

**INVESTMENT
DIGEST**
Teaser

LONGEVITY INDUSTRY 2021

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Longevity Investment Digest at a Glance

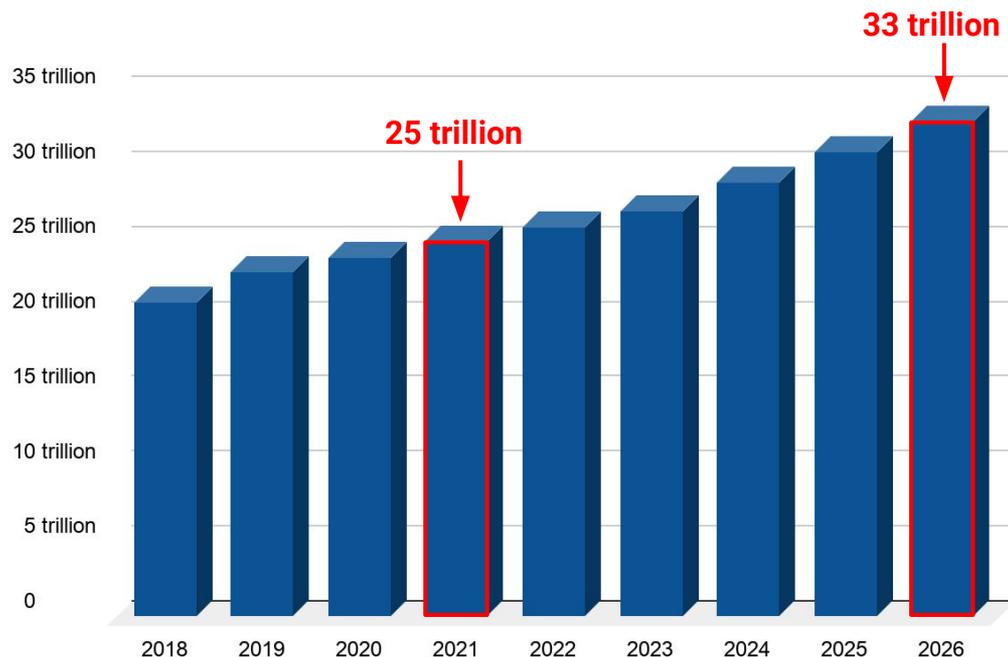
This Investment Digest is summarizing key observations in the private equity and venture capital ecosystem of the rapidly evolving and exponentially growing Longevity industry. Here we have assembled information about key industry trends, more than 20000 longevity companies, 50 leading investors in this sector, and more than 300 longevity-focused publicly traded corporations, outlining major investment rounds and relevant R&D trends illustrating the industry traction and readiness of institutional investors (including top-tier financial institutions) to potentially acquire most successful AgeTech, Longevity Fintech, and Longevity Biomedicine startups.

The covid pandemic has facilitated not only biotech capital market development in general, but the longevity biomedicine sector in particular, resulting in more than 30% of growth compared to the previous year. Longevity market growth outperforms the general trend of the biotech and financial services market, yet remains more volatile. 19 longevity companies made IPO in 2020, whereas more than a thousand received private equity funding. The growth rate of the market is comparable to the IT sector. Longevity is now regularly embraced 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.

The industry is poised to witness a quantum leap in the near future, particularly because of the impact of Artificial Intelligence in biomedicine R&D and in light of the upcoming paradigm shift from treatment to prevention.

World Longevity Economy Size

World Longevity Economy Size Projections, US\$



Longevity Biomedicine is the main focus of longevity venture investments currently, yet it is only a tiny fraction of the longevity market.

Aging should be considered not only as one of the most acute problems of our time but also as 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 succeed at riding the wave or drowning under it will depend not only on their willingness to deploy new business models adapted to the aging population and the emerging industries of AgeTech, WealthTech, and Longevity Finance but also on the quality of longevity analytics that they use to formulate such business models.

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

Longevity Industry: Multi Trillion Dollar Opportunity

**Estimated global market size in 2021:
\$25 trillion**

20 000+ companies

350+ corporations

8000+ investors

**1000+ financial
institutions**

100+ governments

114 subsectors

The longevity market is not limited only to the anti-aging applications of life sciences, but also includes advancing sectors of the financial industry, as well as government projects (national longevity development plans). Overall market size thus can exceed 25 trillion USD. Most developed longevity startups are quickly becoming matured companies, large institutional investors are being attracted into the industry, full-fledged longevity infrastructure is emerging.

There are at least 350 publicly traded corporations that can be considered as related to the Longevity industry.

Longevity Biomedicine, FinTech, and AgeTech industries include 20000+ companies, 8000+ investors, 14 sectors, and 114 subsectors.

The longevity Financial Industry includes 1000+ corporations, 15 sectors, and 50 subsectors.

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

The numbers presented in the scheme are approximate since there is no generally accepted methodology for their estimation.

