BIRAX Ageing – Call for Research Proposals

Introduction

The statistics on population ageing are staggering. According to the United Nations Population Fund, the number and proportion of older people are growing faster than any other age group. Currently one in nine people in the world is aged 60 or over, and this figure is projected to increase to one in five by 2050. More than 64 countries are expected to have 30 percent of their population aged 60 or over by this time. In 2012 there were almost 810 million people aged 60 or over in the world, a number that is projected to reach one billion in less than ten years. This figure is expected to double by 2050, reaching two billion and for the first time will supersede the number of children under 15.[1]

With a demographic change of this magnitude experienced by every society around the world and in every domain of life, ageing is certain to become one of the greatest challenges of the 21st Century. From the quality of life of individuals and their families, to the ways in which communities live together, developing strategies for successful ageing is a rapidly rising priority of societies and welfare systems the world over.

An ageing society is an inevitable consequence of one of humankind's greatest achievements. Longevity has been significantly increased by scientific and medical advancements and improved access to health care, which continue to hold the key to remedy many of the challenges faced by ageing populations due to age related ill health. Today, age is the single biggest risk factor for many life-threatening diseases, including heart failure, stroke and dementia. As scientific understanding of the ageing process has become increasingly sophisticated in recent years, so became apparent the gaps in our knowledge and the need to invest more in scientific research into ageing.[2]

The UK and Israel are natural partners for scientific research collaboration. Both countries are scientific superpowers that have produced a disproportionate number of Nobel Laureates per capita. Both top the chart of European Research Council grants per capita: Israel is the second and the UK sixth, and first in the total number of awards granted. Israel and the UK have a strong record of scientific collaboration, with the UK being Israel's third largest collaborator. 4,477 co-authored articles were published in 2015-17, out of which almost 40 percent were in medicine, biochemistry, neuroscience, and computer science.[3] However, despite their scientific prowess, and the emphasis placed on ageing as a national priority by both Governments, the potential for ageing research in the UK and Israel has yet to be met in full. The opportunities for collaboration in this fieldare immense.

BIRAX (the Britain Israel Research and Academic Exchange Partnership) is a £multi-million initiative of the British Council, the Pears Foundation and the British Embassy in Israel investing in world-leading research jointly undertaken by scientists in Britain and Israel. In its first six years, the BIRAX Regenerative Medicine Initiative supported 19 cutting edge

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[1] United Nations Population Fund, *Ageing in the Twenty-First Century: A Celebration and A Challenge,* 2012

[2] The Academy of Medical Sciences, Rejuvenating Ageing Research, 2009

[3] Data taken from SciVal.com; Data analysis from ERC website by Professor David Levi-Faur

collaborative research projects. In 2016 the UK-Israel Science Council[4] considered the challenges and the opportunities ageing presents and decided to focus BIRAX on ageing research. This is the first call for proposals under the new programme.

The aim of BIRAX Ageing is two fold: (1) to advance innovative scientific research into ageing and its impact on human health and to encourage the use of cutting edge technology, big data and personalised medicine in ageing research (2) to develop meaningful, sustainable and mutually enriching scientific collaboration between researchers, labs and institutions in the UK and Israel that will further ageing research for the benefit of humanity as a whole.

Call for Proposals

BIRAX Ageing will fund ground breaking projects that will focus on diverse aspects of ageing-related health. Proposals must address at least one of the themes listed below.

We will only fund joint collaborations between Principal Investigators resident and working in the UK and Israel. Proposals involving a lab from a third country are allowed, however BIRAX funding will only support the activities taken in Israel and the UK.

Funding Criteria

- The primary consideration in ranking the proposals will be scientific excellence, novelty, focus on understanding disease mechanisms and use of advanced research strategies;
- Clear and direct relevance to the ageing process and age-related disease;
- Proposals for interventions in the ageing process in order to prevent or mitigate age-related disease;
- Proposals for diagnostic approaches (e.g. use of relevant biomarkers) for predicting the ageing trajectory or overall pathogenesis of disease;
- Use of cutting-edge technologies taking into account ageing-driven phenomena.

Research focus

1. Standard research projects: the effect of ageing on human health

We invite proposals addressing diverse effects of ageing on human health, exploring the basic mechanisms underlying ageing-related disease. The research proposals can address these issues using a broad range of biological organisationsal levels and scales, from

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[4] The UK-Israel Science Council is a body of 25 leading life scientists, chaired by Professor Ruth Arnon and Professor Lord Robert Winston whose core mandate is to improve scientific collaboration between the two countries.

molecular to cellular, tissues to organs and the entire organism and its environment. Multidisciplinary research plans based on synergising collaborations between the partnering researchers are recommended.

2. Precision Medicine and big data in ageing research

We are also interested in proposals researching the use of big data and precision medicine in relation to ageing. In particular, we are interested in precision diagnostics and personalized effects of treatments specifically for older subjects, preventive measures and predictive analytics for older populations. Research proposals that contain a central "omics" component (e.g. genomics, epigenomics, transcriptomics, proteomics, metabolomics) are encouraged.

Specific research priorities

1. **The effect of ageing on human health: preventive, disease modifiying and regenerative medicine approaches to medical conditions and the ageing process.**

We invite studies that explore the relation of the ageing process either with individual or multiple diseases and medical conditions.

Successful proposals in these areas may receive funding - wholly or partially – from one of our partners. Applications in these areas may benefit from addressing the research priorities of our partners.

