Welcome.













15 June 2018

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UK start-up's anti-ageing therapies win support

SCIENCE EDITOR

Juvenescence, a UK start-up developing anti-ageing therapies, has raised \$50m in Series A financing, with another \$100m funding round planned for later this year and an initial public offering in 2019.

The company is chaired by Jim Mellon, a billionaire investor who has become a passionate advocate of using recent scientific advances to promote longevity.

"Our ethos is to advance the science that will add years of healthy life to every human being - and that is exactly what we are doing at record speed," said Mr Mellon, whose main investment vehicle Burnbrae is based in the Isle of

Juvenescence has raised \$13m in seed finance, followed by this \$50m Series A round involving a variety of international investors. The company's estiments. "We have sourced a portfolio of compelling therapies, some of which we will endeavour to take into the clinic in the medium term and others which we term," said Greg Bailey, chief executive. The biggest investment so far is \$8.3m

'Our ethos is to advance

the science that will add years of healthy life to every human being'

ligence group that applies "deep learning" technology to drug discovery and ageing research. Yesterday Insilico itself ounced a funding round of \$5m to \$10m led by China's WuXi AppTec.

Juvenescence also announced yesterday a \$5m investment in AgeX of California, which is using stem cell technology to regenerate human tissue that is

Pittsburgh, which aims to use the patient's lymph nodes as a bioreactor to grow a replacement organ if the original is destroyed by disease or fails in old age. hope to commercialise in the nearer It is focusing first on liver regeneration for people with end-stage hepatic disease, and future targets include the thymus, pancreas and kidney.

Juvenescence has also signed commercialisation deals with the Buck Institute for Research on Aging in California and is in negotiation with other biomedical organisations. "We aim to have about 20 shots on this goal - longevity science - and if we get two or three of them right, there will be a very good return to shareholders," said Mr Mellon.

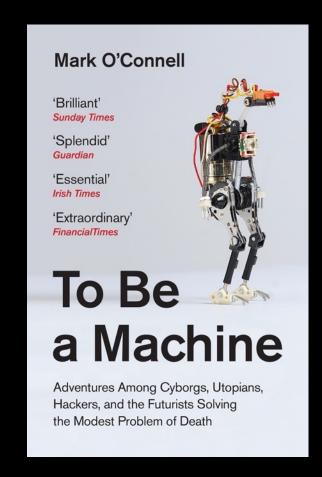
He made a fortune in the 1990s from Russian privatisation, international mining and German property, among other fields. Mr Mellon became interested in biotech investing a few years ago and recently became enthusiastic about life-extending research.

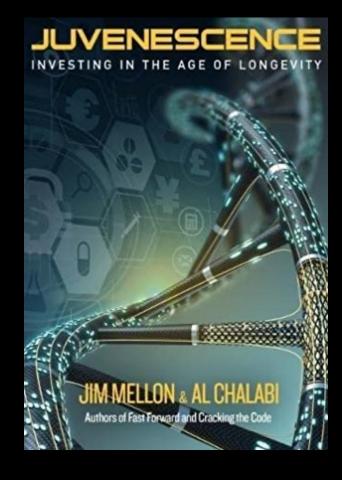
His book, Juvenescence, published last

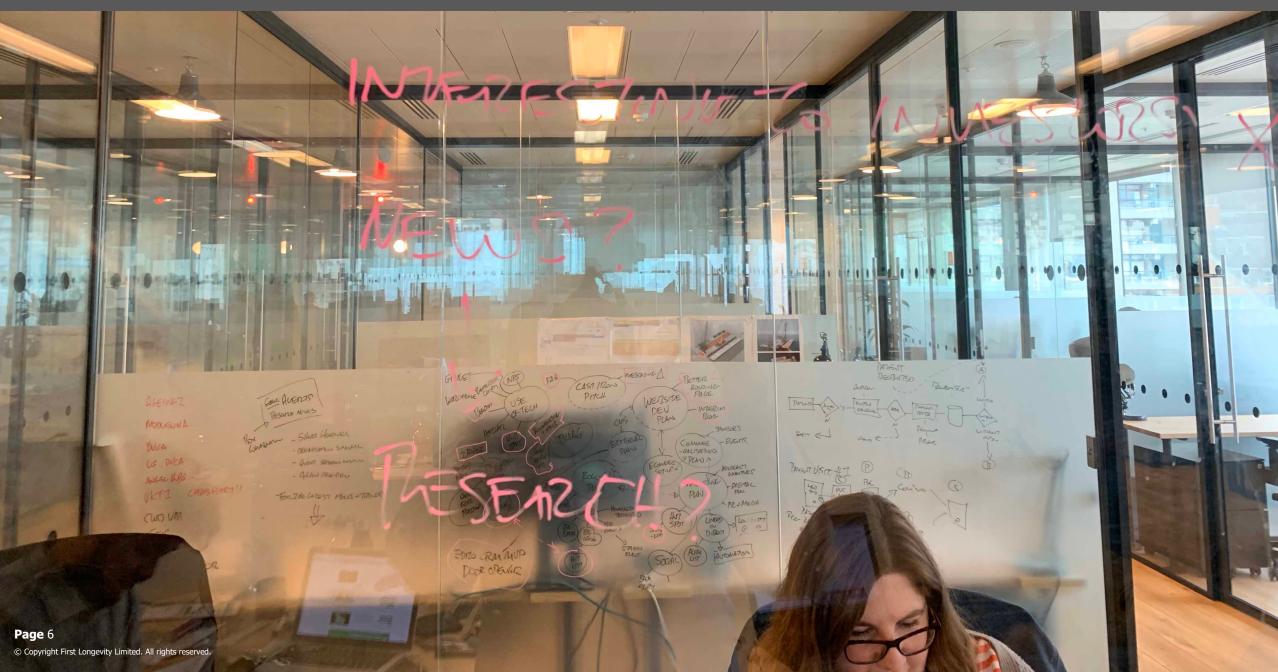


Longevity market inflection: 'if' or 'when'



