

Chapter II

History of Geroscience in the UK

A History of Geroscience in the United Kingdom

In 2000, the International Longevity Centre – United Kingdom was established, dedicated to “addressing issues of longevity, ageing and population change.” The organization became one of the major branches of the International Longevity Center – US, established in 1990 by the American gerontologist Robert Neil Butler.

In 1992, the British Longevity Society was established by Marios Kyriazis. Kyriazis has been a staunch supporter and provider of anti-aging medicine, which he defined as a “branch of medical science and clinical medicine, aimed at treating some of the underlying processes of ageing and at alleviating or postponing any age-related ailments, with the ultimate goal of extending the healthy lifespan of humans” (2006).

Since 2002, the SENS project (Strategies for Engineered Negligible Senescence) has been led by Dr. Aubrey David Nicholas Jasper de Grey of Cambridge. Up-to-date, this has been perhaps the most ambitious life-extensionist endeavor in UK, perhaps in the world. The SENS project synthesizes various approaches toward “curing aging”: biological replacements, maintaining homeostasis, repairing molecular damage by genetic engineering, eliminating metabolic waste products by enzymatic catalysis and other methods. SENS suggests testing specific interventions against “The Seven Deadly Things”, the seven types of pathogenic damage that accumulate with age: cell loss or atrophy, nuclear mutations and epimutations, mutant mitochondria, cellular senescence, extracellular cross-links, extracellular junk, and intracellular junk.

On May 10-11, 2010, a conference was held by the Royal Society in London, entitled “The New Science of Ageing.” The conference focused on pharmacological and genetic control of aging and experimental life-extension, and brought together some of the foremost American and British researchers. Several prestigious British conferences related to life-extension have been held since.

Source: [Stambler I. A History of Life-Extensionism In The Twentieth Century. 2014](#)

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The UK, with its high quality of life and internationally renowned healthcare system, is the site of many of the 'problems of success' presented by an aging population.

As explained in BGRF's February report: *Longevity Industry Landscape Overview - Volume 1: The Science of Longevity*, aging is a multifarious phenomenon and its potential technological redresses are diverse. The economic impact of aging makes itself felt as a 'silver tsunami', a burden on national healthcare budgets and pension funds borne increasingly by the UK.

Life expectancy at birth in UK has increased slightly in recent years, to its highest point ever. According to the Office for National Statistics (ONS), life expectancy at birth rose from 79.1 years for males and 82.8 years for females in the period between 2013 and 2015, to 79.2 years for males and 82.9 years for females in the period between 2014 and 2016. This is just 4.2 weeks for males and 2.1 weeks for females to be exact.

This translates into males having a 21% chance of living until at least 90, while the odds for females stand at 32%, a small increase from the previous year. And, for perhaps the first time ever, there are now more 60+ UK citizens than those aged 18 or under.

Basic biological laboratory research of aging seems to have developed quite late in UK. It was not until the Russian-born Vladimir Korenchevsky (1880-1959) organized the British Society for Research on Aging in 1939 and, with the grant of £3,000 from Lord Nuffield established in 1944 the Gerontological Research Unit in Oxford, that British aging research became institutionalized.

Sources: National life tables UK: 2014 to 2016 (September 27, 2017)

<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/bulletins/nationallifetablesunitedkingdom/2014to2016>

An overview of lifestyles and wider characteristics linked to Healthy Life Expectancy in England: June 2017

<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthinequalities/articles/healthrelatedlifestylesandwidercharacteristicsofpeoplelivinginareaswiththehighestorlowesthealthylife/june2017>

Life Expectancy in UK In 2017 Is Higher Than Ever - But Scotland Is Falling Behind; Jasmin Gray (September 27, 2017)

http://www.huffingtonpost.co.uk/entry/life-expectancy-uk_uk_59ca2b4ee4b01cc57ff533f2

British longevity research: practice, theory and programs

http://www.longevityhistory.com/book/indexb.html#_Toc328320052

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DEEP KNOWLEDGE VENTURES INVESTMENT FUND

UNIVERSITY OF OXFORD

Biogerontology Research Foundation
Prevent. Restore. Prolong.