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](#)



“The global spending power of those aged 60 and over will reach \$15 trillion annually by 2020”

~ Bank of America Merrill Lynch

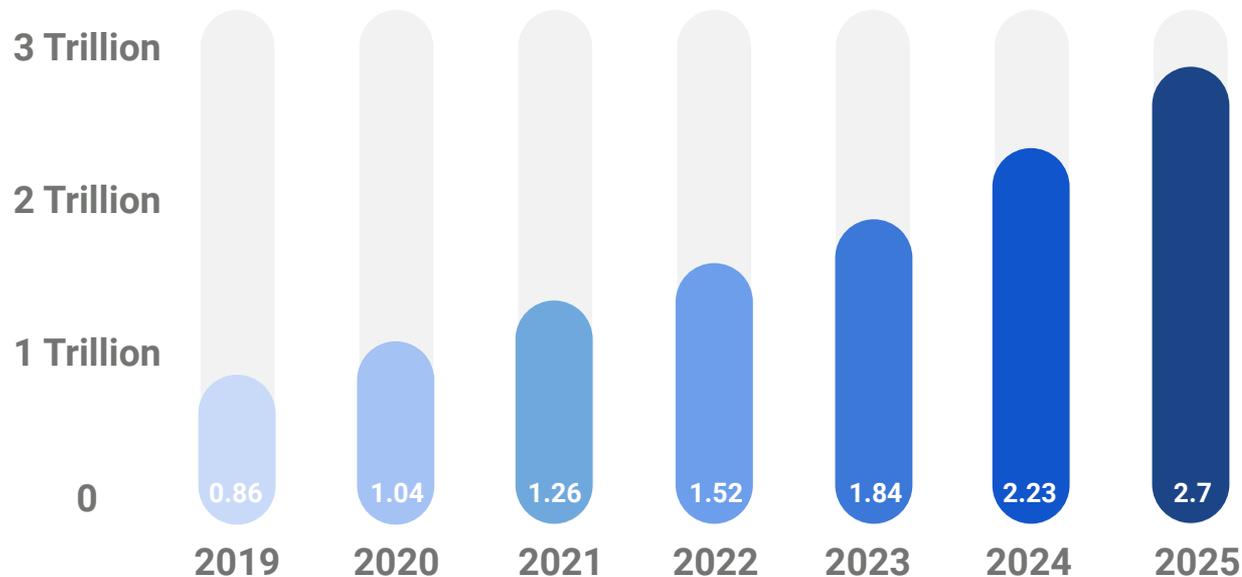


The “7th Continent” of 1 Billion People in Retirement

There are more than 1 billion people over 60 years old in the world and thus could be considered the citizens of the ‘7th Continent’. They represent not only a significant share of the global purchasing power, but also hold the largest amount of financial assets compared to other age groups.



AgeTech Industry Market Capitalisation



World AgeTech Industry Size Projections, current US \$

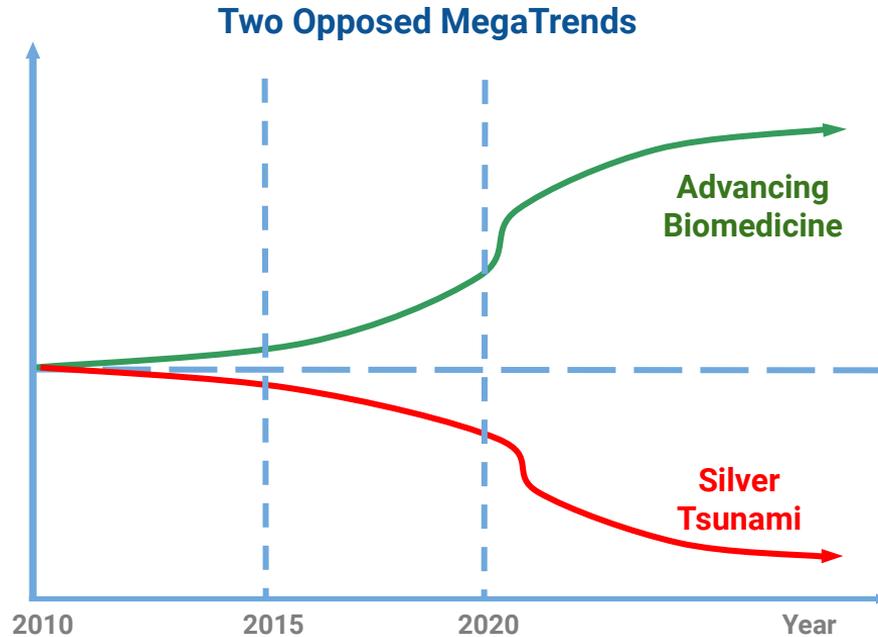
AgeTech Sector:

- Elderly Care
- FinTech
- m-Health
- Senior Living Communities
- Social and Communication Caregiving
- Independence
- Social Protection
- Cognitive Care

The global longevity economy reached \$17 trillion in 2019 and is showing stable growth to achieve \$27 trillion in 2026. According to the most conservative estimates, it takes 20% of the global GDP. While the global Longevity Economy is projected to reach \$27 trillion in 2026, the Age-Tech segment alone will reach \$2.7 trillion by 2025.

This would imply 21% annual growth in the global Age-Tech market. This growth is driven by the general development of the elderly care sector enhanced by advancing IT, FinTech, and other digital technologies.

Longevity and Silver Tsunami - Collision of Two Opposed MegaTrends



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

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

Top-5 Longevity Investment Deals in 2020

In 2020, total investments into Longevity companies globally had crossed the \$156 billion mark, of which \$60B were raised during the last year.