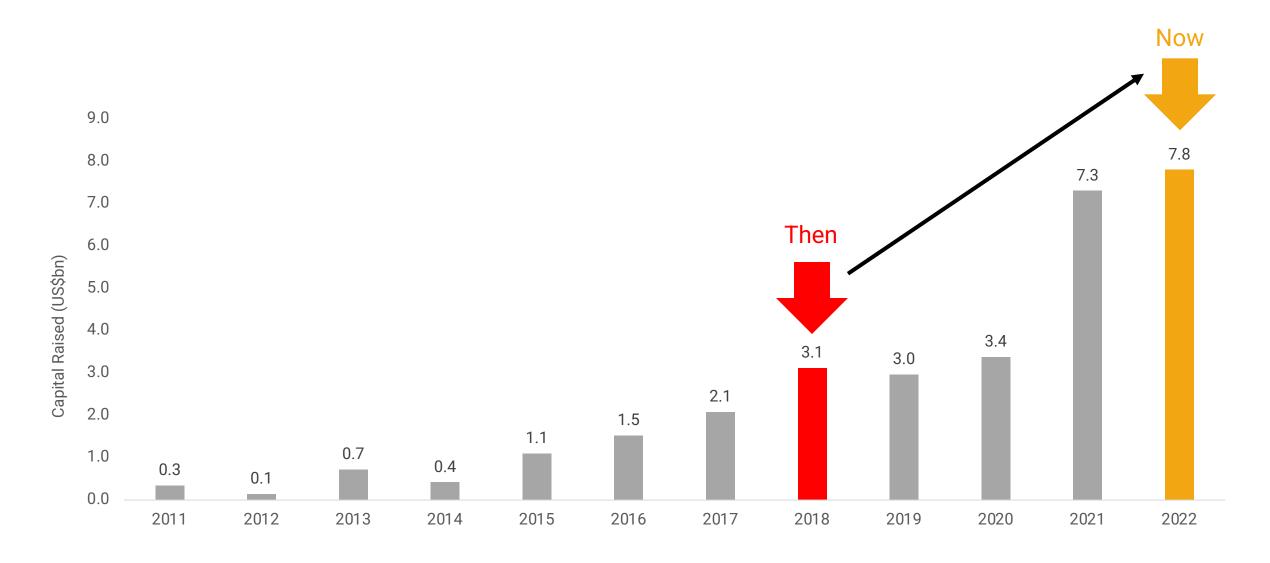








	B2C			B2B						
Persona	GenZ <24yrs	Millennial <40yrs	Gen X <56yrs	Boomers <75yrs	Professional Investor (Longevity)	Professional Investor	Biotech Entrepreneur	MedTech / Agetech Entrepreneur	Researcher / Academic	New markets executive
Character	Olivia	Ashley	Mike	Sally	Sergey	Janet	Aanya	Lucas	Doug	Anne
	really all about. She's more driven by body	Ashley likes his sport and tries to keep on top of his weight - mixing a busy career with time in the gym and with friends socialising. He's considering ways to age well but it's not his biggest priority right now, anything easy and proven gets his attention.	Mike's knees ache and he's feeling his years; but still a weekend warrior, Mike has a Whoop band and a plan! Still working and always busy, he's starting to think about retirement and the implications of both his health and finances.	Sally has had a few health scares but she's doing well and quite fancies outdoor swimmign as yoga's a bit dull. She lovers her grandchildren and wants to avoid hip replacements and dementia and has spare income to invest in health products.		Janet gets pitched deals all the time but is only really interested in following deals that have have breakthrough status into large market opportunities. She's heard of longevity but can't see the difference to regular healthcare.	Aanya has completed her PhD at Harvard and has funded her new start-up with grant money and an early investment from angels. Her biotech business addresses a major disease of aging and she's not sure if she should pitch it as longevity or biotech.	Lucas has a degree in engineering and has been through an accelerator programme for his startup which has made him a bit over-confident. The company has angel funding and is looking for the next funding round to finish trials ahead of launch.	Douglas is a professor at a midwest university and specialises in small molecule biology. He's an avid reader of the major journals but is also interested in learning more about longevity and how his work dovetails into the new longevity field.	Anne has worked her way up the ladder with various large enterprises. Having worked both in big pharma and food conglomerates she's now in charge of new product development for future revenue pipelines.
Knowledge about longevity?	Low	Medium	Medium	High	High	Medium	Medium	Medium	High	Low



Page 9 Figure: Longevity companies investment activity analysis by Longevity. Technology, based on Pitchbook data funding data as of 16/09/2022.

Longevity market inflection: 'now' not 'if' or 'when'

Nobody talks about 'snake oil' anymore; now the questions simply distil down to:

How quickly will the science be validated?

About us

- How soon will therapies go mainstream?
- How will therapies go mainstream?

Holy grail of anti-ageing comes step closer

Jeff Bezos is among the tech billionaires backing Altos Labs, a new \$3 billion project that has poached leading scientists and Nobel laureates..



The Guardian

Morgan Levine: 'Only 10-30% of our lifespan is estimated to be due to genetics'

This June she will join Altos Labs, a new \$3bn (£2.2bn) anti-ageing biotech startup whose funders are said to include Jeff Bezos



F Futurism

Billionaire Launches Startup to Reprogram Human Gene Expression

Billionaire Coinbase founder Brian Armstrong has launched a new "epigenetic ... called NewLimit, with the goal of greatly extending the human lifespan.



B Bloomberg.com

Watch The \$7.6 Trillion Quest for Longer Life

The new field of longevity science aims to slow aging and make late-life more livable. But will the science ever work?



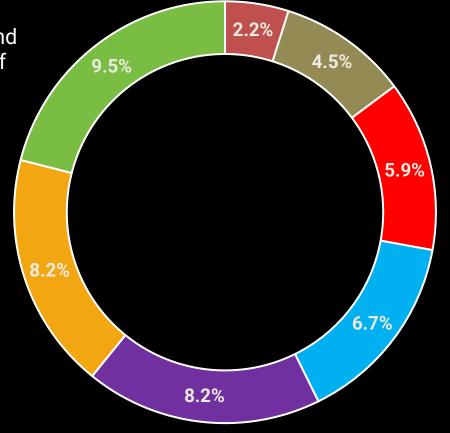


Aging diseases cost a lot!

At some point, internal programming and wear and tear may result in a disease of aging.

Total of annual US-expenditure >>

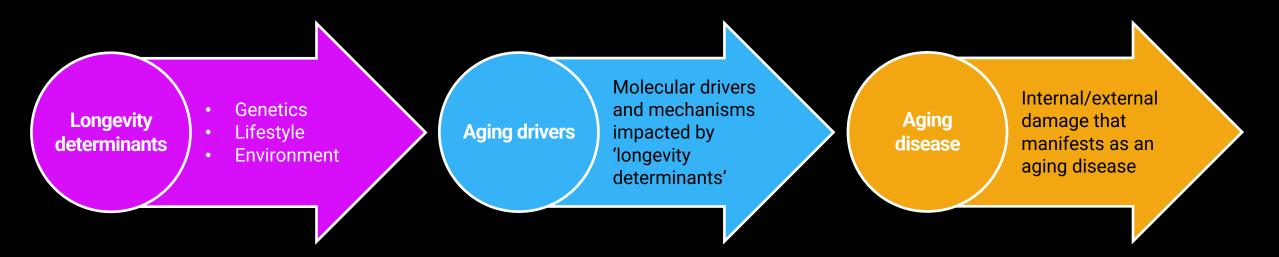
USA = \$3073bn annually

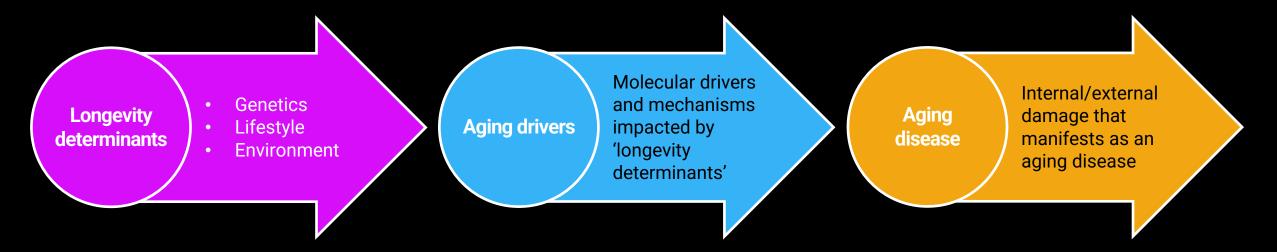


- Skin
- Digestive system
- Endocrine and metabolic diseases and immunity disorders
- Nervous system
- Musculoskeletal system
- Respiratory system
- Circulatory system

Defining longevity: 3 Targets

Domains





Aging pathways, mechanisms and hallmarks								
Epigenetics	Mitochondrial dysfunction	Immuno-modulation	IGF-1	Nf-Kb	Nrf3			
DNA repair	Progeronic chronokines	Reproduction	Insulin	IL-1B	PAI			
Telomere regulation	Oxidative stress	Glycation	mTOR	P53	Wnt			
Proteostasis	Stem cell exhaustion	Defective autophagy	FOXO	Ang-II	SIRTs			
Nutrient sensing	Cellular senescence	Androgenic signalling	AMPK	AKT	NAD			
Macromolecular damage	Dysregulated microbiome							

Defining longevity: aging drivers



Defining longevity: aging drivers





Aging drivers

Longevity thinking:

Target aging drivers to

Target aging drivers to mitigate multiple diseases at same time.

