LIFE EXTENSION ADVOCACY FOUNDATION

WWW.LEAFSCIENCE.ORG

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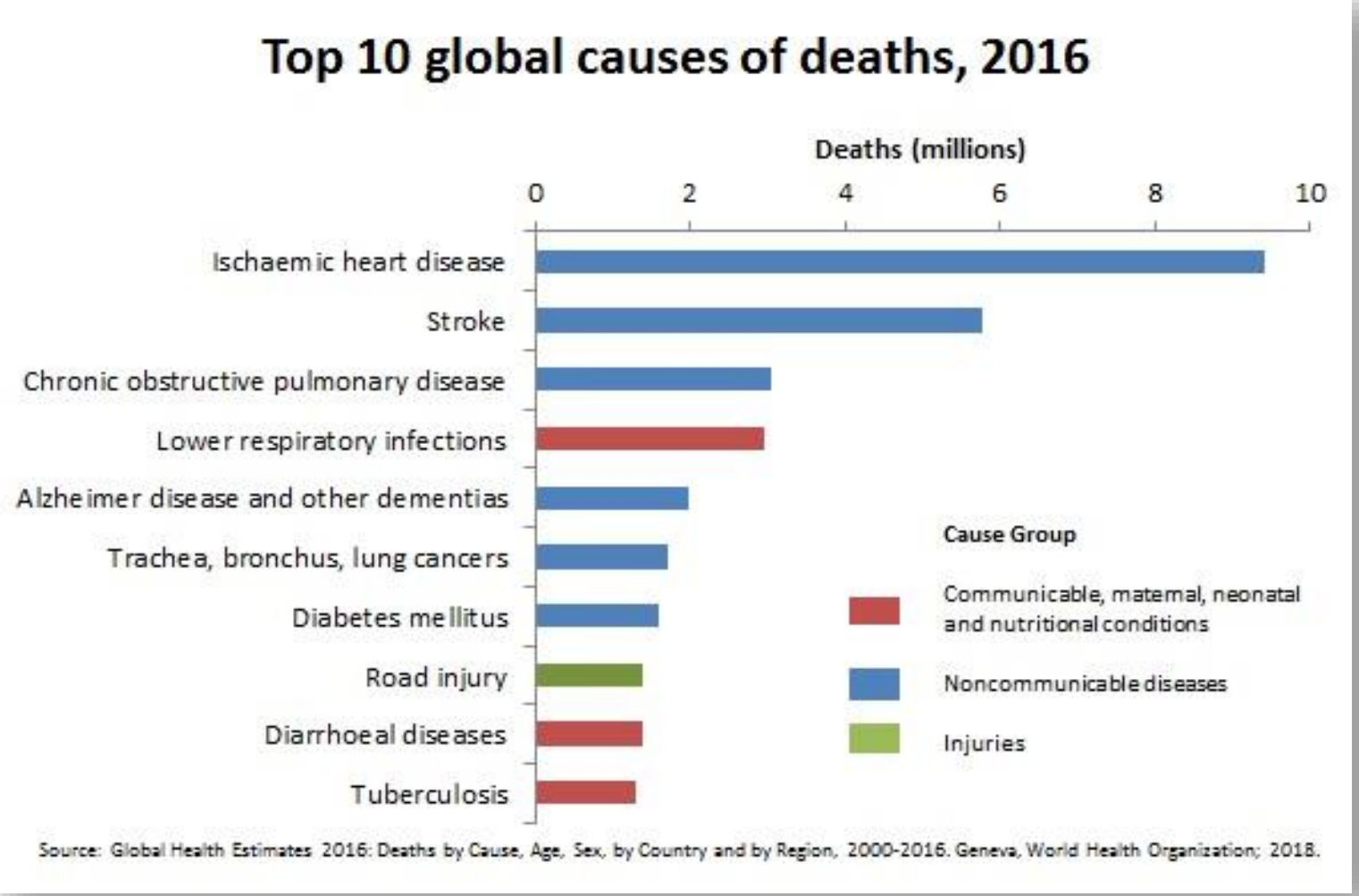
Why is the cure for aging not ready yet? The main bottlenecks in aging research and how you can help overcome them.

