



INVESTMENT DIGEST

Longevity Industry Q4 2021

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Longevity Investment Digest at a Glance

This Investment Digest summarizes key observations in the private equity and venture capital ecosystem, as well as public companies of the rapidly evolving and exponentially growing Longevity Industry. This edition assembled information about key industry trends, more than 50,000 Longevity companies, 50 leading investors, and 495 Longevity-focused publicly traded corporations. There have also been outlined major investment rounds and relevant R&D trends, illustrating the industry's traction and readiness of institutional investors to potentially acquire the most successful startups, such as AgeTech, Longevity Fintech, and Longevity Biomedicine.

The COVID-19 pandemic has offered a lot of challenges to the industry, affecting global supply chains and the relevance of certain ventures. However, this pandemic presented many possibilities, such as developing the Longevity biomedicine sector. The public part of the Longevity industry increased by 20% during 2021. Though the growth in the Longevity market exceeds that of in the biotech and financial services markets, it still remains pretty volatile. 8 Longevity-focused companies launched their IPOs in Q4 2021, whereas more than a thousand of them received private equity investments. Longevity continues to be picked as a major topic of interest for panel discussions and entire conference series by top-tier finance and business media brands, including The Economist, Financial Times, and Bloomberg.

To sum up, the Longevity industry has shown a steady development in Q4 2021. The Investment Digest, now covering the double amount of companies since previous edition, will provide you with even more information about the Industry that is poised to witness a quantum leap in the near future.

LONGEVITY INDUSTRY

Overview



LONGEVITY INDUSTRY: MULTI-TRILLION DOLLAR OPPORTUNITY



“The one billion retired people globally are a multi-trillion dollar opportunity for business “

~ Dmitry Kaminskiy, [interview in the Financial Times](#)

“We expect to add 1 billion older individuals in the next three to four decades, atop the more than 700 million older people we have today “

~ *International Monetary Fund*



LONGEVITY INDUSTRY: MULTI-TRILLION DOLLAR OPPORTUNITY

The Global Longevity Market is Estimated at \$25 trillion in 2021

50,000+ companies
(incl. 495 listed companies)

1,000+ R&D hubs

9,000+ investors

1,000+ financial institutions

100+ governments

160 subsectors

The Longevity market is not only limited to anti-aging applications of life sciences. It also includes some new sectors of the financial industry, as well as government projects (national Longevity development plans); hence, its overall size potentially exceeds \$25 trillion. As the majority of full-blown Longevity startups are quickly becoming mature companies, large institutional investors are making increasingly more investments into the industry and a full-fledged Longevity infrastructure is emerging.

There are at least 495 publicly traded corporations that can be considered part of the Longevity industry.

Longevity Biomedicine, FinTech, and AgeTech industries include 50,000+ companies, 9,000+ investors, 14 sectors, and 114 subsectors.

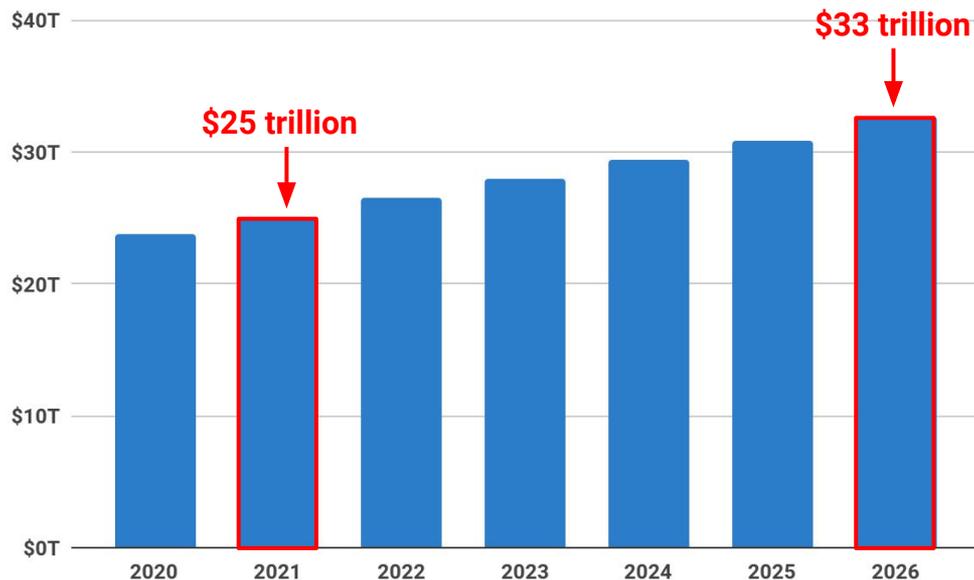
The Longevity Financial Industry includes 1,000+ corporations, 15 sectors, and 50 subsectors.

The Longevity Governance Landscape includes national healthcare budgets and development plans of at least 100 governments.

Note: Since there is no generally accepted methodology for their estimation, the numbers presented in the scheme are approximate.

THE LONGEVITY ECONOMY ON A GLOBAL SCALE

The Longevity Economy: Scale Projections, Trillion USD



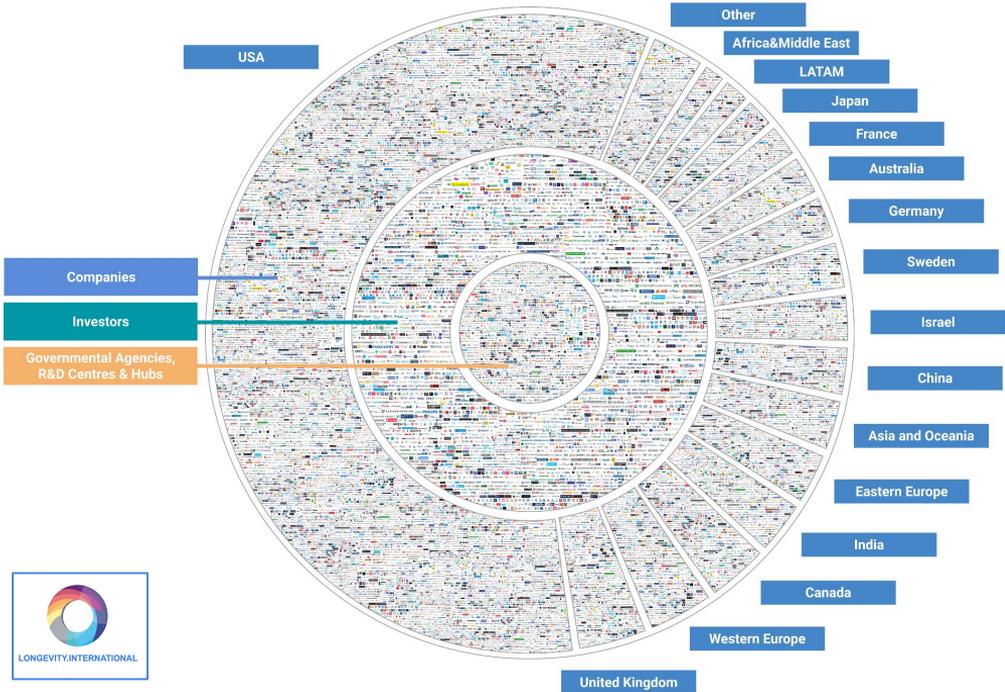
The Longevity Economy's Scale Projections contains global healthcare spending affecting Longevity, the combined capitalisation of publicly listed Longevity companies, the capitalisation of Longevity-related insurance and reinsurance companies, banks and pension funds and privately held Longevity companies.

Not only does ageing pose one of the most acute problems of our time - it also presents one of the most promising opportunities. Financial institutions, such as investment banks, pension funds, and insurance companies can either sink or swim when hit by the oncoming Silver Tsunami. Whether they will succeed in riding the wave or end up drowning under it will depend not only on their willingness to deploy new business models adapted to population aging and emerging industries of AgeTech, WealthTech, and Longevity Finance, but also on the quality of Longevity analytics that they use to develop such business models.

We define the Longevity Industry as a combination of aging, advanced preventive precision biomedicine, AgeTech, relevant parts of national healthcare budgets, and the global financial industry related to such sub-industries.

GLOBAL LONGEVITY ECOSYSTEM 2021

50,000 Companies 9,000 Investors 1,000 Hubs 20 Sectors



USA	UK
Canada	India
Japan	China
Sweden	Germany
Switzerland	Spain
CEE*	Singapore
Portugal	France
Brazil	Australia
MENA Region	EU

* – Central and Eastern Europe

GLOBAL LONGEVITY ECOSYSTEM - 50,000 COMPANIES BY 20 SECTORS



Geroscience



Longevity WealthTech



Space Medicine



Deep Diagnostics



Longevity Biomarkers



FinTech



Longevity FemTech



Regenerative Medicine



AI for Longevity



InsurTech



Advanced Cosmetics



P4 Medicine



NeuroTech



AgeTech



Clinical Data management



Longevity Gene Therapy



PharmTech



Wellness & Fitness



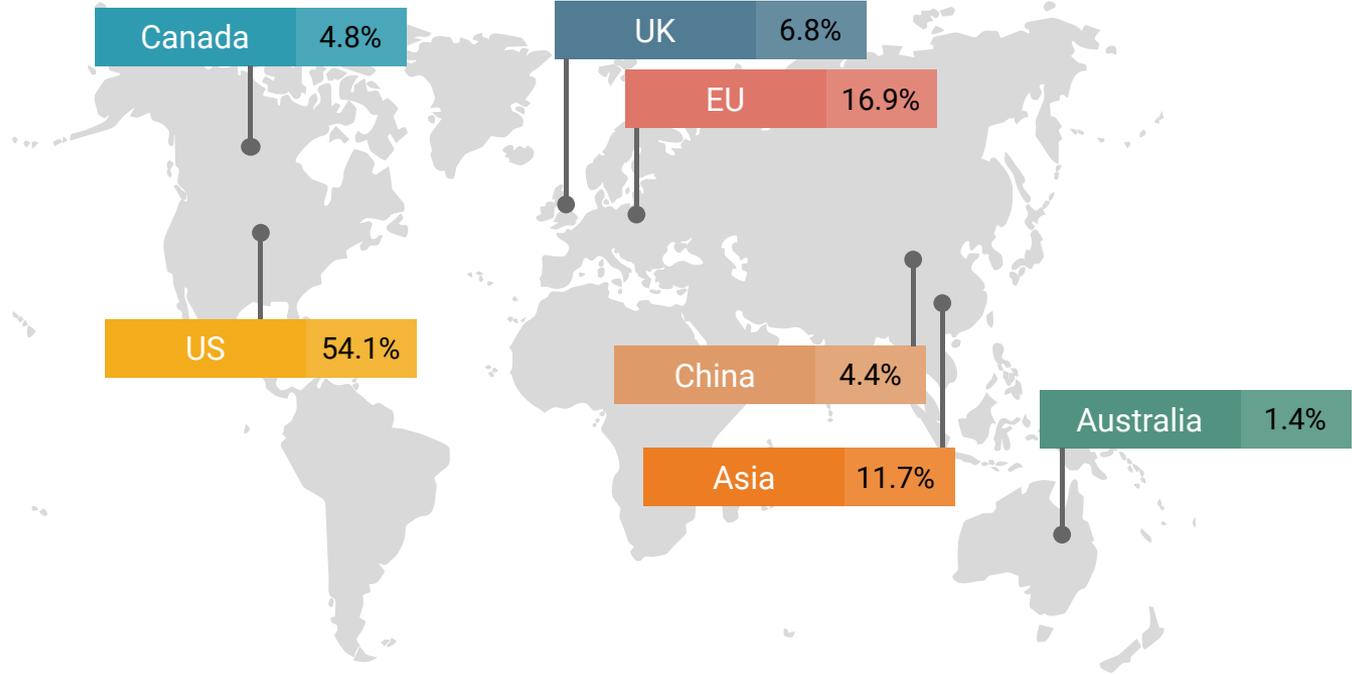
Telemedicine



Mental Health



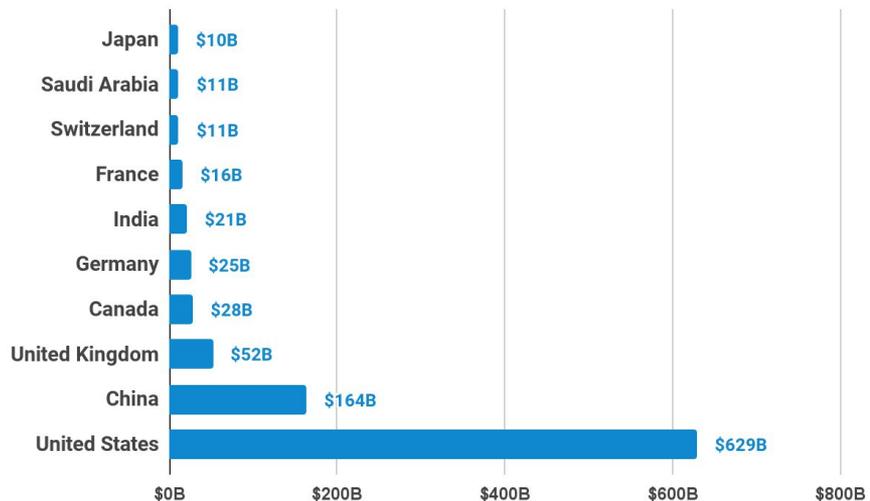
50,000 COMPANIES: REGIONAL PROPORTION



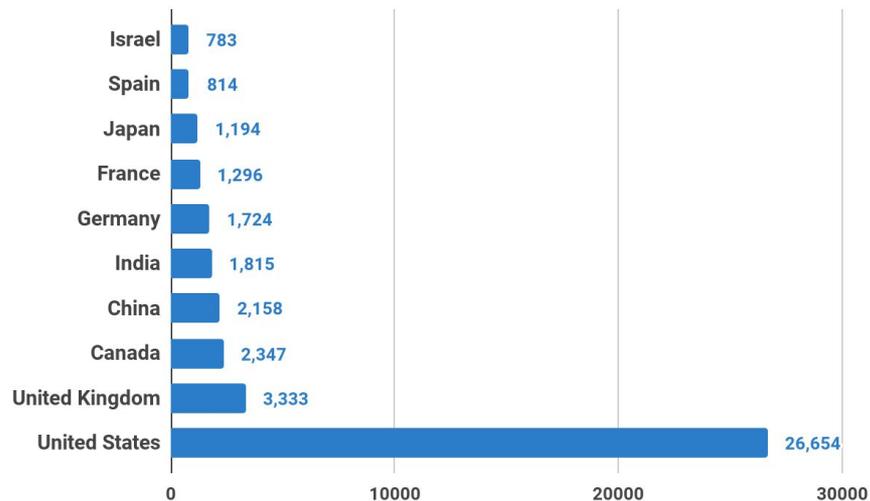
The US is still firmly in the lead in terms of the number of Longevity-focused companies, and the EU is the second biggest market in the world. However, Asia increased the market share to 11.7% (represented by 5,746 companies of different sizes and funding structures) and keeps growing today. We expect steady growth of the Asian companies with an increase in the number of public offerings among them.

TOP 10 COUNTRIES IN THE LONGEVITY SECTOR AS OF Q4 2021

Total Investment by Countries



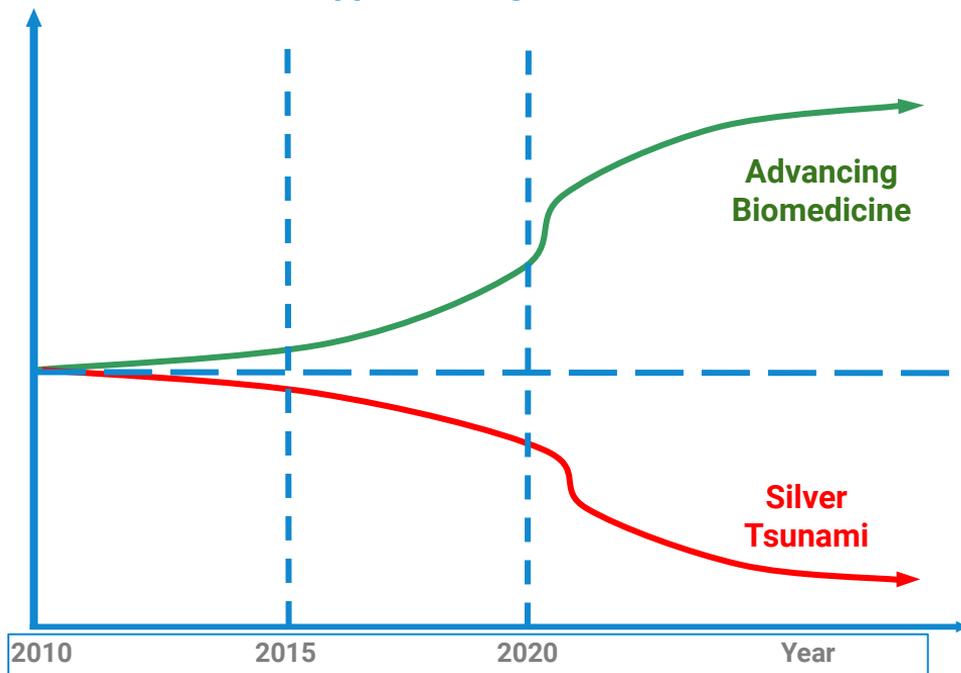
Number of Companies



The chart on the left represents the top 10 countries with the largest investment in the Longevity Industry (as of December 2021). The chart on the right shows the top 10 countries for the number of Longevity-focused companies (as of December 2021). The undisputed leader here is the US which has a total of \$629 billion invested in 26,654 companies. It is followed by China, the second largest country for Longevity investment, which has a total of \$164 billion invested in 2,158 companies. China's closest competitor is the UK where funds are mostly raised from public sources and IPOs, not from private investors.

LONGEVITY AND SILVER TSUNAMI - COLLISION OF TWO OPPOSING MEGATRENDS

Two Opposed MegaTrends



Rapid progress in biomedicine has been mainly due to the advances in collection and analysis of data. The industry is poised to witness a quantum leap in the near future, particularly because of the impact made by Artificial Intelligence on biomedicine R&D and in light of the upcoming paradigm shift from treatment to prevention.

At the same time, the inevitable Silver Tsunami (demographic aging) places a major economic burden not only on the healthcare systems of developing nations, but also on major financial institutions, including pension funds, insurance companies, asset management firms and retail/private wealth banks. It is also expected to increase costs associated with old age.

THE “7TH CONTINENT” OF 1 BILLION PEOPLE IN RETIREMENT



There are more than 1 billion people aged 60 years and older in the world nowadays. In fact, there are so many of them that they can populate an entire ‘7th Continent’.

Not only do they wield immense purchasing power, but they also hold the largest amount of financial assets compared to other age groups.

TOP 20 LONGEVITY COMPANIES



Jiangsu



BeiGene

Changping, Beijing, China



Ontario



BlueRock Therapeutics

Toronto, Ontario, Canada



Maharashtra



PharmEasy

Mumbai, Maharashtra, India



United Kingdom



Abcam

Cambridge, Cambridgeshire, UK



Juvenescence

Douglas, NA - Isle of Man,
Isle of Man



Tel Aviv



EarlySense

Ramat Gan, Tel Aviv, Israel



California



BioSplice

San Diego, California, US



One Medical

San Francisco, California, US



Freenome

South San Francisco,
California, US



Human Longevity

San Diego, California, US



UNITY Biotechnology

Brisbane, California, US



Geron

Menlo Park, California, US



Epirium Bio

San Diego, California, US

Massachusetts



Amwell

Boston, Massachusetts, US



Decibel Therapeutics

Cambridge, Massachusetts, US



Navitor Pharmaceuticals

Cambridge, Massachusetts, US

Washington



Sana Biotechnology

Seattle, Washington, US

Colorado



SomaLogic

Boulder, Colorado, US

Maryland



Osiris Therapeutics

Columbia, Maryland, US

New Jersey



Celularity

Warren, New Jersey, US

LONGEVITY LANDSCAPE FRAMEWORK

Longevity Science

Rejuvenation
Biotechnology

Basic Research on
Biology of Ageing

Geroprotectors

Regenerative
Medicine

Nutraceuticals

Gene Therapy

Longevity Medicine

Personalized
Diagnostics

Personalized HALE
and QALE Estimation

Personalized
Prognostics

Personalized in vivo
and in silico Drug
Testing

Preventive Therapies

Participatory Medicine

AgeTech

NeuroTech

Cognitive
Enhancement

Smart Homes

NextGen Mobile Apps
for the Elderly

Continuing Education

Entertainment for the
Elderly

Longevity Finance

Longevity Index Fund

Longevity Hedge Fund

Longevity Stock
Exchange

AgeTech Bank

Longevity Derivatives

Longevity Investment
Bank

Longevity Governance

Pension Plans

National Healthcare
Budgets

Longevity
Development
Strategies

Elderly Care Programs

National Insurance

Elderly Education

Longevity Ethics

Ageism mitigation

Civil participation

Logistical Effects of
Longevity

Age-friendly
environment

Social inclusivity

Healthcare as a Basic
Human Right

LONGEVITY INDUSTRY SUBSECTORS

AgeTech

Digital, IT and mechanical technologies aiming at prolonging physical functionality and wellbeing in elderly demographics.

AI for Longevity

Application of Artificial Intelligence for Longevity research and development, including AI for drug discovery and biomarker development.

FemTech

FemTech products and services targeting core female-specific hallmarks of aging and/or aspects of aging. Prominent sectors include fertility, ovarian rejuvenation.

PharmTech

PharmTech include application of scientific knowledge or technology to pharmacy, pharmacology, and the pharmaceutical industry.

P4 Medicine

P4 (Precision Preventive Personalized Participatory) diagnostic, prognostic and therapeutic technologies to maintain an optimal state of health for as long as possible. Considered as the leading edge of practical applications of Longevity technologies.

Regenerative Medicine

Cell therapies, bioengineered organs, tissue engineering and xenotransplantation targeting core hallmarks of aging.

Biomarkers for Longevity

Discovery and development of panels of biomarkers of aging, the core infrastructure required for testing the safety and efficacy of Longevity therapies and the effectiveness of interventions.

LONGEVITY INDUSTRY SUBSECTORS

Longevity NeuroTech

NeuroTechnologies to improve and maintain cognitive abilities, neurological plasticity, sleep quality (SleepTech) and psychological well-being into later stages of life.

Deep Diagnostic

Treating or diagnosing a problem you're having by monitoring existing problems, checking out new symptoms or following up on abnormal test results.

FinTech

The integration of technology into offerings by financial services companies in order to improve their use and delivery to consumers.

Space Medicine

The practice of medicine on astronauts in outer space whereas astronautical hygiene is the application of science and technology to the prevention or control of exposure to the hazards that may cause astronaut ill health.

Longevity WealthTech

WealthTech industry comprises any product or service (again, almost invariably IT-based) that either simplifies or enhances the creation and maintenance of Wealth - from savings to investment - for all ages of society.

Advanced Cosmetics

Advanced cosmetic describes the industry that manufactures and distributes advanced cosmetic products. It includes Natural cosmetics, Cosmeceuticals, Beauty devices, Ingredients-as-a-Service and Anti-aging cosmetics markets.

Longevity Gene Therapy

Gene therapy is an experimental technique that uses genes to treat or prevent disease. In the future, this technique may allow doctors to treat a disorder by inserting a gene into a patient's cells instead of using drugs or surgery.

LONGEVITY INDUSTRY SUBSECTORS

Mental Health

Mental Health includes a wide range of psychological or psychiatric disorders and often requires psychiatric intervention. Conditions can be caused by either a biological origin such as genetic, chemical, and anatomical.

Clinical Data Management

Clinical data management is the process of collecting and managing research data in accordance with regulatory standards to obtain quality information that is complete and error-free.

Telemedicine

Telemedicine, or virtual health, refers to one-on-one consultations between patients and health professionals via video chat, phone call, or text message.

InsurTech

Insurtech refers to the use of technology innovations designed to squeeze out savings and efficiency from the current insurance industry model. Insurtech is a combination of the words “insurance” and “technology,” inspired by the term fintech.

Geroscience

Biomedical therapies targeting the root causes of aging, including Cellular Senescence, Stem Cell Exhaustion, Epigenetic Alterations, Altered InterCellular Communication, Loss of Proteostasis, Deregulated Nutrient Sensing, Mitochondrial Dysfunction, Telomere Attrition and Genomic Instability.

Wellness & Fitness

Wellness & Fitness encompasses all activities which promote physical and mental wellbeing: from yoga to healthy eating, personal care and beauty, nutrition and weight-loss, meditation, spa retreats, workplace wellness and wellness tourism.

TOP LONGEVITY COMPANIES BY SUBSECTORS

Regenerative Medicine



BlueRock Therapeutics
(Canada)



Vericel Corp
(United States)



ReNeuron Group (United Kingdom)



TreeFrog Therapeutics
(France)



VisionCare Ophthalmic
(United States)



EGenesis
(United States)

P4 Medicine



Bayer
(Germany)



Biogroup-LCD
(France)



Boston Scientific
(United States)



Siemens Healthineers
(United States)



Aurora
(United States)



AmersourceBergen
(United States)

Biomarkers for Longevity



SomaLogic
(United States)



Quanterix
(United States)



Abcam
(United Kingdom)



Edifice Health
(United States)



TAMiRNA
(Austria)



Astute Medical
(United States)

Geroscience



Mesoblast
(Australia)



UNITY Biotechnology
(United States)



Stealth BioTherapeutics
(United States)



Epirium
(United States)



BIOTECH
YOUR TAGLINE HERE
Imagen Biotech
(United States)



CohBar
(United States)

TOP LONGEVITY COMPANIES BY SUBSECTORS

AgeTech



Devoted Health
(United States)



Affirm
(United States)



AdaptHealth
(United States)



Honor
(United States)



ClassPass
(United States)



ConforMIS
(United States)

AI for Longevity



Meta
(United States)



NVIDIA
(United States)



Nuro
(United States)



Babylon
(United Kingdom)



Tempus
(United States)



OpenAI
(United States)

Longevity FemTech



Progyny
(United States)



Endoceutics
(Canada)



Endomag
(United Kingdom)



Natural Cycles

Natural Cycles
(Sweden)



Cadence Health
(United States)



Cradle Genomics
(United States)

PharmTech



Galapagos
(Belgium)



Quintiles
(United States)



Moderna Therapeutics
(United States)



Horizon Therapeutics
(Ireland)



Ainylam Pharmaceuticals
(United States)



Carestream
(United States)

TOP LONGEVITY COMPANIES BY SUBSECTORS

Longevity Neurotech



Zogenix
(United States)



Alphatec Spine
(United States)



MindMaze (Switzerland)



Neuronetics
(United States)



Alector
(United States)



Cala Health
(United States)

Deep Diagnostics



Roche
(Switzerland)



Thermo Fisher Scientific
(United States)



MorphoSys
(Germany)



Radiology Partners
(United States)



Agilent Technologies
(United States)



Bluebird Bio
(United States)

Longevity FinTech



Next Insurance
(United States)



Plaid
(United States)



Marqeta
(United States)



Lemonade
(United States)



MoneyLion
(United States)



MediTrust Health
(China)

Space Medicine



Indigo
(United States)



Expert.ai
(United States)



AbilTo
(United States)



iGenetic Diagnostics
(India)



Apollo Agriculture
(Kenya)



Medyria
(Switzerland)

TOP LONGEVITY COMPANIES BY SUBSECTORS

WealthTech



Australian Unity
(Australia)



Quartet Health
(United States)



Eliza
(United States)



HealthCentral
(United States)



Just Retirement
(United Kingdom)



BioIQ
(United States)

Advanced Cosmetics



Canopy Growth
(Canada)



Ginkgo Bioworks
(United States)



Revance Therapeutics
(United States)



Biomat USA
(United States)



Humacyte
(United States)



Essity
(Sweden)

Gene Therapy



Sarepta Therapeutics
(United States)



Audentes Therapeutics
(United States)



Abeona Therapeutics
(United States)



4D Molecular Therapeutics
(United States)



Nightstar Therapeutics
(United Kingdom)



Affinia Therapeutics
(United States)

Mental Health



Lyra Health
(United States)



ATAI Life Sciences
(Germany)



Mindstrong
(United States)



COMPASS Pathways
(United Kingdom)



Linus Health
(United States)



HMNC Brain Health
(Germany)

TOP LONGEVITY COMPANIES BY SUBSECTORS

Clinical Data Management



Piramal Enterprises
(India)



Syneos Health
(United States)



Medable
(United States)



Color
(United States)



Phoenix Insurance Company
(Israel)



Helix
(United States)

Telemedicine



Independent Vetcare
(United Kingdom)



PharmEasy
(India)



Welltower Inc
(United States)



23andMe
(United States)



Wellcome Trust
(United Kingdom)



Hinge Health
(United States)

InsurTech



Bright Health Group
(United States)



Oscar Health
(United States)



Hippo Insurance
(United States)



Ping An Healthcare Management
(China)



WeDoctor
(China)



The Exchange
(United States)

Wellness & Fitness



COFCO
(China)



JD Health
(China)



ChargePoint
(United States)



Perfect Day
(United States)



YgEia3
(United Kingdom)



Apeel Sciences
(United States)

TOP LONGEVITY COMPANIES BY SUBSECTORS

Deep Dentistry



Dental Corp
(Canada)



Zimmer Biomet
(United States)



MRC
(United States)



SmileDirectClub
(United States)



Arrail Dental Clinic
(China)



Planet
(United States)

Others



Ant Group
(China)



Meituan
(China)



Tencent
(China)



Siemens
(Germany)



Saudi Arabia's Public
Investment Fund
(Saudi Arabia)



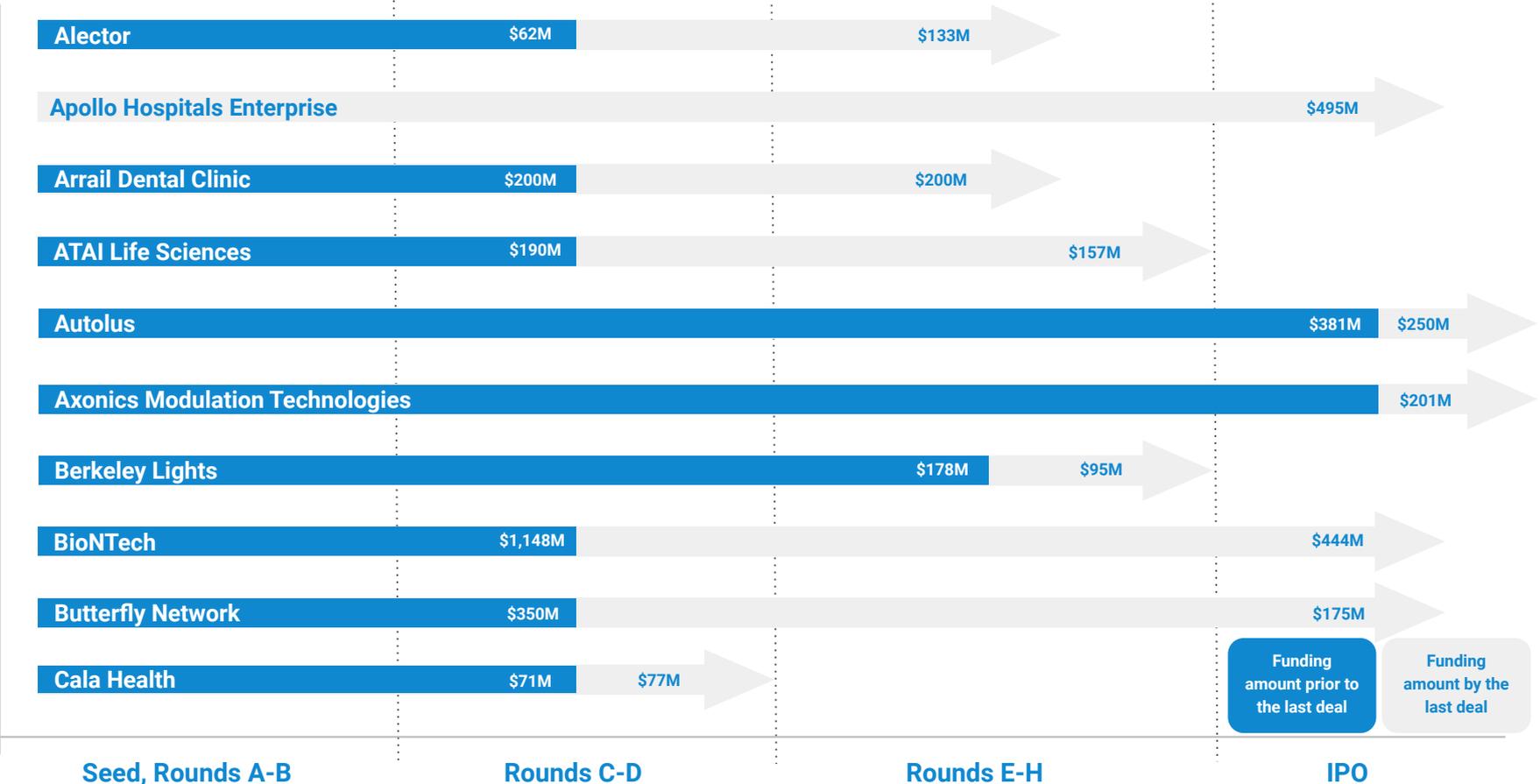
SenseTime
(Hong Kong)