Many of the aging drivers that are implicated as "aging pathways" in preclinical studies are also implicated in the age-related diseases.

Aging is the common and the major risk factor for these chronic diseases

By targeting aging drivers to slow the progression of aging, we will delay the onset of multiple age-related diseases (and early death) collectively, rather than one at a time.



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Prevention

Every company in the longevity industry is based around these three targets and aim to modulate the trajectory by prevention, diagnostic, renewal, or treatment.

Longevity determinants

- Genetics
- Lifestyle
- Environment

Aging drivers

Molecular drivers and mechanisms impacted by 'longevity determinants'

Aging disease

Internal/external damage that manifests as an aging disease

Treatment

Diagnostic

reprogramming

Example applied to CVD

diet, longevity

supplements

Prevention	Diagnostics	Renewal	Treatment
Prevent damage that accelerates aging and modify longevity determinants and aging drivers.	Early identification of health status and accumulation of aging damage. Diagnostics span across longevity determinants, aging drivers and at the point of aging disease.	Treatment of damage that has occurred. This means direct treatment of an aging disease.	Reversal of damage that has occurred. This includes either accumulated damage before disease has arisen, damage arising from aging drivers, or that which occurs at the point of disease.
Prescription medications	ECG, EGG	Pacemaker, lipid-lowering agents	Angioplasty/stents, bypass surgery
Exercise, Mediterranean	Epigenetic clock to	Treatment of atherosclerosis-related	Heart repair by cardiac

risk (by removal of arterial

plaque)

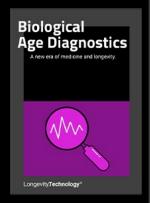
predict CVH (BASE-II)

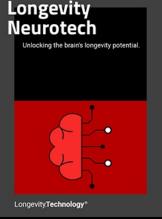
Current approach

Longevity approach

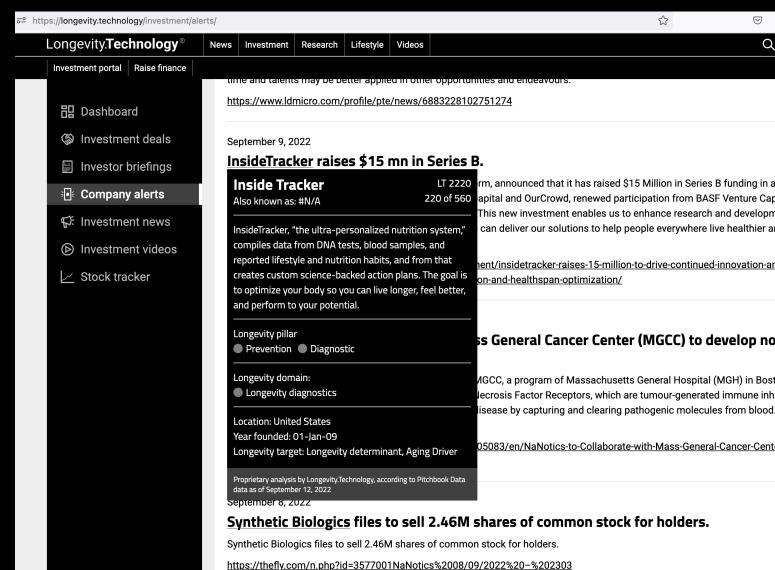
Defining longevity: Domains

These are popular market clusters that are frequently used to view the different segments of the longevity industry.