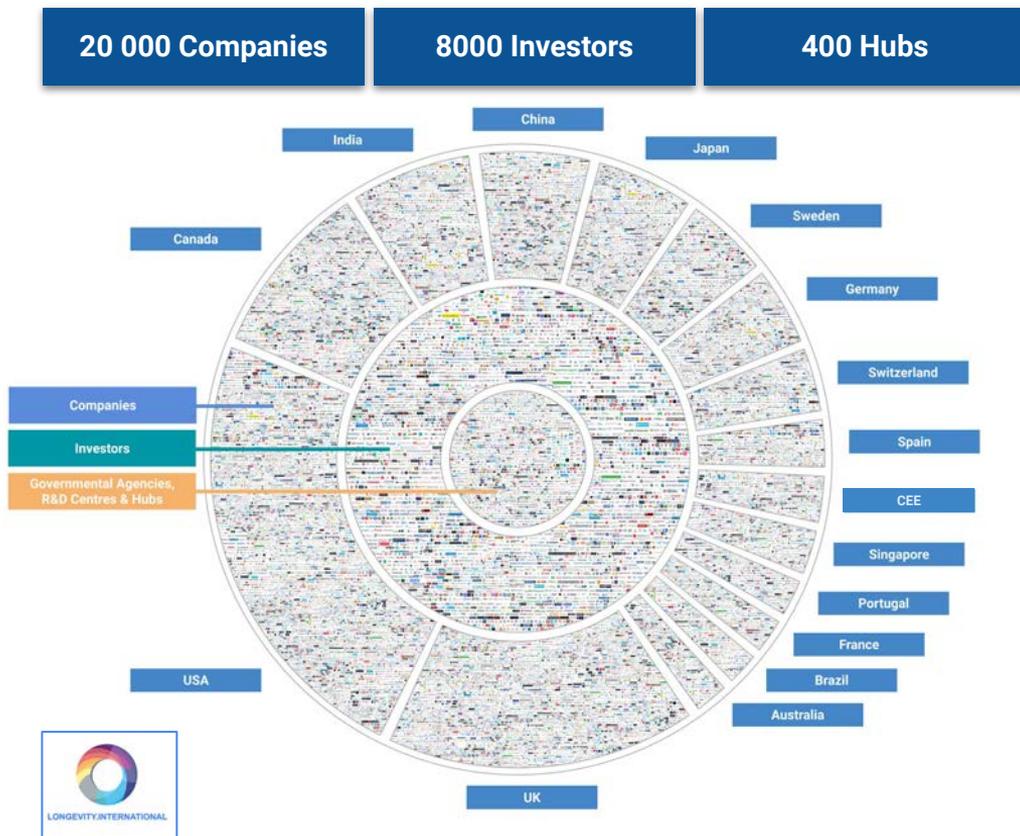
Some of the major deals included:

- Sana Biotechnology – \$700M in initial financing to advance the company’s discovery and development programs that create and deliver engineered cells as a treatment for different disease types (Series A round);
- Cue – \$481M (grant from US government);
- Freenome – \$270M to advance novel multiomics blood resting platform for early cancer detection (Series C Round);
- Recursion Pharmaceuticals – \$239M (Series D Round led by Bayer);
- ElevateBio – \$170M which will be directed toward manufacturing cell and gene therapies, enabling new technology platforms, and pursuing therapeutics (Series B Round).

Top-5 Investment Deals in 2020



Global Longevity Ecosystem 2021



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

* – Central and Eastern Europe

Global Longevity Ecosystem - 20 000 Companies by Sectors



Geroscience



Longevity WealthTech



Space Medicine



Deep Diagnostics



Longevity Biomarkers



FinTech



Longevity FemTech



Regenerative Medicine



AI for Longevity



InsurTech



Advanced Cosmetics



Longevity Gene Therapy



NeuroTech



AgeTech



Clinical Data Management



P4 Medicine



Longevity Landscape Framework

Geroscience R&D

Rejuvenation
Biotechnology

Basic Research on
Biology of Ageing

Geroprotectors

Regenerative
Medicine

Nutraceuticals

Gene Therapy

P4 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 WealthTech

Financial Planning

Asset Management

Micro-Investments

Digital Brokers

AI-Driven Assistants

Long-Term Securities

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 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 and 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

Most Progressive Pension-Tech Companies

grandhood™

Aging Analytics Agency made an analysis of the most progressive pension-tech companies, where it is clear that the majority of them are based in the UK and EU.



Top-150 Financial Institutions Advancing Financial Industry Longevity / AgeTech / WealthTech