INVESTMENT LANDSCAPE

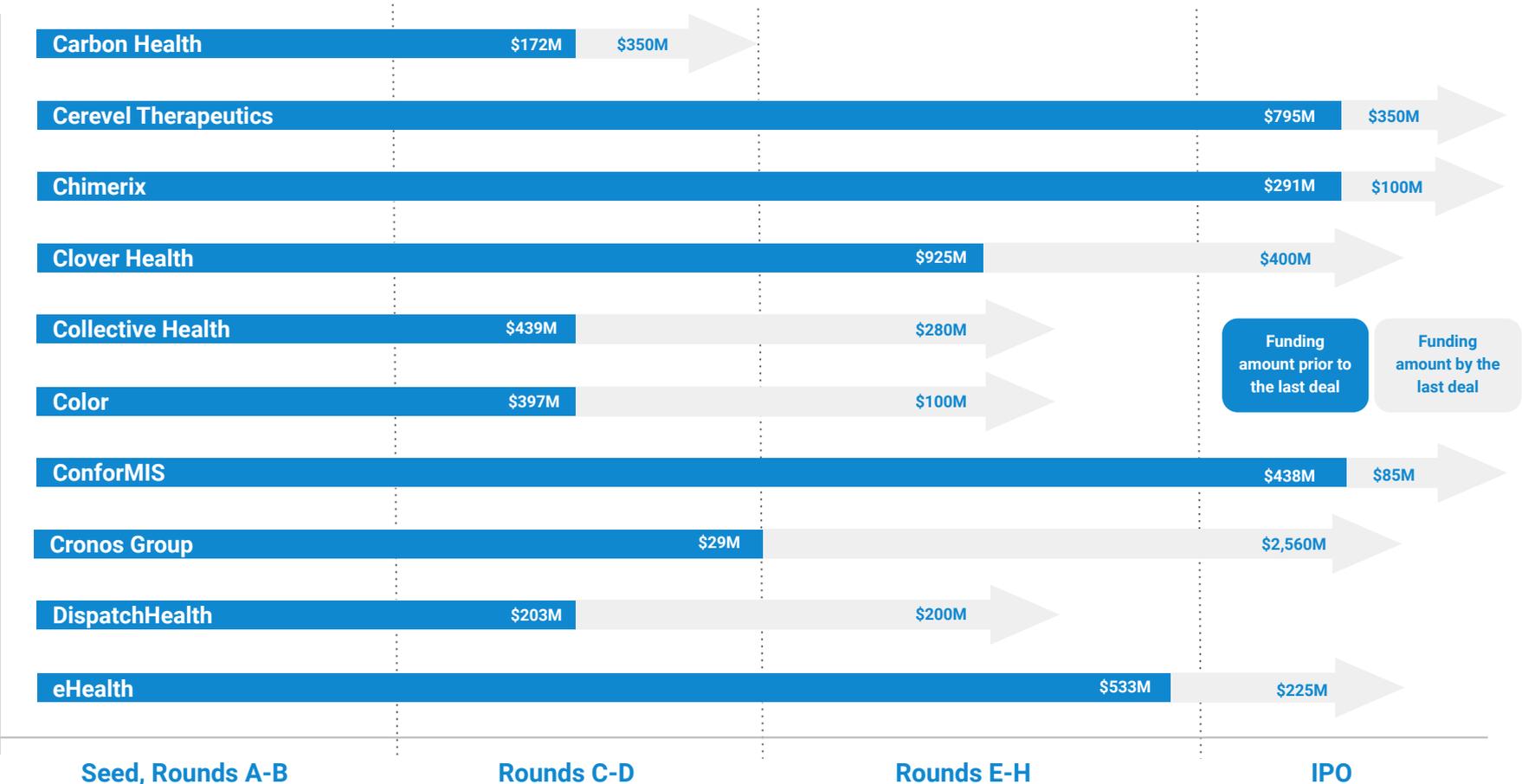
Overview



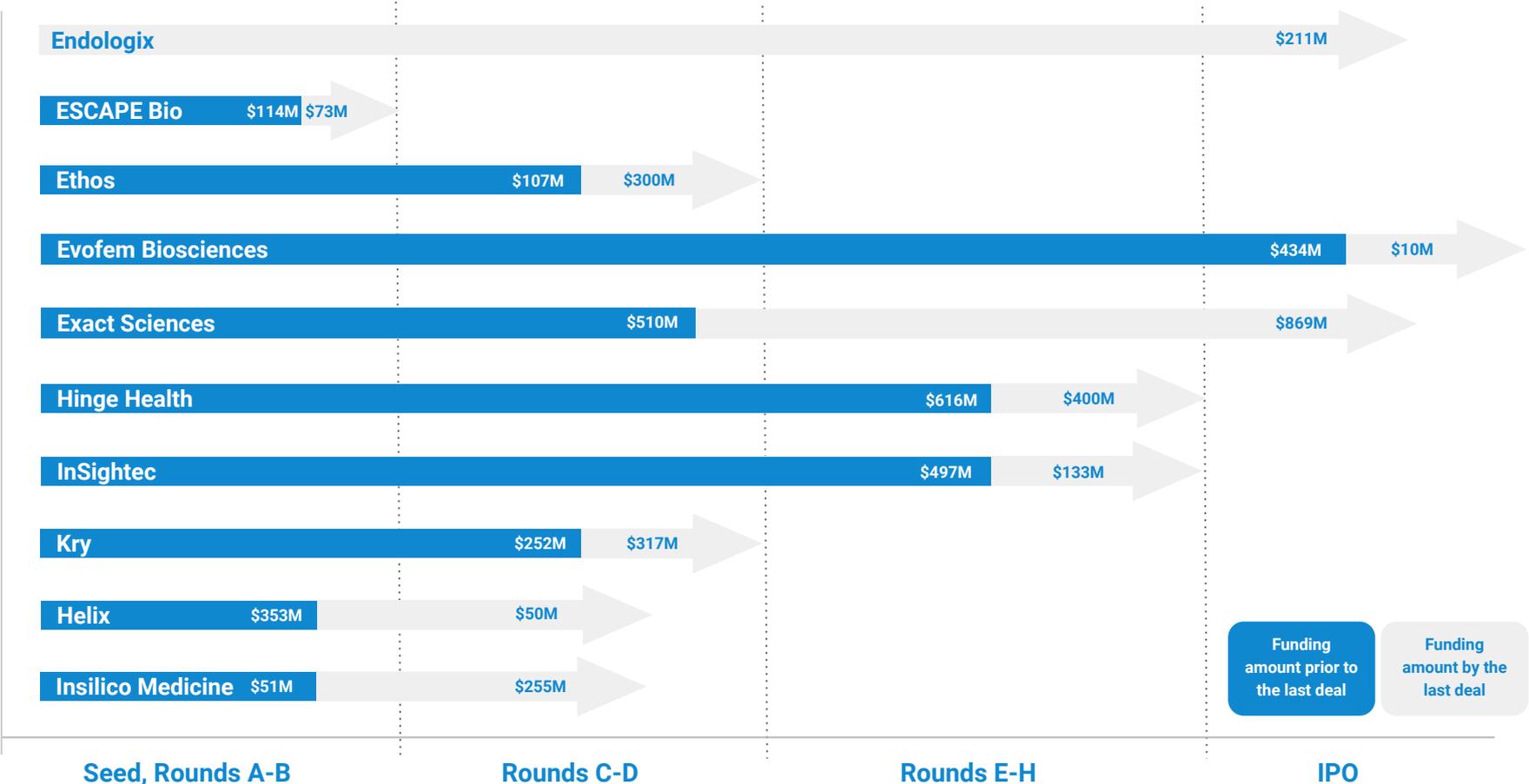
LEADING COMPANIES. AMOUNT AND STAGE OF FUNDING



LEADING COMPANIES. AMOUNT AND STAGE OF FUNDING



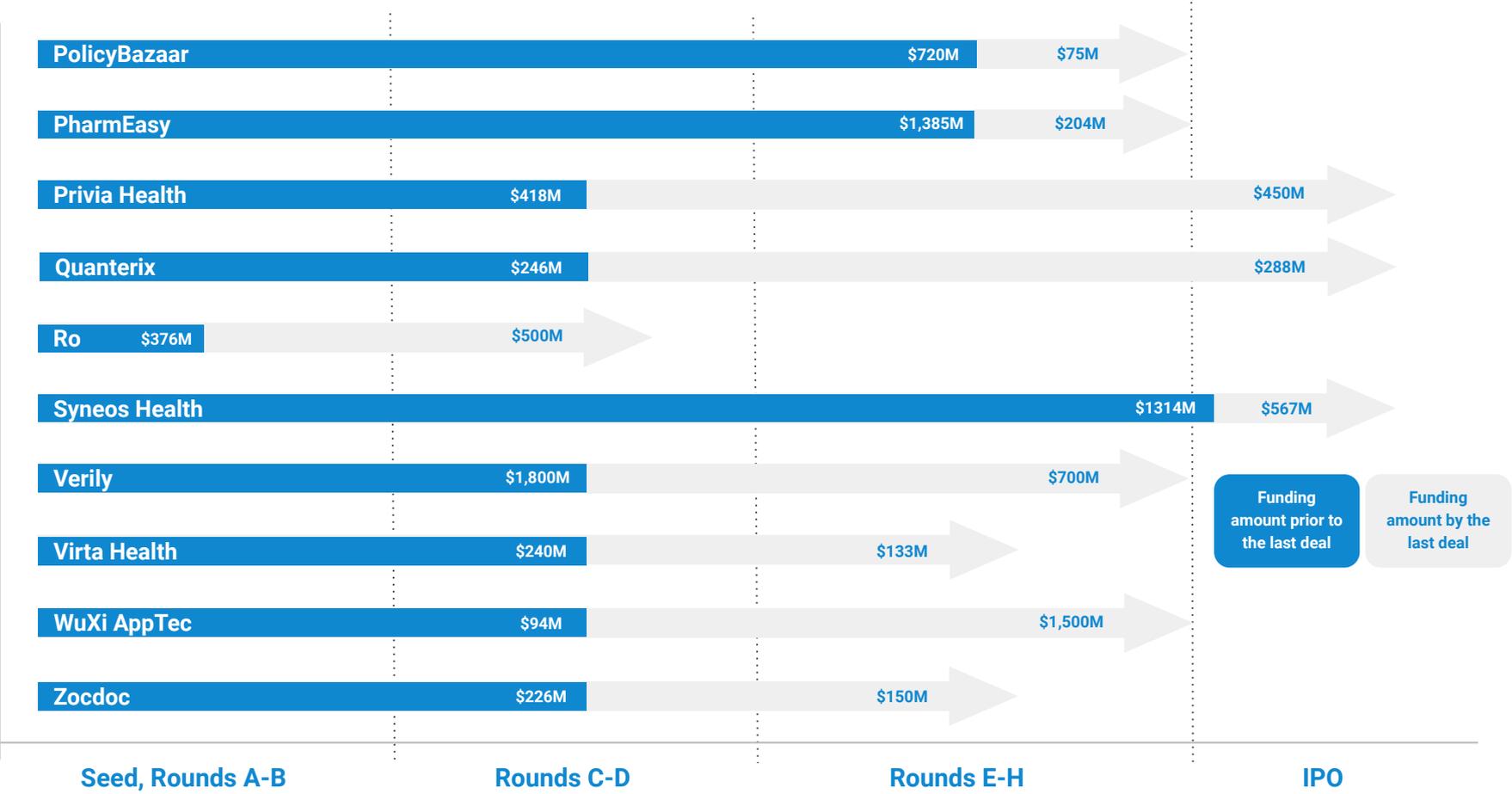
LEADING COMPANIES. AMOUNT AND STAGE OF FUNDING



LEADING COMPANIES. AMOUNT AND STAGE OF FUNDING



LEADING COMPANIES. AMOUNT AND STAGE OF FUNDING



BIGGEST FUNDING ROUNDS IN PRIVATE LONGEVITY COMPANIES

Biggest funding rounds of prominent companies:

- **Thermo Fisher Scientific**, a pharma services provider of laboratory information management & scientific data systems, has raised a total of \$6B in Post-IPO Debt funding over 1 round in Oct, 2021. Net proceeds will be used to pay a portion of the cash consideration payable for the pending acquisition of PPD and a portion of the offering for general corporate purposes.
- **Devoted Health**, a healthcare company serving seniors and giving them a health care plan with personal guides and world-class technology, raised \$1.2B Series D in 2021 to expand its services across the country.
- **BridgeBio Pharma**, focuses on genetic disease therapies and develops those assets with the right approach in supporting R&D, raised \$750M Post-IPO Debt in Nov 2021. The financing is expected to fully fund BridgeBio's portfolio of more than 30 drug development and discovery programs into 2024, independent of near-term milestone readouts.
- **Sarepta Therapeutics**, focuses on the discovery and development of precision genetic medicine to treat rare diseases, has raised a total of \$500M Post-IPO Equity round. Sarepta intends to use the net proceeds for the continuation of, and initiation of further, clinical trials, commercialization, manufacturing, business development activities, including the potential licensing or acquisition of complementary products, technologies and entities, and other general corporate purposes.
- **PharmEasy**, a health tech startup offering services such as teleconsultation, medicine deliveries, and diagnostic test sample collection, has raised \$350M in Pre-IPO round.

Top 5 Investment Deals



MEDIUM FUNDING ROUNDS IN PRIVATE LONGEVITY COMPANIES

Medium funding rounds of prominent companies:

- **Luma Health** solves the central challenge in healthcare – getting a patient in front of the right healthcare provider quickly, raised \$130M Series C from lead investor FTV Capital in Nov 2021 to unify, automate, and transform patients' healthcare journeys
- **Pear Therapeutics**, a software-based digital therapeutics platform designed to treat disease and enhance the efficacy of pharmaceuticals, announced \$125M Post-IPO Equity financing in Dec 2021. The funding will be used for commercialization of Pear's three FDA-authorized products, advancing Pear's pipeline of product candidates, and scaling its end-to-end platform to host PDTs across a wide range of therapeutic areas
- **MindMaze**, a digital neurotherapeutic platform that provides digital assessments and therapeutics to treat and rehab patients, has raised \$125M in venture round to accelerate commercialization and expansion of its SaaS-based digital neurotherapeutics platform
- **Workit Health**, a virtual clinic dedicated to medically-assisted treatment and online therapy for substance use disorder, received \$90M Series C and \$28M Debt Financing in Oct 2021. The Company plans to use the funding to expand into new regions. It aims to operate nationwide by 2023.
- **EyePoint Pharmaceuticals**, specializes in the development and commercialization of ophthalmic products for the treatment of eye diseases. EyePoint has raised \$115.4M Post-IPO Equity and intends to use the net proceeds from the offering for the advancement of EYP-1901 for wet AMD, for pipeline and commercial programs, and for general corporate purposes

Top 5 Investment Deals

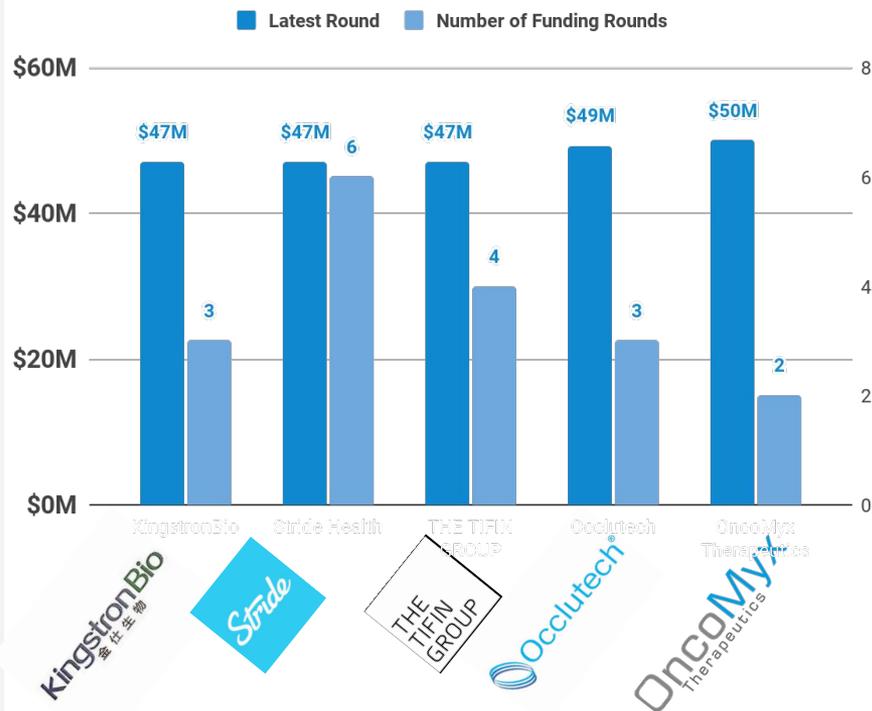


SMALL FUNDING ROUNDS IN PRIVATE LONGEVITY COMPANIES

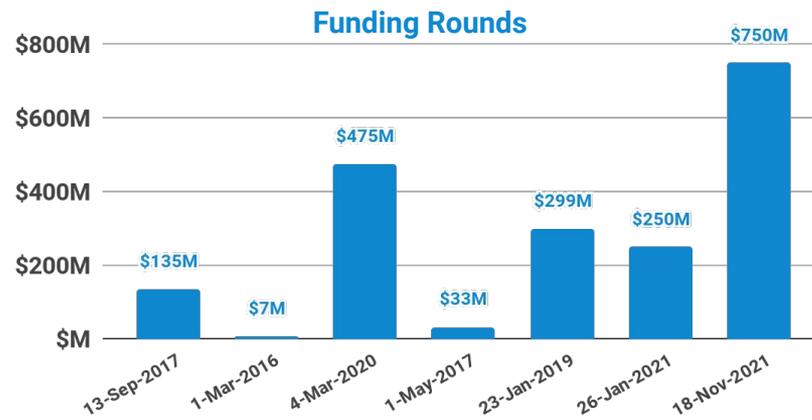
Small funding rounds of prominent companies:

- **OncoMyx Therapeutics**, develops oncolytic immunotherapies to orchestrate an immune response and treat cancer. In Dec 2021, OncoMyx raised \$50M Series B financing. The financing will support the further development of OncoMyx's pipeline of multi-armed myxoma immunotherapies for the treatment of solid tumors and hematological malignances and the advancement of the company's lead candidate into clinical trials
- **Occlutech**, a hi-tech company developing cardiac occlusion devices and other vascular implants, raised \$49M from lead investors including Carnegie, Fourth Swedish National Pension Fund. The financing will allow Occlutech to continue with clinical trials for regulatory approvals in the U.S. for both the AFR device for heart failure and the PFO Occluder for stroke prevention
- **THE TIFIN GROUP**, a platform that creates and operates fintech companies in wealth management, investments, and personal finance, has raised \$47M Series C financing. With the financing, the Company will fund platform expansion and further the mission of reshaping investment experiences
- **Stride Health**, a provider of an insurance recommendation platform designed to offer health insurance services, announced \$47M Series C investment from lead investor King River Capital in Oct 2021. The Company will use funds to expand portable benefits platform, accelerate membership growth, and further invest in partnerships and new channels
- **KingstonBio** manufactures artificial heart valves and annuloplasty rings. KingstonBio has raised \$47M Series C financing to provide medical devices for heart diseases, offerings include heart valve bioprosthesis, TAVR, and biological patches

Top 5 Investment Deals

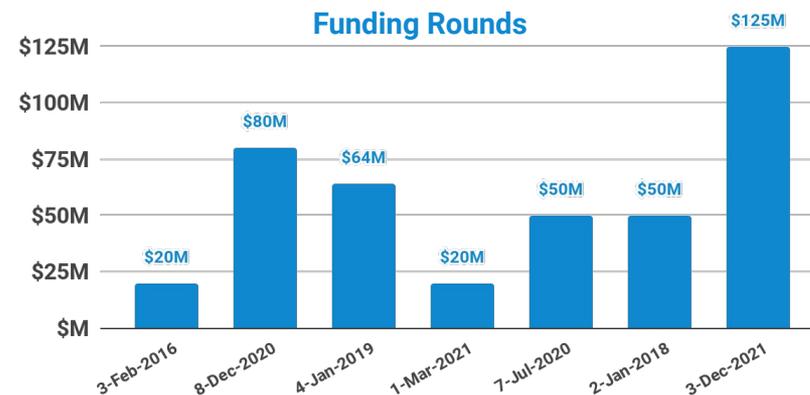


- 1. Company description:** BridgeBio Pharma, Inc. is a US company founded in 2015. The company discovers and develops medicines that target well-characterized genetic diseases. Its product platform is divided into three key categories: Mendelian, Oncology and Gene therapy. BridgeBio Pharma’s pipeline programs include product candidates ranging from early discovery to late-stage development.
- 2. Financial position:** BridgeBio has raised a total of \$1.9 billion in funding over 8 rounds. With latest addition of \$750 million on November 18, 2021.
- 3. Recent news/deals description:** China-based partner LianBio raised \$325 million in its initial public offering on November 1, 2021. BridgeBio is estimated to own approximately 4.7% post-IPO. BridgeBio and LianBio announced in August that the first patient was treated in a Phase 2a trial of infigratinib in patients with gastric cancer and other advanced solid tumors. LianBio in-licensed rights from BridgeBio for infigratinib for development and commercialization in Mainland China, Hong Kong and Macau.
- 4. Summary:** BridgeBio has more than 30 programs in its pipeline for patients living with genetic diseases and cancers and 20 ongoing clinical trials underway across more than 450 sites around the world. Earlier this year BridgeBio received its first two Food and Drug Administration (FDA) drug approvals and has successfully filed 15 Investigational New Drug (IND) applications since its founding.



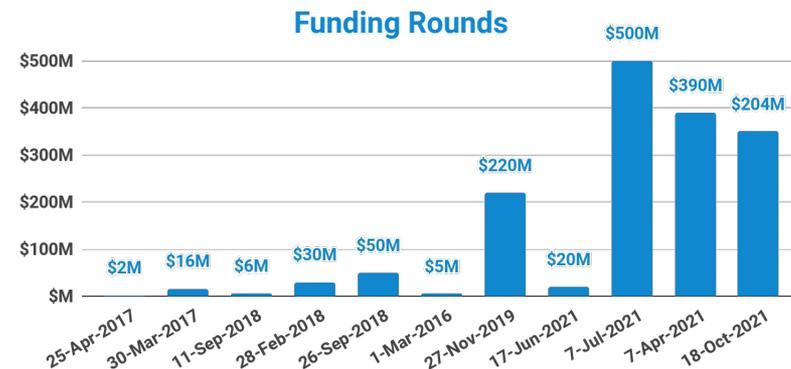
Round	Date	Top Investors
Post-IPO Debt	November, 2021	-
Series D	January, 2019	AIG Investments, Aisling Capital, Cormorant Capital, Hercules Capital, Kohlberg Kravis Roberts, Perceptive Advisors, Sequoia Capital, Viking Global Investors
Series C	September, 2017	AIG Investments, Aisling Capital, Cormorant Capital, Janus Fund, Kohlberg Kravis Roberts, Perceptive Advisors, Viking Global Investors
Series B	May, 2017	Kohlberg Kravis Roberts

- 1. Company description:** Pear Therapeutics is a US company founded in 2013. It is the leader in prescription digital therapeutics, or PDTs. Pear is discovering, developing, and delivering clinically validated software-based therapeutics to provide better outcomes for patients, smarter engagement and tracking tools for clinicians, and cost-effective solutions for payers. The company completed its IPO on December 6, 2021.
- 2. Financial position:** Pear Therapeutics has raised a total of \$409 million in funding over 8 rounds. With latest addition of \$125 million on December 3, 2021.
- 3. Recent news/deals description:** Pear Therapeutics completed SPAC, began trading on Nasdaq and the transaction generated approximately \$175 million. The Company said it will be used to capitalize its digital therapeutic products.
- 4. Summary:** In 2017, Pear received de novo clearance from the FDA for its reSET tool used for treating substance use disorder, the first digital therapeutic approved by the FDA with claims to improve clinical outcomes. Since then, the company has received FDA marketing clearance for its reSET-O product for opioid use disorder and its digital chronic insomnia therapeutic, Somryst. In late November, it received Breakthrough Device Designation for reSET-A, a prescription digital therapeutic aimed at alcohol use disorder.



Round	Date	Top Investors
Post-IPO Equity	December, 2021	5AM Ventures, Arboretum Ventures, Blue Water Life Science Fund, dRx Capital, Forth Management, Health Innovation Capital, Jazz Venture Partners, Neuberger Berman Group, Palantir Capital
Debt Financing	July, 2020	Perceptive Advisors
Series D	March, 2021	5AM Ventures, Arboretum Ventures, Crimsonox Capital, EDBI, Forth Management, Jazz Venture Partners, Novartis, QUAD Investment Management
Series C	January, 2019	5AM Ventures, Arboretum Ventures, Blue Water Life Science Fund, Novartis, Temasek Holdings, Trustbridge Partners
Series B	January, 2018	5AM Ventures, Arboretum Ventures, Bridge Builders Collaborative, Jazz Venture Partners, Novartis, Temasek Holdings
Series A	February, 2016	5AM Ventures, Arboretum Ventures, Bridge Builders Collaborative, Novartis

- 1. Company description:** PharmEasy is a health tech startup founded in 2015 that offers services such as teleconsultation, medicine deliveries, and diagnostic test sample collection. It also operates an online pharmacy stores and diagnostic centres in order to fulfill their extensive medical needs. The company is based out of Mumbai, India.
- 2. Financial position:** PharmEasy has raised a total of \$1.6 billion in funding over 14 rounds. In the latest round the Company has raised \$350M Pre-IPO financing.
- 3. Recent news/deals description:** PharmEasy invested in BeatO on July 7, 2021. This investment - Series B - BeatO - was valued at ₹420 million (\$5.6 million). PharmEasy has acquired 3 organizations: the most recent one was Aknamed (\$144 million) on September 14, 2021. PharmEasy is funded by 43 investors. VestinWolf Capital Management and Trifecta Capital Advisors are the most recent investors.
- 4. Summary:** PharmEasy has 25 million users (as of June 30, 2021) and got 8.8 million orders in 2021. It has already sold 50+ thousand stock keeping units in Q1 2022. In a bid to diversify its operations, the firm had acquired Thyrocare Technologies, India's largest diagnostic test provider by volumes, in September, 2021. It also filed for an initial public offering of up to ₹6,250 crore (\$842.43 million) in November, 2021, becoming the latest startup in the country to pursue a domestic stock listing.



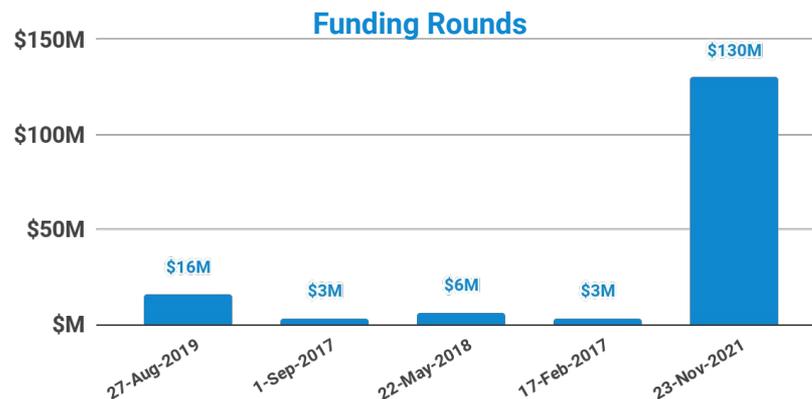
Round	Date	Top Investors
Venture - Series Unknown	October, 2021	ADQ, Amansa Holdings, ApaH Capital Management, Janus Henderson Investors, Neuberger Berman Group
Secondary Market	October, 2021	IIFL Finance, B Capital Group
Series F	July, 2021	Arokiaswamy Velumani, B Capital Group, Kotak Realty Fund, Orios Venture Partners, Prosus Ventures
Series E	April, 2021	Aditya Puri, Caisse de Depot et Placement du Quebec, Chetan Gopaladas Cholera, Deepak Vaidya, Dharmil Sheth
Series D	November, 2019	Bessemer Venture Partners, Caisse de Depot et Placement du Quebec, Eight Roads Ventures
Series C	February, 2018	Bessemer Venture Partners, Eight Roads Ventures India, F-Prime Capital, Fundamentum, Orios Venture Partners
Series B	April, 2017	Aarin Capital, Bessemer Venture Partners, Orios Venture Partners
Series A	March, 2016	Aarin Capital, Astarc Ventures, Bessemer Venture Partners

1. Company description: Luma Health is a patient engagement platform, with a suite of solutions for COVID-19, builds deeper patient relationships, and retains lifetime value for clinics, hospital and health systems, and community health centers. Luma Health's comprehensive patient access solution reduces no-shows, backfills cancellations, and maximizes referral conversions, all with zero staff effort. The company is based in San Francisco, United States since founding in 2015.

2. Financial position: Luma Health has raised a total of \$159 million in funding over 5 rounds. With latest addition of \$130 million on November 23, 2021.

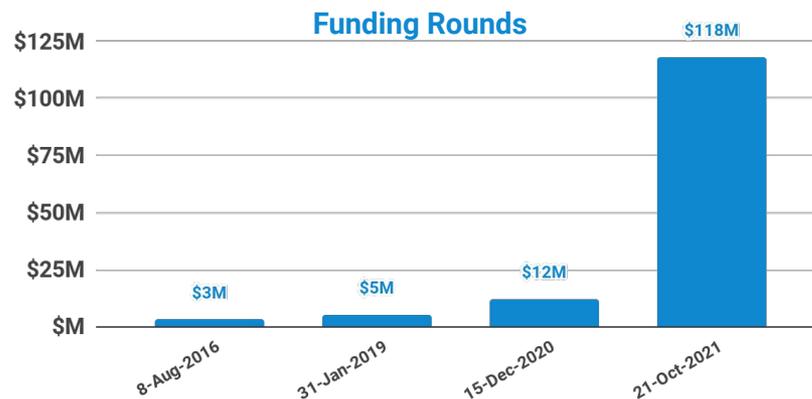
3. Recent news/deals description: Before receiving \$130 million from FTV Capital as Series C funding, Luma Health raised \$16 million on August 27, 2019 from PeakSpan Capital. That was Series C round.

4. Summary: Luma Health is the most comprehensive platform available to unify and automate the patient healthcare journey. It is currently used by more than 550 health systems, hospitals, federally qualified health centers (FQHCs), and clinic networks across the United States. Luma Health is funded by 10 investors. Alumni Ventures and Cisco are the most recent investors.



Round	Date	Top Investors
Series C	November, 2021	Alumni Ventures, Cisco, FTV Capital, PeakSpan Capital, Texas Medical Center, U.S. Venture Partners
Series B	August, 2019	Alumni Ventures, Cisco, PeakSpan Capital, Texas Medical Center, U.S. Venture Partners
Series A	May, 2018	StartX (Stanford-StartX Fund), Temerity Capital Partners, U.S. Venture Partners
Seed	September, 2017	Azure Capital Partners, Shorooq Partners
Convertible Note	February, 2017	Azure Capital Partners, StartX (Stanford-StartX Fund)

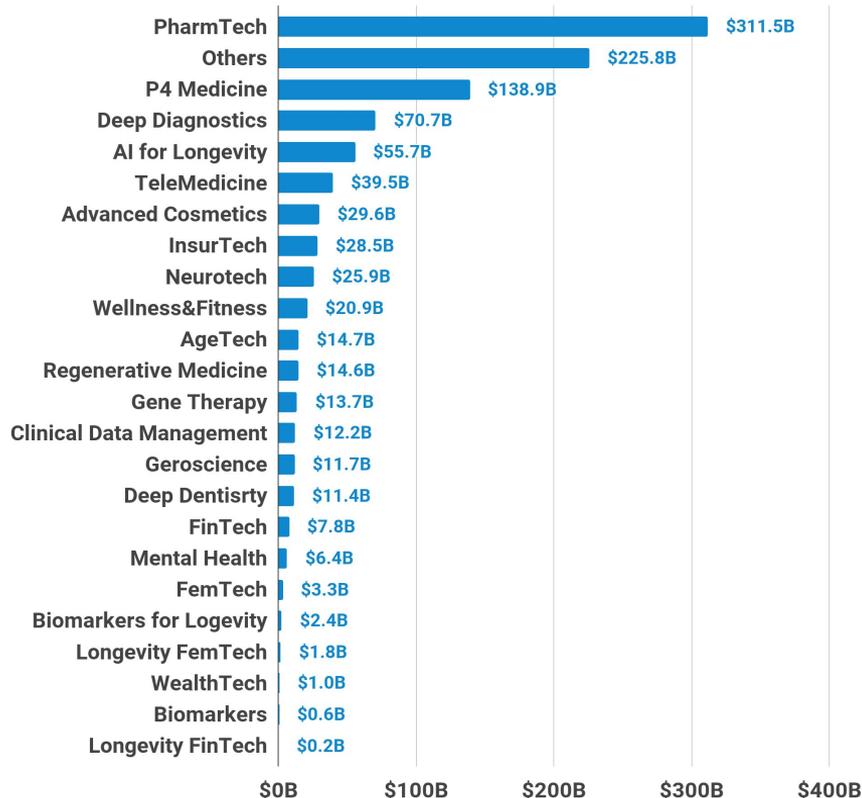
- 1. Company description:** Workit Health was founded in the USA in 2015. It makes treatment for risky substance use behaviors simple, accessible and responsive. The signature Workit product is a digital intervention providing remote behavioral change, helping individuals reduce or quit addictive behaviors in 90 days. On the Workit platform, users complete dynamic exercises to develop the emotional, social and psychological skills needed for substance wellbeing. They learn to recognize warning signs, articulate needs, and access supportive resources. Core content is adapted from evidence-based therapies like cognitive behavioral therapy and motivational interviewing.
- 2. Financial position:** Workit Health has raised a total of \$138 million in funding over 5 rounds. With latest addition of \$90 million on October 21, 2021.
- 3. Recent news/deals description:** The company's latest funding was raised from a Series C round. Workit Health is funded by 14 investors. CVS Health Ventures and Insight Partners are the most recent investors.
- 4. Summary:** In the short time since Workit's founding, it has attracted a highly talented interdisciplinary team of developers, designers and clinicians, including expert advisors across relevant specialties such as behavioral health and psychology and research partnerships with hospitals and universities.



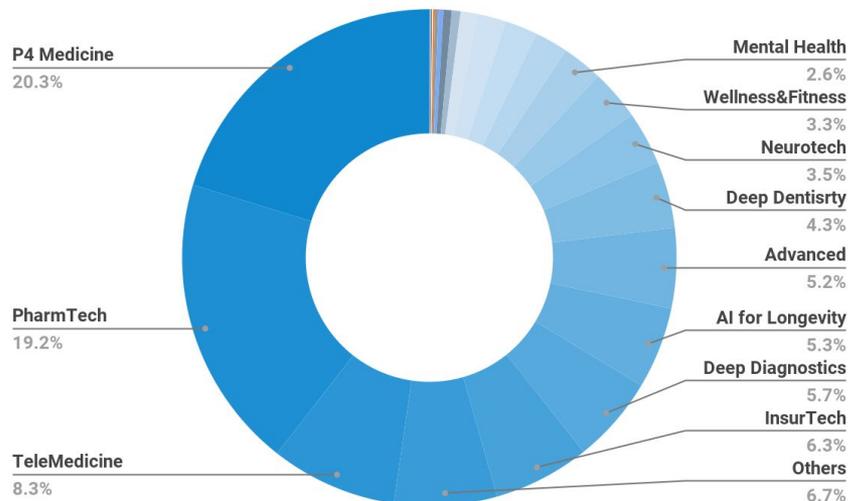
Round	Date	Top Investors
Debt Financing	October, 2021	-
Series C	October, 2021	3L Capital, BlueCross BlueShield Venture Partners, CVS Health Ventures, FirstMark, Insight Partners
Series B	December, 2020	BlueCross BlueShield Venture Partners, FirstMark, GingerBread Capital, Lux Capital, Rob Lowe
Series A	January, 2019	BlueCross BlueShield Venture Partners, Endeavor Catalyst, Invest Detroit, Lux Capital, Montage Ventures, RRE Ventures, Wakestream Ventures
Seed	August, 2016	Impact Engine, Invest Detroit, Lux Capital, Montage Ventures, RRE Ventures, Wakestream Ventures

INVESTMENTS IN LONGEVITY BY SECTOR

Total Investments Raised by Longevity Companies



Companies Distribution by Longevity Subsectors



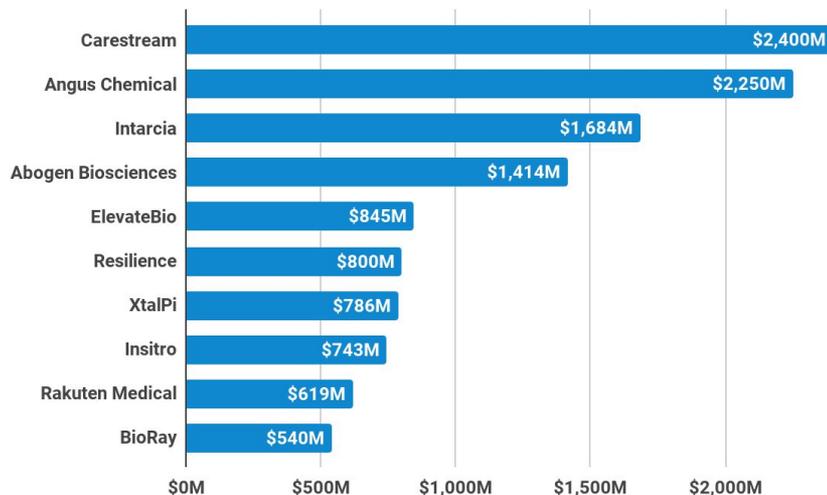
PharmTech and **P4 Medicine** are Longevity subsectors involving the largest number of companies and receiving the highest volume of investments. The subsequent pages outline key trends of private investing for top 5 Longevity subsectors.