Age-related diseases are the main causes of disability and death in the modern world*



***Infectious diseases are mostly defeated; chronic diseases prevail. [Source: WHO.]**

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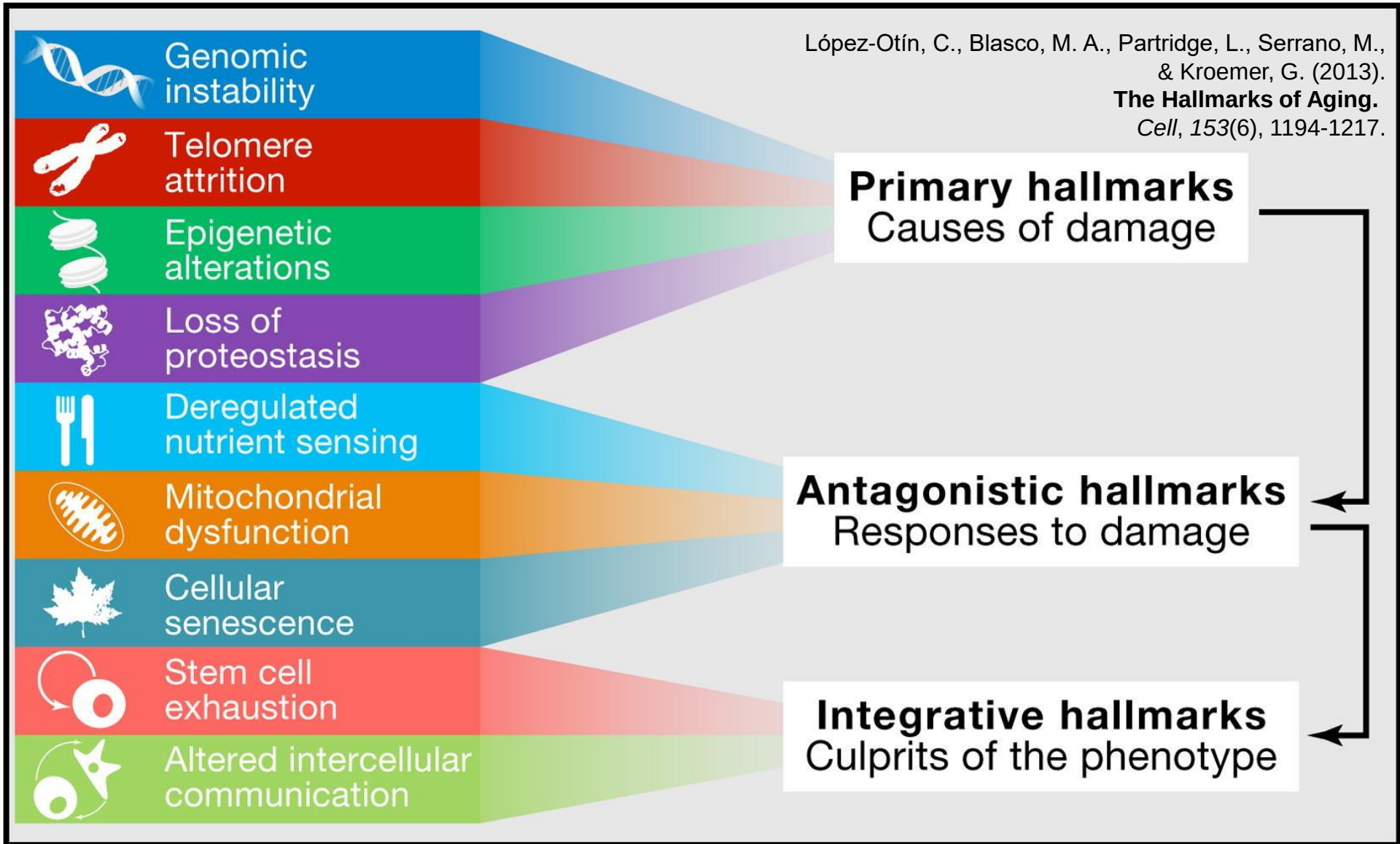
Age-related diseases started to prevail because infectious diseases were brought under medical control.

