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## BIRAX AGEING STRATEGY

### **BIRAX Ageing – Call for Proposals – draft call:**

BIRAX Ageing will fund ground breaking projects that will focus on at least one of the themes listed below.

We will only fund joint collaborations between Principal Investigators resident and working in both the UK and Israel.

### **BIRAX Ageing - general research themes:**

#### **1. Medical conditions and the ageing process**

We invite proposals that research the effects of ageing on morbidity and the relations of ageing and diseases, exploring new approaches to diagnosis and therapy of ageing-related diseases and medical conditions. Research can be conducted at every level of biological organization – from the molecular to cellular, to tissues and organs, to the entire organism and to the organism’s interrelation with the environment. Preference will be given to integrated approaches.

#### **2. Precision Medicine and big data in ageing**

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 the aged subjects, preventive measures and predictive analytics for the aged patients.

### **Priority will be given to research projects that:**

- Show clear relevance to the ageing process, including (but not restricted to): effects in aged models and subjects, long term effects on aged models and subjects, diagnostic and therapeutic effects related to ageing processes and subjects.
- Propose interventions in the ageing process in order to prevent or mitigate age-related multimorbidity and frailty.
- Propose diagnostic measures (biomarkers) to predict or evaluate age-related multimorbidity and frailty and evaluate the effects of therapeutic interventions on multimorbidity and frailty.
- Use cutting age technologies and/or generate and analyse big data toward the development of precision medicine for aged patients, taking into account aged-specific phenomena, such as old-age multimorbidity and frailty, multi-pharmacy, multiple and cumulative age-related disease etiologies and risk factors; age-specific systemic dysregulation, etc.

## 1. 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 discussing the research priorities of our partners.*

### **Specific priorities: preventive and regenerative medicine approaches to medical conditions and the ageing process.**

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, and the corresponding application of regenerative therapies, exploring new directions toward the diagnosis and treatment. Studies that tackle the effect of reduced regenerative capacity in the context of CVD (specifically ischaemic heart disease and acute myocardial infarction) would be of interest, as would strategies to enhance capacity in the aged setting. We welcome research in the class of diseases that involve the heart, the blood vessels or both.
2. **TYPE 1 DIABETES:** The impact of the ageing process, from infancy to senescence, on the progression of Type 1 Diabetes, including, but not limited to, changes in beta cell regenerative capacity and antigenicity. Regeneration of beta cells and the prevention of their immune-mediated 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 TYPE 1 DIABETES:** Interactions between the normal ageing process and long-standing Type 1 diabetes, including skeletal fragility and sarcopenia in T1D, neuronal degeneration etc. With an emphasis on strategies to diagnose, prevent and treat these processes.

3. **NEURODEGENERATIVE CONDITIONS:** The impact of the ageing process on the development and progression of neurodegenerative conditions, and the potential of stem cell technology to better model and understand the underlying pathogenic processes, as well as elucidate new targets. This will include diseases such as Alzheimer's and other dementias, Multiple Sclerosis, Motor Neurone disease and Parkinson's disease.
4. **ARTHRITIS AND OTHER MUSCULOSKELETAL DISORDERS:** The application of regenerative medicine to musculoskeletal conditions, in particular degenerative joint diseases.

5. **AGE-RELATED MULTIMORBIDITY:** We invite research toward diagnosis and treatment of multimorbidities, as prevalent in older patients. 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 a special 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.
  
6. **AGE-RELATED FRAILITY 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 geriatric patients, rather than non-specific "age-less" populations, with reference to specific medication dosages, regimens, drug interactions, long term effects and systemic dysregulation in older patients. Research can be done on all levels, from the molecular and cellular to systemic, and include both pre-clinical and clinical effects, but must show specific relevance for the ageing process and aged patients.

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

Proposals under this theme will aim to identify innovative biomarkers, algorithms, computational and measurement techniques, 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 built 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, driving advances in underpinning data science to answer challenges related to ageing.
- Research that built on effective collaboration between basic and clinical research and big data, as well as research that facilitates translation from basic studies to clinical applications.

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- Proposals that identify biomarkers and algorithms for early pre-clinical diagnosis and prediction of morbid age-related conditions (both individual and multiple).
  - Proposals that prospectively and retrospectively evaluate the efficacy and safety of treatments and interventions for aged models and patients. Of special interest are generalized, widely applicable, quantitative criteria for the efficacy and safety of geriatric medications and treatments.
  - 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.
  - Proposals that quantitatively evaluate fundamental ageing phenomena, such as dysregulation, impairment of homeostatic capacity, maladaptation, dynamic longitudinal changes (including self-referential changes) – from the molecular and cellular to organism levels.
  - Proposals that quantitatively evaluate the specifics of diagnosis and therapy for the aged subjects (rather than non-specific “age-less” populations), with the aim to develop precision diagnosis and therapy for the aged patients. Of special interest are such issues as: segmentation and diversity of the aged population; general assessment criteria, such as physiological and biological age, different types of old-age frailty indices; synergistic and antagonistic effects of multiple etiologies, risk factors and therapeutic interventions; long-term and self-referential effects.