Defining longevity: Domains



Senotherapeutics



Longevity supplements



Young blood

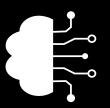


Domains

Longevity diagnostics



Aging in place



Neurotech



Longevity immunity



Discovery platforms



Rejuvenation



Regeneration



Reprogramming



Metabolic rejuvenation



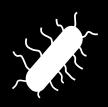
Companion longevity



Advanced aesthetics



Repurposed drugs



Microbiome



Longevity genetics



Longevity platforms



Longevity lifestyle



Longevity clinics



Longevity drugs



Functional food



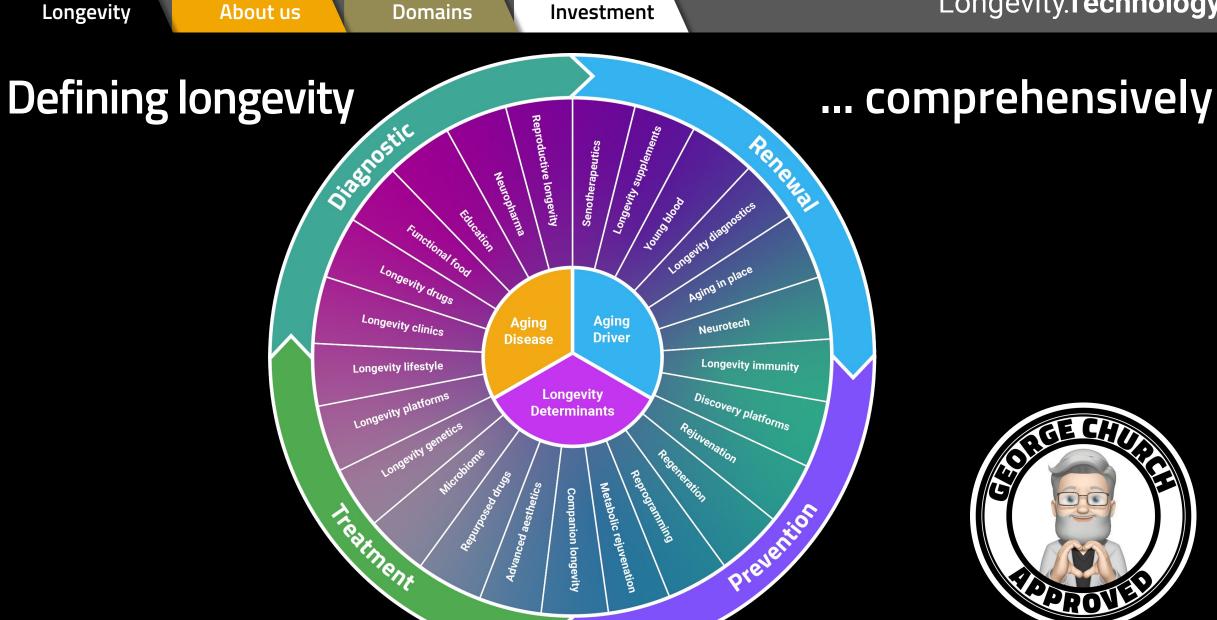
Education



Neuropharma

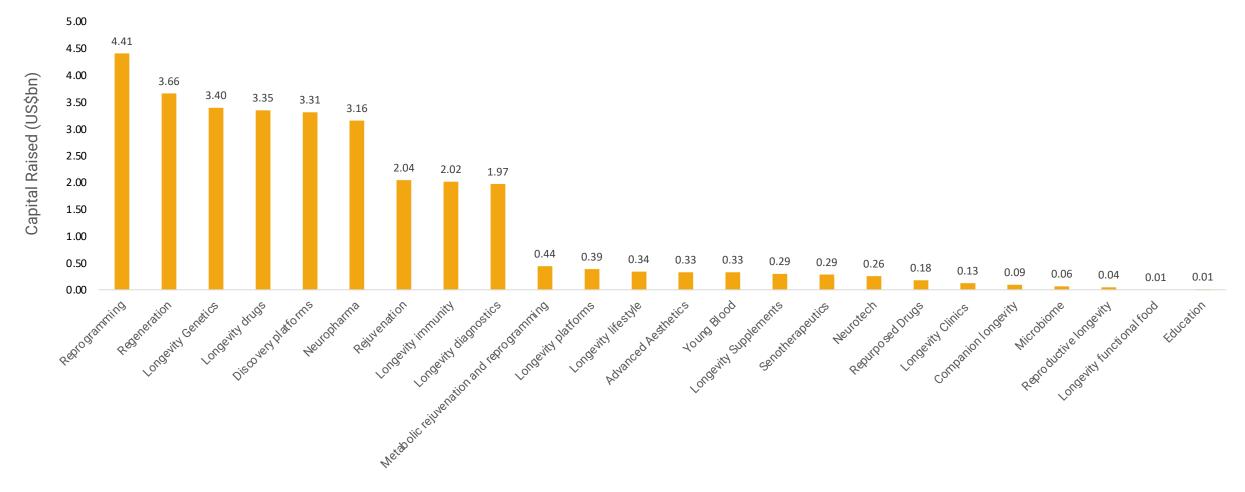


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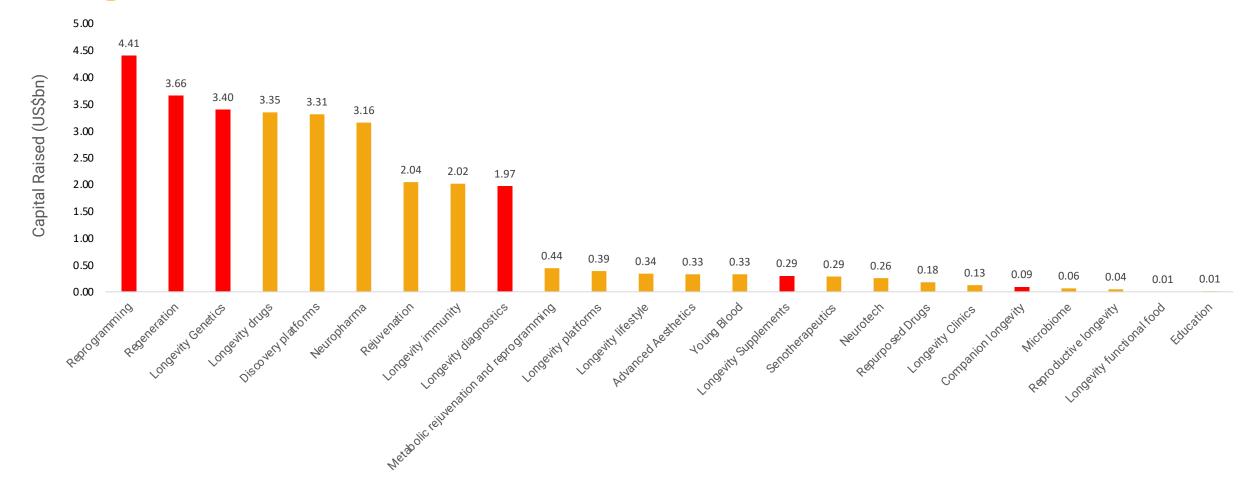


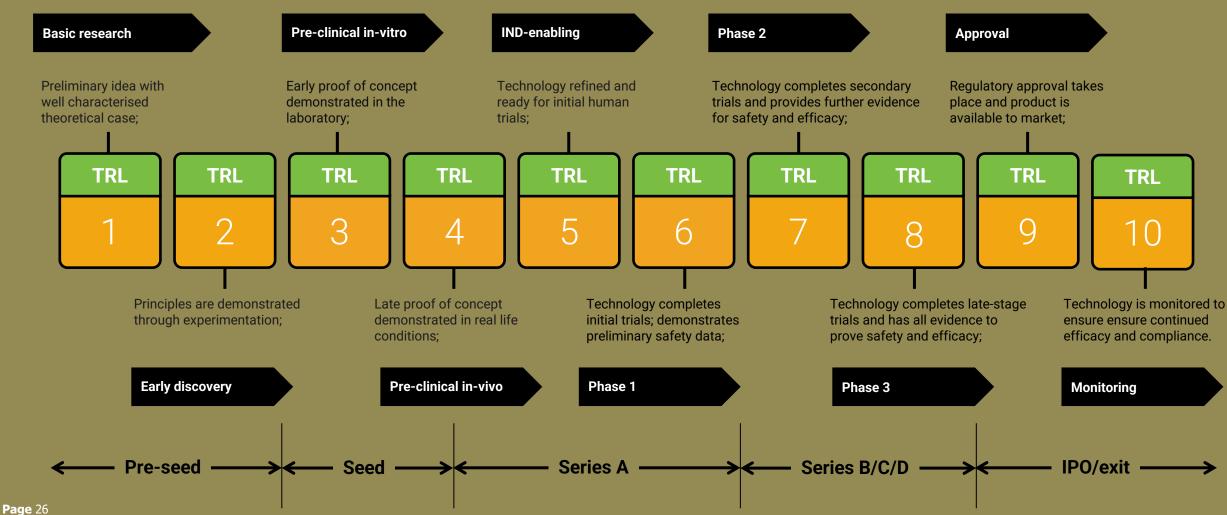


Longevity investment by domain: the last 5 years



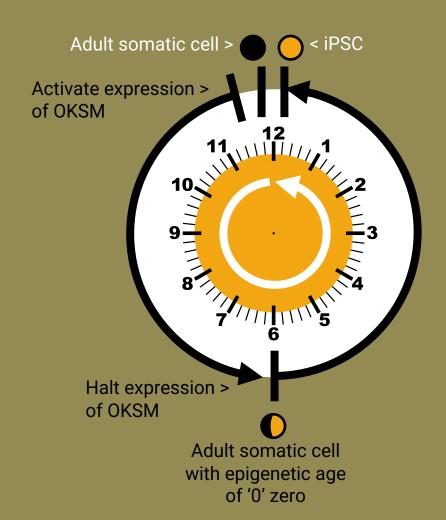






#1 Reprogramming





- Complete cellular reprogramming: IPSCs can differentiate into many different cell types and being derived from the patient's cells reduces any risk of rejection
- Efficiency needs to be increased dramatically whilst avoiding the induction of cancer
- Partial reprogramming: companies are looking to reverse the age of a cell from old to young without losing the cells identity.
- This would have the potential to target many age-related diseases.

#1 Reprogramming: \$4.41bn invested last 5 years

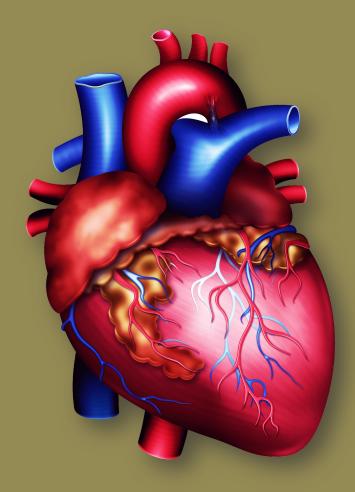
Domains



	ALTOS	bit.bio	MOGRIFY Transforming Cell Therapy	VITA Therapeutics	Retro
Raised to date	\$3.27bn	\$250mn	\$39.72mn	\$34.70mn	\$180mn
Most recent raise	£3bn	\$187.5mn	\$20mn	\$32mn	\$180mn
HQ	California	California	Cambridge	Cambridge	Maryland
Note	A biotechnology company focused on cellular rejuvenation programming to restore cell health and resilience, with the goal of reversing disease.	Developing cellular drivers of aging therapies to increase healthy human lifespan by 10 years, focusing on cellular reprogramming, autophagy and plasma-inspired therapeutics.	Developer of a cell coding technology designed for a new generation of cell therapies by democratizing access to consistent and functional human cells.	Transforming the lives of patients with degenerative diseases through a novel class of in vivo reprogramming therapies.	A cell engineering company harnessing the power of genetics to replace defective cells.
TRL /clinical stage	3: Pre-clinical in-vitro	3: Pre-clinical in-vitro	4: Pre-clinical in-vivo	4: Pre-clinical in-vivo	4: Pre-clinical in-vivo

Investment

#2 Regeneration



- Over time, our organs, tissues and cells degenerate and are destroyed
- Regenerative medicine could completely revolutionise the medical industry and how we treat disease
- Having the ability to regenerate opens the door to increased longevity
- Replacing older organs, tissues and cells with new optimally functioning ones.