PHARMTECH

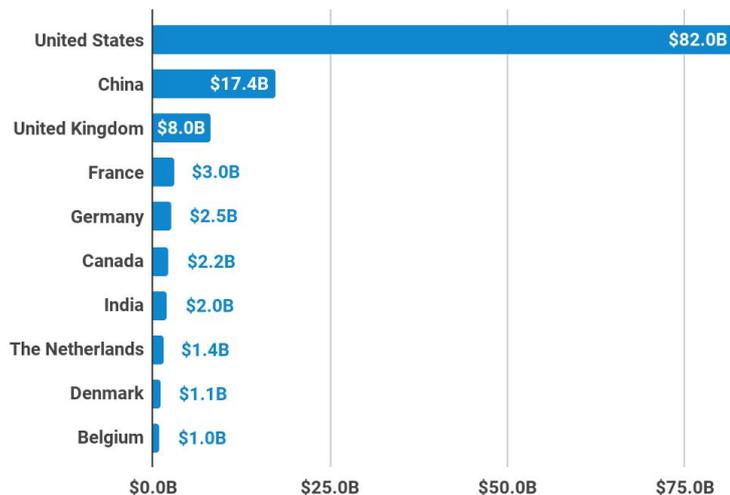
Key market drivers

- **PharmTech is becoming a lucrative area for specialized biotech investors and investment funds (VCs)** just entering the pharma space to include high-risk/high-return companies in their investment portfolios.
- The rise of PharmTech catalyzes **technological expansion of other vendors and service providers** e.g. big data providers, quantum computing providers, cloud and data storage providers, etc.
- **Tech companies are expanding into pharma space** via offering specialized services and tools to pharma counterparties and directly investing into disruptive startups
- Nowadays, **advanced technologies (AI, ML, Big Data)** offer services for drug development with greater success rate, in most of areas such solutions create a unique chance to find novel treatments faster and at lower costs.

Top 10 Private Companies by Total Raised Investments



Top 10 Countries by Investments

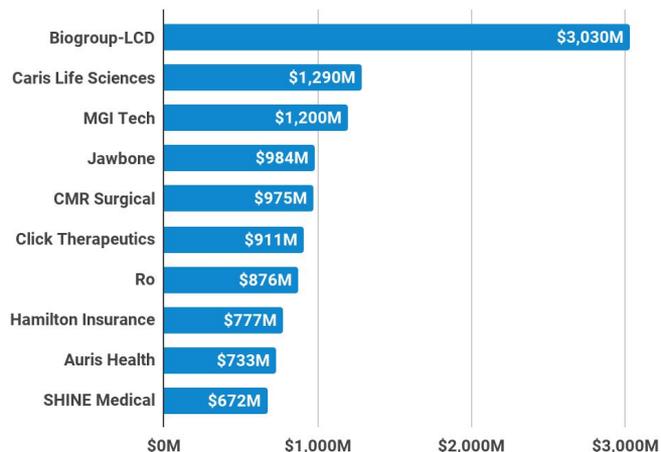


P4 MEDICINE

Key market drivers

- We are already seeing **a great shift in diagnostics from symptoms analysis towards a precision analysis** of molecular predictors, and markers of diseases will result in far greater cost/effectiveness.
- Biomedical innovations discovery and supply are being accelerated both by **rising implementation in practical medicine and demand from informed consumers**.
- **Consumers prefer the P4 form of healthcare**, which is science-based and provides active prevention of diseases and ageing, and enhancement of wellness without the regular need to visit clinics. The at-home mode of testing, monitoring, prevention or treatment is in compliance with lifestyle trends of modern humanity.
- **A new wellness and the Longevity Industry has emerged and is expected to supersede the current healthcare industry** by a number of products and become a major source of economic growth in the near future.

Top 10 Private Companies by Total Raised Investments



Top 10 Countries by Investments

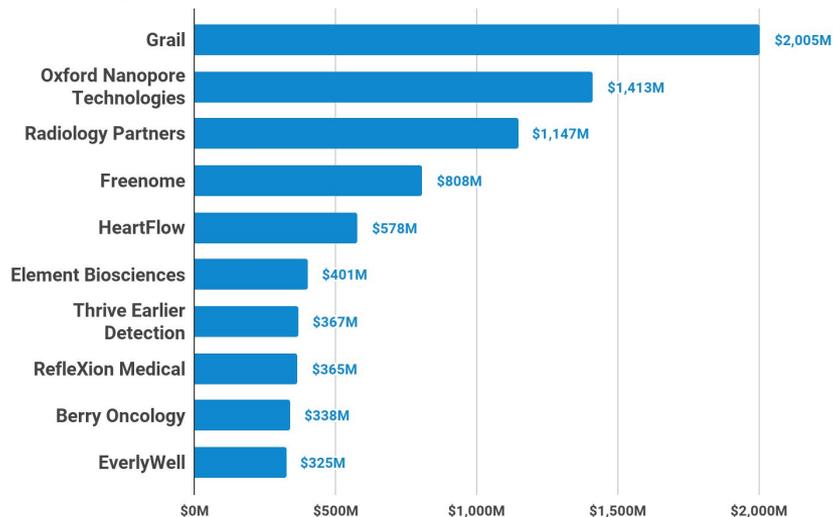


DEEP DIAGNOSTICS

Key market drivers

- **The request of seniors to preventive diagnostics services is becoming more clear:** this population group intends to be independent, vital, and healthy for a longer period of lifespan.
- **The demand for more accessible and on-hand diagnostics tools will arise.** The possible prospective areas of Longevity deep diagnostics may involve blood pressure, cancer screening, eyes protecting solutions, hearing tests, cholesterol screening etc.
- As older adults begin experiencing age-related decline and requiring more assistance with daily tasks, they and their family members want **to receive precise and necessary tests and doctor's appointments.** Thus, new companies emerge to fit such needs with new solutions.

Top 10 Private Companies by Total Raised Investments



Top 10 Countries by Investments

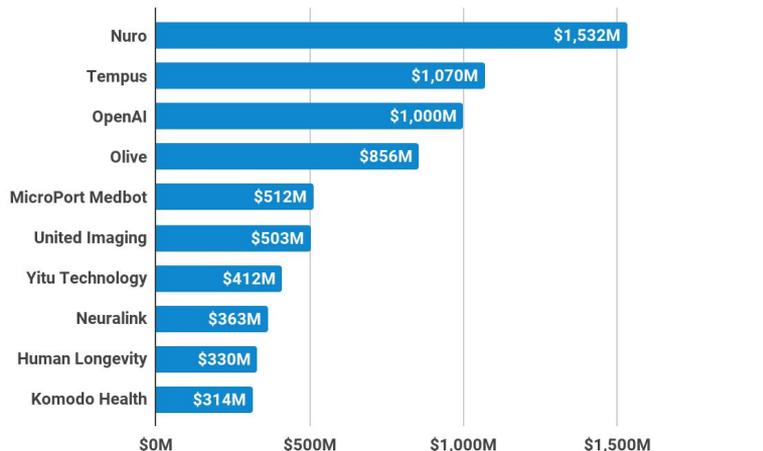


AI FOR LONGEVITY

Key market drivers

- **The primary goal of AI application in Longevity Industry for the next 5-10 years** will lie in the aggregation, development and deployment of biomarkers of aging, health and Longevity; Preventive Medicine diagnostics and prognostics; Precision Health technologies and therapeutics; and integrated wealthspan-extending AgeTech and WealthTech solutions for financial wellness across extended periods of Healthy Longevity.
- As **the complexities of Longevity science and technology increase**, and as the volume of data continues to amass, the role of AI in both analysis and comprehension becomes completely necessary for continued progress and industry development.
- **Companies advancing AI in Longevity are widely becoming the object of interest of investment funds across the global market.** Next 5 years can bring new Longevity-focused funds having more precise expertise necessary to make intelligent investments in such a complex and multidisciplinary industry.

Top 10 Private Companies by Total Raised Investments



Top 10 Countries by Investments

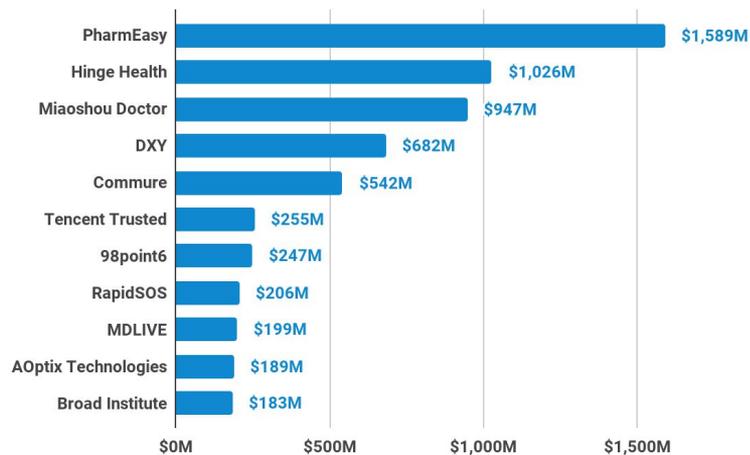


TELEMEDICINE

Key market drivers

- **The COVID-19 pandemic has shone a new spotlight on the potential for telehealth to complement in-person care** – especially for people who may face mobility challenges in going to a brick-and-mortar office.
- **Telemedicine prove to be effective in cases of urgent and one-time visits:** e.g. seniors with respiratory infections may use telemedicine solutions saving their time and money while enjoying the solid level of healthcare services.
- **Physicians can spot early warning signs associated with worsening chronic conditions** and the onset of new ones, allowing for early intervention and reducing the chance of hospital admission and readmission.
- **Ever increasing number of new companies emerge which are aimed at reducing the cost of healthcare services for services.** For example, the expense of implementing telemedicine programs in nursing homes could be offset by a reduction in costs related to transferring residents to and from emergency rooms and physicians' offices.

Top 10 Private Companies by Total Raised Investments



Top 10 Countries by Investments

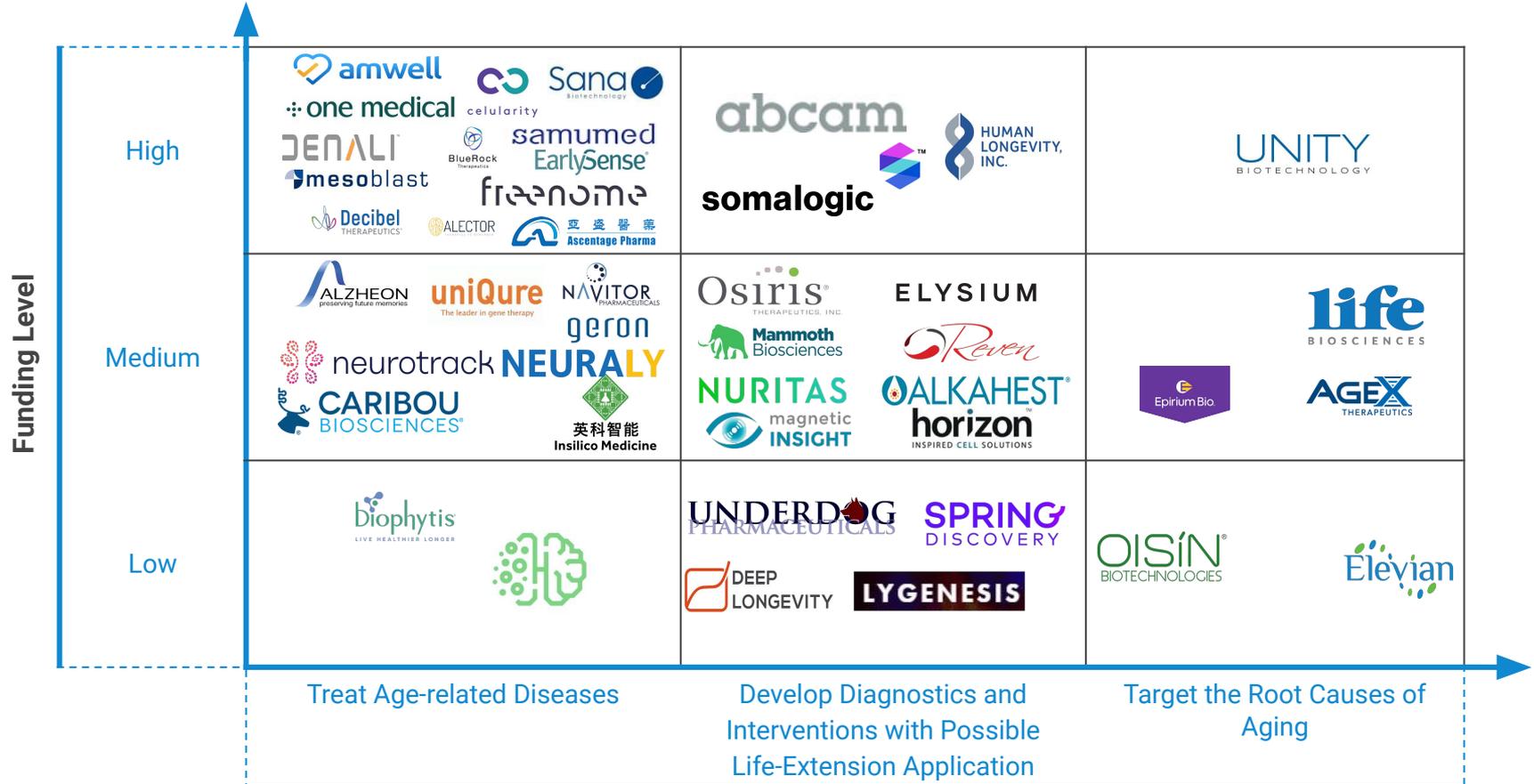


TOP 10 PRIVATE LONGEVITY-FOCUSED COMPANIES BY TOTAL INVESTMENTS AS OF Q4 2021



2021 demonstrates the lasting trend of boosted growth of the PharmTech market and the development of the Longevity sector. Pandemic has stimulated an increase in investments in the Longevity industry, where total funding of top 10 Longevity-focused companies exceeds **\$20.2B** as of December 30, 2021. BioGroup, the leader of rating, has raised a total of \$3B in funding over 3 rounds.

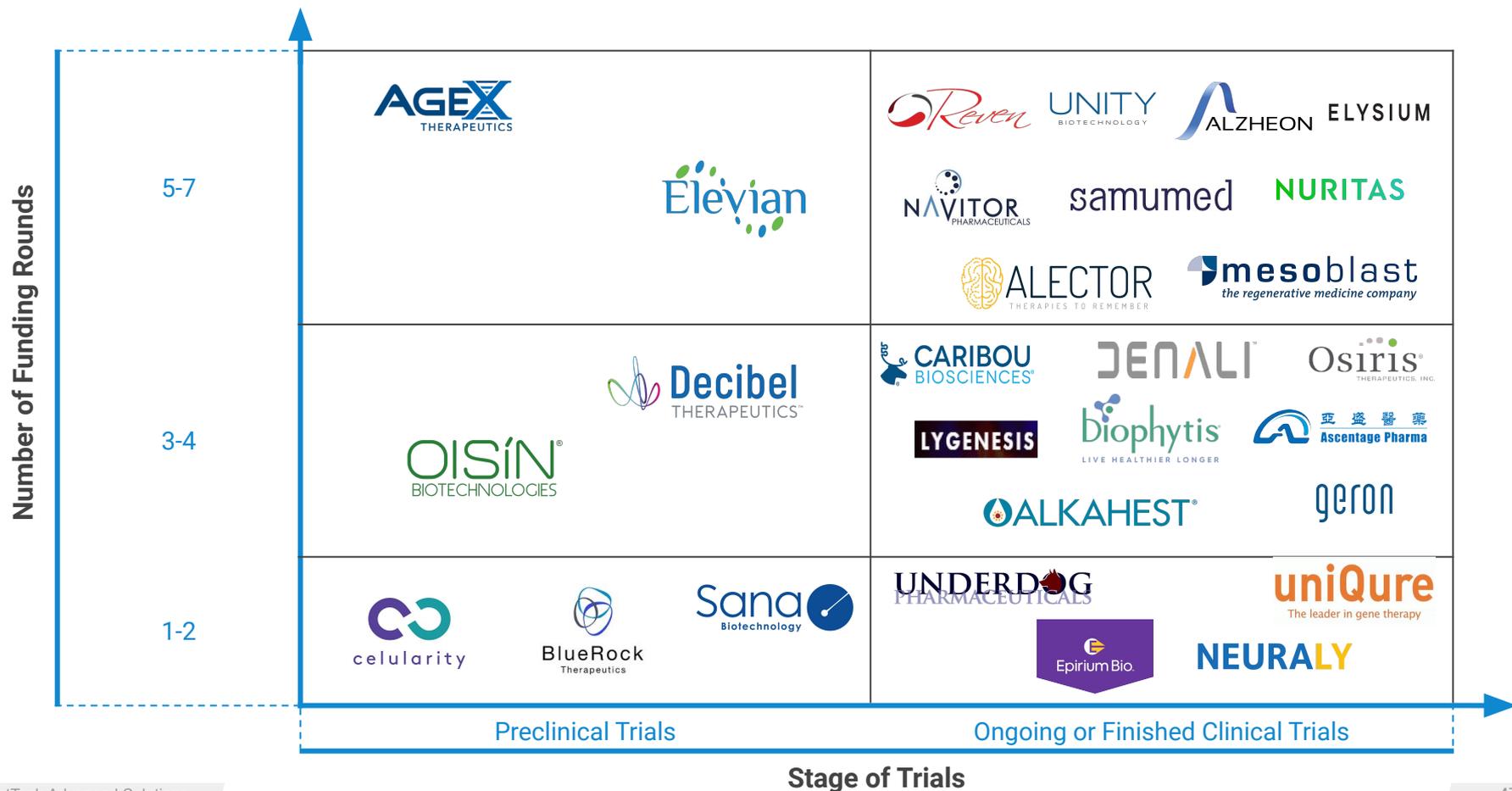
TOP LONGEVITY COMPANIES BY FUNDING LEVEL AND SPECIALIZATION



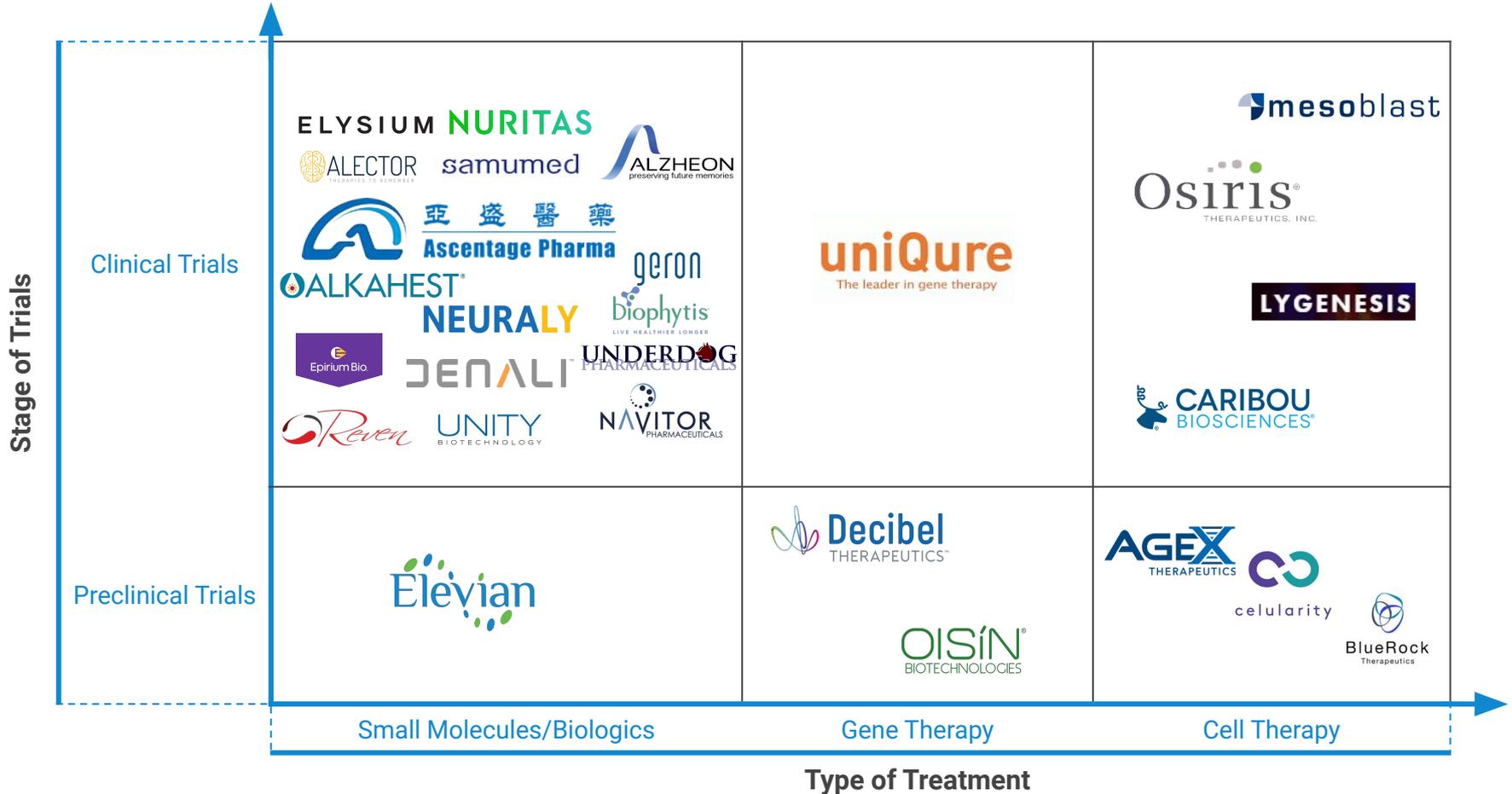
TOP LONGEVITY COMPANIES BY FUNDING ROUND AND TREATMENT TYPE

Funding Round	Type of Treatment		
	Small Molecules / Biologics	Gene Therapy	Cell Therapy
IPO	    		 
Rounds C-F	   		
Round B			 
Round A	       		  
Seed			

TOP LONGEVITY COMPANIES BY ROUNDS NUMBER AND STAGE OF TRIALS



TOP LONGEVITY COMPANIES BY STAGE OF TRIALS AND TREATMENT TYPE



LEADING INVESTORS IN THE INDUSTRY

Overview



TOP 50 INVESTORS IN LONGEVITY COMPANIES

INVESTORS	NUMBER OF INVESTMENTS	NUMBER OF COMPANIES INVESTED	COMPANIES WITH THE BIGGEST FUNDING
National Science Foundation 	35	35	Spero Therapeutics, Semiotic AI, Vaxess Technologies, Ansa Biotechnologies, BioAesthetics
National Institutes of Health 	26	26	Versiti, Helixbind, BiVACOR, Drexel University, HDT Bio
RA Capital Management 	21	20	Freenome, Adagio Therapeutics, Graphite Bio, Janux Therapeutics, Day One Biopharmaceuticals
Northpond Ventures 	18	18	Emulate, Scipher Medicine, Vestaron, Ultivue, Aro Biotherapeutics
Y Combinator 	18	18	Zepto, Zeit Medical, Yemaachi Biotechnology, Intellect, Atlas
General Catalyst 	16	16	Ro, Color, Ethos, SWORD Health, BrightInsight
OrbiMed 	16	16	XalPi, Binx Health, Yisheng Biopharma, Zentera Therapeutics
Temasek Holdings 	16	16	Abogen Biosciences, Lenskart, Perfect Day, Apeel Sciences, Pivot Bio
Tiger Global Management 	17	16	Hinge Health, Scale AI, Medable, DispatchHealth, Innovaccer,
Creative Destruction Lab 	14	14	ECONcrete, Navega Therapeutics, Nia Therapeutics, Ariel Precision, NANOCHON

TOP 50 INVESTORS IN LONGEVITY COMPANIES

INVESTORS		NUMBER OF INVESTMENTS	NUMBER OF COMPANIES INVESTED	COMPANIES WITH THE BIGGEST FUNDING
One North Carolina Small Business Program		14	14	Baebies, Altis Biosystems, Atom Bioworks, Redbud Labs, EpiCypher
SoftBank Vision Fund		14	14	Devoted Health, Abogen Biosciences, Digital Currency Group, CMR Surgical, Better.com
European Innovation Council		15	12	VarmX, VBL Therapeutics, Vivasure Medical, OneProjects, Xenothera
Insight Partners		12	11	RapidSOS, TytoCare, Viz, Workit Health, TetraScience
Silicon Valley Bank		11	11	Humacyte, Organogenesis, Akili Interactive Labs, Viracta Therapeutics, Impel NeuroPharma
SOSV		17	11	Criam, BioSapien, CyGenica, Nyoka Design Labs, Beemunity
Economic Development Administration		10	10	University of North Carolina at Chapel Hill, Washington State University, Launch NY, Massachusetts Biomedical Initiatives, Science Center
Khosla Ventures		10	10	HealthifyMe, Earli, Synchron, IgGenix, Bionaut Labs
National Cancer Institute		10	10	Shasqi, Strand Therapeutics, Anixa Biosciences, Viewpoint Molecular Targeting, Collectar Biosciences
Sequoia Capital China		11	10	Analytical Biosciences, Harvest Capital Management, ABclonal, Cellular Biomedicine Group, Stemirna

TOP 50 INVESTORS IN LONGEVITY COMPANIES

INVESTORS		NUMBER OF INVESTMENTS	NUMBER OF COMPANIES INVESTED	COMPANIES WITH THE BIGGEST FUNDING
US Department of Commerce		10	10	University of North Carolina at Chapel Hill, Washington State University, Launch NY, Massachusetts Biomedical Initiatives, Science Center
CARB-X		9	9	Affinivax, Vaxcyte, Summit Therapeutics, Accelerate Diagnostics, Baebies
MassChallenge Switzerland		9	9	Criam, Michroma, Reazent, BrightCure, BestHealth4u
Bill & Melinda Gates Foundation		8	8	Schrödinger, Evotec, Exscientia, Provivi, Inventprise
Bpifrance		9	8	Inotrem, TreeFrog Therapeutics, METabolic EXplorer, Depixus, Biophytis
Casdin Capital		8	8	Century Therapeutics, LetsGetChecked, Absci, Paige, Verve Therapeutics
Cormorant Asset Management		8	8	Umoja Biopharma, NiKang Therapeutics, Expansion Therapeutics, Interius BioTherapeutics, Chemomab
Deerfield Management		9	8	Crossover Health, Xeris Pharmaceuticals, Terns Pharmaceuticals, Synthekine, Nuvalent
Fidelity Management & Research Company		8	8	Kry, Quell Therapeutics, Tenstorrent, Skyhawk Therapeutics, Inscripta
General Atlantic		8	8	Centassa Pharmaceuticals, Acko, Incode Technologies, Cincor Pharma, Vida Health

TOP 50 INVESTORS IN LONGEVITY COMPANIES

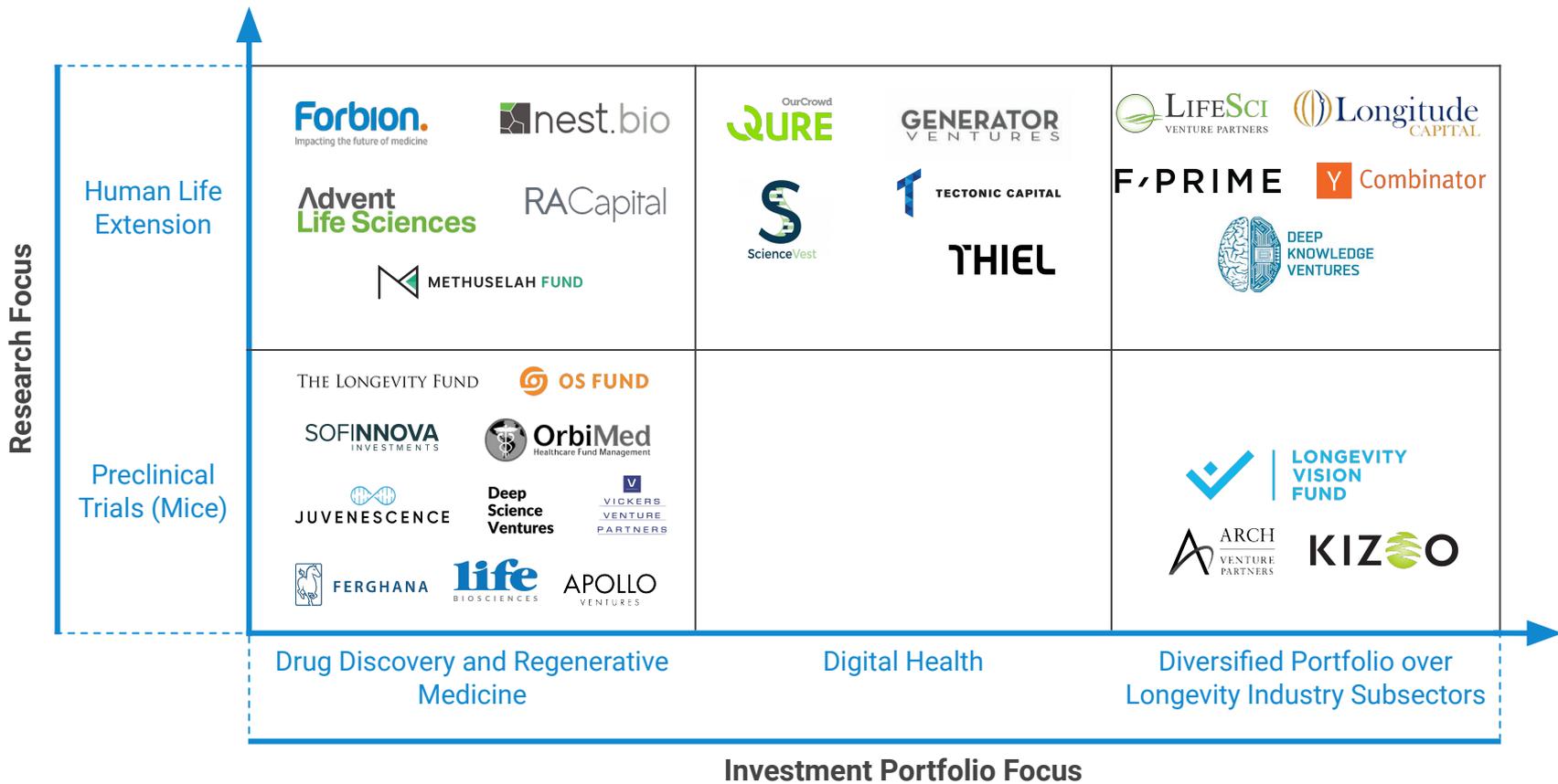
INVESTORS		NUMBER OF INVESTMENTS	NUMBER OF COMPANIES INVESTED	COMPANIES WITH THE BIGGEST FUNDING
GL Ventures		8	8	Abogen Biosciences, Clover Biopharmaceuticals, Hangzhou DAC Biotech Co., Ltd, Thousand Oaks Biopharmaceuticals, Bioheng
Illumina Accelerator		8	8	NewStem, Flightpath Biosciences, Mitra bio, Oshun Medical, Parallel Health
Novo Holdings		8	8	Quanta, Hummingbird Bioscience, StrideBio, Muna Therapeutics, ADCendo
Qiming Venture Partners		8	8	Zhenge Biotech, Newsoara, IntoCare, SinoUnited Health Clinic, MediLink-Global
Vivo Capital		8	8	Innocare, Neurogastrx, BlossomHill Therapeutics, Ossium Health, Scientia Vascular
Ally Bridge Group		7	7	CMR Surgical, RefleXion Medical, Mainstay Medical, Sonoma BioTherapeutics, Arbor Biotechnologies
European Investment Bank		7	7	Stilla Technologies, Robocath, BioVersys, OSE Immunotherapeutics, LYSOGENE
Foresite Capital		8	7	Affinivax, Gemini Therapeutics, Pardes Biosciences, Theseus Pharmaceuticals, Interline Therapeutics
Innovate UK		8	7	Rinri Therapeutics, CN Bio Innovations, SleepCogni, Vamstar, Bea Fertility
Leaps by Bayer		7	7	Senti Biosciences, Sound Agriculture, GRO Biosciences, Andes, Deka Biosciences

TOP 50 INVESTORS IN LONGEVITY COMPANIES

INVESTORS		NUMBER OF INVESTMENTS	NUMBER OF COMPANIES INVESTED	COMPANIES WITH THE BIGGEST FUNDING
Morningside Ventures		7	7	New Amsterdam Pharma, Alebund Pharmaceuticals, Apnimed, Linus Health, Wellinks
Perceptive Advisors		8	7	Freenome, Honor, IsoPlexis, Nautilus Biotechnology, Sermonix Pharmaceuticals
Redmile Group		7	7	Mammoth Biosciences, Absci, Evox Therapeutics, AgomAb Therapeutics, Ayala Pharmaceuticals
Sofinnova Partners		7	7	Mainstay Medical, Synthace, Muna Therapeutics, Sphere Fluidics, Meigenix
Vida Ventures		7	7	Centessa Pharmaceuticals, Scorpion Therapeutics, Vigil Neuroscience, Tectonic Therapeutic, IconOVir Bio
Blackrock		6	6	Immunocore, Planet, MoneyLion, Motif, Astra
Business Growth Fund		6	6	Elvie, Phico Therapeutics, Closed Loop Medicine, Entia, Locate Bio
Coatue		7	6	Hinge Health, Lyra Health, Alchemy, Alan, DNA Script
EcorR1 Capital		6	6	Nuvation Bio, Scorpion Therapeutics, Corvus Pharmaceuticals, Affinia Therapeutics, Aktis Oncology
Eli Lilly		6	6	Terns Pharmaceuticals, Jaguar Gene Therapy, MiNA Therapeutics, Seraxis, GenEdit