Martin Wood Lecture Theatre,
20 Parks Rd,
Oxford
OX1 3PU
15 September, 16:30 to 19:30

21st Century Medicine Forum:

BIG DATA SCIENCE IN MEDICINE

Aubrey de Grey, SENS Research Foundation
Avi Roy, Oxford University Scientific Society
Geoffrey Furlonger, Aging Analytics Agency
Dmitry Kaminskiy, Deep Knowledge Ventures
Joao Pedro De Magalhaes, University of Liverpool
Alex Zhavoronkov, InSilico Medicine
Dr. Gordon Sanghera, Oxford Nanopore

bdscongress.org

In 2014 the Biogerontology Research Foundation, Deep Knowledge Ventures and the Oxford University Scientific Society co-hosted two conferences on the subject of advances in longevity research at the First Big Data Science in Medicine Conference, and on convergence of AI research, geroscience and the leading practical applications of preventive medicine at the Second Big Data Science in Medicine Conference. These event brought together leading lights from artificial intelligence, biomedical science and regenerative medicine for an evening of talks and discussion in Oxford with the ambition of accelerating research on ageing. Speakers at these conferences included Alex Zhavoronkov (Biogerontology Research Foundation and InSilico Medicine), Aubrey de Grey (SENS Research Foundation), João Pedro de Magalhães (University of Liverpool), Riva-Melissa Tez (Project X), Dmitry Kaminskiy (Deep Knowledge Ventures and the Biogerontology Research Foundation), Avi Roy (OUSS, SynOx, BITM and OXTET) and Geoffrey Furlonger (Aging Analytics Agency).

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OXFORD BIOTECH **Biogerontology Research Foundation** **UNIVERSITY OF OXFORD** **DEEP KNOWLEDGE VENTURES INVESTMENT FUND**

The Second 2014 Symposium
Big Data Science in Medicine
Accelerating Preventive Medicine

8 December, 1:00pm–7:00pm
Saïd Business School, University of Oxford

Richard Barker CASMI, Oxford & UCL
Olga Kovalchuk University of Lethbridge
Thomas Wilckens InnVentis
Alex Zhavaronkov BGRF & InSilico Medicine
Anders Sandberg Future of Humanity Institute
Gitte Pederson Genomic Expression Inc
Maneesh Juneja Health 2.0 and MJ Analytics
Dmitry Kaminskiy Deep Knowledge Ventures

Register at: bit.ly/oxfordmed
bigdatamed.org

The aim of these two landmark conferences was to galvanize progress in the convergence of longevity research, AI and preventive medicine. While the synergetic convergence of these three spheres is well-recognized today, it was much less so in 2014, and it is possible that these conferences made an impact in solidifying this trend in the eyes of the larger scientific community.

Additionally, these conferences were an effort to engage the best science hubs in the UK area, including Oxford University, to recognize the importance of ageing research and the extension of healthy longevity. This was further elaborated upon through an ongoing partnership formed in 2017 between the Oxford University Scientific Society and the Biogerontology Research Foundation, including joint work on analytical reports and the launch of a monthly longevity podcast.

Today, universities like Oxford and Cambridge conduct dedicated aging research, showing that the most elite academic institutions in the UK are indeed taking the topic of longevity seriously.

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The term 'geroscience' was coined by a Scot, Gordon J. Lithgow, now at the Buck Institute for Research on Aging, to describe research aimed at understanding the mechanisms of biological aging, in particular genetic, epigenetic, and environmental features that determine individual rates of aging. A further goal of geroscience is to use this knowledge to develop interventions that can slow or delay aging and thereby increase healthspan, the period of life spent in good health free from chronic disease and disability.

Slowing aging is predicted to be more effective at improving both the quality and length of life compared to treating or curing any individual disease. Importantly, these extra years are relatively healthy, due to the fact that slowing biological aging would also slow the onset and progression of all age-associated disorders. If realized, this "longevity dividend" from targeting biological aging is expected to yield significant economic and social benefits for societies that are currently experiencing major demographic shifts toward increasing numbers of elderly individuals

By the early 21st century the United Kingdom had emerged as a hub of hubs for research in all the relevant areas. The UK is, for example, now peppered with regenerative medicine centres such as **Keele University**, the site of one of regenerative medicine's first ever the border crossings into age-related ill-health, with their work on repairing osteoarthritic knee joints. Edinburgh, one of the cradles of modern medicine, now supports the **MRC Centre for Regenerative Medicine** whose focus includes the aging immune system.

The **UK Regenerative Medicine Platform (UKRMP)** is a £25M initiative that is addressing the key translational challenges of regenerative medicine. And, of course, biotechnology has been a speciality of the **University of Cambridge** for many decades, particularly their School of Clinical Medicine, active in research covering many of the age-related diseases such as cancer, cardiovascular disease and diabetes. Its preventive biotech arms also cover genetics, immunity, transplants, stem cells and regenerative medicine.

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As the original epicentre of the First Industrial Revolution, the UK looks set to become the epicentre of the Fourth, with implications for geroscience.