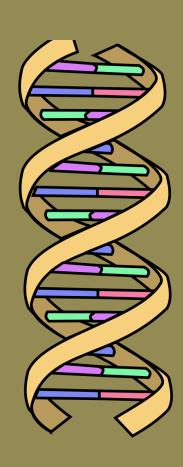
About us

#2 Regeneration: \$3.66bn invested last 5 years



	mesoblast	HUMACYTE	celularity	CARMAT	FREQUENCY THERAPEUTICS
Raised to date	\$883.10mn	\$615mn	\$537.70mn	\$424.46mn	\$273.3mn
Most recent raise	\$44.76mn	\$175mn	\$30mn	\$65.6mn	\$42.30mn
HQ	Melbourne	North Carolina	New Jersey	France	Massachusetts
Note	Mesoblast's novel allogeneic product candidates are mediators that promote tissue repair and modulate immune responses.	Manufacturing off- the-shelf, universally implantable bioengineered human tissues.	Creating cell therapies from placenta. Material arrest or reverse degenerative process by supporting healthy repair of regeneration of organs/tissues.	The CARMAT total artificial heart could, assuming a successful clinical development, potentially save the lives of thousands of patients each year with no risk of rejection and with an enhanced quality of life.	Developer of regenerative therapeutics intended to repair or reverse damage caused by a broad range of degenerative diseases.
TRL /clinical stage	7: Phase 2	7: Phase 2	4: Pre-clinical in-vivo	6: Phase 1	7: Phase 2





- Gene therapy could be a radical solution to treat age-related pathologies (as well as many other diseases)
- A human being who lives in a perfect environment with adequate health care and an exemplary lifestyle would never live past the age of 122
- We are programmed to die and the answer might be in our genetics
- This is one of the reasons why gene therapies are among the most promising therapies for longevity
- Gene-based therapies could target any aging phenotypes and diseases and have been successful in preclinical studies.



	TENAYA THERAPEUTICS	GYROSCOPE VISION FOR LIFE	BlueRock	GenSight	EAPSIDA BIOTHERAPEUTICS
Raised to date	\$428mn	\$284.60mn	\$225mn	\$221.40mn	\$140mn
Most recent raise	\$180mn	\$1,500bn (acquired)	\$581.60mn (M&A)	\$35.88mn	\$50mn
HQ	San Francisco	London	Cambridge	Paris	California
Note	Restore heart cell function by using viral vectors to deliver healthy copies of genes or other therapeutic payloads	Developer of genetically-defined therapies intended to fight the devastating impact of age-related macular degeneration (AMD). Was acquired in 2022 by Novartis with upfront cash payment of \$800mn.	Enhanced iPSCs with genetic engineering to enhance authentic cells with specific functions to improve therapeutic effect. Following a 2016 joint venture with Versant Ventures Bayer acquired its remaining stake in 2019.	Combining a gene therapy-based approach with proprietary technology platforms of mitochondrial targeting sequence, or MTS, and optogenetics.	Capsida's initial internal preclinical programmes centre on neurodevelopmental and neurodegenerative disorders, areas in which gene therapies have yet to gain significant traction due to the difficulties of targeting the brain.
TRL /clinical stage	6: Phase 1	6: Phase 1	6: Phase 1	3: Pre-clinical in-vitro	3: Pre-clinical in-vitro





- Dogs are an interesting model for human aging they have co-evolved with us, and share similar environments to us
- Owners would be happy paying \$10,725 per year to keep save their dog from a life-threatening disease
- Dogs develop age-related diseases just like humans do - laboratory mice often must be bred or altered to have an age-related illness
- As dogs age faster than humans, clinical trials could be conducted in only 3-5 years.
- Creating a drug to extend dog lifespan would provide a platform for similar interventions in humans.

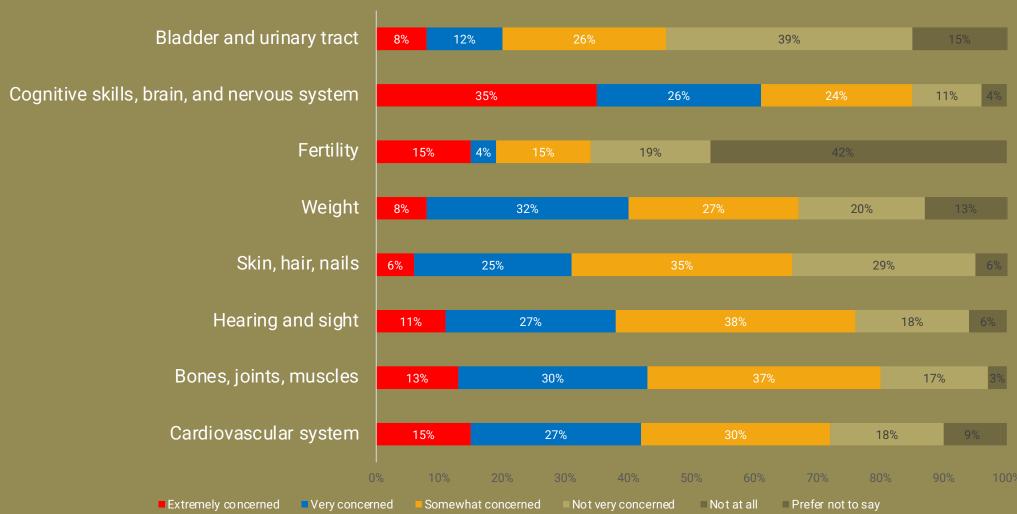
#20 Pet longevity: \$90mn invested last 5 years



	loyal	REJUVENATE BIO	genflow biosciences longer better life	W1LD	animal BIOSCIENCE
Raised to date	\$57.3mn	\$19.77mn	\$6.71mn	\$6.55mn	\$1.7mn
Most recent raise	\$20mn	\$3mn	\$4.27mn	\$2mn	\$1.27mn
HQ	California	California	London	Rehovot	Massachusetts
Note	The company's target drugs delay the onset of agerelated diseases like cancer, heart diseases, and metabolic diseases.	Developer of a cardio-protective gene therapy designed to increase the health and lifespan of domesticated animals.	Lead compound is an AAV containing transgene encoding cDNA portion of human SIRT6 gene. Currently in a pivotal anti-aging trial in dogs. Disclosure: First Longevity Ltd has a commercial interest in Genflow Biosciences Ltd.	Wild animals' evolution results in remarkable resilience to many diseases via potent and balanced microbiome. Wild Biotech translates into novel therapeutics for humans.	Developer of Leap Years™, a chewable supplement for pets that has been scientifically proven to prevent aging at the cellular level to extend the health and vitality to pet's life.
TRL /clinical stage	7: Phase 2	7: Phase 2	4: Pre-clinical in-vivo	6: Phase 1	7: Phase 2