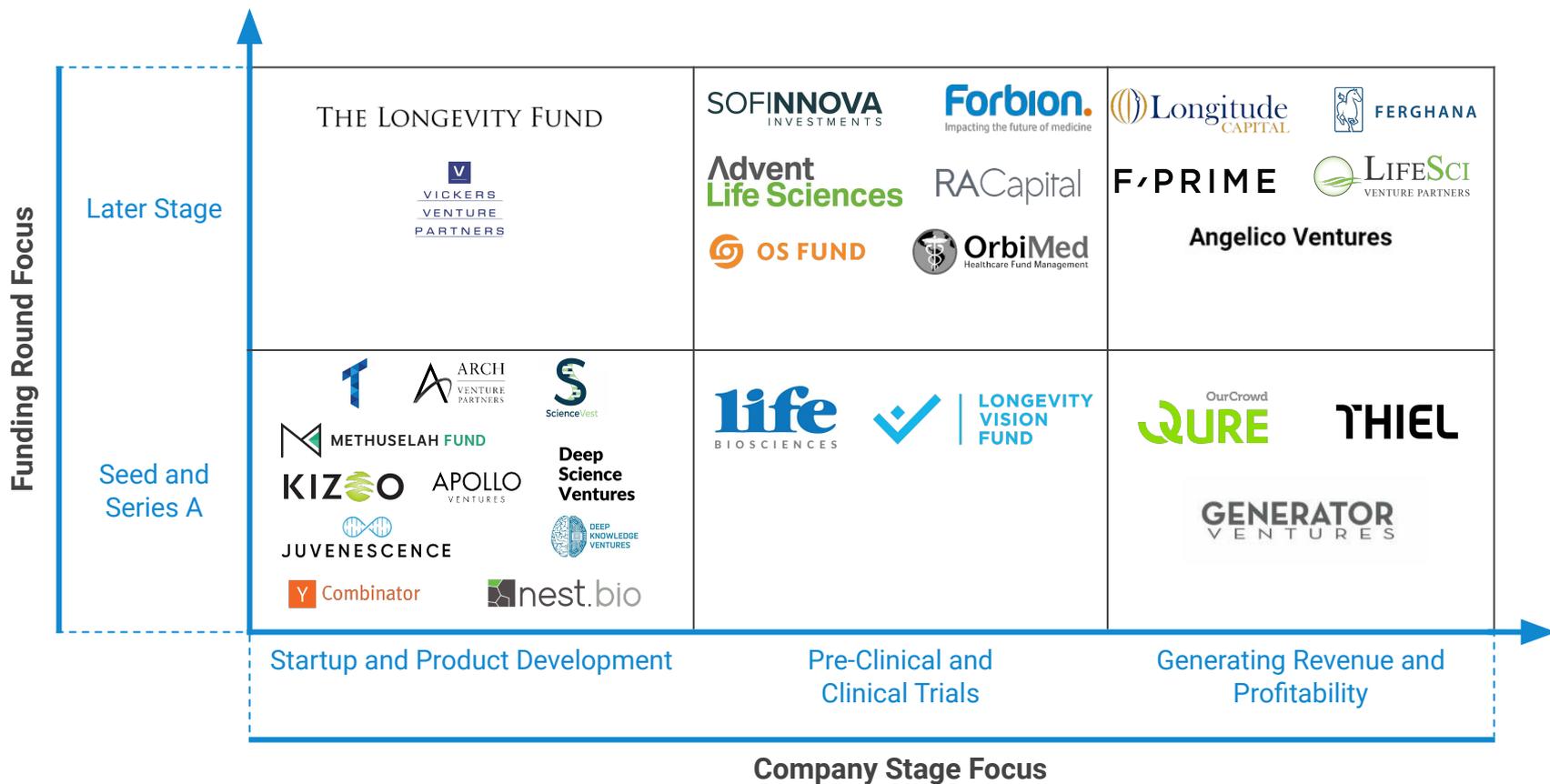
COMPARISON OF LONGEVITY INVESTMENT FUNDS

RESEARCH FOCUS / INVESTMENT PORTFOLIO FOCUS



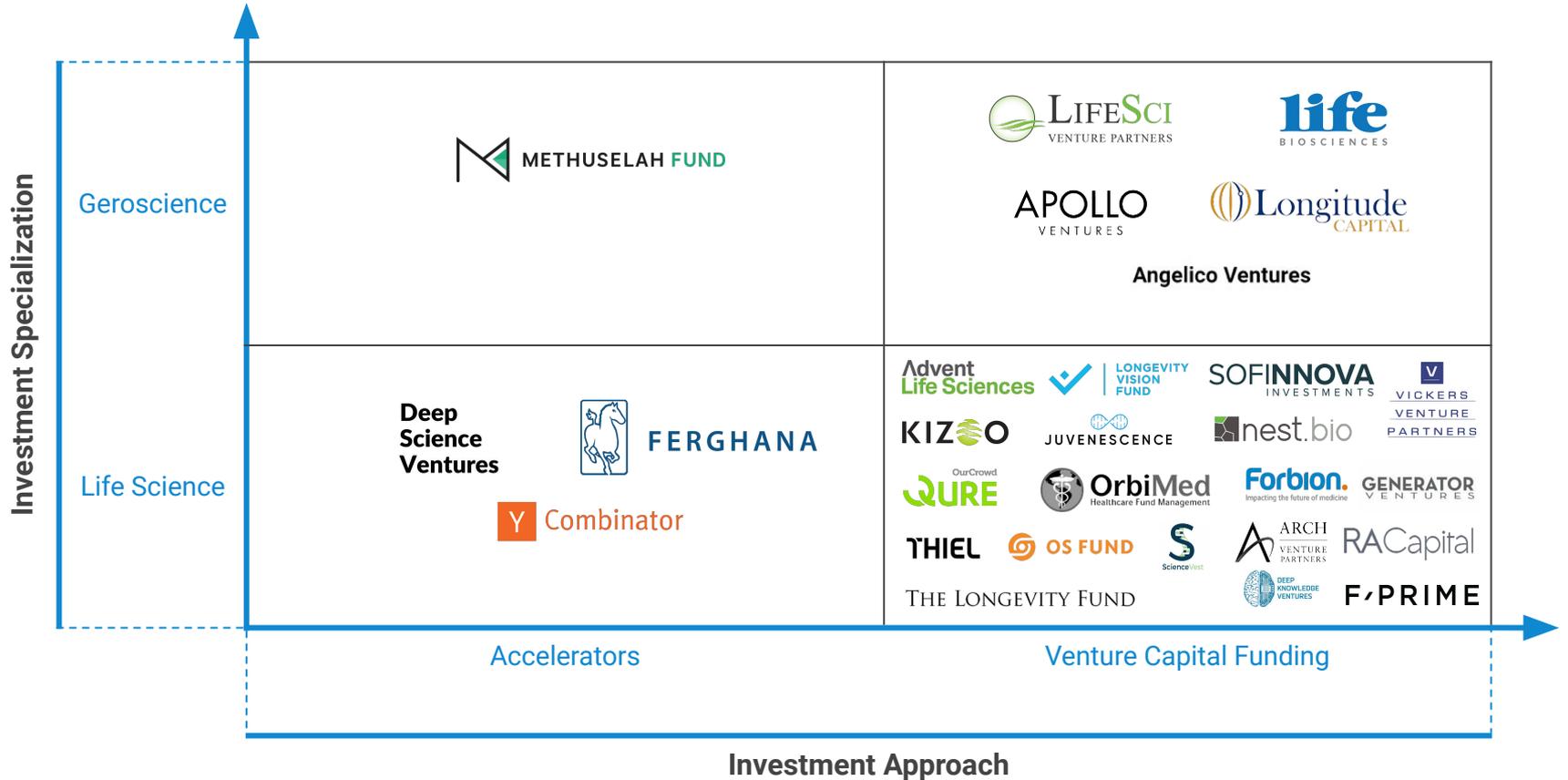
COMPARISON OF LONGEVITY INVESTMENT FUNDS

FUNDING ROUND FOCUS / COMPANY STAGE FOCUS



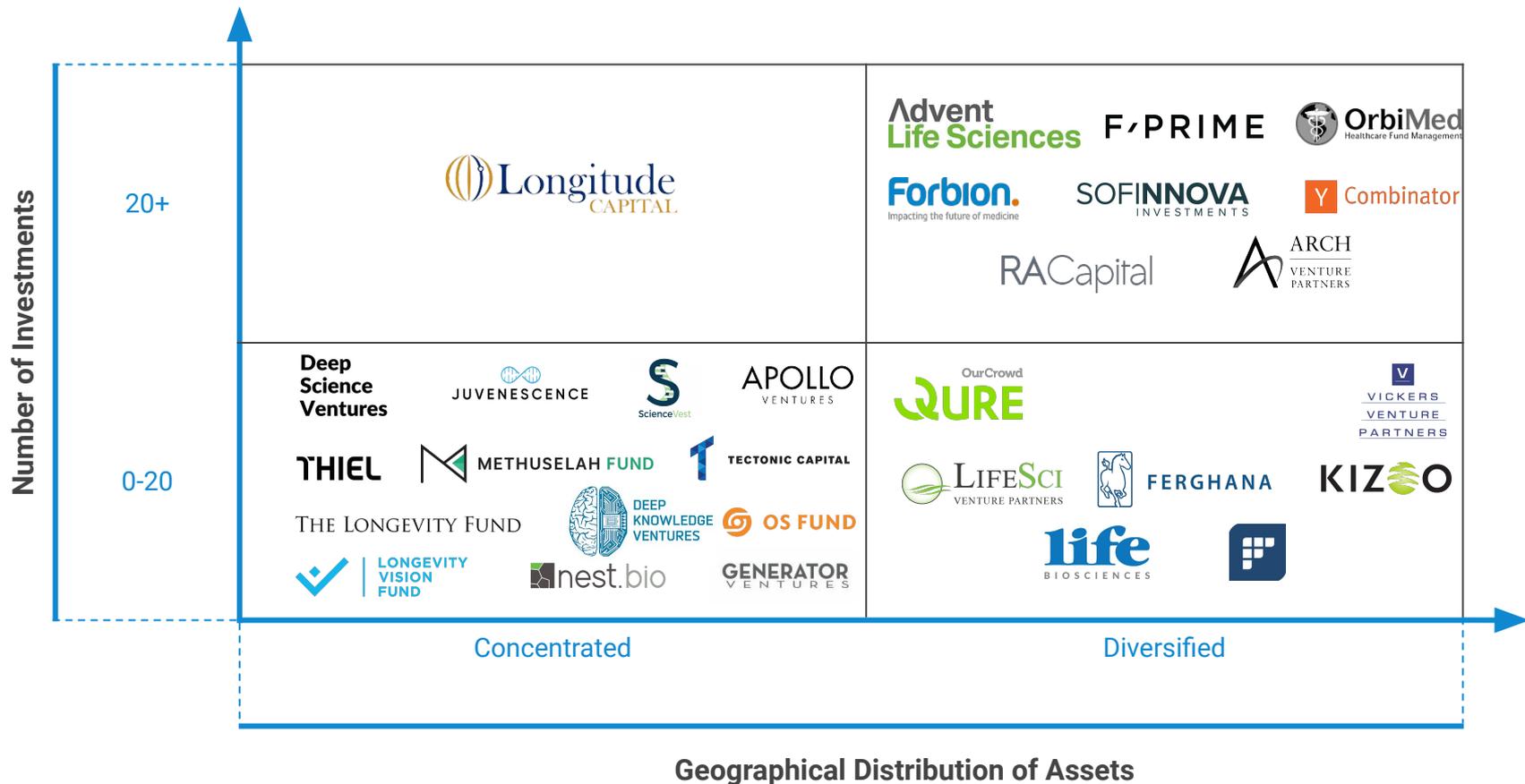
COMPARISON OF LONGEVITY INVESTMENT FUNDS

INVESTMENT SPECIALIZATION / INVESTMENT APPROACH



COMPARISON OF LONGEVITY INVESTMENT FUNDS

NUMBER OF INVESTMENTS / GEOGRAPHICAL DISTRIBUTION OF ASSETS



LONGEVITY INDUSTRY MARKET TIMELINE

The first approaches

- The first scalable approaches for Longevity biomedicine and biomarkers of ageing were developed and several industry players with forward-thinking executives started launching pilot collaborations and making small investments.
- However, only few market players believed in anti-aging technologies.

Criticism

- Many pilot projects failed due to the lack of scientific validation and immaturity of the technologies, creating a lot of criticism towards the whole industry.
- Since then the race for the acquisition of the Longevity startups began.
- Testing of the technology began.

Industry development

- Capitalization of the industry was continuously growing.
- Many bets of early investors appeared to be justified.
- Large financial institutions, as well as government agencies, started to express interest in the Longevity industry.

Transition from quantity to quality

- An important milestone in transitioning from the quantity of Longevity startups to qualitative gains – significant number of practical validations of previously conducted research appeared during this year.
- Competition for the most successful pharma AI companies increased dramatically.
- Most developed Longevity startups are becoming mature companies, large institutional investors are being attracted to the industry, full-fledged Longevity infrastructure is being developed.

Intensive competition

- Intensive cooperation of Longevity companies with corporations, banks, and governments begins.
- Competition among advanced Longevity companies booms.

2013-2015

2016-2017

2018

2019

2020-2023

CONCLUSIONS



Most of the Longevity-focused investment funds invest in drug discovery and depend on the success of clinical trials. They follow a strategy whereby they invest in one another, drug discovery and AI-driven pharma companies. Investors are highly exposed to risks associated with drug failure because most of portfolio drug discovery companies specialize in animal clinical trials. Animal models have limited concordance with human pathology. A molecule that extends a healthy lifespan in one species often extends a lifespan in other species. To minimize the risk of failed clinical trials and increase the probability of successful commercialization of treatment, researchers should determine the effects of the drug on the human body, assess its dosage and safety, and obtain a safe and optimal dosage that is likely to be effective for the proposed indication.



Lack of portfolio diversification over Longevity industry subsectors. Although venture funds, by definition, are supposed to prioritize investments into the most disruptive technologies and startups, most of them actually prefer to specifically avoid DeepTech sectors or enter investment rounds at later stages. **Longitude Capital, F-Prime Capital** and **LifeSci Venture Partners** have a sufficiently diversified investment portfolio both by Longevity subsectors and by the level of companies' maturity. They prefer to invest in AgeTech, Drug Discovery, and P4 Medicine projects at different funding stages.

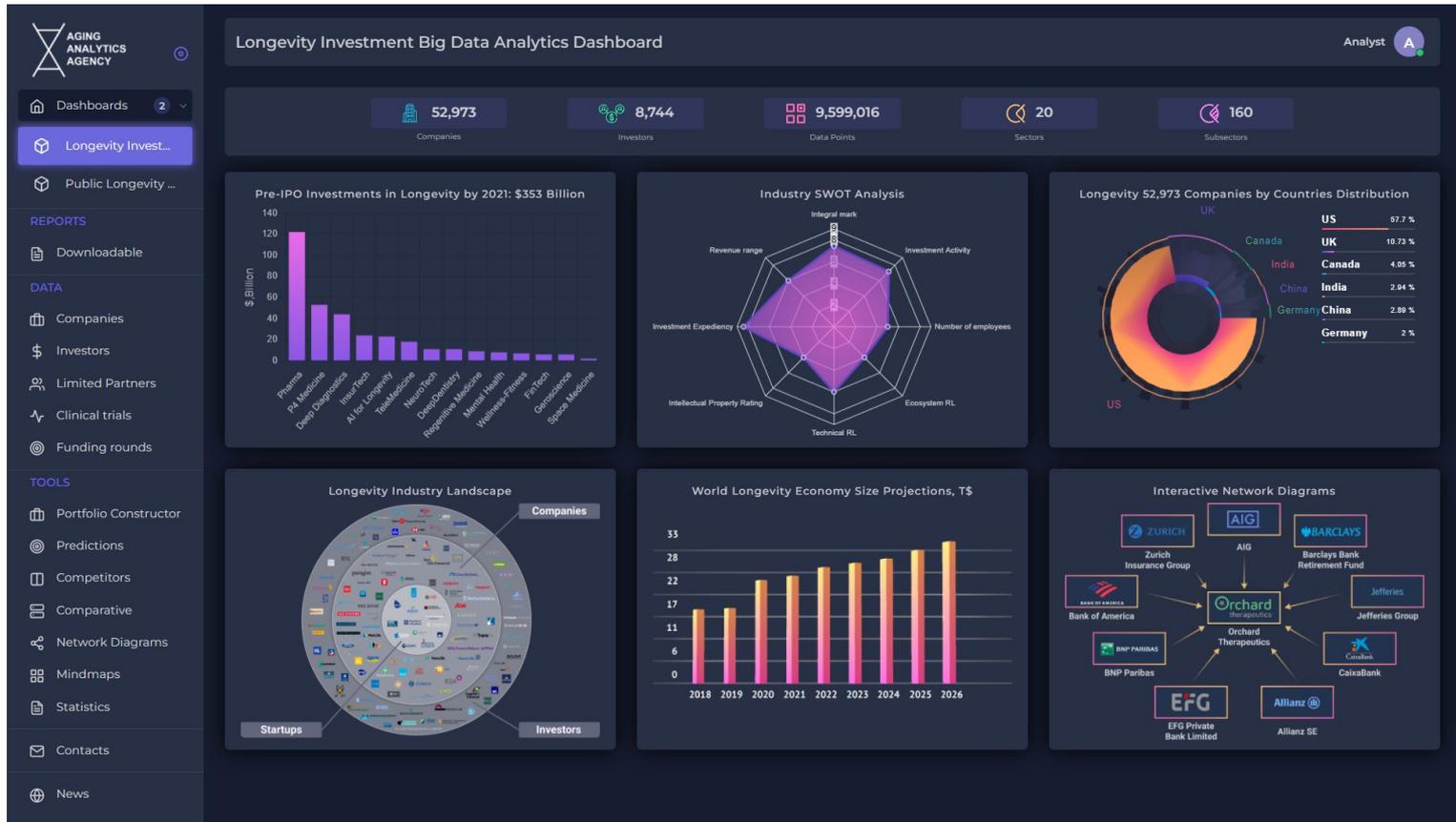


Lack of effective de-risking investment strategies in terms of “time diversification” and company stage. The majority of Longevity-focused funds (e.g. KIZOO, Apollo Ventures, and Juvenescence) are early-stage investors, which are exposed to critical investment risks. They understand that building a new business takes time and ongoing support, so they typically expect to make multiple investments in a single company as it develops. The challenge is to design de-risking strategy that can cost-effectively catalyze private investment and deliver a successful outcome for every portfolio project.



The Longevity industry will inevitably exhibit growth. It is beneficial for investors, as it accelerates their access to biomedical technology and life extension. It is of great benefit to humanity, creating the products and services that will help us enter a new era of long, comfortable and productive lives. Being the most ethical way of conducting business, it also helps generate enormous profits, contributes to developing the most advanced Longevity technologies, and makes humanity healthier.

LONGEVITY INVESTMENT: BIG DATA ANALYTICS DASHBOARD

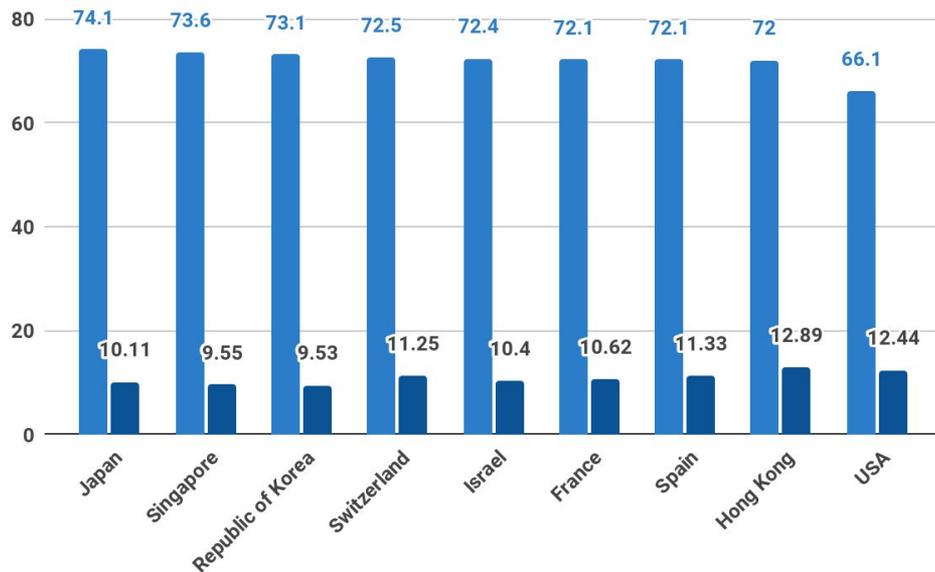


LONGEVITY GOVERNANCE AND NATIONAL HEALTHCARE BUDGETS

Overview



LONGEVITY GOVERNANCE INDUSTRY: OVERVIEW



■ HALE, 2019
■ Life expectancy and HALE difference, 2019

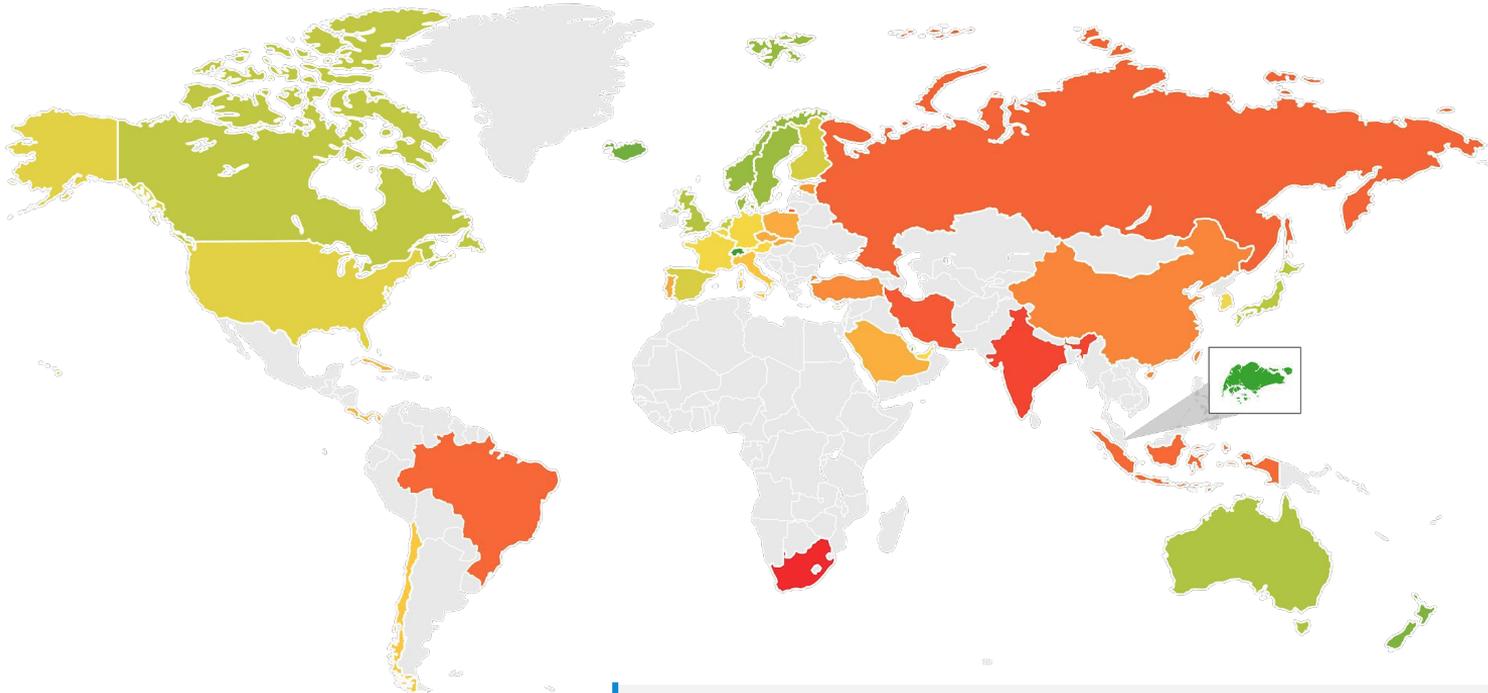
The main goal of the Longevity Governance Industry is to **reduce the gap between life expectancy and HALE** (Health-Adjusted Life Expectancy). Global Longevity Governance is a special analytical study that uses data across 50 countries to measure Healthy Longevity according to HALE. In so doing, it is able to identify the existing gaps between HALE and unadjusted life expectancy. All the parameters used in the report depend on the social policy, healthcare, medical, financial and socio-economic factors in a particular country. We provide an overview of countries with the lowest to highest HALE indicators.

The lowest gap between HALE and Life Expectancy is observed in **Singapore** where people tend to be wealthier and are, therefore, able to eat healthy food and have access to the best health care. However, this rule is not applicable to **the US**, which spends a significant amount of money on healthcare but still has a relatively low HALE. Countries in which people live in poor environmental conditions, do not have access to modern healthcare and appropriate nutrition also have a low HALE.

50 COUNTRIES: ANALYSIS OF LONGEVITY PROGRESS

1	Argentina	13	Estonia	26	Japan	39	Saudi Arabia
2	Australia	14	Finland	27	Luxembourg	40	Singapore
3	Austria	15	France	28	Malta	41	Slovakia
4	Belgium	16	Germany	29	Mexico	42	Slovenia
5	Brazil	17	Greece	30	Netherlands	43	South Africa
6	Canada	18	Hong-Kong, SAR	31	New Zealand	44	Spain
7	Chile	19	Iceland	32	Norway	45	Sweden
8	China	20	India	33	Panama	46	Switzerland
9	Costa Rica	21	Indonesia	34	Poland	47	Turkey
10	Cuba	22	Iran	35	Portugal	48	United Arab Emirates
11	Czech Republic	23	Ireland	36	Qatar	49	United Kingdom
12	Denmark	24	Israel	37	Republic of Korea	50	United States of America
		25	Italy	38	Russian Federation		

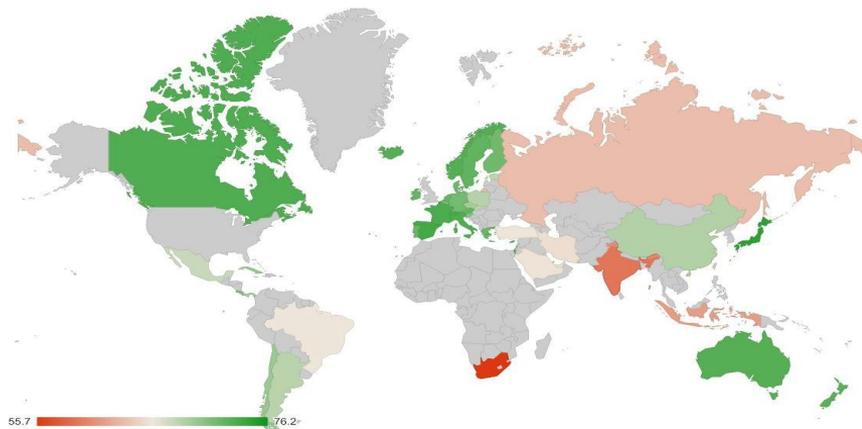
HALE RANKING AND GAP ESTIMATION



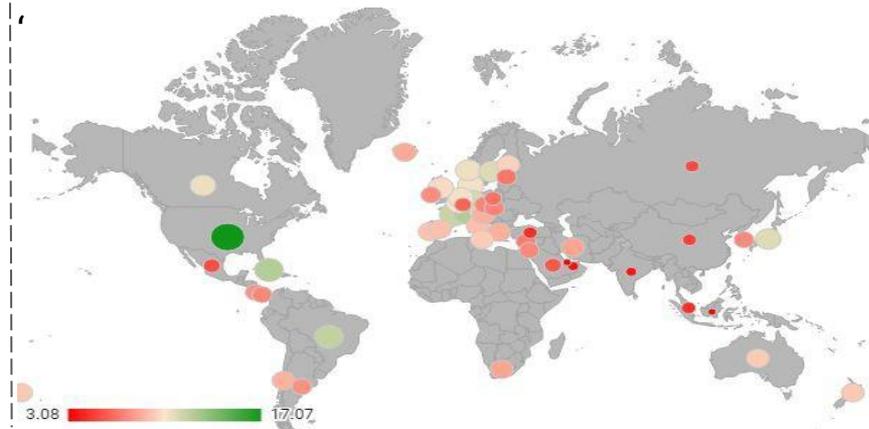
Health-Adjusted Life Expectancy (HALE), used here as a measure of Healthy Longevity, is the average number of years an individual can expect to live free of chronic age-related disease.

HALE AND LIFE EXPECTANCY: FACTORS AFFECTING HALE

Both sexes HALE



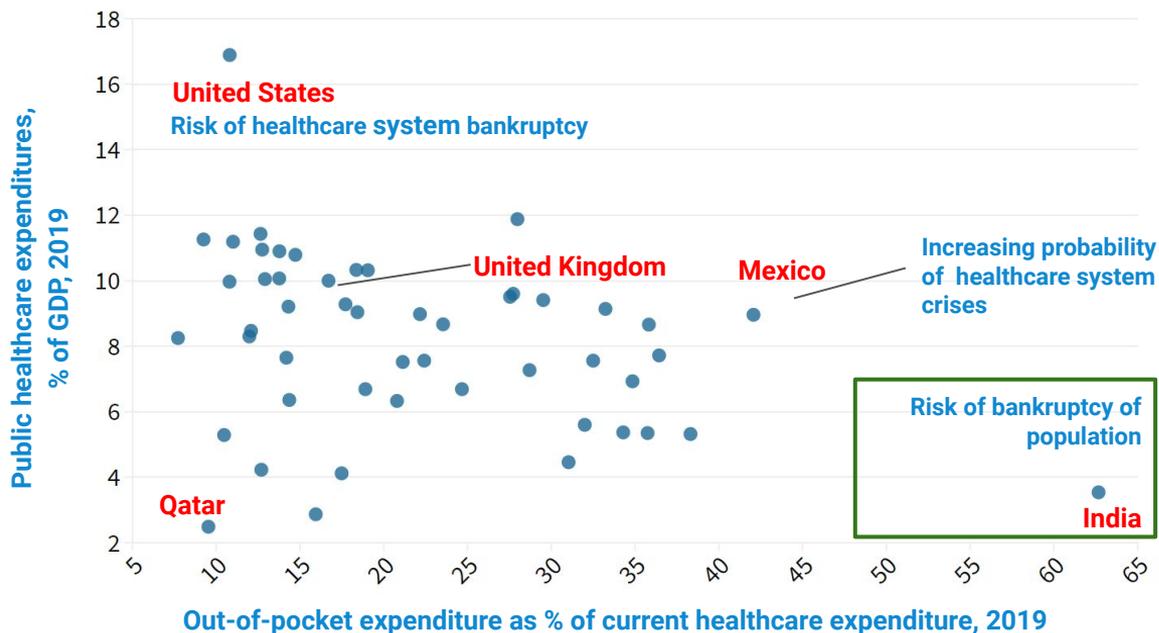
Public health expenditures (as % of GDP)



Being a major characteristic of a country's healthcare policy, public health expenditure is, therefore, a key variable as far as the research purpose is concerned. There is a wide variation in the percentage of public healthcare expenditure across different countries, which reflects profound differences in their healthcare systems. Hence, public spending on healthcare affects the latter's efficiency than being an input in the health production function.

Efficiency of a healthcare system cannot be measured by health expenditure as percentage of GDP. Health expenditure involves consumption of healthcare goods and services, including personal healthcare and collective services. It is a complex indicator that varies across different countries. Healthcare spending in developed countries is impacted by higher prices, as well as higher administrative and transaction costs. That is precisely why increased healthcare spending does not always result in a more efficient healthcare system and better health of a country's citizens.

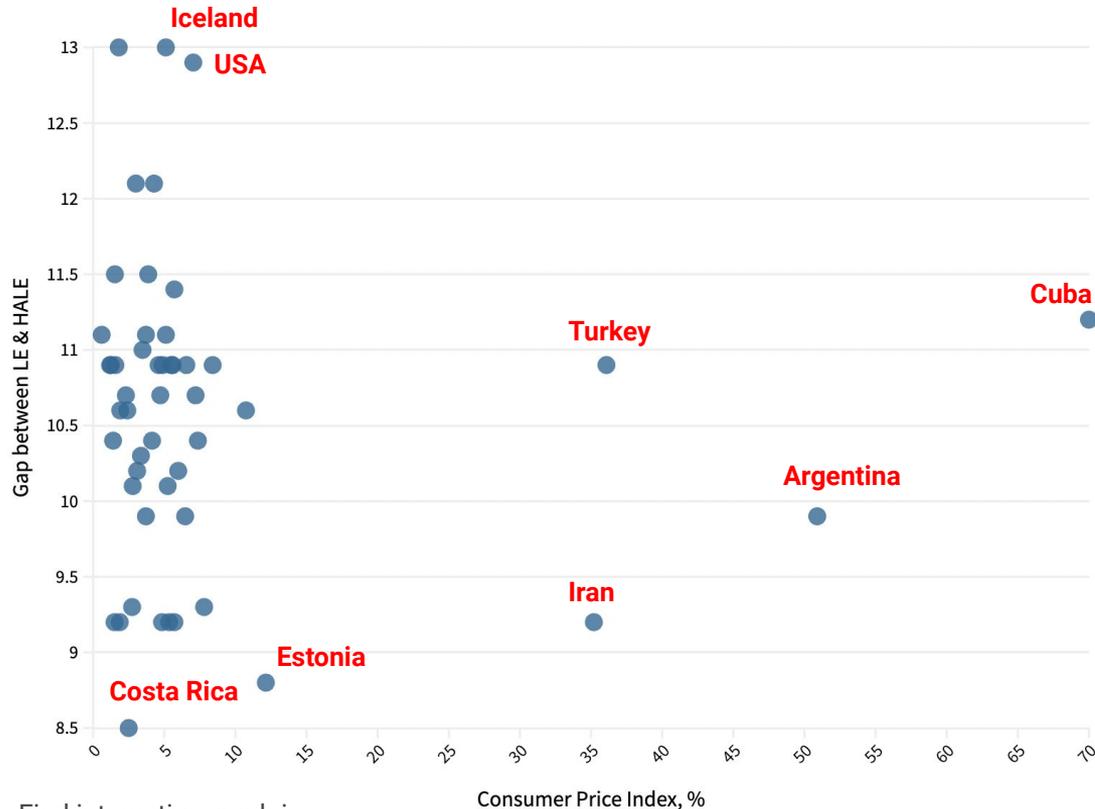
PUBLIC HEALTHCARE AND OUT-OF-POCKET EXPENDITURE



Find interactive graph in Flourish by following the [link](#)

Unregulated direct charges often pose a significant hurdle to individuals that require health care. They also tend to contribute to high out-of-pocket payments and cause problems with financial protection. Out-of-pocket expenses place a heavy burden on households' financial resources and make healthcare unaffordable to low-income groups. As a result, there appear significant disparities in healthcare status between groups with different income levels. In contrast, public spending on health care is central to universal health coverage and social protection. However, no clear trend signifying that is observable at the moment. In the US, healthcare expenditure is a result of high administrative costs and corruption in healthcare.

ECONOMIC INSTABILITY AND A GAP BETWEEN HALE AND LIFE EXPECTANCY



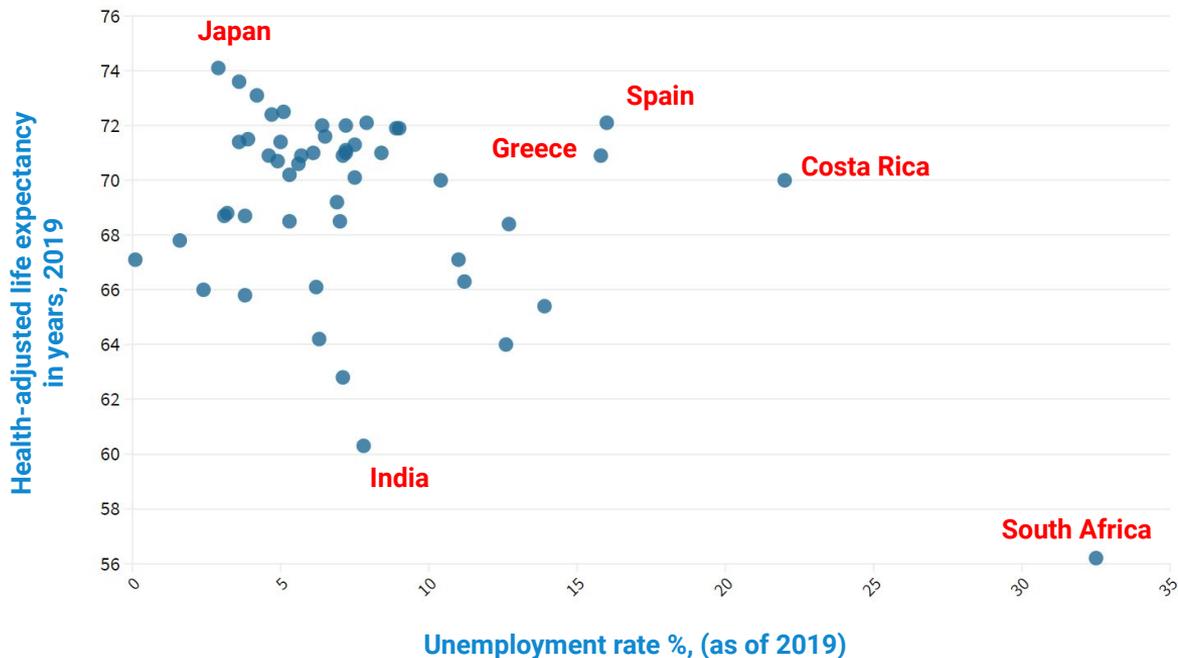
Find interactive graph in
Flourish by following the [link](#)

The Consumer Price Index (CPI) is used to measure the average change in prices paid by consumers for goods and services over time. CPI characterises prices' instability and economic instability, whereas inflation indicates recession or systemic crises.