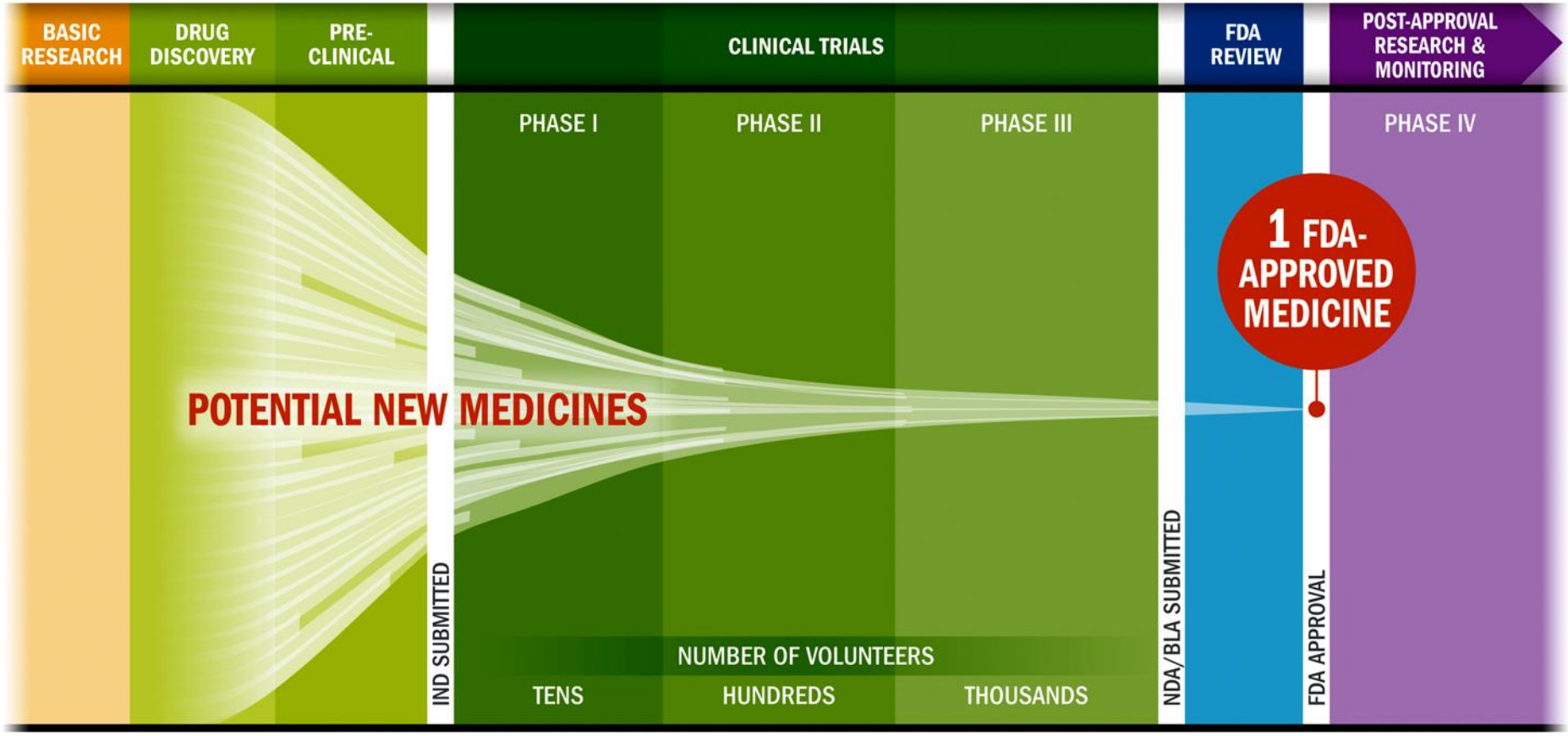
Understanding the root causes of infectious diseases – pathogens – allowed us to develop effective measures to prevent and treat them: hygiene, sanitation, water chlorination, vaccines and antibiotics.

Can we identify and address the root mechanisms of aging?

In 2013, academia reached a consensus regarding the root mechanisms of aging: 9 mechanisms, 4 of them primary



To address the mechanisms of aging, we need to develop a new generation of therapies and drugs.



Key: IND: Investigational New Drug Application, NDA: New Drug Application, BLA: Biologics License Application