About us

#15 Longevity supplements: people's aging concerns





About us

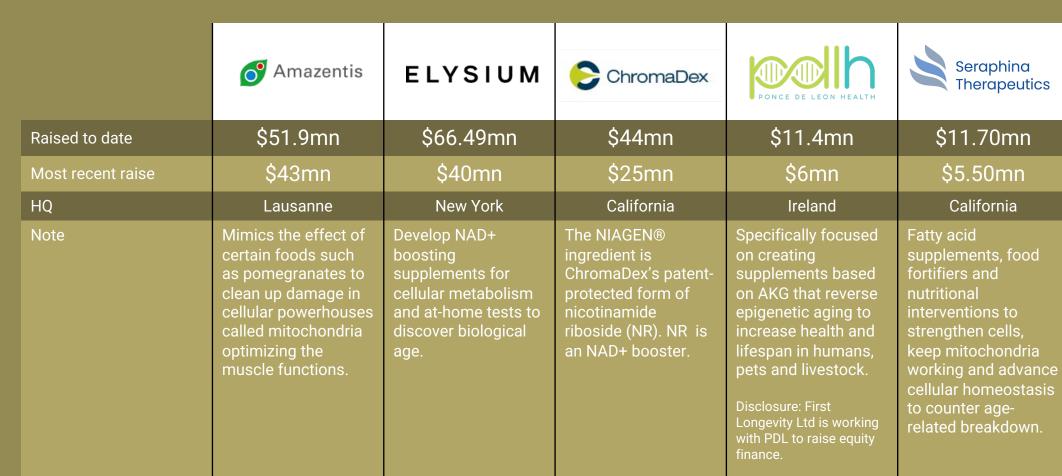
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#15 Longevity supplements: \$290mn / last 5 years



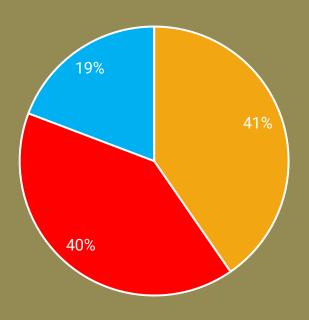
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TRL /clinical stage

#9 Longevity diagnostics

About us



■ Biological age test ■ Health assessment ■ Digital health assessment

- We need an objective, quantifiable biomarker for the aging process that can be tracked in clinical trials.
- If we can resolve a validated aging biomarker, prevention drug design may be even more lucrative than the disease treatment design we have now
- A good longevity diagnostic should:
 - 1. Be relevant to aging
 - 2. Should robustly and consistently predict trial endpoints, such as functional ability, disease, or death
 - 3. Measure reliably overseen by peer-review
 - 4. React to interventions targeting aging biology.

#9 Longevity diagnostics: \$1.97bn / last 5 years



	somalogic	Nightingale	\'IOME	CKlothoyears	O bio
Raised to date	\$1.17bn	\$335.46mn	\$182.5mn	\$100mn	\$52.18
Most recent raise	\$375mn	\$132.17mn	\$20mn	\$99.64mn	\$8.67
HQ	Colorado	Helsinki	Washington	London	California
Note	By examining proteins at the cellular level, proteomics allows providers to measure and track patient health risks holistically and in real-time and prevent the escalation of disease.	Health data platform that detects disease risks. The Health Data Platform empowers individuals to take better actions to prevent diseases by allowing them access to disease risk information	Decodes precise health insights and biomarkers of various chronic diseases using artificial intelligence and systems biology expertise, enabling healthcare providers to give personalized nutrition precision supplements.	Klotho-based tests and therapies, enabling people to reduce the risk of many aging-related diseases including cancer, chronic inflammation, diabetes, calcification of arteries, vision and memory loss.	Whole-body scans to generate a digital twin of the patient's physical body to quantify, digitize, the data and utilize simulated human physiology and machine learning to predict potential health risks.
TRL /clinical stage	10	10	10	10	10

Investment

Longevity

Longevity: it's possible for everyone to grow younger

Investment



Example of what's possible:

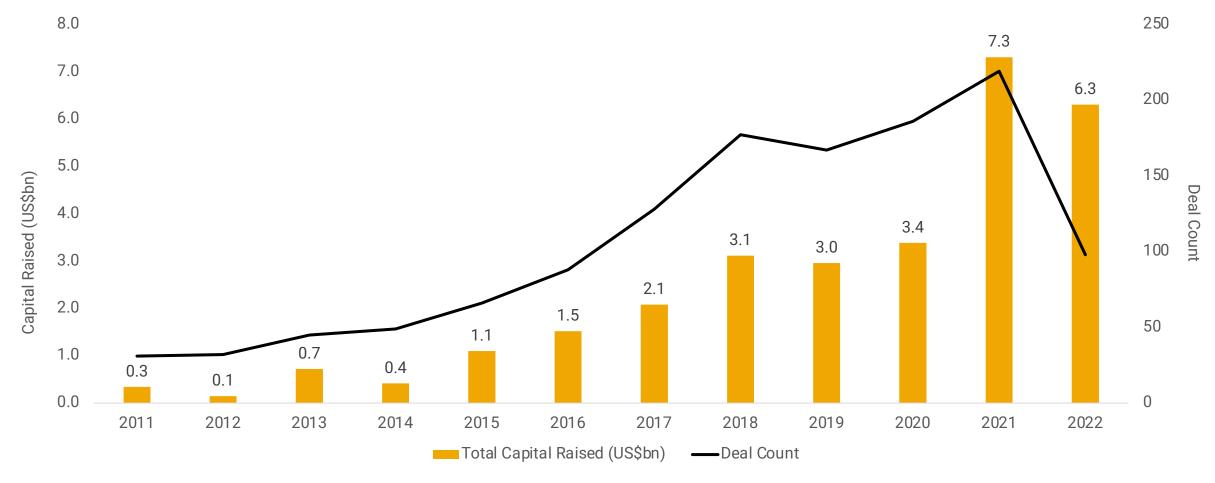
- Chronological age: 55 ... Metabolic age: 47
- Exercise-centered lifestyle
- Curious about health and improvement
- Disposable income
- A long-way from retirement
- Physician-prescribed longevity regime:

NMN Booster (NAD+ precursor) NR Booster (NAD+ precursor) Omega 3 High EPA Co Q10 High Strength Alpha Lipoic Acid

Regular exercise Reduced animal protein NAC Glutathione Boost Acetyl L-carnitine MitoPQQ Energy Boost Promultima (gut bacteria) Vitamin D3 + K2 (high strength)

Reduced alcohol Intermittent fasting

Stage	Birth age	Chronological age	Metabolic age	Chronic diseases	Age-deceleration	Projected death age
No-test	0	54	55	Unknown	100%	85
Epigentically tested	0	54	47	None	115%	98