According to the 2019 [Medical Trends Around the World survey](#), health conditions, supplier factors and consumer habits are the primary factors contributing to increased costs. A surge in prices for basic medical services and goods makes healthcare less affordable and leads to higher inequality in a healthcare status.

The graph shows the intersection between [increase of CPI and](#) a gap between [life expectancy at birth and HALE](#). The lowest level of CPI in 2021 was observed in [Japan](#), while the highest one was in [Cuba](#).

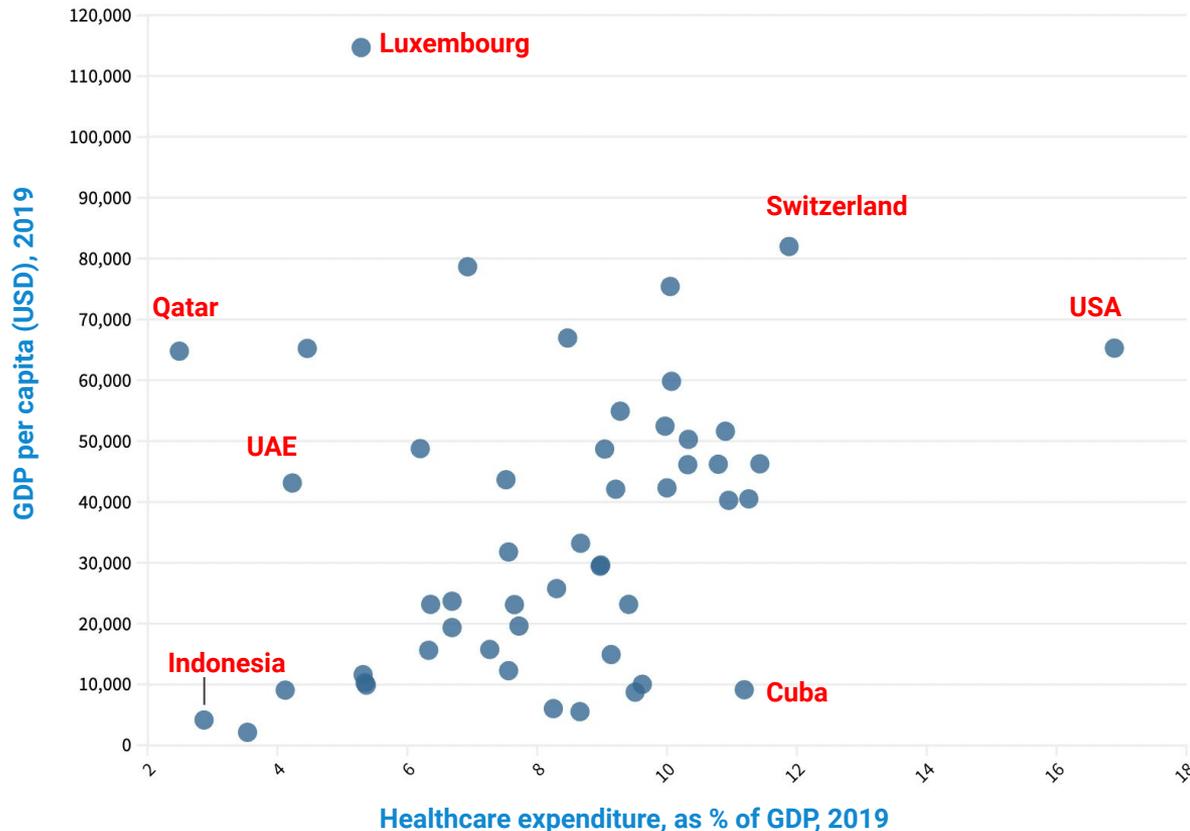
UNEMPLOYMENT AND HEALTHY LONGEVITY



There is no direct correlation that high unemployment rate leads to the reduction in health-adjusted life expectancy. However, most of the countries with a low unemployment rate (i.e. those of them that are close to natural level of unemployment) have higher HALE. A high unemployment rate leads to social inequality and inability of people to afford basic goods and services, which affects HALE in the long term.

Find interactive graph in Flourish by following the [link](#)

HEALTHCARE SPENDING AND GDP



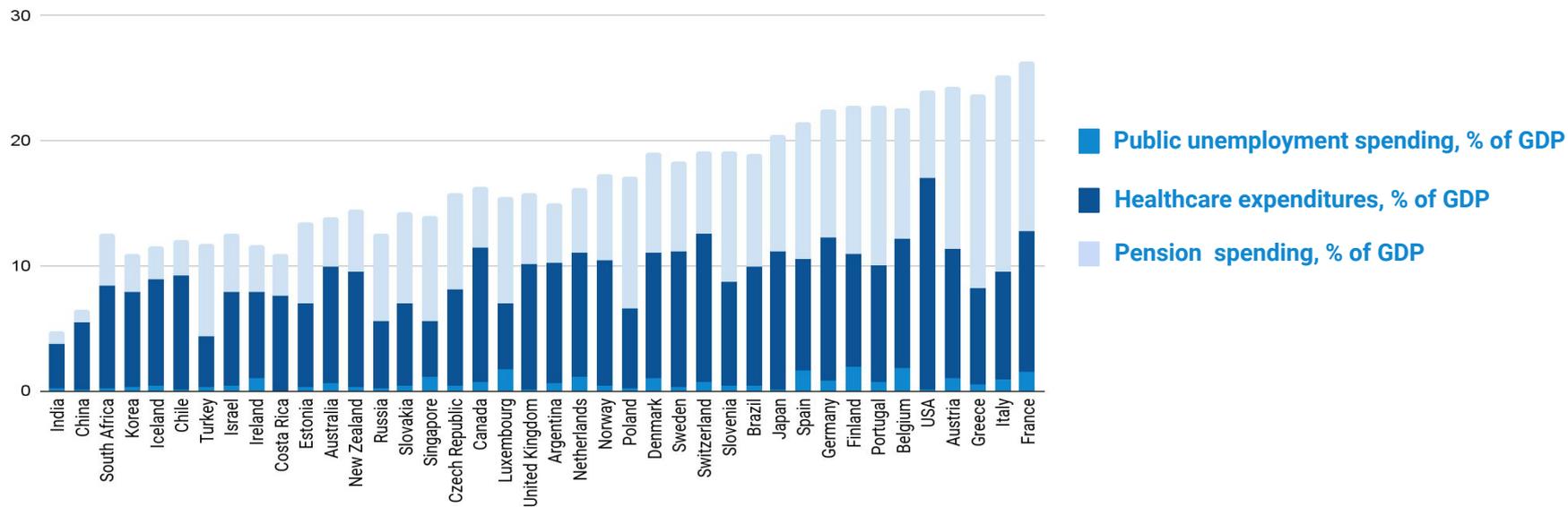
This chart represents a relation between healthcare spending as a percentage of GDP and GDP per capita. Data provided by the World Bank and Organization of Economic Cooperation and Development (OECD) in 2019 suggests that wealthy countries, such as Hong Kong, United States, Switzerland, and Norway, tend to increase Healthcare budgeting, in comparison with middle-income countries, such as India, Brazil, South Africa, and Indonesia.

As for now, top developed countries by % of GDP they spend on Healthcare are:

- USA
- Switzerland
- Germany
- Norway
- Sweden

Find interactive graph in Flourish by following the [link](#)

SOCIAL PROTECTION AND HEALTHCARE



Different countries have different political, economic, and social systems. Hence, they tend to allocate various sums of money to social protection programs. In 2019, the US spent some 17.1 percent of its GDP on healthcare – more than twice the average among developed countries.

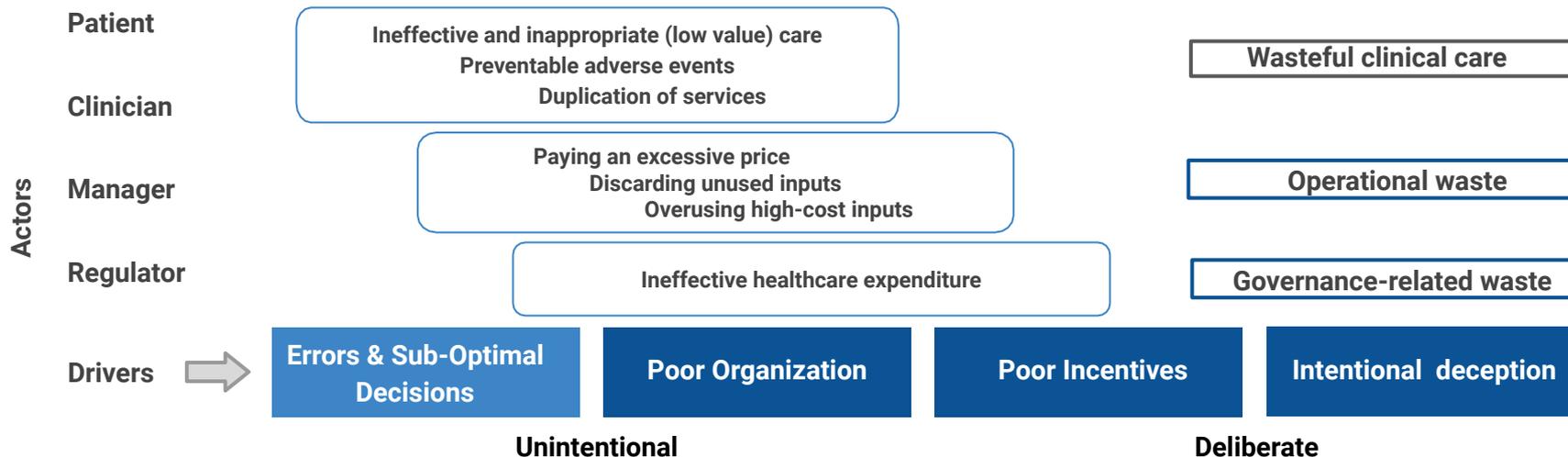
Greece has the most significant pension expenditure (16.9%), which, at the same time, does not allow it to pay high pensions. This fact is caused by the solidarity pension system, which continues to operate in Greece and is expected to stay in force in the nearest future. Therefore, due to a disproportionately high number of pensioners and the low number of workers, the current state is not changing and worsens.

DISPROPORTIONATELY HIGH HEALTH EXPENDITURE

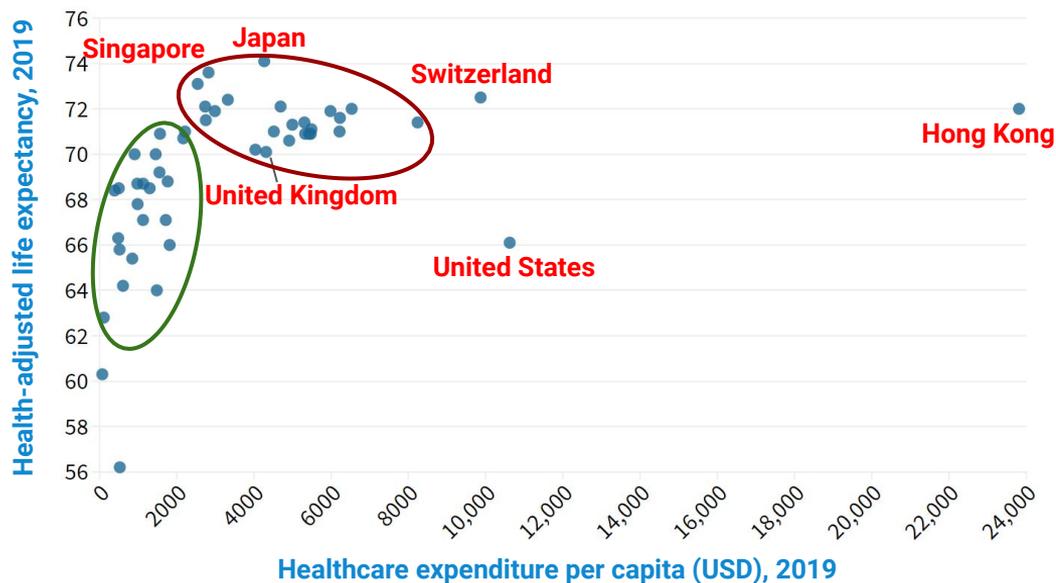
Health expenditure is rising in the United States and in the majority of OECD countries. However, an increase in health expenditure is having little or no effect on the improvement of people's health. In some cases, it even results in worse health outcomes. The US could potentially spend significantly less on healthcare without a detriment to its healthcare system or adverse health outcomes.

Behavioral root causes of disproportionate health expenditure include:

- ◆ imperfect knowledge and cognitive biases;
- ◆ poor management, organization and coordination;
- ◆ incentives misaligned with system goals.



HEALTHCARE SPENDING AND HEALTH-ADJUSTED LIFE EXPECTANCY



Find interactive graph in Flourish by following the [link](#)

Based on 2019 data from the OECD and World Health Organization, this chart represents a correlation between health expenditure and Health-Adjusted Life Expectancy (HALE). This relationship is impacted by a number of social and economic factors, as well as the structure of a country's healthcare system.

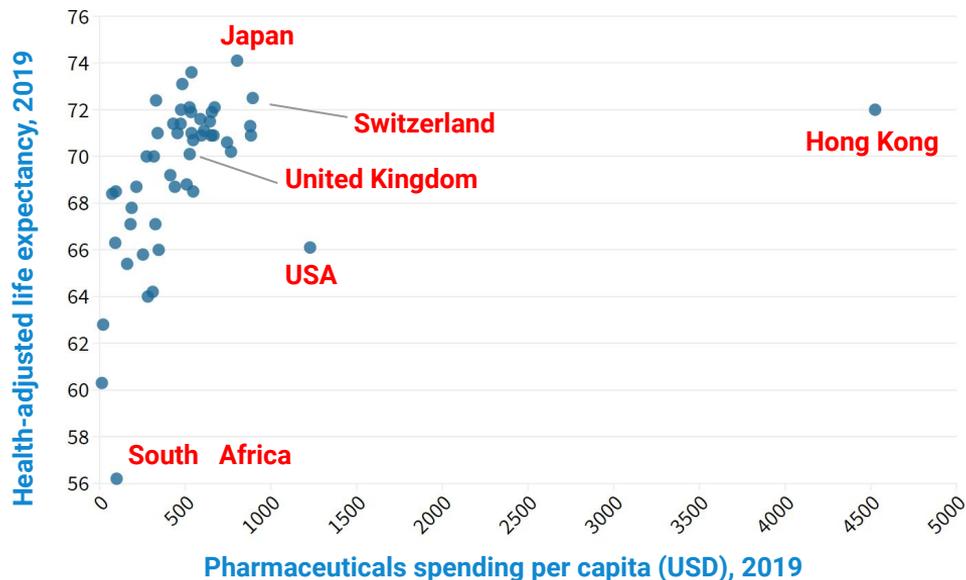
As we can see, there is no linear relationship between life expectancy and health expenditure. What it means is that increased public expenditure on healthcare does not guarantee a healthier and longer life.

The graph is divided into two main groups. The first one (green ellipse) represents developing countries, such as India, Brazil, Russia, Argentina, where increased public spending contributes to an increase in healthy life.

The second group (red ellipse) represents developed countries whose per capita health expenditure, including healthcare-related expenses, is much higher than that of lower-income countries; however, that does not lead to an increase in the life expectancy of their citizens.

If we compare the United States and Singapore, we can see that lower per capita health expenditure in Singapore contributes to higher Health Adjusted Life Expectancy (HALE). Despite spending a disproportionately high amount of money on healthcare (for instance, twice as much as Japan), the United States has the lowest HALE among high-income developed countries (chronic diseases pose the biggest threat to Longevity in the country nowadays).

PHARMACEUTICALS SPENDING PER CAPITA AND HALE



Find interactive graph in Flourish by following the [link](#)

This chart collection takes a look at how pharmaceuticals spending are correlated with Health – Adjusted Life Expectancy. The analysis looks at 2016 health data from OECD and World Health Organization.

There is no strong relationship between HALE and pharmaceuticals spendings as only 23% of variation in HALE is explained by variation in pharmaceuticals expenditures per capita.

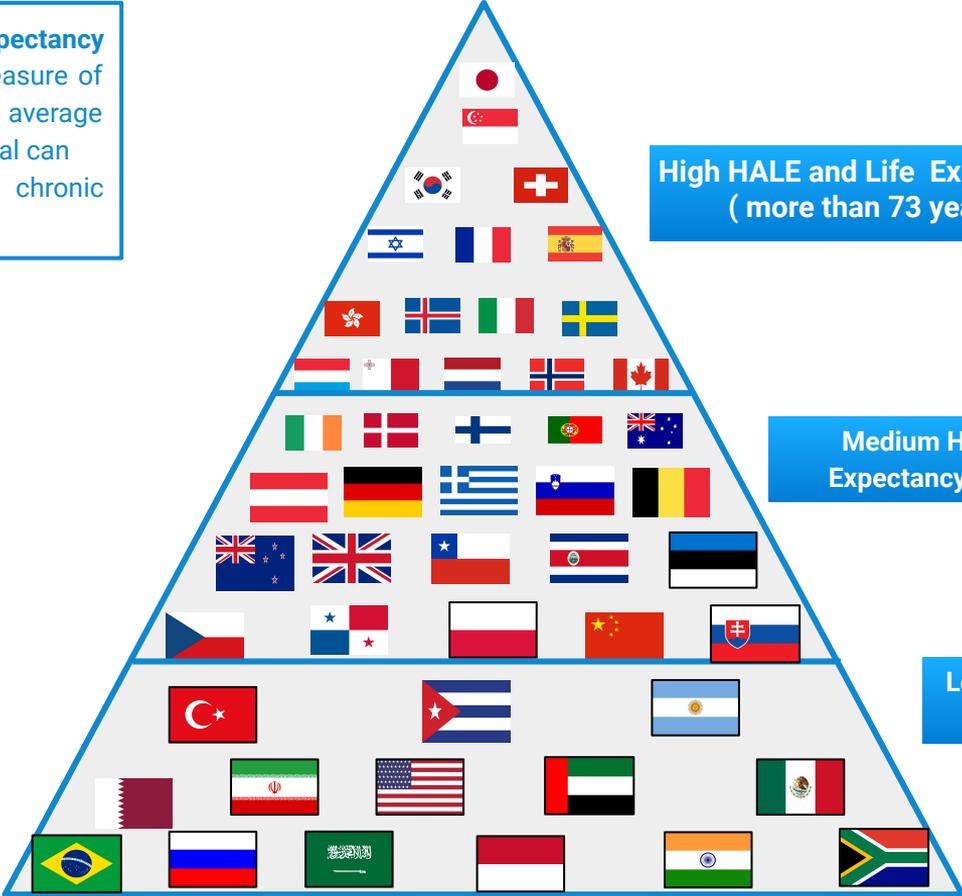
Pharmaceuticals spending is an adjusted indicator as it covers expenditure on prescription medicines and self-medication, often referred to as over-the-counter products.

It is aggregated and its components vary across countries. In some countries, different medical non-durable goods are included. Total pharmaceutical spending refers in most countries to “net” spending, i.e. adjusted for possible rebates payable by manufacturers, wholesalers or pharmacies.

The high value of pharmaceuticals spendings in the Hong Kong is caused by high medical prices. United States is the second by this indicator and Switzerland is third. The growth of pharmaceuticals spendings in Switzerland is due to the launch of new and innovative medicines – especially for cancer. In Japan the government pursues cost-effective approach for drugs development and other medical treatment, that is why relatively small amount of spendings corresponds to the highest HALE across observed countries.

GLOBAL HEALTHY LONGEVITY LANDSCAPE OVERVIEW

Health-Adjusted Life Expectancy (HALE), used here as a measure of Healthy Longevity, is the average number of years an individual can expect to live free of chronic age-related disease.



High HALE and Life Expectancy
(more than 73 years)

50 Countries:
High HALE and Life Expectancy - 16
Medium HALE and Life Expectancy - 20
Low HALE and Life Expectancy - 14

Medium HALE and Life Expectancy
(67-73 years)

Low HALE and Life Expectancy
(less than 67 years)

HIGH HALE COUNTRIES POLICY AND CASE STUDY

Singapore

Singapore has an average of 85 years life expectancy, one of highest across the world. Instead of building new nursing and care homes the country is investing \$3 billion to support lifelong learning and employability, healthcare and wellness, financial literacy and multi-generational housing, among other initiatives. Singapore invests in its human capital and seeks to survive the inevitable “Silver Tide” by sustaining economic growth, over the next decade. Singapore is raising its retirement age from 62 to 65 and requiring employers to reemploy men and women aiming to work until at least 70. The government of Singapore also provides 3% credits to offset wages of employees over 50 and grants to companies so they can modify jobs for older workers.

Country is also offering wellness support for its more advanced citizens. Program includes regular screening from chronic diseases and mental wellness activity such as Tai-chi. Silver Academy, a network of colleges and community based organisations, offers post secondary education to older people, who can take courses in technology, business, literature and other subjects as per as their liking and who often share classrooms with youth. A SkillsFuture program teaches singaporeans of all ages necessary skills for future jobs, an moneySense program teaches young and old alike how to manage money and invest.

Japan

Apart from Singapore, Japan is another rapidly ageing Asian country. Currently, about 25% of Japan’s population is above 65 and this will increase to 40% by 2060. Such a demographic shift would severely strain Japan’s established pension system and Japan’s ageing workforce has already started to slow down the Japanese economy.

The Japanese government has taken a multi-pronged approach to meet the needs of the population and boost economic growth. In 2000, Japan implemented a comprehensive Long-Term Care Insurance. The insurance pays for professionally designed and government-approved care plans that offer the elderly a choice of different care models. The Japanese government has continued to improve care plans in 2011 by introducing more care models that integrate healthcare, preventive care and long-term care.

On the economic front, the Japanese government has also spurred the creation of the MedTech and aged-care industries by tapping into Japan’s historical advantage in industrial manufacturing, design and customer service. Helped by state funding, Japanese firms are now investing in the design of care robots such as Paro the robotic seal, mechanical care aids for caregivers and innovative regenerative and cell therapies.

MEDIUM & LOW HALE COUNTRIES POLICY AND CASE STUDY

The United Kingdom

More recently in the UK, the Pension Advisory Service (TPAS) and insurer Aviva are experimenting with programs to help middle-aged people evaluate their jobs, finances and health, as well as their plans for later in life. In 2018, TPAS targeted a small group of self-employed workers, aged 35 to 50, with one-to-one phone conversations. There are now plans to make this midlife checkup an online program.

Ireland

In Ireland, where just 17% of those aged 65 to 74 have at least basic digital literacy skills, according to a 2017 Eurostat survey, the government has funded several nonprofits to provide 10 hours of free computer instruction to anyone who has never used the Internet. It's targeted for people over 45 and those who live in rural areas, are disabled or unemployed.

Bangladesh

In Bangladesh, where the average life expectancy has risen to about 73 from 48 since 1960. A strong network of non-governmental organizations (NGOs) are taking the lead in addressing aging and longevity.

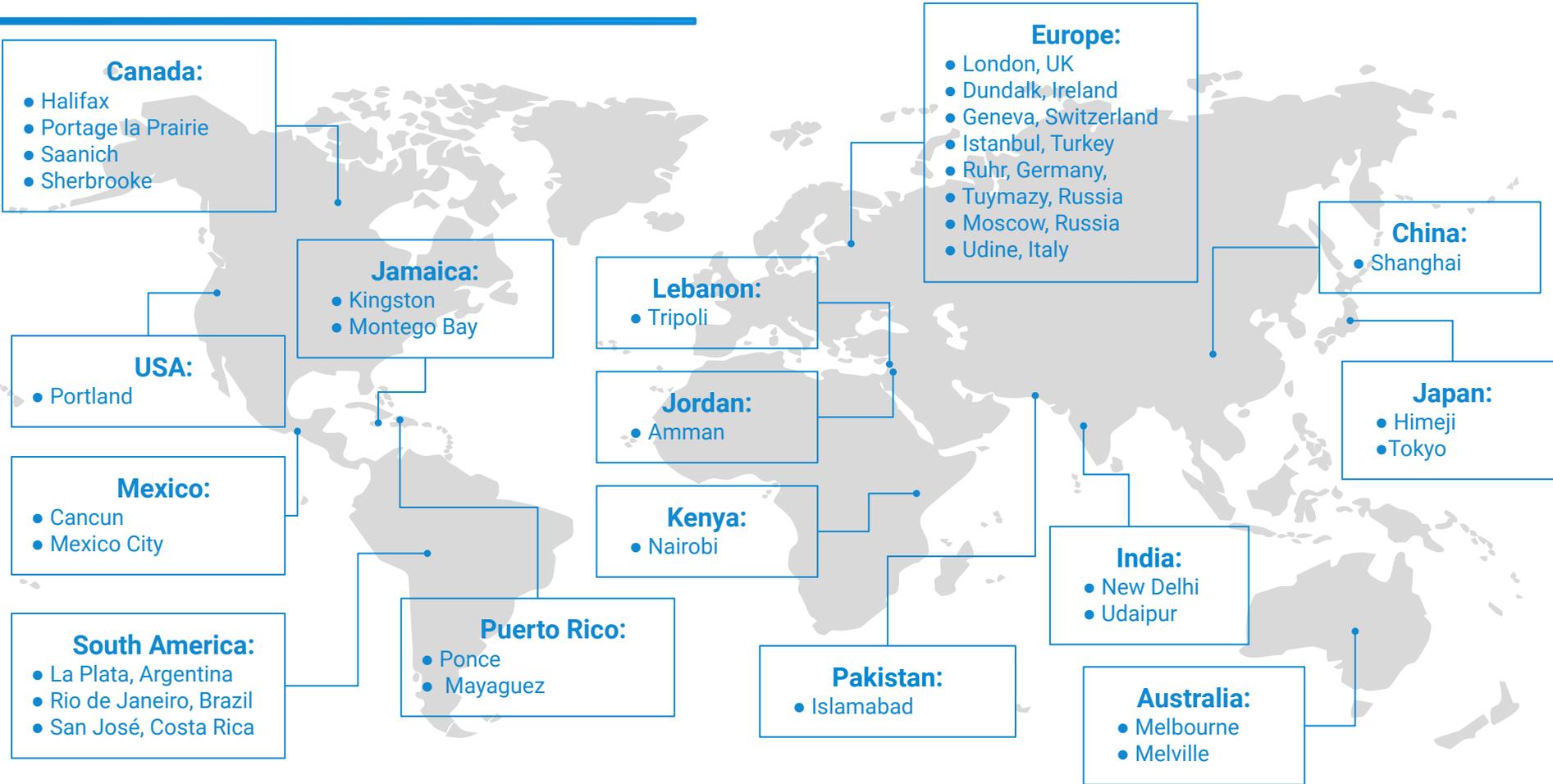
A Dhaka-based BRAC (formerly called the Bangladesh Rehabilitation Assistance Committee), the world's largest NGO, is funding research and treatment of hypertension, diabetes and other noncommunicable diseases. BRAC also offers microloans to adults seeking to start small businesses. Such efforts are enabling Bangladeshi to live longer and more prosperous lives.

AGE FRIENDLY CITIES MODEL PROPOSED BY WHO (2007)

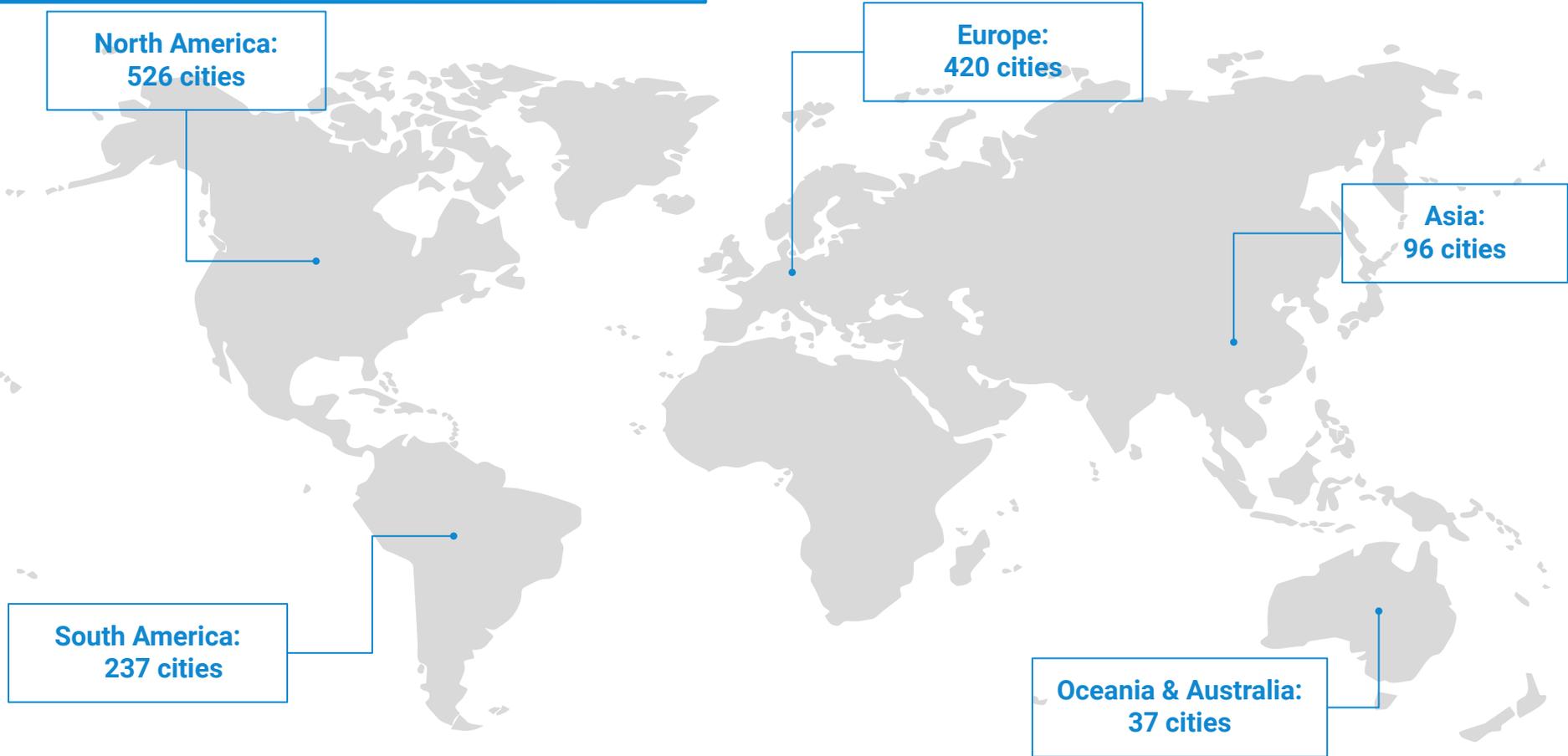
- In 2007 WHO proposed a age friendly city parameters to test out to how making a city age friendly can improve it overall. By consisting parameters of keeping elder population in mind.
- 33 Cities from around the world were selected for this pilot protocol.
- The WHO Global Network for Age-friendly Cities and Communities currently includes 1316 cities and communities in 44 countries, covering over 262 million people worldwide.



PILOT 33 AGE FRIENDLY CITIES PROPOSED BY WHO IN 2007

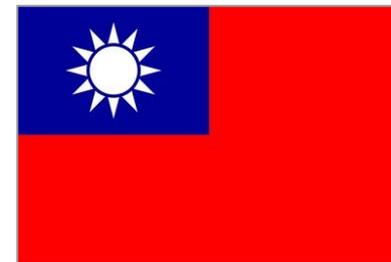


1316 AGE FRIENDLY CITIES DISTRIBUTION IN PRESENT



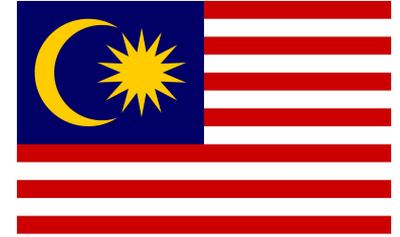
CITIES WITH AGE FRIENDLY APPROACH

- **Taipei:** Taipei's Department of Social Welfare (DOSW) is key to the city's longevity initiatives. It facilitates community services, welfare resources, care visitations, referral services, catering services and health promotion. It even provides a system of telephone calls to keep in touch with older people and make sure they are okay. The city's housing policy also ensures older people are not isolated by bringing different generations together as part of a co-living scheme. The young and old can rent rooms and share a large common area 20% cheaper than the market. Taipei also has generous lifelong learning program. It allows them to regain education which they had missed out in early life.
- **Sharjah:** Sharjah meets standards of age friendly cities criteria. The city managed to meet the criteria 165 standards out of possible 189, within the 8 topics of age-friendly cities. The eight topics are, outdoor spaces and buildings, transportation, housing, social participation, respect and social inclusion, civic participation, employment communication and information, community support and health services.
- **Shanghai:** Shanghai is among the first aging cities of China, and the proportion of aged resident is estimated to rise between 2021 and 2025. The city's residents over the age of 60 comprised more than 36% of the population. Shanghai is creating a comprehensive senior-oriented service network amid the growing aging trend and increasing need for efficient, convenient and equitable senior-care services. The improvement cater to both the general and personal needs of the elderly citizens. The aging trend is not limited just to tier 1 cities such as Shanghai In China.



COUNTRIES WITH AGE FRIENDLY APPROACH

- **Malaysia:** Malaysia has launched My Second Home (MM2H) program which is a great way to enjoy the benefits of retiring abroad without actually having to retire. Successful applicants receive a 10-year, multiple-entry visa that is renewable, plus a tax-exemption on all personal money. Senior expats can also purchase property in Malaysia, as long as local and state authority approve the purchase. A minimum of \$242,395, is typically required, though often times it is lower for people with MM2H visa holders in select states, like Penang. With no inheritance tax in Malaysia, it makes passing the estate easier to the retiree's descendants.
- **Portugal:** Portugal is a prime destination for foreign retirees. Tax resident enrolled in the country's Non-Habitual Residency (NHR) program can benefit from tax rate of 10% on foreign pension income and exemption from almost all foreign originated income source. Moreover, foreign senior residents in Portugal receive full rights to access healthcare through NHR program. Those with NHR status have a tax exemption for a period of 10 years. There will be no tax levied on wealth during the period. In addition to this, any income generated in Portugal will be taxed at a flat rate of 20% instead of progressive rates, which can be 48%.
- **Columbia:** Expats who lives in Colombia for less than 6 months (184) days will only be taxed on any income they earn directly from Colombia. However, a flat tax rate of 35% is incurred on all income level. For those who reside in the country full time will be taxed according as per their income level, which can be from 0% to 39%. Senior expatriates can use the pensionado visa (TP-7). The visa cost \$263 and has a very few requirements that retirees must meet in order to qualify for visa. To qualify, retirees must prove that they have an income of at least three times the minimum salary in Colombia which is \$750 month.