Proposals under this category must be relevant to at least one of the priorities below:

1. CARDIOVASCULAR DISEASE: The impact of ageing on cardiovascular disease, exploring new directions toward understanding mechanisms, diagnosis and treatment.as well as the potential application of regenerative therapies, studies that tackle the effect of reduced regenerative capacity in the context of CVD would be of interest, as would strategies to enhance capacity in the aged setting. We welcome research across the broad spectrum of age-related heart and circulatory diseases including stroke and vascular dementia.

   Projects funded under this strand maybe funded in collaboration with our partner, the British Heart Foundation. Please email us for more details.

2. DIABETES: The impact of the ageing process, from infancy to senescence, on the progression of Type 1 and Type 2 diabetes, including, but not limited to: changes in beta cell regenerative capacity and, in the case of Type 1 diabetes, antigenicity; regeneration of beta cells and the prevention of their destruction; maintaining the survival of extant and newly generated beta cells; developing technologies to efficiently generate pancreatic islet cells from non-beta-cell sources and to protect them by cellular engineering and/or encapsulation technology.

GROWING OLD WITH DIABETES: Interactions between the normal ageing process and long-standing Type 1 and Type 2 diabetes, for example skeletal fragility and sarcopenia, neuronal degeneration, and retinal neuronal degeneration. The emphasis should be on strategies to diagnose, prevent and treat these processes.

Projects funded under this strand maybe funded in collaboration with our partners, JDRF and Diabetes UK. Please email us for more details.

3. NEURODEGENERATIVE CONDITIONS: The impact of the ageing process on the development and progression of neurodegenerative conditions, the elucidation of new targets for diagnosis and disease-modifying therapeutics, as well as the potential of stem cell technology to better model and understand the underlying pathogenic processes. Neurodegenerative diseases include diseases such as Alzheimer's disease and other dementias, Multiple Sclerosis, Motor Neurone disease, Parkinson's disease, and vision disorders, like age-related macular degeneration and glaucoma.

Projects funded under this strand maybe funded in collaboration with our partners, MS Society, and BrightFocus Foundation.Please email us for more details.

Projects focused on novel target identification, validation, hit discovery and preclinical development for disease modifying dementia therapies, with the potential to form part of a dementia drug discovery company, are invited. Biological areas of particular interest include, but are not limited to, mitochondrial biology, synaptic physiology and function, trafficking and membrane biology, neuroinflammation and genomic integrity. Projects informed by human genetics, and capitalising on expertise from other fields and therapeutic areas are welcomed, as are proposals to utilise the DDF's 500,000 compound, CNS-biased small molecule screening library.

Projects under this strand will be considered for venture investment from the The Dementia Discovery Fund, with the intention of future company formation and continued equity investment by the DDF if successful. For more information, please contact Hannah Williams on Hannah@svhealthinvestors.com.

4. ARTHRITIS AND OTHER MUSCULOSKELETAL DISORDERS: The application of regenerative medicine to musculoskeletal conditions, in particular degenerative joint diseases.

Projects funded under this strand maybe funded in collaboration with our partner, Arthritis Research UK who welcome impactful research that aims to prevent the onset of arthritis, develop a cure for arthritis and transform the lives of those with Arthritis. Arthritis Research UK's remit cover conditions which affect the joints, bones and muscles (including back pain), along with autoimmune conditions such as lupus and other rarer forms of arthritis.

5. AGE-RELATED FRAILTY AND OTHER GERIATRIC SYNDROMES: We invite research toward enhanced diagnostic evaluation and therapy of old-age frailty, and other geriatric syndromes, including both specific geriatric syndromes, such as functional decline, pressure ulcers, incontinence, delirium and falls, as well as general systemic geriatric syndromes, such as metabolic syndrome, immune deficiency, sarcopenia, maladaptation, respiratory syndrome and others. We invite studies exploring the specifics of diagnosis and therapy for older people, rather than non-specific "age-less" populations, with reference to specific medication dosages, regimens, drug interactions, long term effects and systemic dysregulation in people later in life. Research can be done on all levels, from the molecular and cellular to the systemic and include both pre-clinical and clinical effects, but must show specific relevance for the ageing process and older people.

6. AGE-RELATED MULTIMORIBIDITY: We invite research toward diagnosis and treatment of multimoribidities, as prevalent in older people. We seek new approaches toward early diagnosis and prediction of old-age multimorbidity and evaluation of the ageing process as a determinant for multimorbidity -- utilizing diverse physiological, functional, genetic, epigenetic and other biomarkers and advanced methods of bioinformatics analysis and data-mining. We invite research on new biomedical approaches for the prevention and alleviation of old-age multimorbidity, with focus on pharmacological and regenerative medicine approaches. Of special interest is the development of evidence-based methods and criteria for the evaluation of the efficacy and safety of treatments against old-age multimorbidity.

2. Ageing and Technology: Precision medicine and big data in ageing research

Proposals under this theme will aim to identify innovative biomarkers, algorithms, computational and measurement techniques and to promote advances in precision medicine that would allow the prevention or mitigation of age related conditions or harmful effects associated with ageing. Proposals that build on effective collaboration between basic and clinical research and big data and those facilitating the translation of basic research to clinical practice will be prioritised.

Proposals may include (but are not limited to):

- Collaborative research programmes to develop new holistic approaches to data science using medical data that drive advances in underpinning data science to answer challenges related to ageing.
- Research that builds on effective collaboration between basic and clinical research and big data, as well as research that facilitates translation from basic studies to clinical applications.
- Proposals that identify biomarkers and algorithms for early pre-clinical diagnosis and prediction of morbid age-related conditions (both individual and multiple).

- Proposals that integrate diverse types of biological and medical data, from different levels of biological organization, including multi-omics and functional data, with reference to the ageing process.
- Proposals that facilitate interoperability, utility and sharing of ageing-related data.