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EDITORIAL

European musculoskeletal health and mobility in Horizon 2020

SETTING PRIORITIES FOR MUSCULOSKELETAL RESEARCH AND INNOVATION

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We have entered the second decade of the new millennium and societies in industrialised countries are facing tremendous challenges from demographic, environmental and lifestyle factors. The European 'age quake' has not reached its highest magnitude. This will have an impact on musculoskeletal health in the coming decades, but has already started to affect health services significantly. This is reflected in an increased financial burden for both direct (e.g., hospital) and indirect (e.g., societal for sick leave and homecare) costs.

Today, musculoskeletal disorders (MSDs) including those resulting from trauma, directly affect the mobility, autonomy and quality of life of more than 100 million Europeans. Mobility from cradle to grave reduces the risk of cardiovascular disease, diabetes and stroke. Through the 'Bone and Joint Decade' initiative, at the beginning of the millennium, the World Health Organization attributed the high burden of MSDs on societies and the individual to an increasingly ageing population[1]:

- 40% of people over the age of 70 years suffer from osteoarthritis (OA) of the knee.
- 80% of people with OA have some limitation of movement, and 25% cannot perform routine daily activities.
- Road traffic injury is the leading cause of death for people between the ages of 15 and 29, with vast differences between EU countries.
- In a review of 27 trauma studies, the median cost per patient for acute trauma treatment was USD $22 448 (IQR: $11 819 to $33 701). The acute treatment cost of trauma was higher than for any other disease group.
- Patients, especially women, aged over 65 years consume a disproportionate share of hospital resources for trauma care: particularly fragility fractures.
- Surveys in developed countries indicated that, by the age of 70 years, more than one in four women had sustained at least one osteoporotic fracture and the estimated lifetime risk for wrist, hip and vertebral fractures were estimated to be 15%; very close to that of ischaemic heart disease.[2,3]

The first calls under the new EU Research Framework Programme 'Horizon 2020' were launched on 11 December. They are structured around three main pillars: 'excellence in science base' which targets frontier or basic research (around €3 billion); 'creating industrial leadership and competitive frameworks' which will support business research and innovation (around €1.8 billion) and 'tackling societal challenges' which will focus on addressing the major issues of our society, including age, health and well-being (around €2.8 billion).

A major element in the legislative texts of Horizon 2020 is the explicit recognition of the burden of MSDs. This unprecedented emphasis creates the opportunity to increase EU funding substantially for research in orthopaedics and traumatology and to position musculoskeletal science at the core of European funding activities. It is therefore crucial that all basic and clinical researchers in the field focus collectively on the submission of projects; building strong consortia within the specific calls for funding that have been launched. It is important to note that the present calls under Horizon 2020 are much broader in scope and encourage cross-sector research, including social implications of diseases, integrated care, understanding the existing relationship between diseases and reducing inequalities. Furthermore, proposals are created to be translational (i.e., from 'bench to bedside') and include, in several calls, early integration with companies that enable basic and clinical research to become an improved treatment. Orthopaedic and

trauma research is perfectly positioned to challenge old care pathways and treatments in direct partnership with both small and large European companies, in order to reduce the burden of MSDs in an exceptional translational manner.

Therefore, much emphasis will be placed on the European added value and on the diversity of project consortia, both in terms of nationality and expertise. Orthopaedics and traumatology have a unique opportunity to make a significant difference in addressing the challenges covered under Horizon 2020, particularly around the ageing population and the need to keep the public active and mobile. High quality research studies are necessary to develop strong evidence-based practice recommendations to support health policies and ultimately improve patient care. We therefore encourage all basic and clinical researchers to chase collaborative opportunities across borders and specialties and to create strong consortia to develop relevant submissions to the EU calls.

An open workshop will be organised by Professor Georg Duda (Berlin), Professor Enrique Gómez Barrena (Madrid) and Professor Andrew Carr (Oxford) during the London EFORT congress in order to build a strong consortia on regenerative medicine and tissue engineering. The recent launch of Horizon 2020 has brought about many interesting opportunities for orthopaedics-led research. A short list of calls is provided on the EFORT homepage: https://www.efort.org/

In order to perform a more extensive search of calls please go to: http://ec.europa.eu/research/participants/portal4/desktop/en/opportunities/h2020/master_calls.html where a search engine is available. In addition, the Innovative Medicines Initiative (IMI) has published calls that may also be of interest. IMI is Europe's largest public-private initiative that aims to speed up the development of better and safer medicines for patients. IMI supports collaborative research projects and builds networks of industrial and academic experts in order to boost pharmaceutical innovation in Europe. IMI is a joint undertaking between the European Union and the pharmaceutical industry association EFPIA. For more information please go to: http://www.imi.europa.eu/content/stage-1-11.

European and North American strategic research reviews have been undertaken[4,5] but need to be brought up to date and focused on the opportunities presented by Horizon 2020.[6] In order to inform and be included in grant calls, EFORT and EORS have formed an EU taskforce, with the goal of setting priorities and developing specific programs to be presented to the EU ministry. Keeping people, particularly the elderly, mobile and free from pain is a crucial objective of Horizon 2020, as is the maintenance of a healthy workforce. Translational research and the transfer of innovations to industry will be an integral part of successful programs.

Preliminary objectives

Improved treatment for musculoskeletal disorders.

- Regenerative therapies to enable endogenous healing and tissue-engineered strategies using cell factories, proteins and novel bio-mimetic scaffolds for treatment of bone, tendon, muscle and cartilage injuries or diseases.
- Novel treatments for surgical repair of bone in an ageing European population. This needs to be based on interdisciplinary cooperation between bone biologist, bioengineer and industry, and be supported by patient advocates for implementation.
- New diagnostic and therapeutic modalities for emerging bone and joint infections, combatting increased bacterial resistance, with focus on local treatment strategies that involve devices and biomaterials.
- Advanced technologies developing bionic limbs after amputation and artificial bridging in nerve palsy and traumatic paraplegic condition.

Improved pipelines for translation and clinical evaluation.

- Establishment of National Clinical Trials Units for evaluation of innovative musculoskeletal therapies, linked through a European Network for large multicentre studies.
- Development of disease specific Patient Reported Outcome Measures (PROMs) for musculoskeletal interventions and their mapping on to health related quality of life (HRQOL) measures.
- Development of personalised treatment models based on individual molecular genetic profiles, histological typing and biomarkers for novel therapy in EU sarcoma trials.
- Improving diagnostics of diseases on a mechanism basis such that early treatment strategies effectively enable preventative and early onset strategies for conditions such as OA, osteoporosis, low back pain and childhood disorders.
- Aggregate outcome on devices from multiple sources using modern web based data-mining techniques and push technology to inform physicians and patients at the point of care.
- Establishment of facilities and novel research methodologies for statistics and bioinformatics, enabling new approaches to the interpretation of complex and interlinked data, using musculoskeletal diseases as a model for systematic medical approaches.

Improved clinical systems for delivering high-quality, cost-effective care and monitor effectiveness of outcome.

- Development and evaluation of new interdisciplinary care models for both treatment and prevention, aiming for major causes of disability such as OA, fragility fractures, spinal disorders and sarcopenia.
- Development of reliable and valid ways for clinical systems to measure and improve their performance, such as the use of real-time, continuous audit to drive

up clinical standards, based on arthroplasty and hip fracture registries.

- Development of harmonised, advanced information technology tools for connecting databases and registries

We welcome comments on the suggested topics. Let us know if you would like an active role in taking any of them further to be included in upcoming grant calls.

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