BIG DATA ANALYSIS: GROWTH RATES, EFFECTIVENESS RATIOS

Ratios		Growth Rates of Rates, CAGR (6 years)	
Demography		Economy	
Population Growth Rate, %	Total Fertility Rate (per Woman)	GDP (per Capita)	Adjusted Income Inequality (A-IPI)
Crude Death Rate (per 1 000 People)	Crude Birth Rate (per 1 000 People)	Healthcare Expenditure	Health Expenditure (per 1 000 People)
Total Age Dependency Ratio (per 1000 of Working-Age Population)	Population Density, Number of People/km2	Current Health Expenditure (Current US\$)	Health Expenditure (per 1 000 People)
Population over 65 (%)	Age Dependency Ratio	Domestic Health Expenditure (per 1 000 of Working-Age Population)	Health Expenditure (per 1 000 People)
Urban Population (% of Total)	Age Dependency Ratio, Old	Health Expenditure (per 1 000 People)	Health Expenditure (per 1 000 People)
	Senior Poverty Ratio	Health Expenditure (per 1 000 People)	Health Expenditure (per 1 000 People)
Growth Rates		Economic Growth Rates	
Life Expectancy and HALE, CAGR (6 years)		GDP (per Capita)	
Both Sexes Life Expectancy	Male Life Expectancy	Healthcare Expenditure	Health Expenditure (per 1 000 People)
Female Life Expectancy	Both Sexes HALE	Health Expenditure (per 1 000 People)	Health Expenditure (per 1 000 People)
Male HALE	Female HALE	Health Expenditure (per 1 000 People)	Health Expenditure (per 1 000 People)
Both Sexes HALE and Life Expectancy Difference	Male HALE and Life Expectancy Difference	Health Expenditure (per 1 000 People)	Health Expenditure (per 1 000 People)
Female HALE and Life Expectancy Difference	Human Development Index Score	Health Expenditure (per 1 000 People)	Health Expenditure (per 1 000 People)

Absolute values are enhanced by relative ones, and using both of them enables one to have a better understanding of the interaction between the two. It also provides one with an opportunity to investigate factors that have the biggest impact on HALE and life expectancy in a particular country.

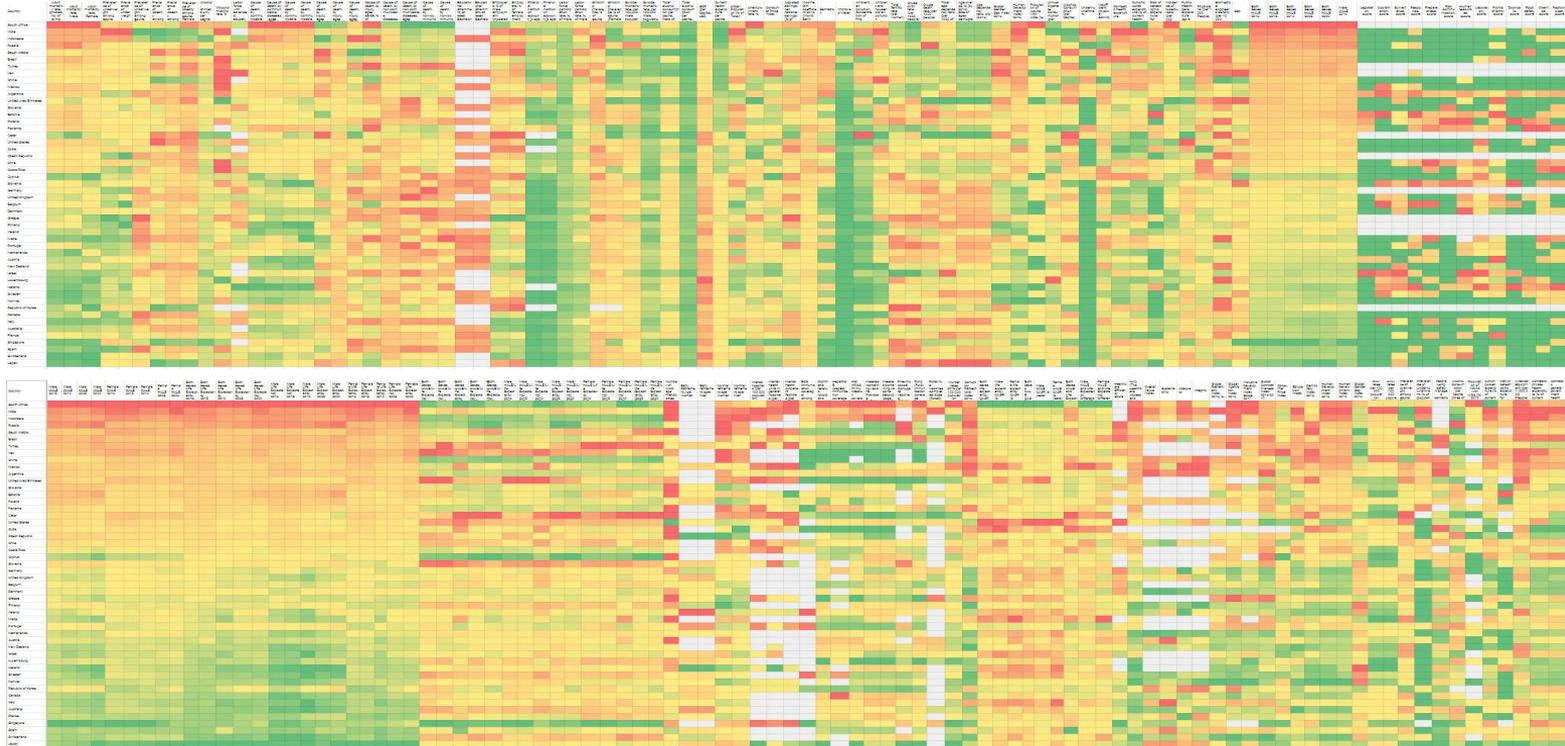
Multicollinearity between some metrics is caused by the use of dummy variables and inclusion of a variable which is computed from other variables in a data set.

Each level of metrics is based upon extension, further subdivision or comparative combination of metrics in a preceding level, or is derived from insights provided by them.

Our analysis is based on open source data and information provided by the WHO, OECD, World Bank, and various institutions operating in a particular country.

50 COUNTRIES AND 200 PARAMETERS

Based on the comparison of 200 parameters across 50 countries, patterns are recognized according to their distribution and variation. In so doing we aim to identify an interconnection between various metrics and classify countries into groups. Detailed overview of the methodology and parameters are available by the [link](#).



BIG DATA COMPARATIVE ANALYSIS FRAMEWORK

Big Data comparative analysis is based on the specific nature of parameters and their relationship. They help determine the development of healthy Longevity progress across countries with different levels of economic development.

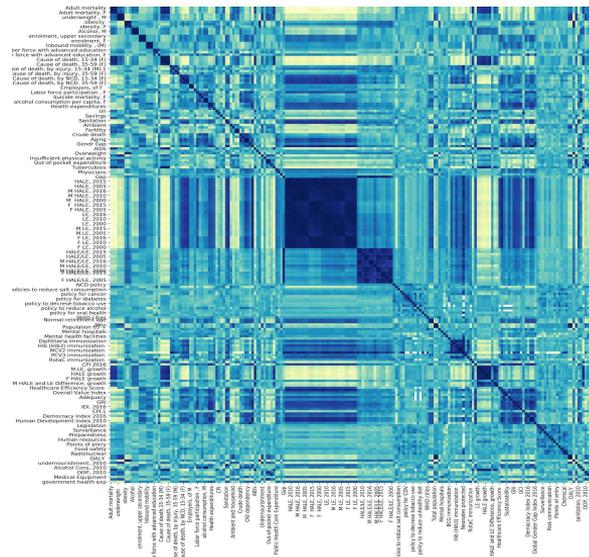
50 Countries



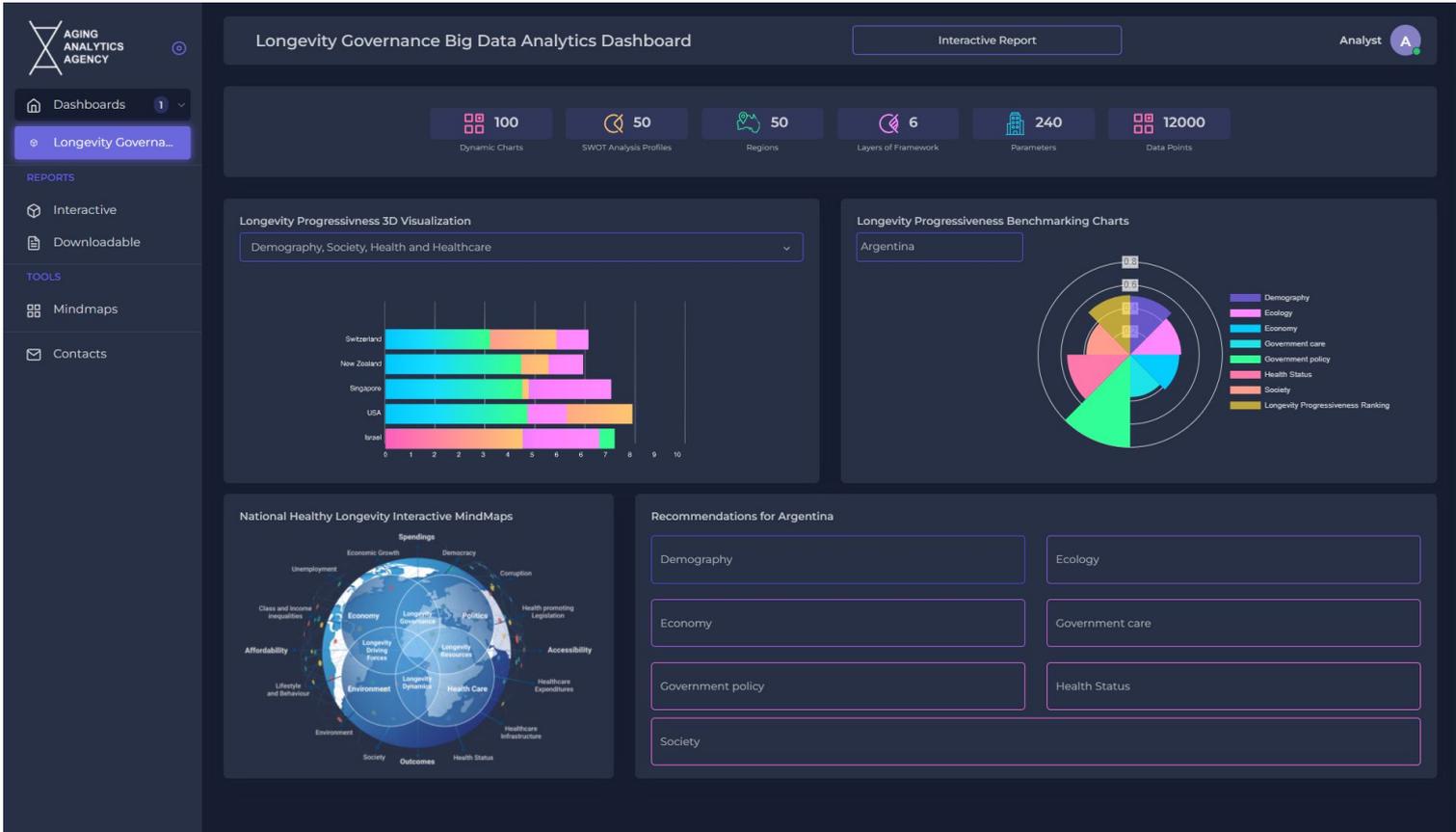
6 Layers and 200 Parameters

Cause of death, 15-34 (M)	Improved Water	government health exp	Female HALE growth	Human Development Index 2010	Domestic health expenditure	undernourishm...	DK, 2016	Adequacy	Female LE, 2016	Male HALE growth	Female LE, 2015
Health Status	Environment and Infrastructure	Healthcare	Healthcare	Human Capital	Healthcare	Life Style	Human Capital	Healthcare	Demography	Healthcare	Demography
Tuberculosis	HIV (HIV) immunization	Female LE, growth	Male LE, 2005	density	Male LE, growth	Public Health Care Expenditure	Health expenditures	Health retirement age	Women	Male LE, 2006	Cause of death, 15-34 (M)
Health Status	Healthcare	Healthcare	Demography	PCV3 immunization	Crude birth rate	Overall Value Index	CPI 2016	Points of entry	ODP, 2010	Mental health facilities	Number rate
Cause of death, 15-34 (F)	Health Status	Demography	Health Status	Education Index	EPI	Male HALE, 2005	Survival	Female HALE, 2010	Out-of-pocket expenditure	Male HALE, 2016	Male HALE, 2015
Health Status	HALE growth	LE, 2005	Diphtheria immunization	Economy	Male HALE, 2010	Population 65+	Cause of death, by NCD, 15-34 (M)	Female HALE, 2009	HALE 2016	Net migration	Underwe...
Cause of death, 35-59 (M)	Healthcare	Adult mortality, M	Healthcare	Normal retirement age Men	Health Status	Health Status	Health Status	Health Status	Health Status	Health Status	Life Style
Health Status	Health Status	Health Status	Environment and Infrastructure	Economy	HALE 2006	Ageing	Female HALE, 2011	Health Status	High	Female LE, 2016	Female LE, 2015
Cause of death, 35-59 (F)	Health Status	Health Status	Healthcare	GI	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare
Health Status	Male LE, 2010	Human Development	HAQ (The Healthcare Access and Quality Index) 2016	Human Capital	Female HALE, 2010	Obesity, F	Cause of death, by NCD, 15-34 (F)	Healthcare	Human Capital	Healthcare	Healthcare
Health Status	Obesity, M	Demography	Human Capital	PH3 immunization	Health Status	Life Style	Cause of death, by NCD, 15-34 (F)	Healthcare	Healthcare	Healthcare	Healthcare
Life Style	Adult mortality, F	Health Status	Human Capital	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare
Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare
GI	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare
Human Capital	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare	Healthcare

Correlations Between Parameters



LONGEVITY GOVERNANCE: BIG DATA ANALYTICS DASHBOARD



LONGEVITY-FOCUSED FINANCIAL INSTITUTIONS

Overview



LONGEVITY FINANCIAL INDUSTRY FRAMEWORK

InsurTech

HALE/QALE-Based Insurance

AI-Driven Insurance Premium Calculation

NextGen Mobile Apps

Healthy Lifestyle Bonuses

Big Data Actuarial Models

Biological Age Estimation

WealthTech

Robo-Retirement

Digital Brokers

Micro-Investments

Annuities

Long-Term Securities

AI-Driven Advisors

Longevity Asset Management

Novel Retirement Plans

Portfolio Management

FinTech for the Elderly

NextGen Mobile Apps for the Elderly

Financial Planning

De-Risking

Novel Financial System

Longevity Index Fund

Longevity Hedge Fund

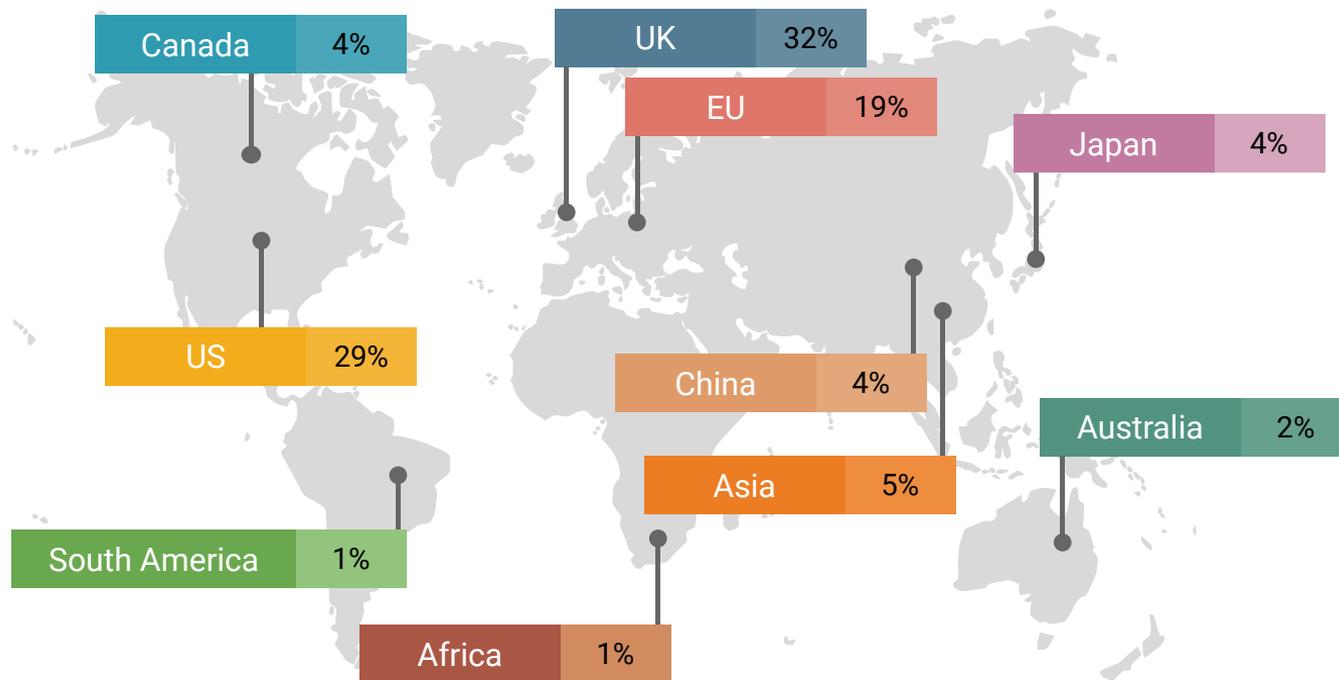
Strategies Diversification

AgeTech Bank

Longevity Derivatives

Pension Planning

300 FINANCIAL INSTITUTIONS: REGIONAL PROPORTION



The chart represents the distribution of Longevity-focused financial institutions by country. In terms of number of financial institutions, UK took the first place with 32% and followed by US. On the one hand, the largest number of the selected companies have their headquarters in the US because of the high availability of developed financial markets.

TOP 300 FINANCIAL INSTITUTIONS ADVANCING THE LONGEVITY INDUSTRY

105 Asset Management Firms



75 Banks



55 Insurance Companies



20 Reinsurance Companies



45 Pension Funds



FINANCIAL INSTITUTIONS ADVANCING THE LONGEVITY INDUSTRY

Cumulative Capitalization Dynamics Q1-Q4 2021, Trillions USD

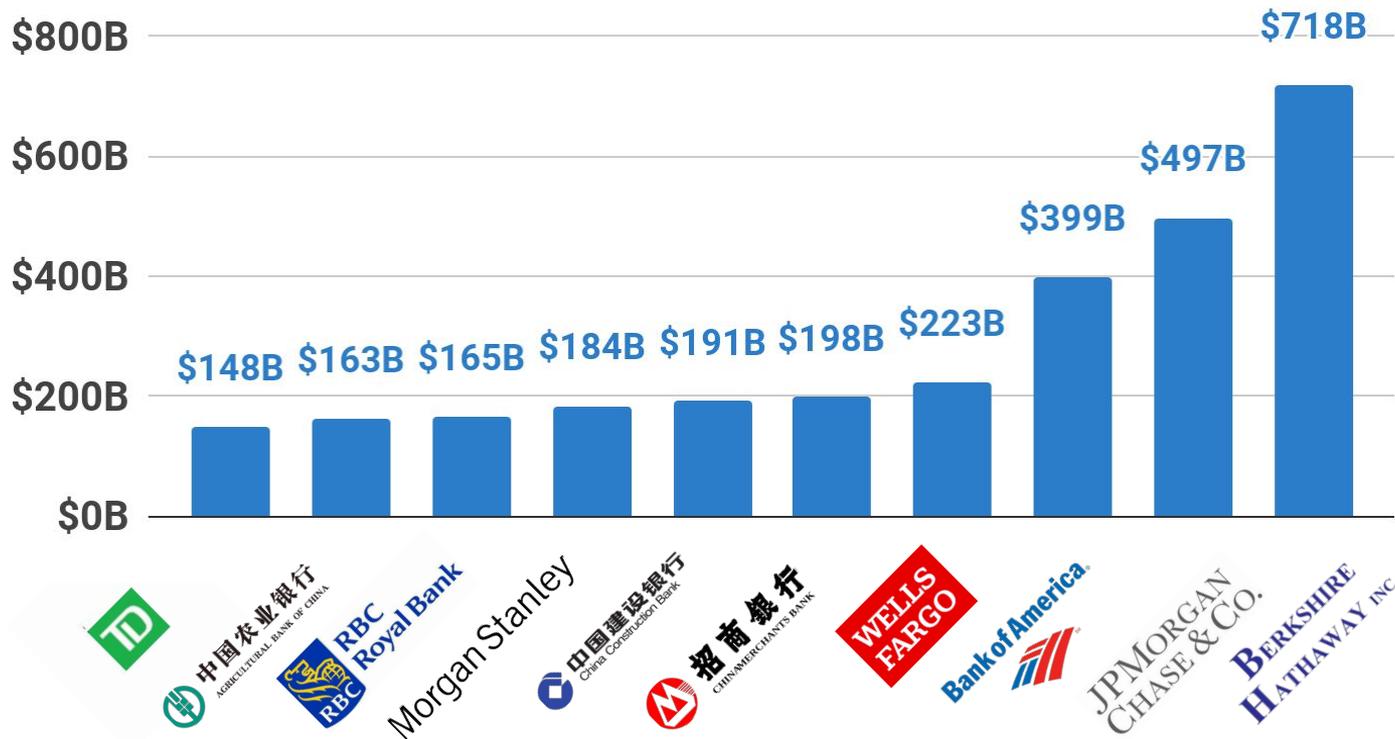


Cumulative capitalization of Financial Institution advancing the Longevity Industry **has reached more than 8.5 T USD, resulting in 17% growth YTD.**

The largest institutions by market capitalization are **Berkshire Hathaway, JPMorgan Chase & Co., Bank of America, and Wells Fargo & Co.**

Given that many Longevity advancing financial institutions are included in the S&P 500, this chart represents the approximate dynamics of the whole stock market.

TOP 10 FINANCIAL INSTITUTIONS IN 2021 (BY MARKET CAPITALIZATION)



TOP 20 FINANCIAL INSTITUTIONS BY STOCK EXCHANGE

NYSE



US-Based

BH Berkshire Hathaway (BRK-B)
Market Cap: \$718B

JPMC & Co. JPMorgan Chase & Co.(JPM)
Market Cap: \$497B

BAC Bank of America Corp.(BAC)
Market Cap: \$399B



Canada-Based

RY Royal Bank of Canada (RY)
Market Cap: \$165B

AXP American Express (AXP)
Market Cap: \$134B

B The Blackstone Group (BX)
Market Cap: \$142B

MS Morgan Stanley (MS)
Market Cap: \$184B

TD Toronto-Dominion Bank (TD)
Market Cap: \$148B

citi Citigroup (C)
Market Cap: \$134B

GS Goldman Sachs Group Inc. (GS)
Market Cap: \$130B

WFC Wells Fargo & Co. (WFC)
Market Cap: \$223B



UK-Based

HSBC HSBC Holdings (HSBC)
Market Cap: \$142B

Hong Kong (HKEX)



China-Based

CHICHY China Construction Bank (CHICHY)
Market Cap: \$191B

CIHKY China Merchants Bank (CIHKY)
Market Cap: \$198B

BACHY Bank of China (BACHY)
Market Cap: \$136B

AAGIY AIA Group (AAGIY)
Market Cap: \$128B

LFC China Life Insurance (LFC)
Market Cap: \$111B

Australia (ASX)



Australia-Based

CBA Commonwealth Bank of Australia (CBA)
Market Cap: \$127B

China (SSE)



China-Based

PING AN Ping An Insurance (PINGAY)
Market Cap: \$147B

ACGBY Agricultural Bank of China (ACGBY)
Market Cap: \$163B

LONGEVITY-FOCUSED FINANCIAL INSTITUTIONS: MARKET INDICES

Our Financial Institutions Index includes 182 Longevity-focused corporations operating in the financial sector.

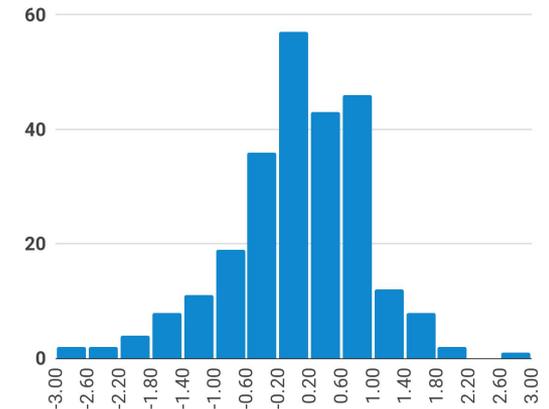
The index exhibits the returns close to the Nasdaq Bank Index.

While the volatility of such a Longevity-focused index is lower compared to Nasdaq Bank index but close to the S&P 500 Index, the distribution of the Longevity-focused index returns is left-skewed, which differentiates it from the vast majority of stock indices. That means that the extraordinary positive events are more likely to happen in Longevity sector compared to other market segments.

The distribution of Longevity-focused financial institutions stock returns cannot be referred to as normal but it is close to normal (kurtosis 1.11).

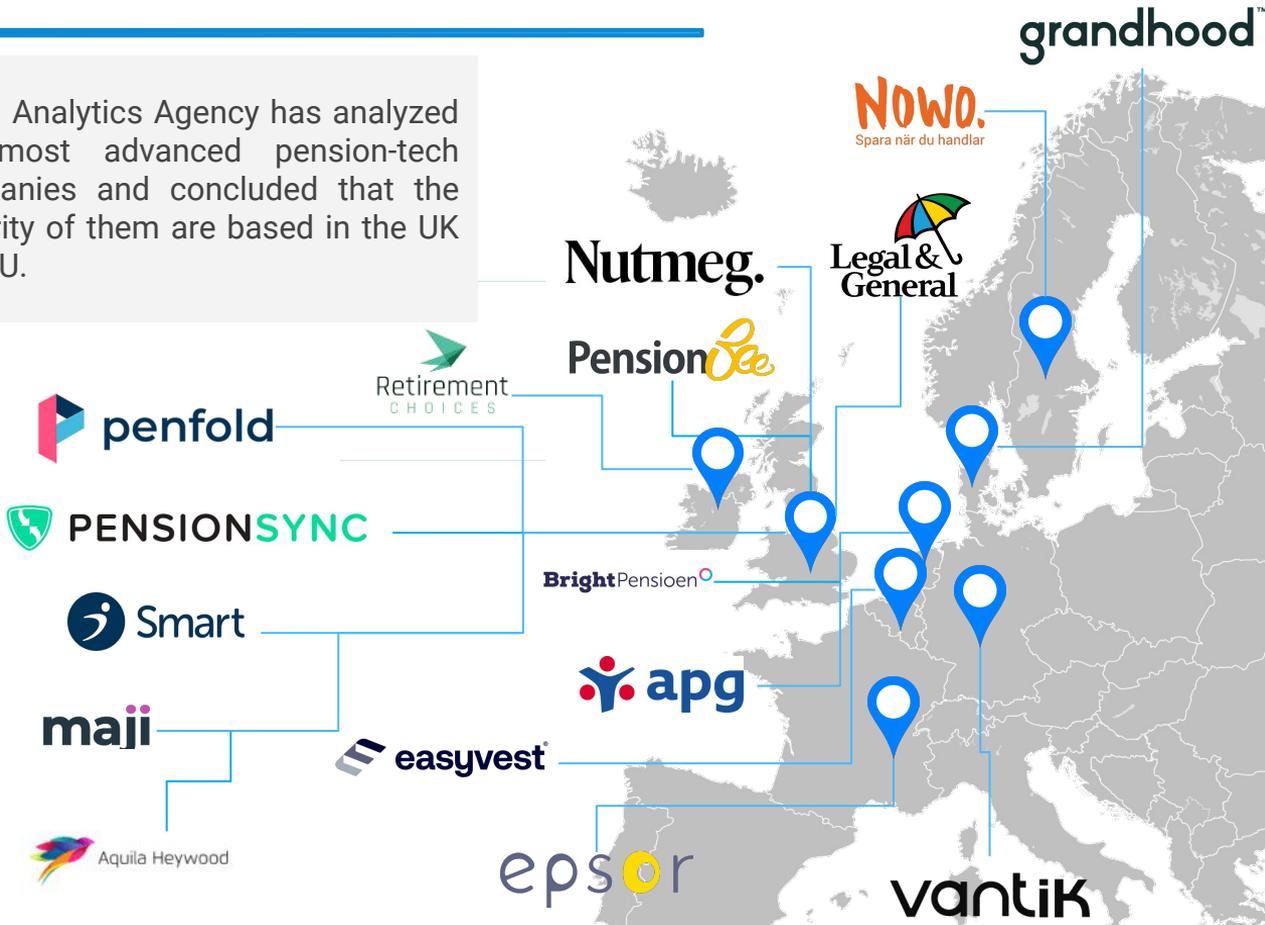
Index	Correlation with Financial Institution index	Average daily return in 2021	Average daily volatility in 2021	Skewness	Kurtosis
Financial Institutions Index	N/A	0.06	0.85	-0.48	1.11
S&P 500	-0.05	0.62	0.83	-0.41	0.84
Nasdaq Bank Index	0.80	0.12	1.67	0.09	1.08
SSE Composite Index	0.0	0.01	0.88	-0.30	0.41

Financial Institution Index Stock Returns



MOST ADVANCED PENSION-TECH COMPANIES

Aging Analytics Agency has analyzed the most advanced pension-tech companies and concluded that the majority of them are based in the UK and EU.



MOST ADVANCED PENSION-TECH PUBLIC COMPANIES



Short Description	Technology and Retirement Solutions
<p>Legal & General provides individual life assurance products and manages retirement risk for pension schemes. They are not only a top 20 global asset manager but also the UK's largest provider of individual life assurance products and a market leader in managing retirement risk for pension schemes, both in the UK and US.</p>	<p>Company provides has variety products in three categories retirement and pension , insurance and late life care that contains equity release products such as life time mortgage. The full range of retirement income solutions including personal and workspace pension plans and annuities, and lifetime mortgages.</p>
<p>PensionBee Group PLC is engaged in the provision of direct-to-consumer online pensions. The company raised £59.65M in its IPO on the LSE in 2021. Regarding the market cap decrease, early volatility is common in any market debut, but sharp swings in PensionBee shouldn't be a huge surprise. That's because – with limited sales and trading history, and statutory losses expected for several years to come.</p>	<p>PensionBee provides two services: an introducer of client funds to large asset managers unable or unwilling to market to smaller customers, and a technology provider to individuals who need to consolidate and take charge of their past pensions on one platform.</p>



	Legal & General	PensionBee
Market Cap	\$24 Billion	\$379 Million
AUM	\$1.35 Trillion	£2.2 Billion **
P/E Ratio (ttm)	8.02	N/A
Quarterly Revenue Growth (yoy)	-75.70 %	108.70%

** As of October, 2021

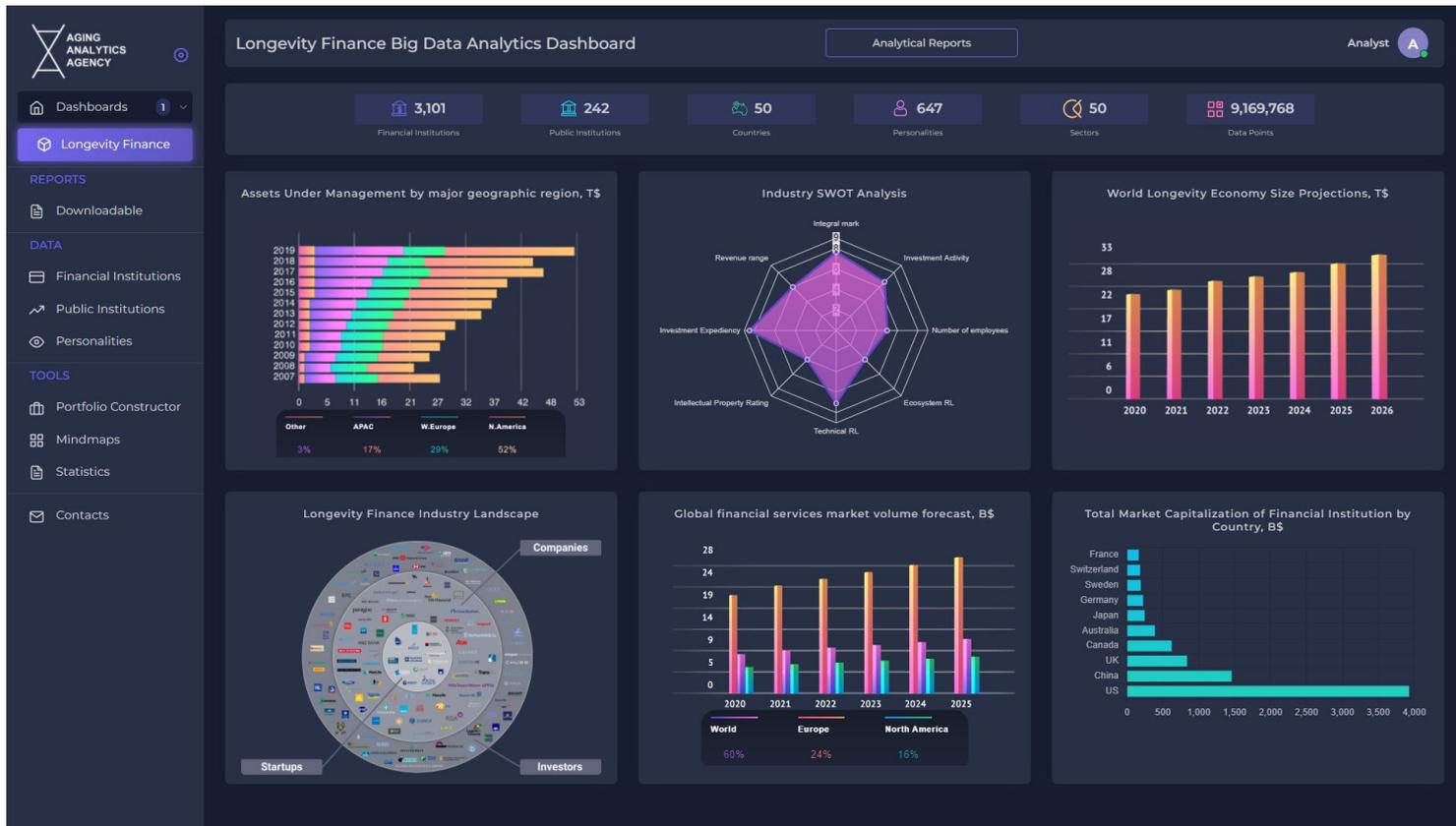
MOST ADVANCED PENSION-TECH PRIVATE COMPANIES

	Short Description	Funding Amount	Technology and Retirement Solutions
	The startup working on an alternative pension fund to create an easy to understand, low-cost pension platform for European small and medium enterprises. Pension and insurance products are provided in cooperation with Velliv, Denmark's third largest pension customer-owned company.	\$3.2M	Grandhood's app allows SMEs to sign up in a matter of minutes, and start making contributions instantly simplifying investment choices. The company invests savings mainly into ETFs that can offer lower management fees. Investments are determined using of machine learning risk-optimization algorithms.
	Nutmeg is an online investment service, acquired by JPMorgan Chase that specializes in investments, ISAs and pensions.	\$154M	An automated portfolio-management service, known as a robo-advisor which provides a choice of 10 managed portfolios (mainly ETFs) based on you risk profile., as well as general investment accounts, shares ISAs, lifetime and junior ISAs, other pension scheme.
	The mission of the company is to give people complete transparency to track everything about their pension in real time.	\$12M	It myth-busts and explains pensions and retirement planning in the most simple way, and it helps you avoid building up loads of small pots every time you change jobs. Auto-enrolment platform provides with a simple, flexible, digital way of saving for retirement.
	APG Asset Management is a company that invests in and manages pension funds for future retirement purposes. APG carries out executive consultancy services, asset management and pension administration and operates globally. The firm manages the pension assets of around 4.5 million active and retired Dutch citizens.	–	APG has teamed up with The Glue to establish Hyfen, a spin-off firm that specialises in digital innovation and automation of pension operations.