40 Pension Funds



35 Banks



30 Insurance Companies



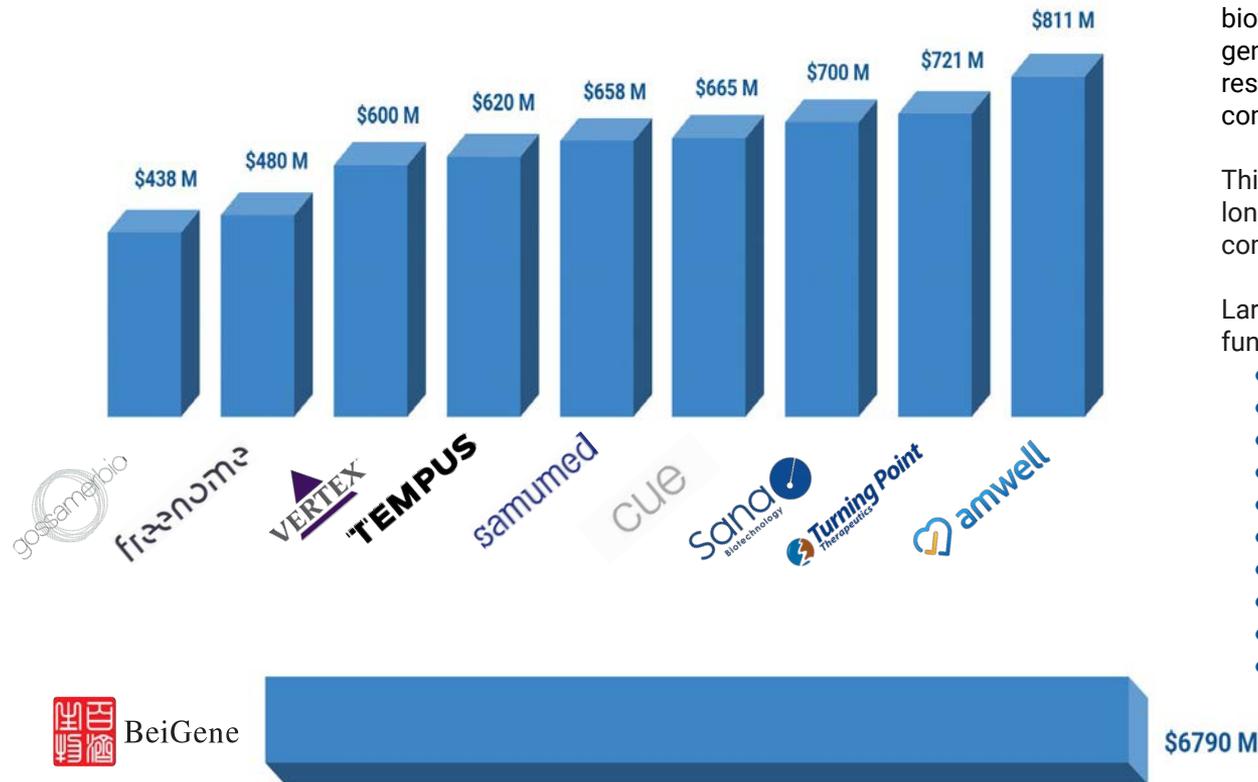
15 Reinsurance Companies



30 Asset Management Firms



Top-10 Longevity Companies by Total Funding Amount in 2020



Covid pandemic has facilitated not only biotech capital market development in general, but longevity sector in particular, resulting in more than 30% of growth compared to the previous year.

This stimulated the investment in the longevity industry. Funding of 8 longevity companies in 2020 exceeded \$500M.

Largest longevity-related companies by funding amount in 2020 are:

- BeiGene;
- Amwell;
- Turning Point Therapeutics;
- Sana Biotechnology;
- Cue;
- Samumed;
- Tempus;
- Vertex Pharmaceuticals;
- Freenome;
- Gossamer Bio.

Top-20 Publicly Traded Longevity Companies

NASDAQ

US-Based

Turning Point Therapeutics (TPTX)
Market Cap: \$5 852M



Vertex Pharmaceuticals (VRTX)
Market Cap: \$55 693M



Fate Therapeutics (FATE)
Market Cap: \$9 727M



SAGE Therapeutics (SAGE)
Market Cap: \$4 888M



Arena Pharmaceuticals (ARNA)
Market Cap: \$4 643M



Outset Medical (OM)
Market Cap: \$2 162M



Gossamer Bio (GOSS)
Market Cap: \$852M



Kronos Bio (KRON)
Market Cap: \$1 566M



One Medical (ONEM)
Market Cap: \$2 162M



China-Based

Tandem Diabetes Care (TNDM)
Market Cap: \$5 903M



BeiGene (BGNE)
Market Cap: \$29 885M



UK-Based

Abcam (ABCM)
Market Cap: \$5 400M



Orchard Therapeutics (ORTX)
Market Cap: \$954M



Freeline Therapeutics (FRLN)
Market Cap: \$539M



Autolus (AUTL)
Market Cap: \$367M



Euronext Brussel (BR)

Switzerland-Based



Biocartis (BCART)
Market Cap: \$315M

Copenhagen (CPH)

Sweden-Based



Getinge (GETI-B)
Market Cap: \$7 320M

Hong Kong (HKD)