Since 2002, the SENS project (Strategies for Engineered Negligible Senescence) has been led by Dr. Aubrey David Nicholas Jasper de Grey of Cambridge. Up-to-date, this has been perhaps the most ambitious life-extensionist endeavor in UK, perhaps in the world.

The SENS project synthesizes various approaches toward “curing aging”: biological replacements, maintaining homeostasis, repairing molecular damage by genetic engineering, eliminating metabolic waste products by enzymatic catalysis and other methods.

The UK is also among the most FinTech-ready of the world’s large parliamentary democracies. The only current obstacle to the creation of a FinTech bank for the elderly (**AgeTech Bank**) is the lack of a specific solution tailored to their needs. However, given the continuing rate of progress in the IT sector, we expect one to emerge in the next several years, The UK is well-positioned in this regard with one of world's fastest advancing IT sectors. Barclays Bank for instance now uses voice recognition to help customers who have trouble with passwords.

The UK has also produced many of the world’s leading geroscientists, from Gordon Lithgow (the father of the term ‘geroscience’) to Aubrey de Grey, father of rejuvenation biotechnology - the practice of applying regenerative medicine to aging.

Other FinTech solutions for the elderly focus on mobile technology: the devices currently found on the market aren’t friendly to elderly populations. A revolution in Agetech is therefore very dependent on the availability of mobile devices that are easy to use for older people. Only then will banks unlock mobile banking for that demographic.

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The top 10 countries harnessing information technology

Networked Readiness Index 2016

Global rank*

Singapore	1
Finland	2
Sweden	3
Norway	4
United States	5
Netherlands	6
Switzerland	7
United Kingdom	8
Luxembourg	9
Japan	10

Source: World Economic Forum 2016

*2016 rank out of 139 economies.

The index measures how economies use the opportunities offered by information and communications technologies for increased competitiveness and well-being.

In 2-3 years, the contenders for the most longevity-friendly nation will become clear. They will be those that rose to the challenge of creating the best environments for the convergence of several megatrends impacting the Longevity industry. Creating the most deregulated environment possible to attract all the necessary companies is one way to approach this challenge, but the political systems of many nations do not favour this move.

Some of the more technocratic countries like Singapore and Switzerland for instance, are creating specialised 'sandboxes' - i.e. specific environments - for attracting fintech companies. Less flexible, and more political countries, such the US and China, will be pioneering the technology themselves. It will be left to technocratic countries with smaller populations, such as Singapore, Hong Kong and Switzerland, to develop the necessary frameworks.

In so doing these countries will develop a reputation for being technologically super progressive. The same features that make them leaders in fintech could also make them leaders in longevity.

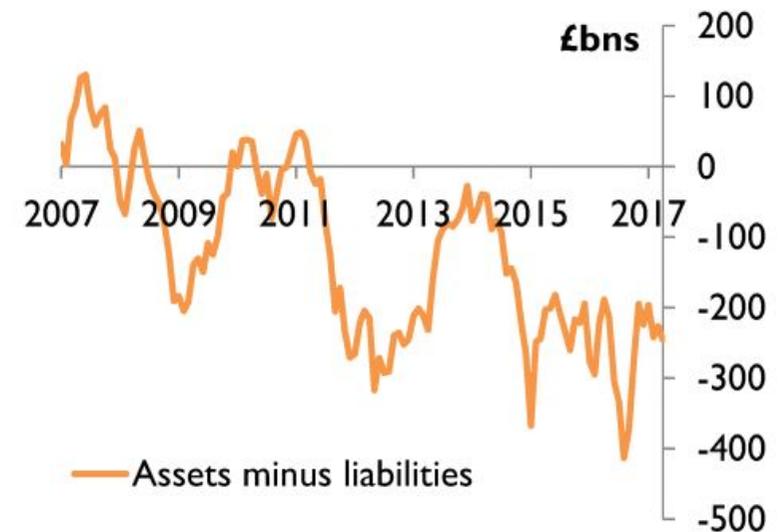
The UK, Japan, and South Korea will be partial exceptions to this rule. Their larger populations and highly developed political systems make them appear inflexible, which obscures their potential to emerge as longevity leaders in 5 to 10 years time.

"AI may be the thing that saves the NHS" ~Sir John Bell

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In the UK, those who are able to afford saving for their old age have a choice: to try to support themselves through their savings, or default to state help. Some of them are approaching retirement, and are on the borderline of qualifying for extra benefits provided by the State; these individuals worry that having money saved up that isn't sufficient to support them for the duration of their retirement will actually disqualify them from many concessions such as Council Tax, and therefore make them worse off in the end.