MOST ADVANCED PENSION-TECH PRIVATE COMPANIES

	Short Description	Funding Amount	Technology and Retirement Solutions
	PensionSync offers a payroll management software that automates the delivery of data between payroll, AE middleware and pension providers.	–	PensionSync is a one-stop-shop pension management portal compatible with payroll software. PensionSync collects, validates and formats pension data files straight from your payroll software into Aviva.
	Epsor is an easy-to-deploy digital platform with a transparent pricing policy, that designs and distributes employee savings and retirement plans to small and medium companies.	\$32.7M	Epsor offers a new-generation of employee savings and retirement solutions. Epsor combines technology and proximity to offer tailor-made financial advice to employees and meet their expectations thanks to its robo advisor and access to real financial advisors.
	Vantik is the first mobile retirement account to secure one percent cash back every time you pay with the free Mastercard from Vantik. Their promise: Money investment - without blah, without fixed costs, without a term.	\$2.6M	Vantik allows users to open an account and start saving by monthly transfers or by one-off transfers starting at €1. The money saved will be invested in the “Vantik Fund” – a mix of stocks, bonds, real estate and commodities that targets a 3% return per year. Customers are able to withdraw their money at any time.
	Smart Pension is a workplace pension tailored specifically for UK businesses. The Company also received a strategic investment from J.P. Morgan.	\$177M	Smart is an innovator and continues to establish itself as the leading retirement technology platform provider globally to create a better way to save toward retirement and access funds during retirement. Smart offers user experience and technology to transform retirement for savers around the world.

LONGEVITY FINANCE: BIG DATA ANALYTICS DASHBOARD



PUBLICLY TRADED LONGEVITY-FOCUSED COMPANIES

Overview



TOP 20 PUBLICLY TRADED LONGEVITY-FOCUSED COMPANIES

NASDAQ



US-Based



Turning Point Therapeutics (TPTX)
Market Cap: \$3,363M



Fate Therapeutics (FATE)
Market Cap: \$5,692M



Arena Pharmaceuticals (ARNA)
Market Cap: \$3,661M



Gossamer Bio (GOSS)
Market Cap: \$1,065M



One Medical (ONEM)
Market Cap: \$4,239M



Tandem Diabetes Care (TNDM)
Market Cap: \$8,220M



Vertex Pharmaceuticals (VRTX)
Market Cap: \$47,273M



SAGE Therapeutics (SAGE)
Market Cap: \$2,597M



Outset Medical (OM)
Market Cap: \$2,257M



Kronos Bio (KRON)
Market Cap: \$926.5M



China-Based



BeiGene (BGNE)
Market Cap: \$33,566M



UK-Based



Abcam (ABCM)
Market Cap: \$4,910M



Freeline Therapeutics (FRLN)
Market Cap: \$114M



Orchard Therapeutics (ORTX)
Market Cap: \$260M



Autolus (AULT)
Market Cap: \$438M

Euronext Brussel (BR)



Switzerland-Based



Biocartis (BCART)
Market Cap: \$254M



Sweden-Based



Getinge (GETI-B)
Market Cap: \$10,760M

Hong Kong (HKD)



Hong Kong-Based



Endurance RP(ex-Regent Pacific Group)
Market Cap: \$51M

Acquired



Deep Longevity
Acquired by \$4M

NYSE



US-Based



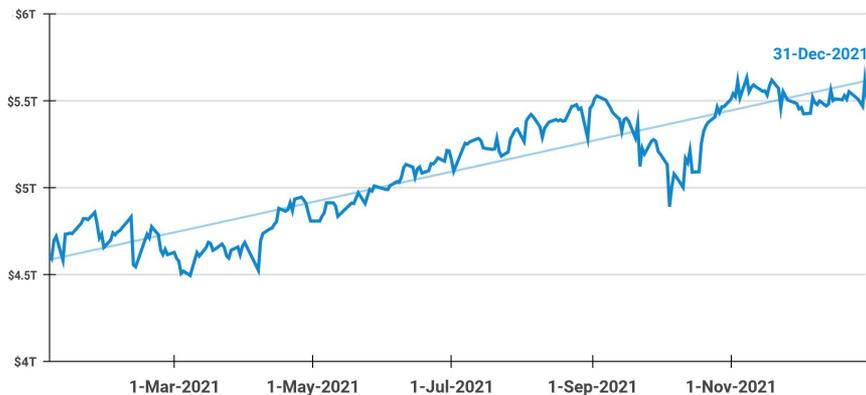
Amwell (AMWL)
Market Cap: \$2 030M



Asensus Surgical(ex-TransEnte rix) (ASXC)
Market Cap: \$553M

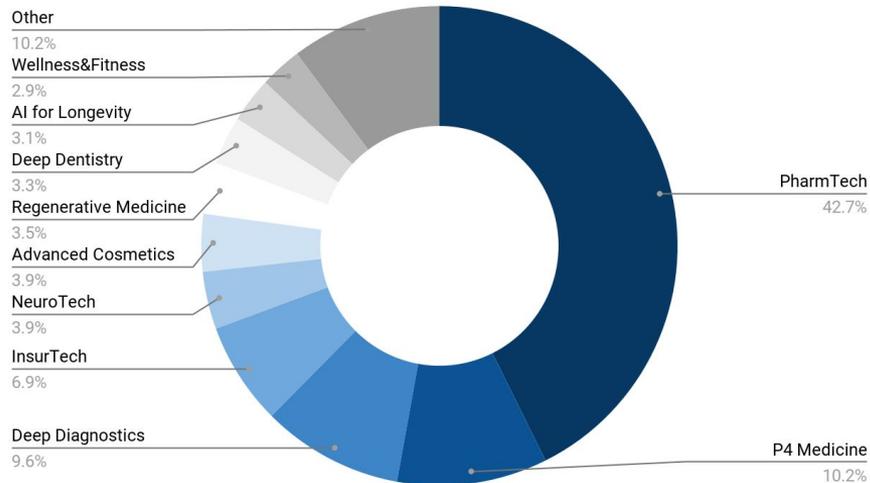
LONGEVITY PUBLICLY TRADED COMPANIES

Cumulative Capitalization Dynamics, Trillions



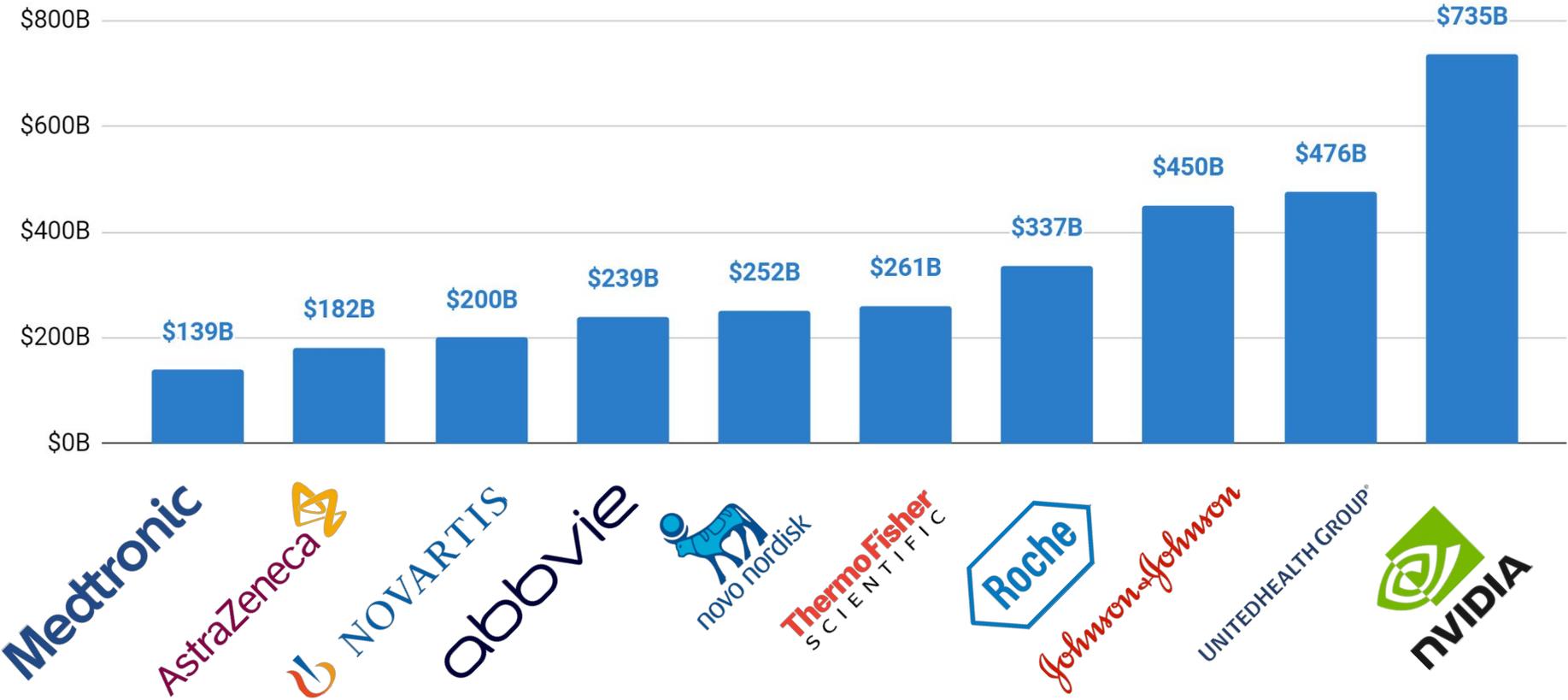
The Longevity Industry has been actively growing over the whole 2021 and it is projected to evolve in the same trend. At the end of 2021, the market capitalization of **495 publicly traded companies** was **more than 5.5 trillion USD, making a 20% growth since the beginning of 2021**. Technologically, publicly-traded Longevity-focused companies are similar to other companies in the sector what means that their market capitalization growth can approximate the dynamics of the whole industry.

Distribution of Public Companies by Longevity Sectors



Among 495 Longevity-focused public companies, **PharmTech**, **P4 Medicine** and **Deep Diagnostics** are the most represented sectors by number of companies. As society's focus is shifting towards keeping older people healthy and active for longer, life sciences and tech-enabled solutions are key areas that are likely to attract even more investments in the near future.

TOP 10 PUBLIC LONGEVITY-FOCUSED CORPORATIONS BY MARKET CAPITALIZATION AS OF DECEMBER, 2021



LONGEVITY IPOS IN Q4 2021

Overview



LONGEVITY IPO CANDIDATES

As of October 2021, over 400 Longevity companies have reached late-stage financing and are expected to tap IPO markets as the next steps. Below are some examples of Longevity companies who have either announced their IPO plans or viewed by market as potential IPO candidates.



Total Funding Amount: \$1.6B

Online pharmacy **PharmEasy** has recently filed for an initial public offering of up to ₹6,250 crore (\$842.43 million). The company will be looking to invest ₹3,000 crore to fund organic and inorganic growth initiatives and other ₹1,929 crore will be spend for repaying its outstanding debt.



Total Funding Amount: \$1.1B

Tempus uses artificial intelligence to provide physicians with clinical data that can be used to create customized treatments for patients. The company is considering a stock-market debut as soon as the first half of 2022.



Total Funding Amount: \$946.7M

Pharmaceutical online retailer **Miaoshou Doctor** is considering an IPO, which could happen during Q1, 2022 in Hong Kong that could fetch at least \$500M.



Total Funding Amount: \$905M

Better.com decided to take their company public earlier in 2021. Better will hit the public markets by merging with Aurora Acquisition Corp in a SPAC deal that values it at \$7.7B.



Total Funding Amount: \$876.1M

Direct-to-consumer telehealth health startup **Ro** is reportedly in talks go public through a merger with SPAC. Reuters reported that the deal could value Ro at more than \$5B.



Total Funding Amount: \$845M

ElevateBio is a biotechnology company, established to create and operate a broad portfolio of cell and gene therapy companies.



Total Funding Amount: \$2B

Devoted Health, a health insurance startup that focuses on Medicare Advantage plans, has rose up to \$1.2B in new series D funding round at around an \$11.5B valuation.



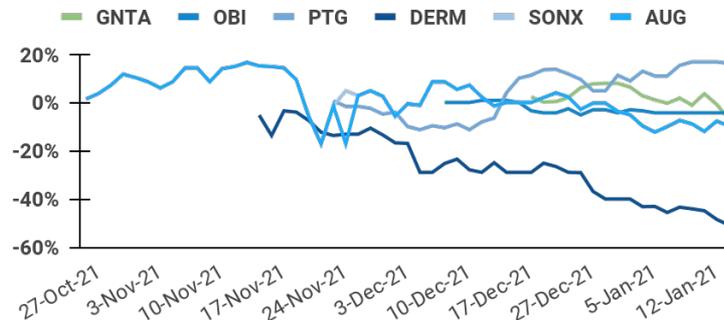
Total Funding Amount: \$1.6B

XtalPi, AI drug discovery company intends to use part of the proceeds from the latest \$400m Series D round. The startup already counts Google, SoftBank, and Tencent among its backers, with XtalPi turning to Goldman Sachs in July to find new investors ahead of an IPO.

LONGEVITY IPOs IN Q4 2021

There are a few signs pointing to continued **acceleration** in the biotechnology market. First, the biotechnology market adoption appears to be stabilizing at a 'new normal' following the onset of the COVID-19 pandemic. **More and more** biotechnology companies are **hitting** the **public markets** in 2021. In **Q4-2021**, **eight biotechnology** companies successfully completed an **IPO** including **reverse merger**.

IPOs Q4 Price Returns



Name	Ticker	Country	Funding Amount, \$M	IPO Date	Capitalization, \$M	Valuation at IPO, \$M	IPO Share Price, \$	Current Share Price, \$	EV/EBITDA	Net Income (TTM), \$M
Exscientia	EXAI	UK	350	01.10.21	2.263	2.900	22	18.80	-64.70	-35
Roivant Sciences	ROIV	USA	611	01.10.21	5.501	7.300	9.35	7.95	N/A	-1.060
Augmedix	AUGX	USA	99.7	26.10.21	124	148	4	3.35	-10.29	-16.1
Sonendo	SONX	USA	271	29.10.21	215	315	12	8.17	-5.61	-47.3
Journey Medical	DERM	USA	18.9	17.11.21	85	124	10	5.11	-11.73	-19.7
Poltreg	PTG	Poland	0.06	23.11.21	88	23	18	17.50	-94	-0.44
Ondine Biomedical	OBI	USA	0.8	06.12.21	145	-	-	74.52	-15	-4.51
Genenta Science	GNTA	UK	33.9	15.12.21	185	-	11.5	10.21	-26.87	-7.16

Stock Price, USD

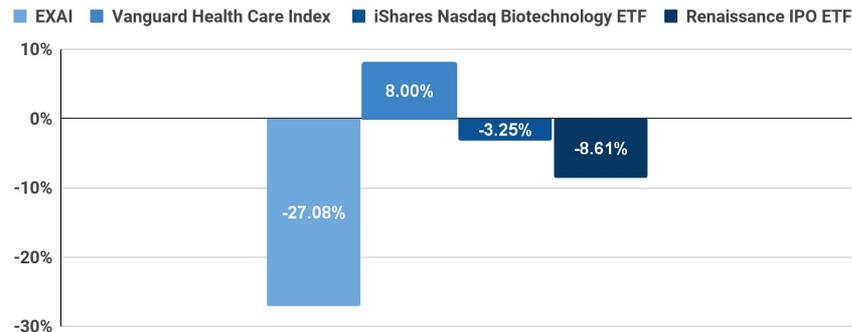


EXAI brought the first drug developed entirely by **AI** into clinical trials last year and has received a tremendous amount of interest in recent months. In fact, EXAI leveraged this success into **two back-to-back VC** rounds. EXAI just raised **\$109M** in its Series C round back in March. And it followed that up with a **\$225M** Series D round in April – less than two months later. A **deal with Sanofi** worth **\$5.2B** was announced to produce more AI Driven drug precision medicines.

Mean Daily Return	Volatility of Daily Returns	Avg. Volume (3 month)	Actual Monthly Return*	Growth after IPO	Capitalization, \$M
-0.50%	5.60%	112k	-4.39%	-27.08%	2,262

Founded in 2012, Exscientia was the first company to automate drug design and have an AI-Designed molecule enter clinical trials. As a full stack AI drug discovery company, Exscientia focuses on implementing AI design as well as precision data generation.

The graph below depicts a comparative performance of EXAI and 3 ETFs in Q4 2021 (starting from 01.10.2021): Vanguard Health Care Index Fund ETF (VHT), iShares Nasdaq Biotechnology ETF (IBB), Renaissance IPO ETF (IPO).



Stock Price, USD

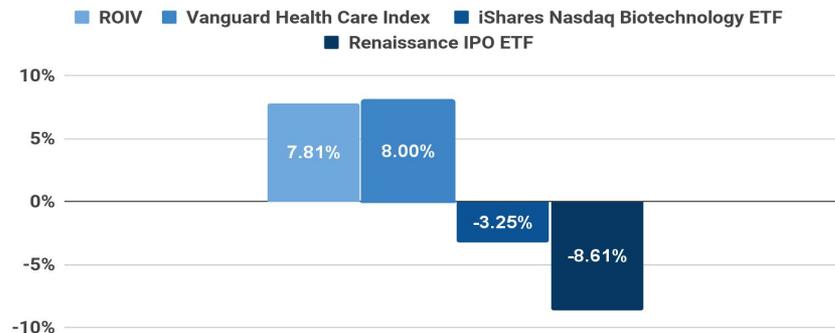


ROIV **awaits** potential approval by the U.S. Food and Drug Administration (FDA) for DARMAVANT TAPINAROF (DMVT-505) in treating plaque psoriasis. Dermavant is also evaluating the experimental drug in a phase 3 study for treating atopic dermatitis. Roivant could soon have more positive catalysts. The **FDA** approval decision on tapinarof as a treatment for **plaque psoriasis** is expected in **Q2-2022**.

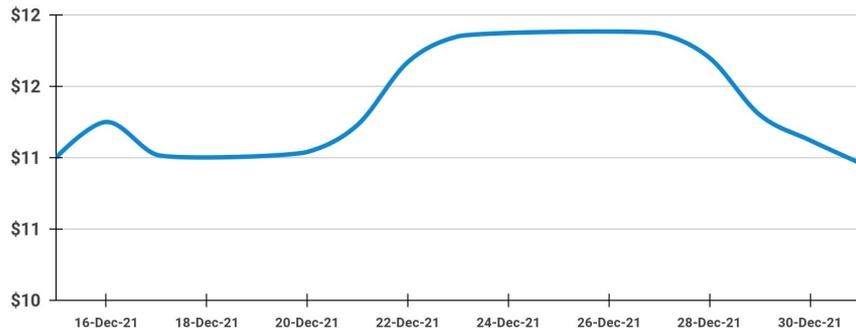
Mean Daily Return	Volatility of Daily Returns	Avg. Volume (3 month)	Actual Monthly Return	Growth after IPO	Capitalization, \$M
0.12%	7.90%	797k	-10.37%	7.81%	5,501

Founded in 2014, Roivant Sciences develops transformative medicines faster by building technologies and developing talent in creative ways, leveraging the Roivant platform to launch "Vants" - nimble and focused bio-pharmaceutical and health technology companies.

The graph below depicts a comparative performance of ROIV and 3 ETFs in Q4 2021 (starting from 01.10.2021): Vanguard Health Care Index Fund ETF (VHT), iShares Nasdaq Biotechnology ETF (IBB), Renaissance IPO ETF (IPO).



Stock Price, USD

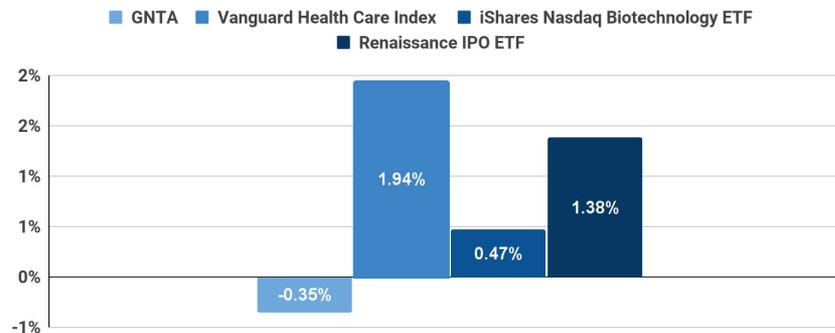


The Company filed form of [SEC](#) on **11/9/2021**, for an **IPO** to raise approximately **\$36M**. The IPO price was **\$11.50**. In addition to that, the **Ferrari family's** affiliates were among the **early investors** in Genenta Science. As of 6/30/2021, the Company had cash and cash equivalents of approximately **€10.6M**, which the Company anticipates being sufficient for a **cash runway** of at least 12 months and through **4Q-2022**.

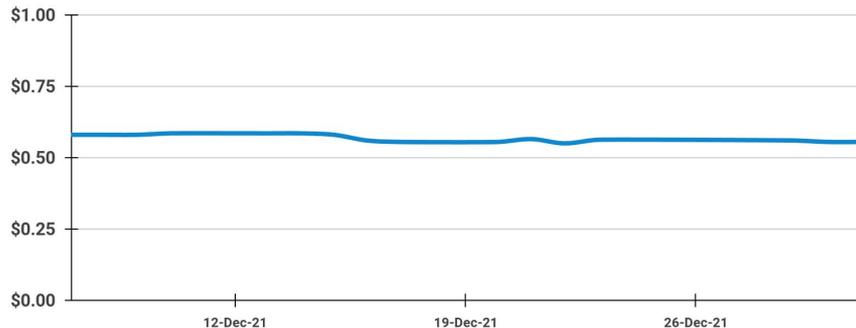
Mean Daily Return	Volatility of Daily Returns	Avg. Volume (3 month)	Actual Monthly Return	Growth after IPO	Capitalization, \$M
-0.03%	2.20%	51.4k	-0.35%	-4.68%	185

Genenta Science, a clinical-stage biotechnology company, engages in the development of hematopoietic stem cell gene therapies for the treatment of solid tumors. The company's lead product candidate is Temferon, which is in Phase 1/2a clinical trials for use in the treatment of glioblastoma multiforme in patients with unmethylated MGMT gene promoter. The company was incorporated in 2014 in Italy.

The graph below depicts a comparative performance of GNTA and 3 ETFs in Q4 2021 (starting from 15.12.2021): Vanguard Health Care Index Fund ETF (VHT), iShares Nasdaq Biotechnology ETF (IBB), Renaissance IPO ETF (IPO).



Stock Price, USD

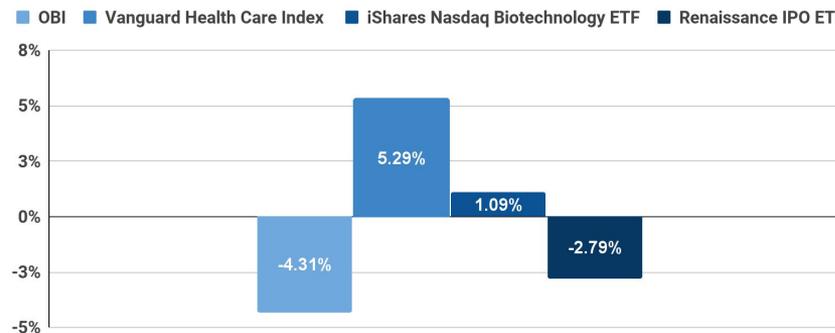


Ondine Biomedical made its **debut** on the AIM market at a **valuation** of **£104M**. Ondine raised around **£23M** prior to the listing, and it planned to use the **IPO** funds to **roll out** its **first product**, a “photo-disinfection liquid treatment” that is says **destroys viruses** and helps prevent the spread of **Covid**. The Company also has made a **key senior appointment** who will lead the **commercialisation** of the company’s breakthrough antimicrobial technology.

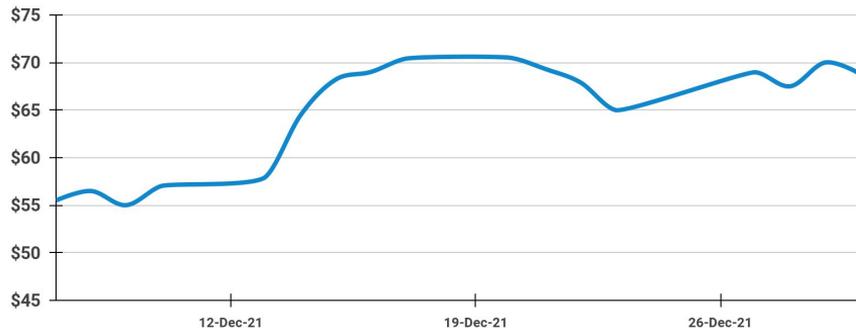
Mean Daily Return	Volatility of Daily Returns	Avg. Volume (3 month)	Actual Monthly Return	Growth after IPO	Capitalization, \$M
-0.29%	1.46%	149.8k	-4.31%	NA	145

Ondine Biomedical Inc. engages in the research, development, and commercialization of antimicrobial photodisinfection therapies. It offers Steriwave, an antimicrobial for nasal decolonization; and SurgENT, a debridement and deep-cleaning catheter designed to reduce biofilm and mucus in the sinuses. The company was founded in 1997 in Canada.

The graph below depicts a comparative performance of OBI and 3 ETFs in Q4 2021 (starting from 07.12.2021): Vanguard Health Care Index Fund ETF (VHT), iShares Nasdaq Biotechnology ETF (IBB), Renaissance IPO ETF (IPO).



Stock Price, USD

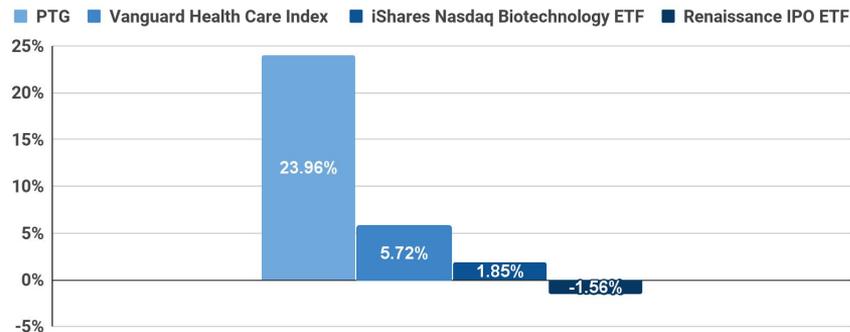


Poltreg went public in Nov 2021 and the **valuation at IPO** is **PLN 100M**. The purpose of the offering is to raise funds necessary to pursue the key **strategic objectives** of Poltreg until **Q1-2025**. These objectives include **research and development** work related to the next phases of research on therapies for treating type 1 diabetes in children and therapy for multiple sclerosis, which Poltreg is working on, as well as the development of Treg 2.0.

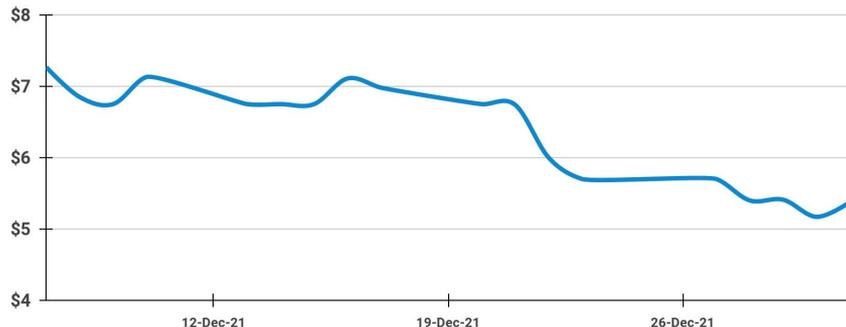
Mean Daily Return	Volatility of Daily Returns	Avg. Volume (3 month)	Actual Monthly Return	Growth after IPO	Capitalization, \$M
1.34%	3.91%	5.18k	23.96%	282.22%	88

Poltreg S.A., a biotechnology company, develops therapies for autoimmune diseases using T-regulatory cells. It engages in the research and development of therapies for the treatment of type 1 diabetes in children and in multiple sclerosis. The company is based in Gdansk, Poland.

The graph below depicts a comparative performance of PTG and 3 ETFs in Q4 2021 (starting from 07.12.2021): Vanguard Health Care Index Fund ETF (VHT), iShares Nasdaq Biotechnology ETF (IBB), Renaissance IPO ETF (IPO).



Stock Price, USD

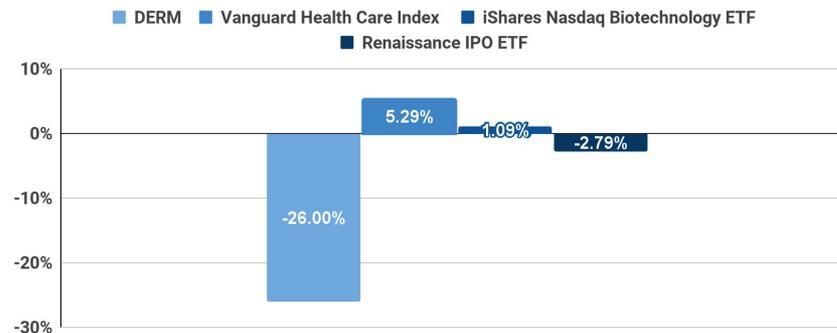


Journey Medical completed its **IPO** for gross proceeds of **\$35.2M** in Nov 2021. The Company expects to use the net proceeds from IPO for **general corporate purposes**, including working capital, R&D, payments for R&D—licenses acquired, sales and marketing activities, general administrative matters, operating expenses and capital expenditures. Their portfolio includes **5 branded** and **3 authorized** generic prescription drugs for dermatological conditions that are marketed in the U.S.

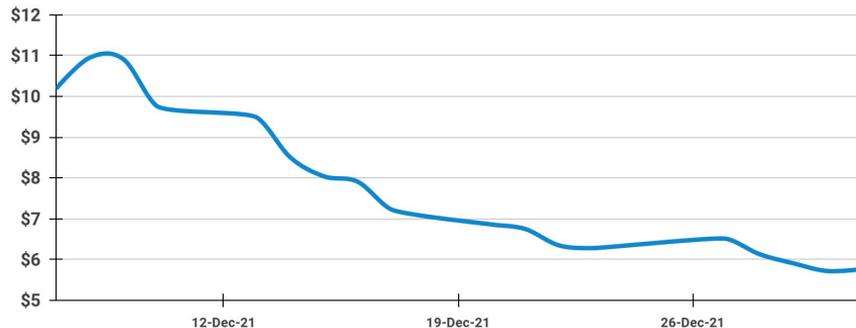
Mean Daily Return	Volatility of Daily Returns	Avg. Volume (3 month)	Actual Monthly Return	Growth after IPO	Capitalization, \$M
-1.77%	4.42%	210.58k	-26%	-46.20%	85

Journey Medical Corporation develops and commercializes pharmaceutical products for the treatment of dermatological conditions. It markets generic prescription drugs for dermatological conditions. The company was formerly known as Coronado Dermatology, Inc. and changed its name to Journey Medical Corporation. It is a spinoff from parent company Fortress Biotech.

The graph below depicts a comparative performance of DERM and 3 ETFs in Q4 2021 (starting from 07.12.2021): Vanguard Health Care Index Fund ETF (VHT), iShares Nasdaq Biotechnology ETF (IBB), Renaissance IPO ETF (IPO).



Stock Price, USD

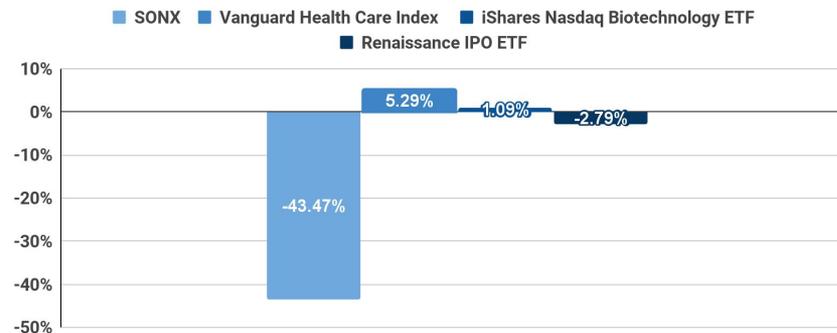


Sonendo has raised **\$93.6M** for its **IPO** in Oct. 2021. Sonendo's some **pre-IPO backers** included EW Healthcare Partners, Redmile Group, ArrowMark Partners, General Atlantic, NeoMed Management, SEB Private Equity. Sonendo began scaling **commercialization** of its current technology in 2017, and as of June 30, 2021, it had an installed base of over **700** GentleWave Systems and has treated more than **600,000 patients**.

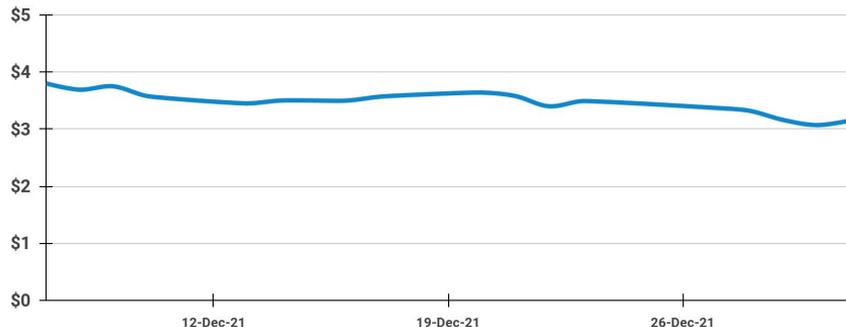
Mean Daily Return	Volatility of Daily Returns	Avg. Volume (3 month)	Actual Monthly Return	Growth after IPO	Capitalization, \$M
-3.36%	4.80%	275.55k	-43.47%	-52%	215

Sonendo, Inc., a commercial-stage medical technology company, develops, manufactures, and commercializes devices for root canal therapy in the United States and Canada. It provides a tooth decay treatment device for cleaning and disinfecting the microscopic spaces within teeth without the need to remove tooth structure.