Hong Kong-Based



Regent Pacific Group
Market Cap: \$72M

Acquired



Deep Longevity
Acquired by \$4M

NYSE

US-Based

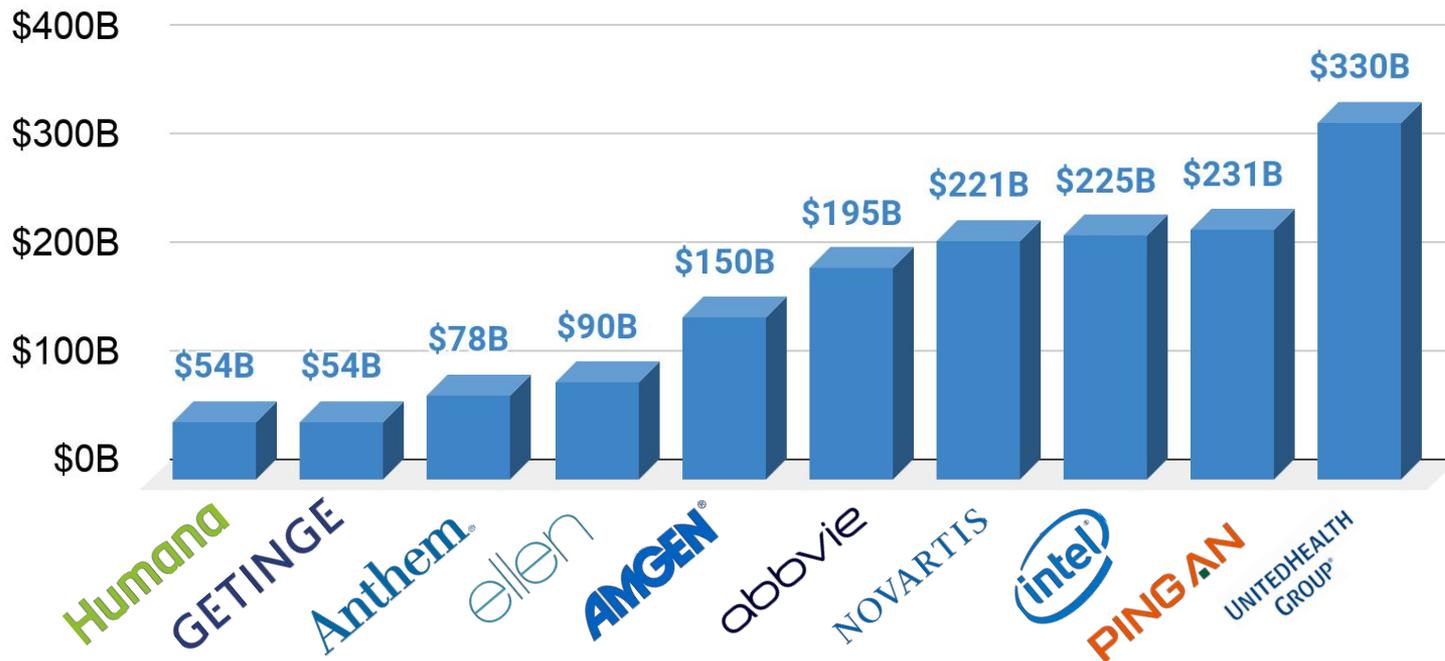


Amwell (AMWL)
Market Cap: \$6 884M



TransEnterix (TRXC)
Market Cap: \$1 135M

Top-10 Public Corporations Involved in the Longevity Industry by Market Capitalization in 2020 (31st December 2020)



Longevity Market Capitalization

Our longevity stock index includes more than 300 longevity-related corporations operating in biotech and IT sectors.

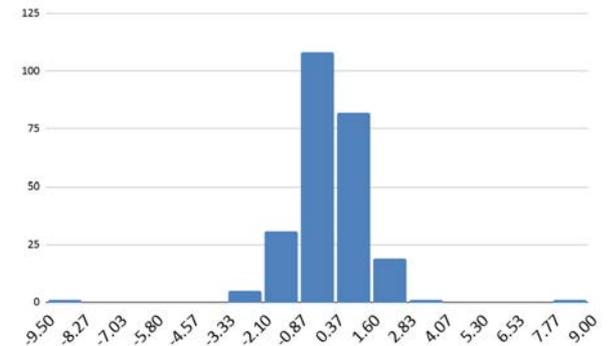
Longevity corporations market capitalization growth strongly outperforms the market as a whole (represented as S&P500 index), as well as general biotech industry indices (IBB and NBI), although longevity stock market segment is more volatile compared to them (as measured by standard deviation).

Interestingly, distribution of the returns of the longevity stock market segment is right-skewed, what differentiates it from the vast majority of stock indices and segments. It means that rare extraordinary positive events play a large role in the dynamics of the market capitalization of the segment, which can be described as the presence of “anti-black swans”. Many other indices are, contrary, characterized by negative skewness, what means that extraordinary negative events are more likely.

Distribution of longevity stock returns is definitely not normal (curstosis exceeds 4.7).

Index	Correlation with longevity market	Average daily return in 2020	Average daily volatility in 2020	Skewness	Curtosis
Longevity Index	-	0.12	1.29	-0.44	17.86
IBB	0.97	0.12	2.13	-0.15	3.11
S&P500	0.99	0.03	2.31	-0.97	8.56
NBI	-0.14	0.12	2.16	-0.19	3.40

Longevity stock returns histogram



Longevity IPOs in 2020

Despite the crisis, all new public companies announced successful closing of the IPO. They show volatile but steady growth, although net income of all corporations remains negative. Most IPOs took place in the USA in the second half. All companies have beta smaller than 1 (although positive) which means that longevity stock prices move in accordance with general market movements, yet the degree of these movements is lower (although volatility as measured by standard deviation can be relatively high).