In the UK the Government pension fund is pre-defined and underfunded so current **tax payers** pay the bill. As a result, the Government provides tax-breaks to companies to encourage corporate pension funds, which are backed by the company that created it (often in Trust form to achieve the tax benefits) - this means even if the fund is currently in deficit, the **company will need to fund this deficit** as long as the company survives. This means companies will ultimately go under when they can't meet the bill to fund their fund's pension deficits.



Some countries provide additional protection to members of such pension funds with failed companies (e.g. Pension Protection Fund or PPF in the UK) - even then this will often mean **reduced benefits**.

Former UK Prime Minister David Cameron attempted to encourage insurers to offer people products to help them buffer the risk of spending too much on long term care in their future, however this did not materialise as insurance companies were too cautious to take the plunge. The plan was for people to have this option for up to the £72,000 cap, past which the Government would take over to cover the costs of elderly care.

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International Longevity Centre - UK

In 2004, the UK established the **International Longevity Centre(ILC)** in affiliation with **UCL (University college London)** to address the coming tide of demographic change is set to impact both the Government and society.

The **ILC-UK** is part of the global ILC and operates as a think tank and registered non-profit. It organises the **Future of Ageing** yearly conference series and liaises with politicians and key people both in London and Brussels. Its CEO is Baroness Sally Greengross OBE.

ILC-UK also publishes yearly reports on statistics pertaining to demographic change and analysis. The latest (2018) articles cover the illusion of a gap between **social services** and **health care**, and the importance of coming up with more creative solutions to the challenge of an increasing number of older people who want to maintain their independent lifestyle, while inevitably requiring some form of special care during their retirement.

One suggested solution was **retirement villages** designed with these people in mind. These would serve their everyday needs according to their preferred living arrangements, while providing the health care services routinely required by this specific demographic.

This would be much more efficient than simply handing them over to the overstretched NHS multiple times over the course of their retirement.

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International Longevity Centre - UK

express.co.uk

Retirement village concept

Developers have already begun work on retirement villages as a result of the accelerating ageing population and stresses on existing healthcare infrastructure.

Of course, this would still require many more people working in these social care services, and based on current stats, there would be a shortage of 750,000 workers by 2037.



Source: http://www.ilcuk.org.uk/index.php/key_facts

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In early 2017, the Biogerontology Research Foundation embarked on a year-long mission to summarise in a series of documents the various emerging technologies and industries which could be brought to bear on aging, healthy longevity, and everything in between, in a joint project between **The Global Longevity Consortium**, consisting of the **Biogerontology Research Foundation**, **Deep Knowledge Life Sciences**, **Aging Analytics Agency** and Longevity.International platform.

Their shared hope is that they will come to be used as an encyclopaedic resource and reference tool for the emerging longevity industry, and serve as a foundation for the first global frameworks for the industry as it grows rapidly as anticipated in coming years.

One of the conclusions of the report is that the longevity industry is emerging behemoth, but remains relatively fragmented, lacking a sufficient degree of inter-organizational collaboration and industry-academic partnerships. As these reports have been spearheaded by BGRF, the UK's oldest biomedical charity focused on healthspan extension, they are being made freely available to the public online.

Sources:

Longevity industry systematized for first time (FEBRUARY 2, 2018)

<http://bg-rf.org.uk/press/longevity-industry-systematized-for-first-time>

Matt Kaerberlein,* Kate E. Creevy, and Daniel E. L. Promislow, **The Dog Aging Project: Translational Geroscience in Companion Animals** (May 3,2016)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4936929/>

http://lir.website/pdf/Infographic_Summary_Longevity_Industry_Report.pdf

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Longevity Science Panel

The **Longevity Science Panel** is a group of influencers and scientists focused on monitoring UK longevity demographics, generating discussion and shaping view around this topic.

It is headed by Dame Karen Dunnell DCB (formerly National Statistician and Chief Executive of the Office for National Statistics) and includes Professor Sir Colin Blakemore (former Chief Executive of the Medical Research Council) and Professor Sir John Pattison (formerly Director of Research and Development at the Department of Health in England).

The panel has produced various documents such as **“What is ageing? Can we delay it?” (2014)** which interviewed 8 top biogerontologists about the state of the science, potential treatment in the future and the biology of ageing. The scientists interviewed were:

Professor Richard Faragher

Professor David Gems

Professor Tom Kirkwood

Professor Janet Lord

João Pedro De Magalhaes

Professor John Mathers

Professor Dame Linda Partridge

Professor Eline Slagboom

PDF: http://www.longevitypanel.co.uk/_files/What-is-ageing-can-we-delay-it.pdf

Website: <http://www.longevitypanel.co.uk/>