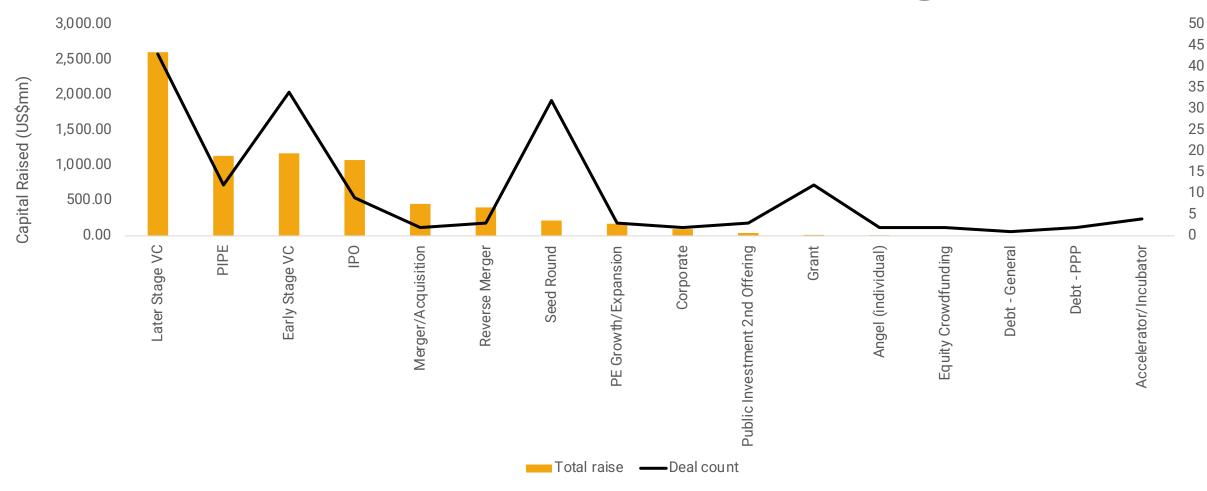
Longevity

2022 is a big year despite the challenges



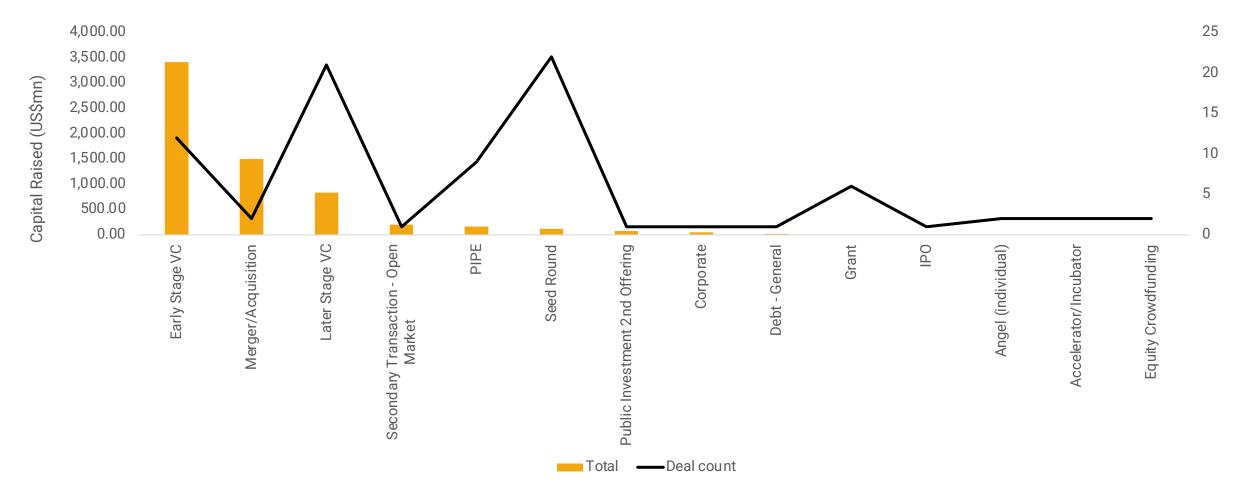


2021 analysis: total raised / deal count / funding type



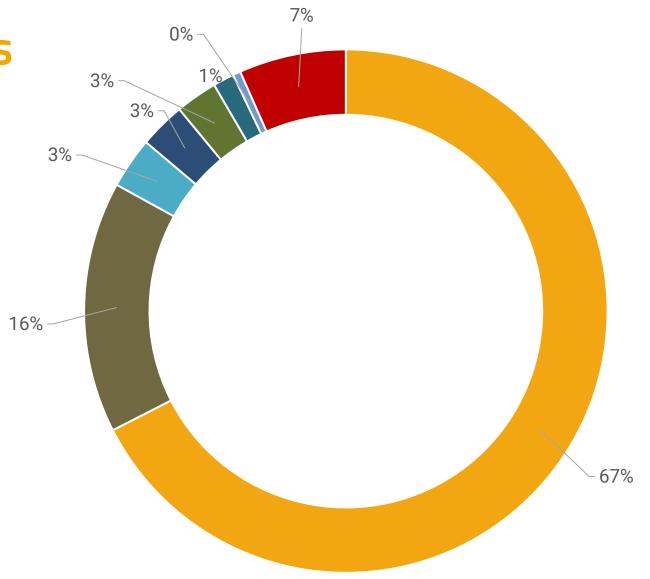
Longevity

2022 analysis: total raised / deal count / funding type



Categories of investors: 5 years

- Venture Capital
- Private Equity
- Private Debt
- Co-investment
- Real Assets
- Funds of Funds
- Secondaries
- Other



Longevity

Investor activity key growth markets

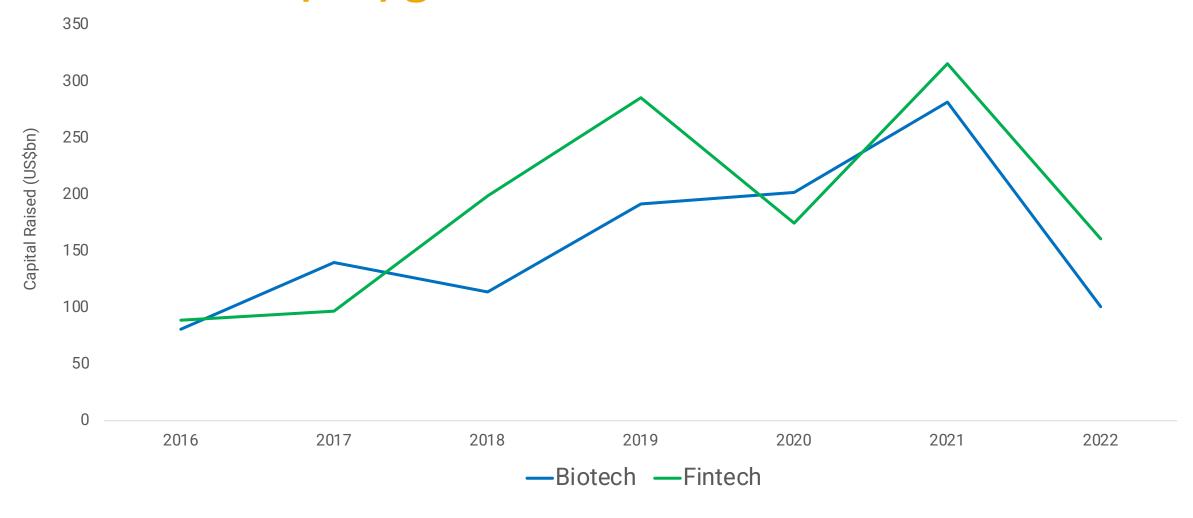
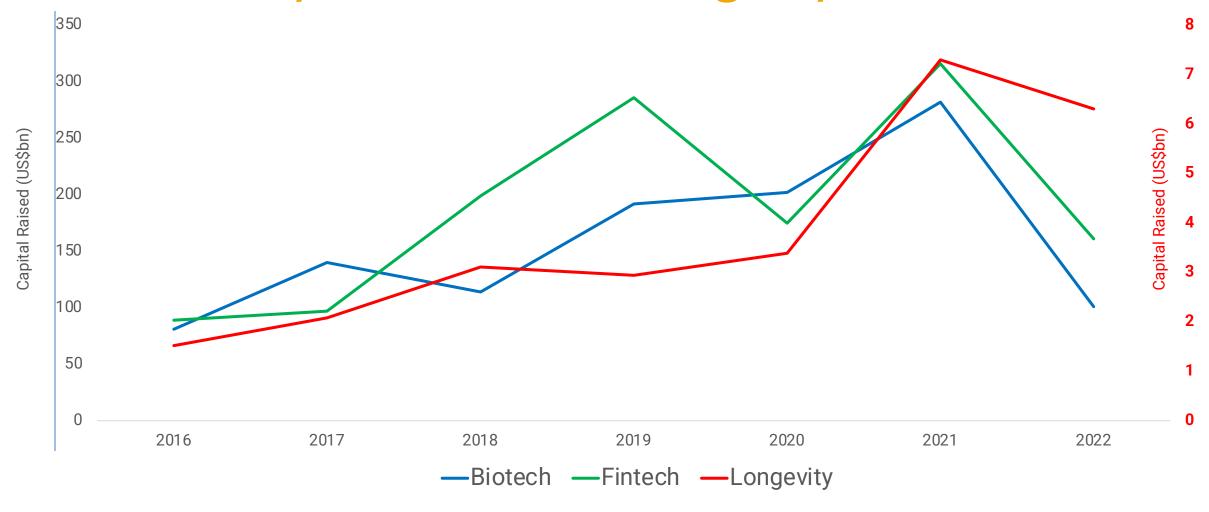