Name	Country	Funding Amount. M\$	Investments in 2020 (M\$)	IPO Date	Capitalization (M\$)	ROA	ROE	Profit margin	Operating margin	EV/EBITDA	Net income
Amwell	USA	1553	1036.0	17.09.2020	7036	N/A	N/A	-85.51%	-87.39%	-30.12	-197
One Medical	USA	777.1	245.0	30.01.2020	6152	-7.51%	-26.19%	-29.78%	-26.06%	-93.34	-100
Abcam	UK	492.2	156.5	21.10.2020	5372	4.42%	2.82%	4.81%	0	121.85	13
ALX Oncology	USA	327.5	266.5	16.07.2020	3092	N/A	N/A	0	-1401.71%	-84.3	-35
Outset Medical	USA	689.0	366.7	14.09.2020	2094	N/A	N/A	-273.79%	-262.55%	-17.3	-109

Longevity Investment Big Data Analytics Dashboard



Longevity Investment Big Data Analytics Dashboard

Market
Intelligence

Longevity Investment
Market Intelligence

Major Trends

Network Diagrams

Interactive MindMaps

Interactive Mindmaps



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Dashboard Parameters

DATA POINTS

814090

PERSONALITIES

16107

COMPANIES

19603

INVESTORS

9007

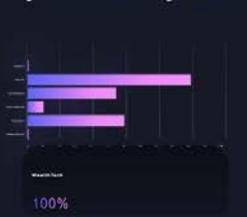
SECTORS

14

SUBSECTORS

140

Dynamic Industry Charts



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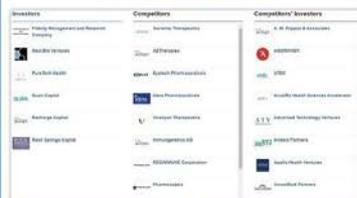
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Find Companies

Competitor Search



Company Competitors

Investor Competitors

Interactive Network Diagrams



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Ecosystem Companies

Company Investor Search

Company Competitors Search

Entrepreneur Search

Welcome There!

Longevity Industry Big Data Analytical Dashboards

Dashboard Overview

Aging Analytics Agency is building a sophisticated cloud-based engine for advanced market and business intelligence in various segments of the longevity industry. It includes data mining engine, infrastructure for expert data curation, and advanced visualization dashboards, including mindmaps, knowledge graphs, and 3-dimensional visualizations. It offers data-driven insights about the trends and the companies in the longevity industry, SWOT analysis of most promising entities and technologies, investment advisory, business and technical due-diligence.

Matching tool	Machine learning for database extrapolation	Dynamic SWOT analysis representing evolution of a company
Companies database	Machine learning and deep neural networks for companies clusterization	Interactive industry mindmaps
Investors database	Machine learning for financial indicators predictions	Real-time financial data analytics platform for AI in pharma corporations
SWOT analysis	Interactive AI-based scenario analysis and financial planning	AI in pharma financial instruments analytics

Database, AI and ML algorithms overview

Parameters	400 parameters with appropriate weights combined into 20 vectors
Data points	8 000 000 data points which are being updated permanently
Algorithms	Deep neural networks, polynomial formulas with mathematical transformations, regression models
Data aggregation	Automatized parsing, extrapolation using machine learning, feedback from companies

Who Can Benefit

- Investment institutions, funds, investment banks, family offices;
- Private and public companies in pharma/biotech space
- Research institutions, universities
- Technology vendors and contract research organizations
- Startup hubs, accelerators
- Consulting companies and agencies

Tangible Metrics to De-Risk Investments in Longevity Startups

Investment decisions practices in the longevity industry can be essentially enhanced through the application of the biomarkers of aging. Concrete and precise metrics of human aging can assist investors in differentiating between overvalued hype-driven startups without any proofs of success in fighting human aging and promising businesses which are producing tangible anti-aging results applicable for humans.

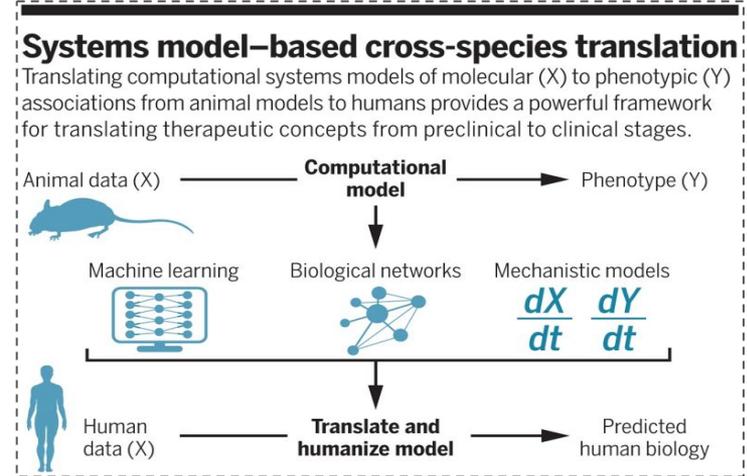
Given the enormous differences between the biology of humans and the biology of common model organisms like mice, combined with the higher degree of biological complexity as it pertains to ageing vs. single diseases, we can expect the clinical translation failure rate in the Longevity Industry to be much higher than the already-enormous failure rate in traditional BioTech.

New approaches to scientific due diligence and the validation of results for Longevity companies are needed to protect against company and industry devaluation. However, there are a number of existing approaches that can be used by investors to de-risk Longevity investments.