The graph below depicts a comparative performance of SONX and 3 ETFs in Q4 2021 (starting from 07.12.2021): Vanguard Health Care Index Fund ETF (VHT), iShares Nasdaq Biotechnology ETF (IBB), Renaissance IPO ETF (IPO). However, the estimation of monthly return by the Fama-French five-factor model in December showed that SONX is underpriced by market and the stock price will start increasing on the first month of 2021.



Stock Price, USD

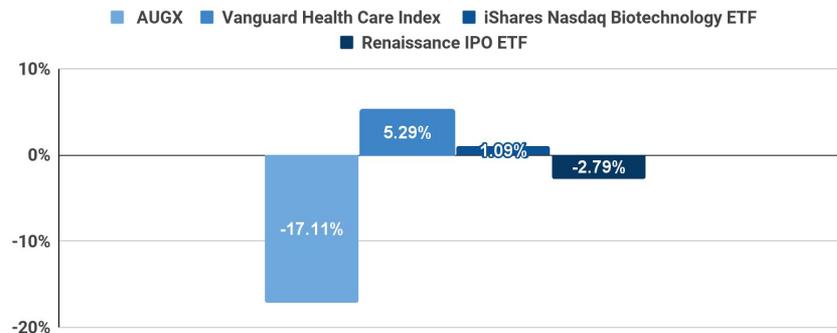


Augmedix landed **\$40M** through a **new IPO**. This news comes roughly a year after the company announced that it had closed a **\$25M private placement** that would merge the company with Malo Holdings, a **SPAC** company. This reverse merger listed the company under over-the-counter (OTC) securities. However, the recent IPO **“uplisted”** the company to **Nasdaq**.

Mean Daily Return	Volatility of Daily Returns	Avg. Volume (3 month)	Actual Monthly Return	Growth after IPO	Capitalization, \$M
-1.10%	2.80%	174.39k	-17.11%	-21.25%	124

Augmedix, Inc. provides remote medical documentation solutions and live clinical support services in the United States. It offers software that is compatible with off-the-shelf, mobile client devices, which enables clinicians to communicate with remotely located documentation specialists (RDSs). The company was founded in 2013 in USA.

The graph below depicts a comparative performance of AUGX and 3 ETFs in Q4 2021 (starting from 07.12.2021): Vanguard Health Care Index Fund ETF (VHT), iShares Nasdaq Biotechnology ETF (IBB), Renaissance IPO ETF (IPO). Based on the Fama-French model, AUGX underperformed by market, due to difference between actual and estimated return in NOV (18%), it seems stock price will increase in 2022.



Genflow Biosciences plc is a UK based biotech company with R&D facilities in Belgium and a US office in Cambridge, MA, driven by one mission: to deliver therapeutics that potentially halt or slow the ageing process in humans and dogs. The company's lead compound works through the delivery of a centenarian variant of the SIRT6 gene and has yielded promising preclinical results.

22.6% Rising Older Population

According to the United Nations the proportion of the world aged over 65 is set to rise from 9.3% in 2020 to reach 22.6% by 2100

10.2% Increased Health Expenditure Due To Ageing

The OECD estimates that health expenditure will rise from 8.8% of GDP in 2015 to 10.2% by 2030

\$38 Trillion Slowing Ageing Opportunity

For the US it has been estimated that the benefits of slowing ageing such that life expectancy increases by between one and two years is worth between \$7trillion and \$38 trillion

Name	Ticker	Country	IPO Date	Capitalization, \$M	Valuation at IPO, \$M	IPO Share Price, \$	Current Share Price, \$
Genflow Biosciences plc	GENF.L	UK	17.01.22	37.726	38	9,25	12.90

Genflow Biosciences becomes first European publicly traded biotech company

Genflow Biosciences became the first Longevity biotech IPO of 2022 on January 17th, listing under the ticker symbol "GENF" at an initial share price of 8 pence on the main market of the London Stock Exchange. A total of 47,036,500 Ordinary Shares were issued (representing roughly 16% of the company's issued share capital at the time of entrance). Genflow's first trading day finished with a 31% price increase, giving it a market capitalization of £23.4 million.

Genflow claims "extensive relationships" within the longevity biotech field and with leading academic centres, including a collaboration agreement with St Anne's University Hospital in the Czech Republic on a pre-clinical programme to assess the effect of SIRT6 delivery on cellular senescence and metabolism in vitro and in vivo.

The company also has a collaboration agreement with Estonian research organisation IVEX Lab OU on the development of adeno-associated virus vectors for SIRT6 therapies and on the large-scale production of AAV vectors for an in vivo study in animal models.

"Genflow Biosciences is starting a new chapter today, as we advance to the next level of our development as a publicly traded business trading on the main market of the London Stock Exchange, we are excited to put our strategy into action. The funds raised will help Genflow develop new gene therapies to combat the impacts of aging and age-related diseases, as well as carry out our long-term company objectives in a field with significant financial prospects"

Dr. Eric Leire, CEO

Headquarter
London, UK

Raised at IPO
£3.7 million

Founded date
2020

R&D center
Charleroi, Belgium

INSILICO MEDICINE INVESTMENT CASE

Overview



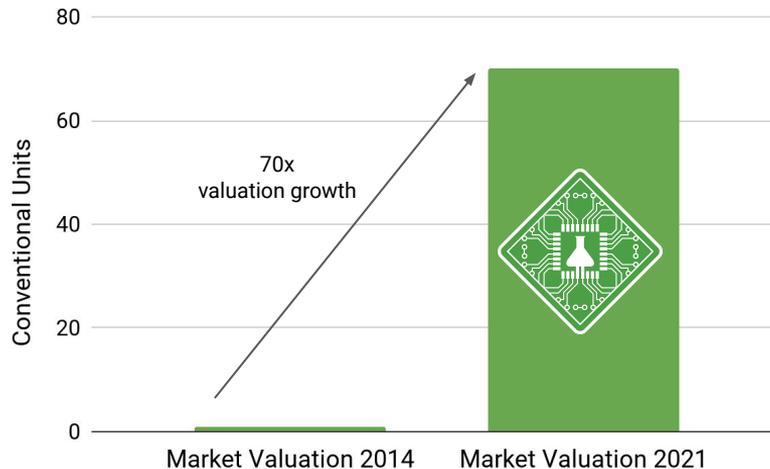
INSILICO MEDICINE VALUATION GROWTH SINCE DEEP KNOWLEDGE GROUP'S INVESTMENT

In 2014 Insilico Medicine was a little-known biotech startup that suggested a computational alternative to animal testing for research and development programs in the pharmaceutical industry by using artificial intelligence.

Deep Knowledge Group was one of the first investors who put their attention on the AI in Pharma sector. We foresaw the potential of Insilico Medicine's idea at the dawn of the industry, 4 years before the concept of AI in Pharma existed as an investable industry for institutional investors.

In 2018, Insilico Medicine succeeded in conducting groundbreaking scientific research on the design of a novel drug by AI in just 21 days, and preclinical validation just 25 days thereafter. In 2019, Insilico Medicine successfully conducted a Series B funding round, which secured the company \$37 million. In 2021, Insilico Medicine announced a \$255 million Series C funding round with Warburg Pincus as lead investor. This deal is evidence that the company's AI-based platform can create a new target for a disease, develop a bespoke molecule to address it and bring it through the clinical trial process at a fraction of the cost of traditional approaches in the Pharmaceutical Industry. Insilico has become one of the most high-profile companies in the Pharmaceutical Industry on a new market that was spawned and inspired by it.

Insilico Medicine Valuation Dynamic
2014 vs. 2021



Insilico Medicine's valuation has grown 70x in 7 years, showing remarkable growth, especially for a company operating on the frontier of the drug development industry

OUR INVESTMENT TRACK RECORD: INSILICO MEDICINE

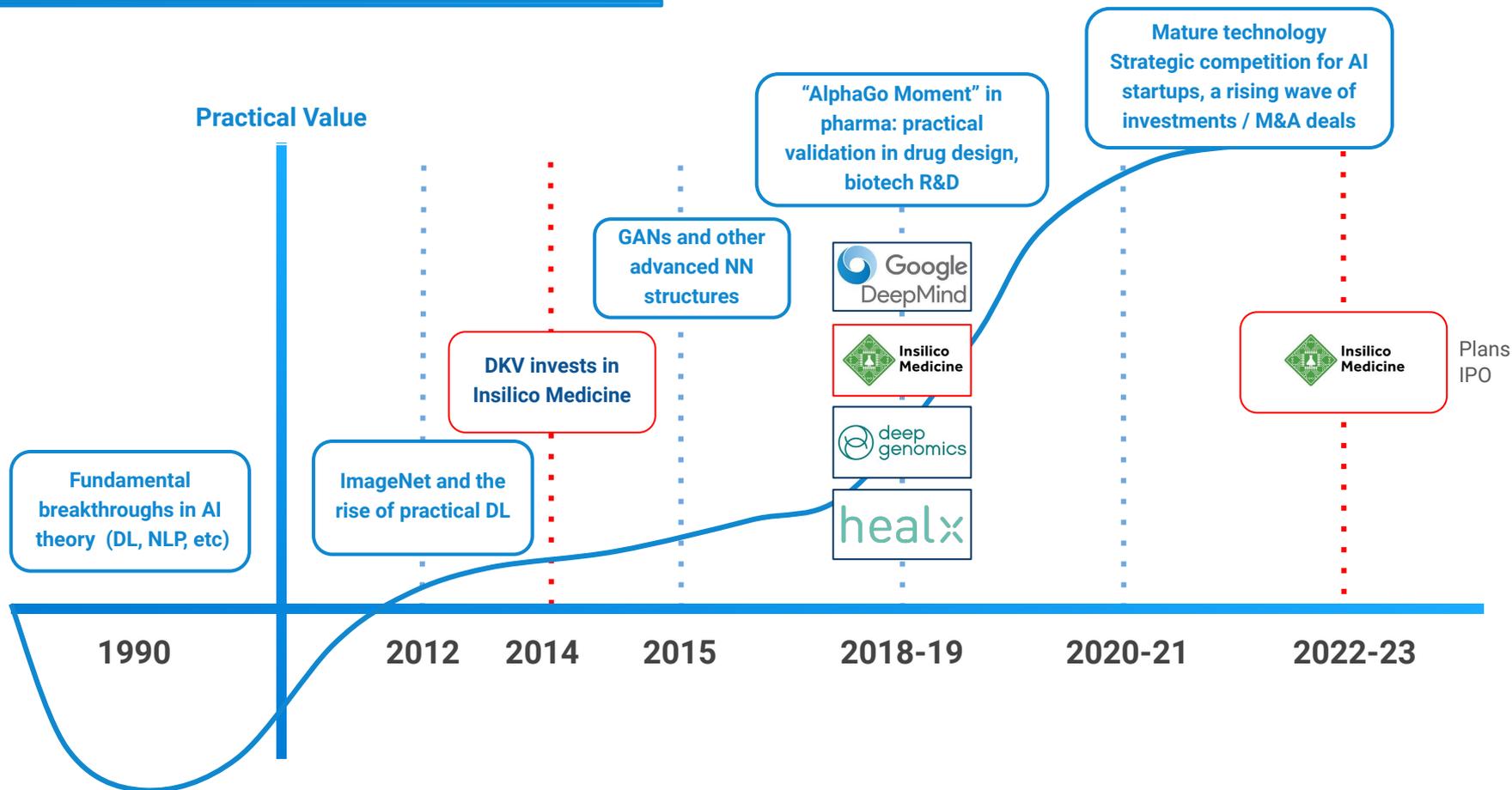


英科智能
Insilico Medicine

Deep Knowledge Group was first to invest in Insilico Medicine

2014 Seed and Convertible Notes	2018 Round A	2019 Round B	2021 Round C	2022-2023 IPO
 <p>DEEP KNOWLEDGE VENTURES</p> <p>Insilico Medicine is an artificial intelligence company headquartered in Hong Kong, which pioneered the applications of the generative adversarial networks (GANs), reinforcement learning, transfer learning and meta-learning for the generation of novel molecular structures for diseases with known and unknown targets.</p>	<p>\$13M</p>    	<p>\$37M</p>           	<p>\$255M</p>           	<p>IPO planned for 2022</p>

AI-DRIVEN BIOTECHS CHANGE PHARMA R&D PARADIGM: LEADERS OF CHANGE

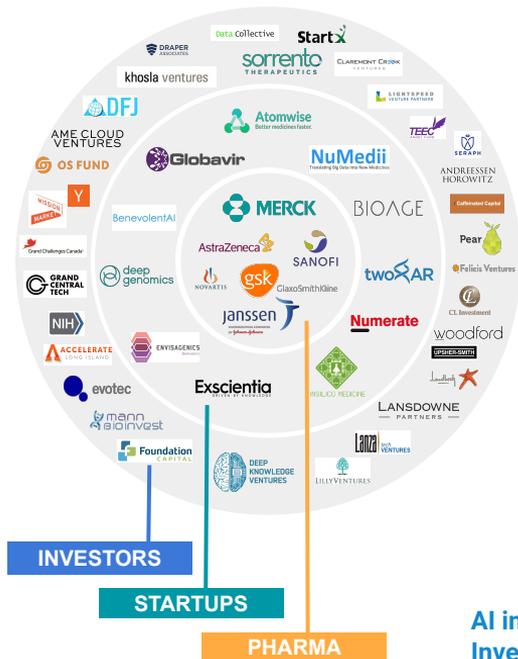


AI FOR DRUG DISCOVERY BOOM - 2017 VS. Q2 2021

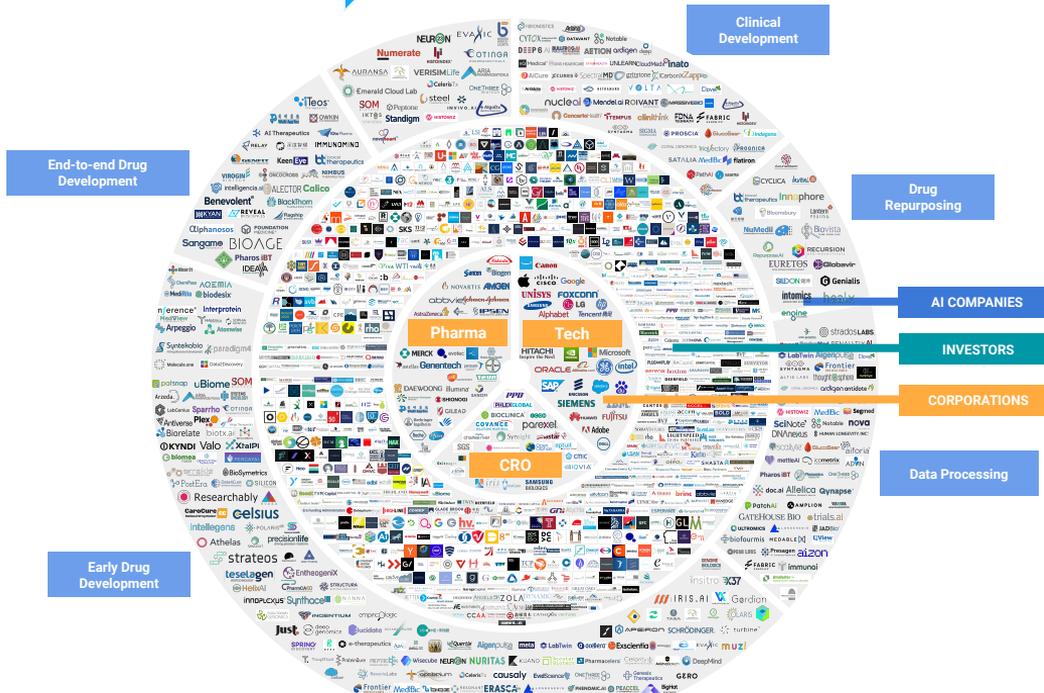
2017

20x industry growth

2021

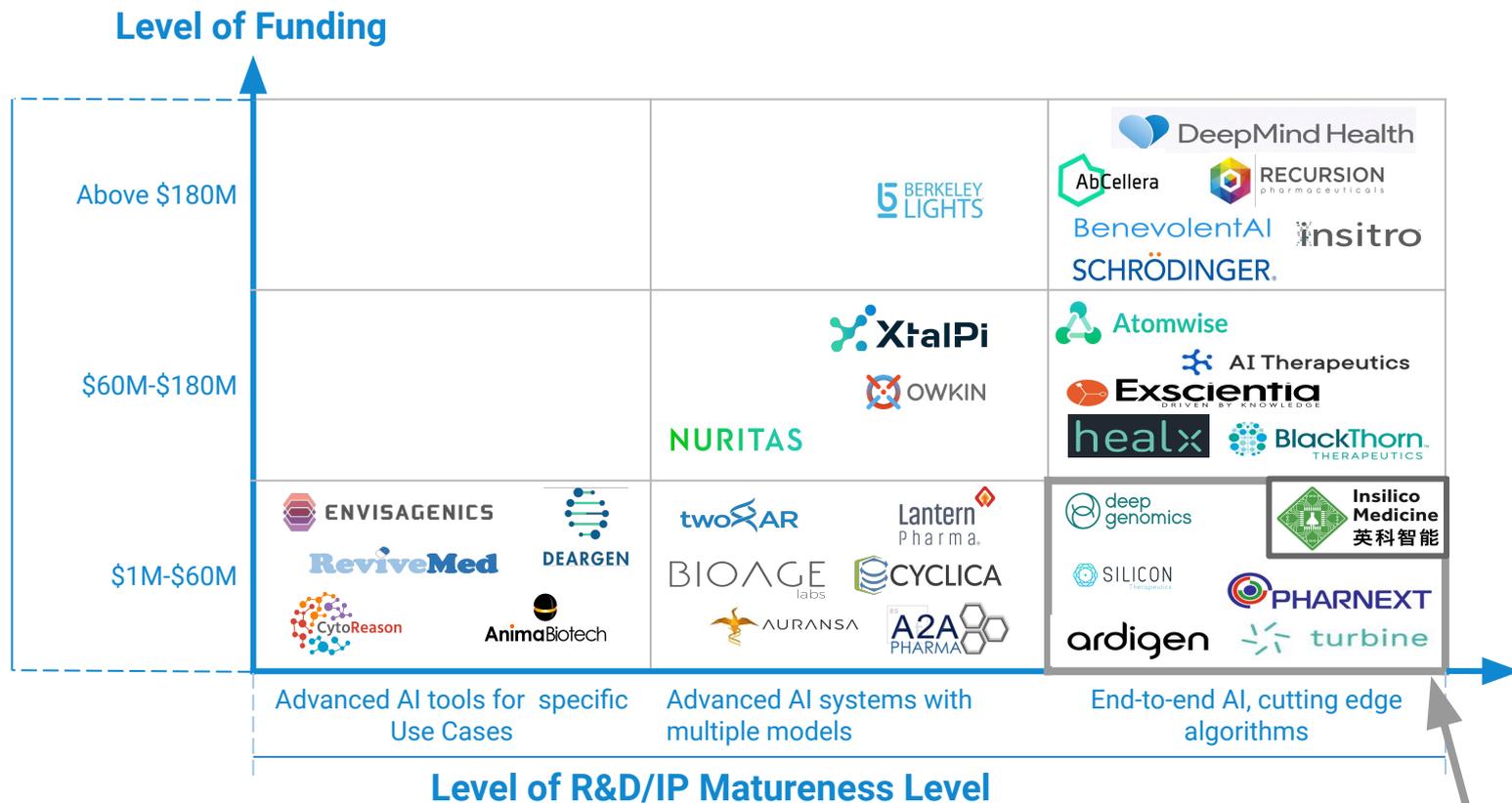


AI in Pharma Companies - 11
Investors - 30
Startups - 10



AI in Pharma Companies - 300
Investors - 880
Corporations - 100

RATIO OF FUNDING VS. R&D MATURITY & OVERALL DEVELOPMENT STAGE



Companies that achieved significant R&D maturity with comparatively small financing

KEY TAKEAWAYS

Overview



MAJOR OBSERVATIONS FOR 2021: KEY BUSINESS TAKEAWAYS

1. The **Longevity** market is not only limited to anti-aging applications of life sciences. It also includes some new sectors of the **financial industry**, as well as **government projects** (national Longevity development plans); hence, its overall size potentially **exceeds \$25 trillion**.
2. The COVID-19 pandemic has given a boost not only to the growth of the biotech capital market, but also to the development of the Longevity biomedicine sector, resulting in an increase of more than **30%** (compared to the previous year).
3. The **undisputed** leader in the Longevity sector is the **US** which has a total of **\$629 billion** invested in 26,654 companies followed by **China** with **\$164 billion** invested in 2,158 companies.
4. **PharmTech** and **P4 Medicine** are Longevity sub-sectors involving the largest number of companies and receiving the highest volume of investments with total investment of **\$311.5B** and **\$138.9B**, respectively. Among 495 Longevity-focused public companies, **PharmTech, P4 Medicine and Deep Diagnostics** are the most represented sectors by number of companies.
5. Among the **300 Longevity-focused financial institutions**, the **UK** took the first place with 32% and followed by the **US** with 29%.
6. The Longevity Industry is relatively volatile (as measured by standard deviation), however, **growth** in the market capitalisation of Longevity-focused companies far exceeds that of the S&P 500 and the iShares Biotechnology ETF. Also, average daily returns of our Longevity ETF during 2021, encompassing **Top 100** companies in the **Longevity** Industry, are **4 times higher** simultaneously less volatile as compared with benchmark indices.
7. The **lowest** gap between **HALE** and **Life Expectancy** is observed in **Singapore** where people tend to be wealthier and are, therefore, able to eat healthy food and have access to the best health care. HALE at birth in countries varies significantly. The **highest** value is in **Japan** (64 years) and the lowest value is in **South Africa** (56 years). The **United States** is the high-income country where life expectancy is marginally **below** the average level of chosen countries (**70 years**).

OBSERVATIONS IN 2021: KEY FINANCIAL AND INVESTMENT TAKEAWAYS

1. **Thermo Fisher Scientific** has raised a total of **\$6 billion** which is the biggest funding round among Longevity-based biotechnology companies in 2021. The smallest-size deal belongs to **OncoMyx Therapeutics** with **\$50 million** from Series B round.
2. **PharmTech** is becoming a lucrative area for specialized biotech investors and investment funds (VCs) just entering the pharma space to include high-risk/high-return companies in their investment portfolios (total investment is **\$312 billion**). **CareStream** which provides imaging and IT systems for medical and life sciences sectors received the biggest investment (**\$2.4 billion**) among PharmTech companies. Another Longevity sub-sector to receive decent investment is **P4 Medicine** (**\$138.9 billion**).
3. More than a thousand of **Longevity companies received private equity investments**. Currently, the growth rate of the Longevity market is comparable to that of the IT sector.
4. **In Q4 2021**, we saw **8 Longevity** companies successfully completed their **IPO** and their total **capitalization** accounted for **\$8.6 billion** as of January 2022. The **biggest valuation at IPO** had **Roivant Sciences** (**\$5.5 billion**), a biopharmaceutical company focused on the development of medicines and healthcare technologies. The most interesting IPO (uplisted) belongs to **Augmedix**, landed \$40 million with **reverse merger** after the company announced its \$25 million **SPAC** deal.
5. The **Longevity Industry** has been actively growing over the whole **2021** and is projected to evolve in the same trend. At the end of 2021, the market capitalization of **495 publicly traded** companies was more than **\$5.5 trillion**.

KEY TECHNOLOGY TAKEAWAYS

1. Over the recent years, **significant progress has been achieved in aging research** (mainly in animal studies). As a result, Longevity has become a complex and multidimensional science. Its diverse technological offshoots, such as geroscience, geriatrics, regenerative medicine, and precision medicine, are all developing simultaneously. This serves as a foundation for the global Longevity Industry, which will probably be humanity's largest industry by the year 2040.
2. **AI-driven biomedical research and development efforts are now more technologically mature and can be successfully used in aging research.** The key power of AI lies in its ability to accelerate real-world implementation of Longevity science, such as drug discovery, biomarkers discovery, new Longevity and genes identification, and bring personalized medicine to clinics based on an individual patient's records.
3. Currently, the main focus of global public health efforts is on increasing human healthspan. Achieving this requires successful **treatment and prevention of age-related diseases**, such as cancer, neurodegeneration and cardiovascular diseases.

OBSTACLES THAT STILL REMAIN

1. Application of discoveries in animal aging to humans requires **better biomarkers** of disease risk and responses to interventions, and **increased use of electronic health records, biobank resources and cohort studies.** Absence of validated biomarkers of risk of age-related diseases poses challenges for the development of anti-aging drugs. There is still no consensus among scientists regarding biomarkers of a biological age.
2. **The ability of AI to make accurate predictions depends on data availability.** A major concern in the application of AI technologies in healthcare is related to the acquisition, generation, and use of health data. Regulatory efforts are needed to ensure proper flow and use of healthcare records.
3. There is a **shortage of financial resources necessary for the development of public health programs** capable of reducing the risk of age-related diseases. Many health promotion strategies lack scientific and clinical evidence of their efficacy.
4. It is crucial to shift focus from treating individual diseases to developing medical interventions capable of **extending the human lifespan.**

LONGEVITY IN THE GLOBAL CONTEXT



Driven by the declining fertility rates and improvement in health and Longevity, human populations are rapidly aging. The world is likely to have 1 billion elderly people by 2030. The most rapid increases in the proportion of people aged 65 and over are taking place in developing countries, with the most dramatic changes being observed in East Asia. There, life expectancy at birth has increased from less than 45 years (in 1950) to more than 72 years. In the near future, the elderly population is expected to grow fastest in Northern Africa. In contrast, the projected increase is relatively small in Australia, New Zealand, Europe and Northern America.



Among the developed countries, Hong Kong and Japan have the highest life expectancy rate at birth (84.7 and 84.5 years, respectively). Despite spending less on health and social care (compared to other developed economies), Hong Kong demonstrates superior social indicators – adolescent birth rate, youth involvement in education or employment, homicide rate and incarceration rate. Its superb health indicators, and more specifically, life expectancy and infant mortality rate, may be considered key Longevity-related factors.



In terms of investments and number of aging research institutions (almost 50% of the total number worldwide), **the US is an undisputed leader in the Longevity industry.** Suffice it to recall that the majority of major Longevity-focused companies are based in the US. This contrasts sharply with health disparities which are due to socio-economic inequalities.



Among EU countries, Italy (22.8 %), Greece (22.0 %), Portugal (21.8 %) and Finland (21.8 %) had the highest percentage of individuals aged 65 and over in 2019. In their turn, Ireland (14.1 %) and Luxembourg (14.4 %) had the lowest percentage. It is expected that the percentage of individuals aged 65 and over will increase and account for 29% of the entire population by 2060.



The demographic shift is affecting each and every aspect of social life, from health system pressures to economic impact on public finances. It presents opportunities to individuals and society; however, it also poses challenges which have to be addressed in government policies. That is precisely why redesigning pension systems has become a priority in many countries.

ABOUT INVESTTECH ADVANCED SOLUTIONS

Who We Are



InvestTech Advanced Solutions provides modern investment analytics and data management tools and algorithms.

Our products are **sophisticated data-driven quantifiable investment recommendations** generated to conduct tangible, fast, comprehensive, and inexpensive **analysis and due diligence for deep tech startups, companies, and corporations**, represented in investment reports.

In addition, InvestTech Advanced Solutions provides proprietary **real-time financial analytics and consulting** for publicly traded corporations in deep tech sectors, which includes 3 stages: data parsing, AI-driven data analysis, and user-friendly data visualization.

InvestTech Advanced Solutions also specializes in **advanced financial engineering**, including **financial derivatives construction and de-risking methods and tools development**.

Our Value Proposition:

● Open Access and Proprietary Analytical Case Studies

Aging Analytics Agency is producing regular open-access reports covering emerging Longevity markets – technologies, innovations, companies, and trends. Our clients and partners can enjoy access to proprietary reports featuring additional in-depth research conducted by our team on a regular basis.

● IT-Platform and Big Data Analytics Dashboard

Our company is building a sophisticated cloud-based engine for advanced market and business intelligence in the Longevity biotech, medicine, finance, and governance industries. It includes a data mining engine, infrastructure for expert data curation, and advanced visualization dashboards, including mindmaps, knowledge graphs, and 3-dimensional visualizations.

● Strategic Consulting

Aging Analytics Agency offers a comprehensive range of consulting services, conducting customized case studies, research, and analytics for internal (organizational) use, tailored to the precise needs of specific clients.

Aging Analytics Agency is the world's premier provider of industry analytics on the topics of Longevity, Precision Preventive Medicine and Economics of Aging, and the convergence of technologies such as AI, Blockchain, Digital Health, and their impact on healthcare industry.

Aging Analytics Agency is open for cooperation with strategic clients via a variety of approaches, including:

- Conducting customised case studies, research and analytics for internal (organizational) use, tailored to the precise needs of specific clients;
- Producing open-access analytical reports;
- Offering customised analysis using specialised interactive industry and technology databases and IT-platforms.

INVESTTECH ADVANCED SOLUTIONS: ANALYTICAL REPORTS

InvestTech Advanced Solutions in cooperation with analytical subsidiaries of Deep Knowledge Group produces regular open access reports covering emerging technologies, innovations, companies, and trends across the variety of DeepTech domains.

These reports focus on major areas of high-potential industries, maintaining ratings of market players based on their innovation potential and business activity.

The scope of analytical reports accounts for over 10 investment digests that are subject to periodic updates. The elements comprised in every report are as follows:

Industry Trends	Investors	Investment Rounds	R&D Trends
Venture capital ecosystem	Private Companies	Public Companies	M&A Landscape

Explore the entire scope of analytical reports at:

www.invest-solutions.tech/reports

Longevity Investment Digest

This landmark report outlines major investment rounds, relevant R&D trends, illustrates the traction of the Longevity Industry and delivers the comparison of market players. The information in the digest covers key industry trends, 23,000 Longevity companies, 50 leading investors, and more than 600 Longevity-focused publicly traded corporations.



INVESTTECH ADVANCED SOLUTIONS: PROPRIETARY ANALYTICS

Some of the more in-depth research is only available to our clients and strategic partners as proprietary analytics. As a rule, this analytics covers the topics that are of great interest to parties concerned and delivers the extensive scope of information on particular topics.

Proprietary Analytics delivers practical answers to certain questions in order to optimize the short and long-term strategies of companies related to the industry. Proprietary reports are supported by our rapidly developing data mining engine and analytics dashboards.

Ready-to-use proprietary reports	Custom Consulting Projects	Investment Prospects	M&A Prospects
Strategic Growth Ideas	Trends Profiling	Niche Industries Overviews	Case Studies

Access our website to learn more:

www.invest-solutions.tech

Proprietary Version of Longevity Derivatives and Financial Instruments Report

This report thoughtfully explores Longevity-derived financial instruments. The study includes derivatives explanation and analysis, including the comparison to other financial instruments. The proprietary version delivers an exhaustive overview of the biomarkers-based Longevity assessment solutions.



LONGEVITY FINANCE BIG DATA ANALYTICS DASHBOARD

Developed by InvestTech Advanced Solutions based on the data provided the Aging Analytics Agency, the Longevity Finance Analytics Dashboard is a licensed white-label solution designed for financial corporations (e.g. banks, pension funds, asset management firms and insurance companies) looking to adjust their business models to Longevity-focused banking and **tap into the multi-trillion dollar market of 1 billion people** in retirement.

The project aims to provide **tangible, data-driven, fast, comprehensive and inexpensive SWOT analysis, customised practical recommendations, benchmarking, forecasting and guidance** needed to transform financial institutions for Longevity-related challenges in the future.



The analytics provided herein can help deliver value to financial institutions and adjust their business models to Longevity-related challenges in the future

Financial Institutions (e.g. Banks, Pension Funds, Asset Management Firms and Insurance Companies)

- SWOT analysis of the most promising entities and technologies
- Real-time monitoring of the developments in the Longevity financial industry
- Benchmarking of the most market-ready Longevity finance technologies
- Due diligence of emerging technologies' strengths
- Opportunities forecasting

LONGEVITY INVESTMENT BIG DATA ANALYTICS DASHBOARD

The Longevity Investment Analytics Dashboard developed by InvestTech Advanced Solutions based on the data provided the Aging Analytics Agency which is active in the industry since 2013 aims to produce **knowledge-based validated investment insights** covering four major Longevity branches: financial Longevity industry, Longevity R&D, Longevity medicine and Longevity technology.

The project generates **quantifiable and advanced data-driven investment recommendations** to conduct **an effective and inexpensive SWOT analysis and due diligence** for Longevity companies and investors, and **real-time financial analytics and consulting** for private and publicly traded companies across 20 Longevity sectors.



The analytics can deliver funding targets to investors, funding to companies and detailed SWOT analysis

Investors

- Comprehensive market analysis
- Due diligence and SWOT analysis of investment targets
- Analysis of the strategies of leading industry investors

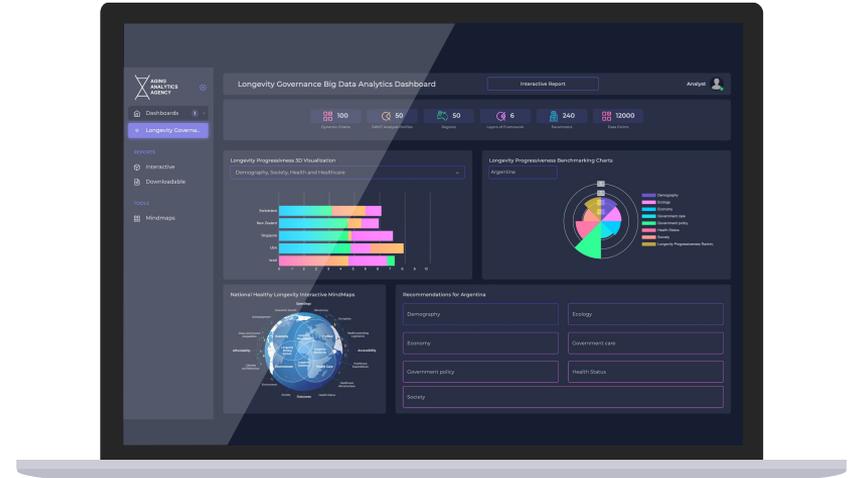
Companies

- SWOT analysis of competitors
- Automated business development recommendations
- AI-based matching with investors

LONGEVITY GOVERNANCE BIG DATA ANALYTICS DASHBOARD

The Longevity Governance Dashboard brings access to continuous monitoring of the specific governmental policy activities directly impacting both National Healthy Longevity and Longevity Industrialization, and to consistently track and analyze data points related to government-led Longevity Development initiatives.

Its aim is to deliver strategic decision makers across the private sector, global investment community, financial industry, and governance access to Big Data analytics and visualization, market intelligence, competitive analysis, technology and company benchmarking, SWOT analysis, practical recommendations and other strategic toolset capable of handling the unprecedented complexity and multidimensionality of the full-scope Global Longevity public and private sector ecosystem.



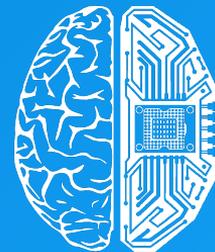
The analytics provided herein identify factors with the greatest effect on the gap between life expectancy and Health-Adjusted Life Expectancy

Government Agencies, Healthcare, Economy & Industrial Development Ministries, & International Policy Organizations

- Features region-specific recommendation packs
- Provides tangible and practical recommendations tuned to the specifics of individual countries
- Precision Health



**AGING
ANALYTICS
AGENCY**



**InvestTech
Advanced
Solutions**

info@aginganalytics.com

www.aginganalytics.com

info@invest-solutions.tech

www.invest-solutions.tech

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