. The vision, driven by the recently announced roadmap for research, is to advance our current and future management of osteoporosis and work towards cure.

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EXPLORING THE RESEARCH PRIORITIES: NOVEL TECHNOLOGIES FOR SKELETAL ASSESSMENT

E. Clark¹

¹Musculoskeletal Research Unit Translational Health Sciences Bristol Medical School University of Bristol, Bristol, United Kingdom

The remit of the Technology Working Group of the Royal Osteoporosis Society Osteoporosis and Bone Research Academy is to explore and develop new and innovative technologies in the field of osteoporosis. By ‘technology’

we mean any method used to promote bone health, prevent and treat osteoporosis and fragility fracture or improve osteoporosis care. It includes interventions used in treatment, prevention or diagnosis of disease, procedures, drugs, devices, diagnostic tests, software and screening programmes. The outputs of this working group will be combined with those of the Causes and Mechanisms, and Effectiveness Working Groups to work towards the aim of preventing and curing osteoporosis. Our first priority was to identify three broad themes and two potential ‘game changers’ within each theme. Our first theme is ‘Developing Systems and Processes’ within which we consider opportunistic analysis technologies and novel software technologies applying automated best-practice osteoporosis care as key technologies. Our second theme is ‘Assessment of Bone Health’ to include novel technologies to define healthy bone at different points in the lifecourse, and novel software technologies to automatically stratify/personalise fracture risk estimates at the point of care. Our final theme is ‘Exploiting Data’ covering use of mega-cohorts such as UK Biobank in novel approaches to assess genotype–phenotype relationships relevant to bone health, and novel technologies to understand the contribution of multiple organ systems to bone health, osteoporosis and multimorbidity. Our initial focus has been to understand the existing technologies available for skeletal assessment that utilise routinely collected imaging for diagnosis and monitoring of various conditions, such as computed tomography (CT) scans. We have commissioned and published[1] a rapid evidence review to define the key unanswered questions where further research is needed to enable the adoption of technologies already available for maximal patient benefit. A series of workshops are planned around our key themes, to work up new research proposals to answer the identified gaps including targets for screening, integration of opportunistic identification of fractures into current care pathways, technical considerations including characterisations of optimum calibration techniques, and head to head comparisons of existing and novel technologies. As with the other working groups, our vision is to generate a new research roadmap to advance our understanding of the key drivers of osteoporosis and work towards a cure.

1. V Aggarwal, C Maslen, RL Abel, P Bhattacharya, PA Bromiley, EM Clark, JE Compston, N Crabtree, JS Gregory, EP Kariki, NC Harvey, KA Ward, KES Poole (2021) Opportunistic Diagnosis of Osteoporosis, Fragile bone health and Vertebral Fractures from Routine CT scans; a Review of Approved Technology Systems and Pathways to Implementation. Therapeutic Advances in Musculoskeletal Disease TAB-20-11-061.R1