The use of biomarkers of aging and longevity constitute the most market-ready and validated means of proving efficacy in humans, and can serve as the basis for demonstrating human-validated results by Longevity companies and startups. A wide array of single biomarkers and panels of biomarkers of Longevity exist in market-ready form, and should be adopted into due-diligence practice by Longevity investors in order to create a more modern, sophisticated and robust method of preliminary validation of therapeutic safety and efficacy.

Besides biomarkers, a number of other modern approaches exist, capable of providing preliminary indications of human validation, which can be used to create a coordinated framework to provide investors with greater confidence in the likelihood of clinical translatability. These include:

- In silico human modeling
- In vitro tests using human cells and tissues
- Human-animal chimeras (e.g., human-mouse chimeras) for safety, toxicity and efficacy testing. This approach is already common in immuno-oncology research, and a wide array of validated approaches can be applied for testing of ageing-focused interventions.
- In vivo administration of sub-therapeutic doses using microfluidic chips (i.e., in vitro “skin-on-a-chip” testing).



Biomarkers of Longevity

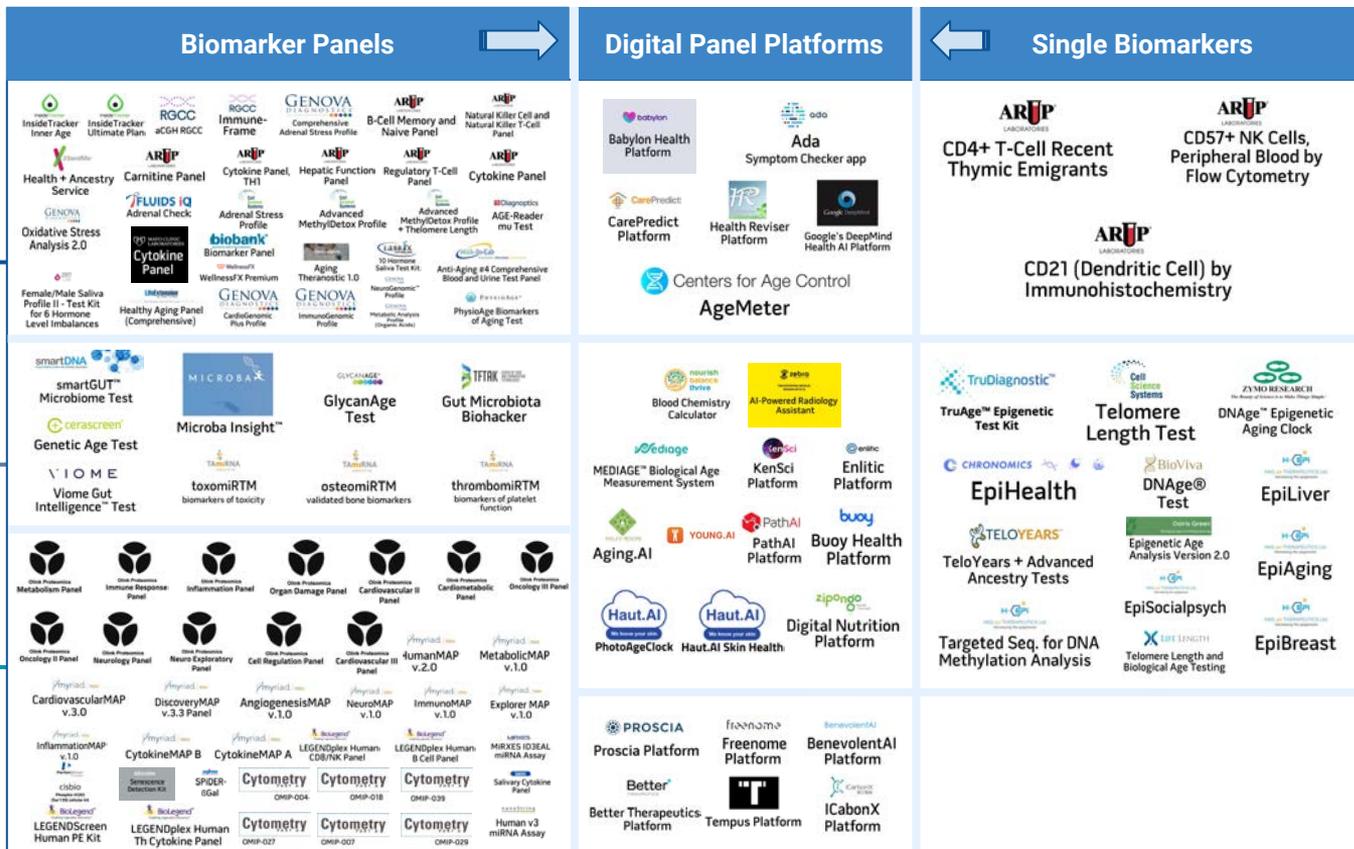
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 Research Use Only - 45
 Healthcare-Ready - 33

2nd edition.
 Current Status, 2021

Approved for Clinical Use

Healthcare-Ready
 (waiting for clinical approval)