Figure: Total raise by biotech, fintech and Longevity industry since 2016 analysis by Longevity. Technology, based on Pitchbook data [23,000 biotech companies, 32,000 Fintech companies, 444 Longevity companies] as of 08/09/2022

Investor activity other markets vs longevity



Investment

Figure: Total raise by biotech, fintech and Longevity industry since 2016 analysis by Longevity. Technology, based on Pitchbook data [23,000 biotech companies, 32,000 Fintech companies, 444 Longevity companies] as of 08/09/2022

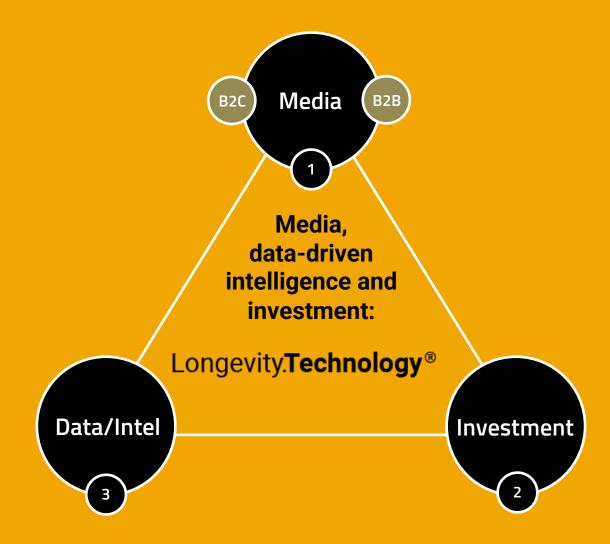
Revenue-generating: £1mn seed round currently open

Our advertising-supported media platform enables us to launch and promote our investment deals;

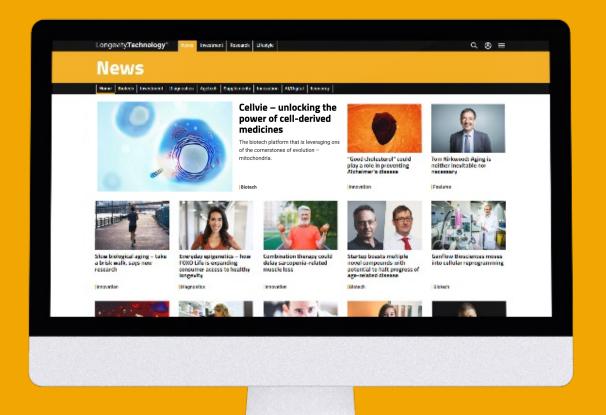
Our unique data sets and extensive network allow us to identify and curate high caliber investment opportunities;

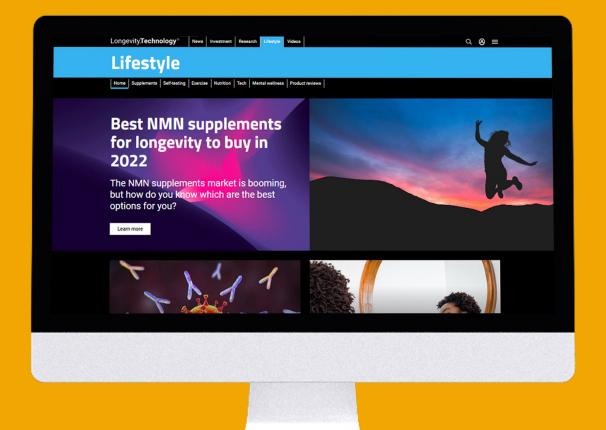
About us

Our data-driven intelligence enables us to identify growth markets and longevity market gaps to exploit.



Our role: media





Our role: brokerage

Longevity domain companies: 560

- Prevention Prevent damage that causes aging;
- Renewal Reversal of damage that has occurred;
- Treatment Treatment of damage that has occurred;
- 4 Diagnostic Early identification of aging damage.

Investment Company alerts Age Labs and BioAge announce

Investor connections (profiled): 1098

Pre-seed longevity investors

Longevity biotech platforms

Biotech funds

AgeTech and tech funds

Larger mainstream funds

Family office and HNW capital

Strategic investors (pharma)

Longevity: it's possible for everyone to grow younger



Example of what's possible:

About us

- Chronological age: 55 ... Metabolic age: 47
- Exercise-centered lifestyle
- Curious about health and improvement
- Disposable income
- A long-way from retirement
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NMN Booster (NAD+ precursor) NR Booster (NAD+ precursor) Omega 3 High EPA Co Q10 High Strength Alpha Lipoic Acid

Regular exercise Reduced animal protein NAC Glutathione Boost
Acetyl L-carnitine
MitoPQQ Energy Boost
Promultima (gut bacteria)
Vitamin D3 + K2 (high strength)

Reduced alcohol Intermittent fasting

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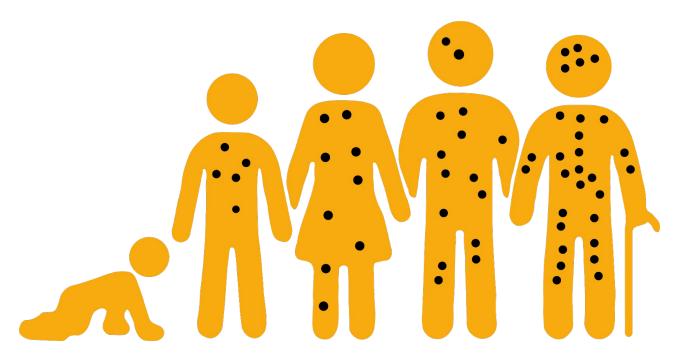
Longevity.**Technology**®





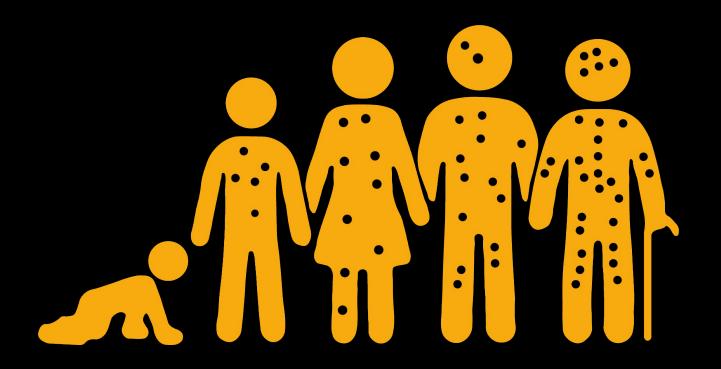
Longevity.**Technology**®

Aging is plastic





Aging is plastic



Aging, as a process, is not fixed to the pace of chronological time; it can speed up or slow down.

We are already:

- 1. Building exciting new technologies and companies;
- 2. Establishing a hugely successful industry;
- 3. Forming amazing investor-returns;
- 4. Giving everyone multiple more years of health;
- 5. Eradicating the trauma of disease and death.

Longevity.**Technology**®



Let's get started!