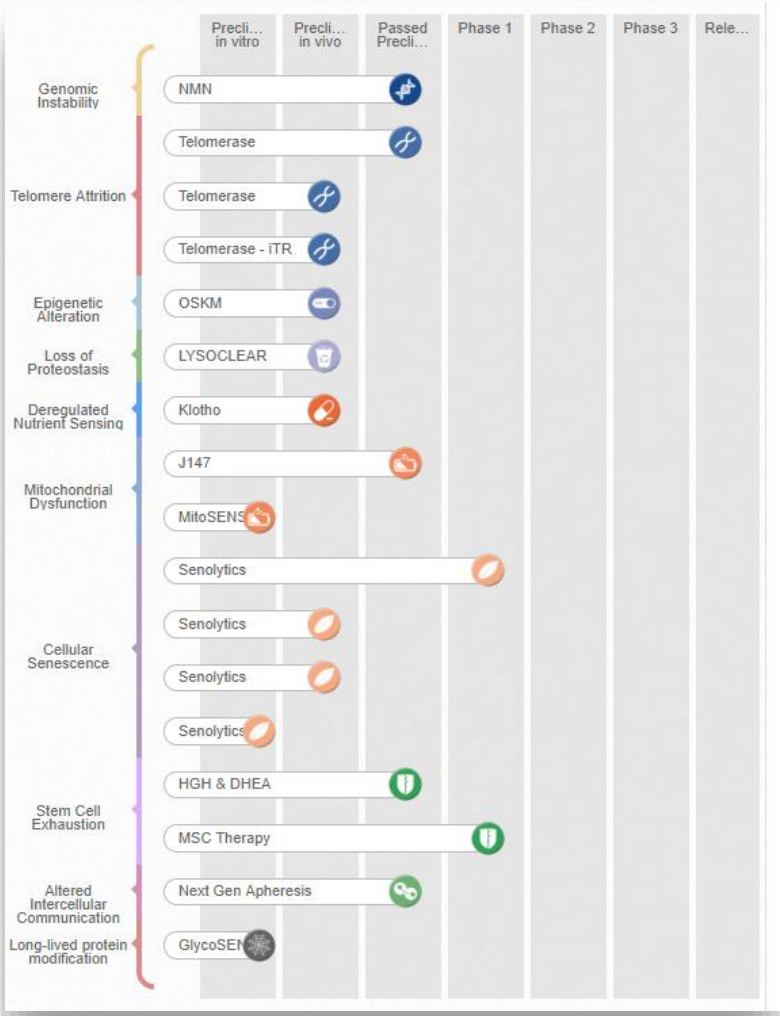
* The average R&D cost required to bring a new, FDA-approved medicine to patients is estimated to be $2.6 billion over the past decade (in 2013 dollars), including the cost of the many potential medicines that do not make it through to FDA approval.

Source: PhRMA adaptation based on Tufts Center for the Study of Drug Development (CSDD) Briefing: "Cost of Developing a New Drug," Nov. 2014. Tufts CSDD & School of Medicine., and US FDA Infographic, "Drug Approval Process," http://www.fda.gov/downloads/Drugs/ResourcesForYou/Consumers/UCM284393.pdf (accessed Jan. 20, 2015).

For most of the mechanisms of aging, studies are in an early stage

- More fundamental studies are needed to find interventions against the root mechanisms of aging
- Government funding is still mostly allocated towards studying single age-related diseases instead of their causes
- Businesses are not keen on donating to support basic science, as this research does not provide a product to sell in the short term
- Philanthropy could be a good source of funding, but many wealthy individuals still don't know about the possibility of addressing aging to eliminate age-related diseases
- The general public also lacks this information, which is why crowdfunding initiatives by advocacy groups and research organizations can't bring large amounts of money into the field

Rejuvenation Roadmap
www.lifespan.io/roadmap



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Here is what the researchers say about the main bottlenecks holding back the development of interventions for aging

Dr. Aubrey de Grey, CSO of SENS Research Foundation:

The ultimate issue here is funding. We have a plan, we know what research needs to be done, and we have the right scientists. We have world leaders in medical research hot to trot; they really want this to happen and would be doing it if they had that money in place.

Joao Pedro de Magalhaes, University of Liverpool:

While government funding exists to support scientific research, including research on aging, this is largely inadequate. [...] The problem is not only that funding is not sufficient to allow progress at a sufficient pace, but government funding is often misdirected. (And I acknowledge this having received substantial government funding to support my lab, so this is not just a case of sour grapes.) The problem with government funding is that, because of the way funding is typically allocated via peer-review, it is a conservative process that rewards incremental advances but discourages out-of-the-box, innovative projects. Therefore, while projects that follow up on established paradigms, such as caloric restriction, have a chance of being funded, radical projects like those inspired by SENS have no chance.

Here is what the researchers say about the main bottlenecks holding back the development of interventions for aging

Dr. Matt Kaeberlein, University of Washington in Seattle:

Funding and perception, and these two are related. There is insufficient funding for scientific research in general and insufficient funding for geroscience in particular. That has been the biggest bottleneck to research progress. The field has also suffered from a reputation problem for many years as not being particularly rigorous, and this has hurt the flow of research dollars into the field. This has been changing but is still a problem.