Research Use Only



Longevity Finance Big Data Analytics Dashboard



Longevity Finance Big Data Analytics Dashboard

Market
Intelligence

Longevity Finance
Market Intelligence

SWOT Analysis

Interactive Mindmaps

Market Intelligence

Interactive Mindmaps



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Dashboard Parameters

DATA POINTS

100019

PERSONALITIES

2000

CORPORATIONS

1000

STARTUPS

5000

INDUSTRIES

15

SECTORS

50

SWOT Analysis



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Market Intelligence

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Sponsorship Opportunities

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Engine

Longevity Finance
Search Engine

Interactive Database

Dynamic Network Diagrams

Competitor Search

Interactive Database



FinTech

WealthTech

InsurTech

Interactive Network Diagrams



FinTech

WealthTech

InsurTech

Competitor & Investor Search



FinTech

WealthTech

InsurTech

Longevity Finance
Search Engine

Personalities

Corporations

Startups

Investors

Longevity Governance Big Data Analytics Dashboard



Longevity Governance Big Data Analytics Dashboard

Market Intelligence

Longevity Governance Market Intelligence

- Full Analysis
- Interactive Mindmaps
- SWOT Analysis
- Dynamic Charts

Full Big Data Analysis

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Dashboard Parameters

DATA POINTS 12000	PARAMETERS 240	REGIONS 50
LAYERS OF FRAMEWORK 6	DYNAMIC CHARTS 100	SWOT ANALYSIS PROFILES 50

SWOT Analysis

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Longevity Governance Market Intelligence

- Pre-Subscribe for Beta
- COVID-19 Dashboard
- 3D Visualization

Search Engine

Longevity Governance Search Engine

- Benchmarking Charts
- Major Trends
- Practical Recommendations
- Big Data Framework

National Healthy Longevity Interactive MindMaps

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Longevity Progressiveness 3D Visualization

Longevity Progressiveness Benchmarking Charts

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Longevity Governance Search Engine

- Health-Adjusted Life Expectancy (HALE) Gap and Life Expectancy

- Health-Adjusted Life Expectancy (HALE) Benchmarking

Artificial Intelligence in Pharma Big Data Analytics Dashboard



Deep Pharma Intelligence Big Data Analytics Dashboard

Landscape Analytics

AI in Pharma 2020
Industry Landscape

Mindmap (Sectors)

Mindmap (Sub-Sectors)

Mindmap (Regions)

AI in Pharma Industry Landscape



[View More](#)

Dashboard Parameters

COMPANIES

286

INVESTORS

733

R&D DEALS

117

FUNDING
ROUNDS

592

PARAMETERS

4192

DATA POINTS

43000+

Industry Growth Dynamics



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[Deals](#)

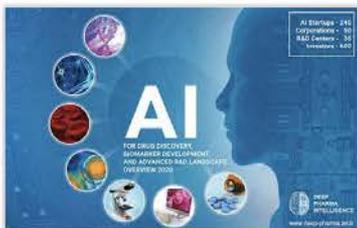
Industry Developments

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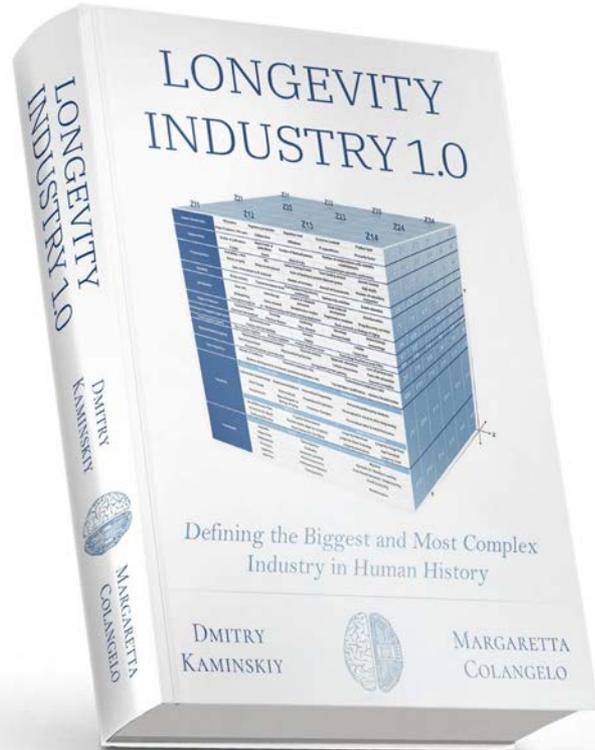
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You Are Welcome!

www.longevity-book.com



Longevity Industry 1.0

Defining the Biggest and Most
Complex Industry in Human History

PART I. Longevity Industry Mega-Complexity

PART II. Longevity Policy and Governance

PART III: The Longevity Financial Industry

Novel Longevity Derivatives and Health as New Wealth

- **The Increasing Role of Longevity in Global Finance**
- Longevity Embraced by the World's Biggest Financial Corporations: Investment Banks, Insurance Companies, Asset Management Firms
- Longevity Derivatives: New Business Models and Novel Financial Instruments Tied to the Rising Longevity Industry
- AgeTech, WealthTech, FinTech
- Why Traditional BioTech Analytics Fails Against the Longevity Industry's Extreme Complexity

PART IV. Longevity Industry (Science and Biomedicine)

Global Industrialization of Longevity



Longevity Industry 1.0
Defining the Biggest and Most
Complex Industry in Human History

Longevity Industry 2.0
DeepTech Engineering The Accelerated
Trajectory of Human Longevity
The Blueprint and Pathway from 1.0 to 2.0



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