Dr. David Gems, the Institute of Healthy Ageing:

There are many, but I find it hard to say which is the biggest. To name a few…

1. Lack of sufficient research funding (obvious, but true).
2. The entrenched configuration of the medical research establishment that leads to diseases of aging being studied separately (in silos).
3. Lack of public awareness of the potential of current progress in biogerontology, due to it being drowned out by bogus information generated by commercial anti-aging medicine peddlers, swindlers of the elderly, and self-publicizing mountebanks.

Dr. Nichola Conlon, CEO of Nuchido:

Failure to recognize the fact that aging is the biggest risk factor for all major diseases to which you and I will ultimately capitulate. This lack of recognition by decision makers means that current funding and resources are pigeonholed into research on specific diseases. For example, compared to cancer research, funding for aging research is minuscule despite the fact that the biggest risk factor for developing cancer is age. The current approach to deal with age-related disease is very much focused on damage control, trying to fix a problem when signs and symptoms have already started. Surely, a preventative strategy where research efforts target the root cause would be far more beneficial.

How do we speed up the development of treatments that prevent age-related diseases?

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Crowdfunding the cure for aging

One fundamental study of the mechanisms of aging (in cells, flies, or mice) requires from 50 to 100 thousand USD.

Every research project of this type can turn out to be crucial for further progress towards human clinical trials.

1,000 people who donate 50 dollars to researchers once per month can provide enough funds to begin one additional experiment per month.

The same thing is true for **50 people who can donate 1,000** USD each per month.

Support of fundamental research on aging

Our non-profit crowdfunding platform was founded in **2015**

6 successful campaigns have been conducted to support scientific studies on aging and longevity

We collected more than **$250,000** to help researchers

The results of one study **are already published***

5 studies are currently running

* Boominathan, A., Vanhoozer, S., Basisty, N., Powers, K., Crampton, A. L., Wang, X., ... & O'Connor, M. S. (2016). Stable nuclear expression of ATP8 and ATP6 genes rescues a mtDNA Complex V null mutant. *Nucleic acids research*, *44*(19), 9342-9357.

If you want to help eradicate age-related diseases for good, then:

Take part in supporting basic research on aging and early-stage biotech startups. This is the **most profitable type of charity** for you personally and for your company.

Your support of early-stage research will be rewarded by the possibility of getting to know the project team and its scientific advisors (who are often renowned researchers) better and being among the first to be informed when a startup intends to attract investment into turning this research into a product.

OncoSENS Control ALT Delete Cancer

High-throughput screening of a library of diverse drugs to find treatments for 'ALT' cancers, those which rely on Alternative Lengthening of Telomeres.

120% FUNDED $72,002 FUNDED CAMPAIGN COMPLETE

The Major Mouse Testing Program

Testing a new class of compounds, Senolytics, on their ability to extend healthy lifespan by clearing out dysfunctional cells in the body.

115% FUNDED $52,070 FUNDED CAMPAIGN COMPLETE

MitoSENS Mitochondrial Repair Project

Engineering backup copies of mitochondrial genes to place in the nucleus of the cell, aiming to prevent age-related damage and restore lost mitochondrial function.

153% FUNDED $46,128 FUNDED CAMPAIGN COMPLETE

MouseAge: Visual Biomarker for Mouse Aging

Using AI and Computer Vision Techniques to Determine Age and Assess the Effect of Therapies Against Aging in Mice, Increasing the Pace of Research.

129% FUNDED $19,408 FUNDED CAMPAIGN COMPLETE

AgeMeter: Physiological Biomarkers to Determine Functional Age

Developing a diagnostic system to measure human functional age in comparison to chronological age, and assist in the assessment of anti-aging therapeutics.

100% FUNDED $30,061 FUNDED CAMPAIGN COMPLETE

CellAge: Targeting Senescent Cells With Synthetic Biology

Designing better systems for detection and safe removal of dysfunctional "senescent" cells to improve health and treat age-related diseases.

171% FUNDED $34,215 FUNDED CAMPAIGN COMPLETE

Scientific advisory board
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Robert Shmookler Reis, Ph.D.
ADVISORY BOARD MEMBER

Aubrey de Grey, Ph.D.
ADVISORY BOARD MEMBER

We carefully review each project to ensure it is scientifically viable!

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Long-term strategy

We aim to develop a public movement supporting the advancement of preventative anti-aging medicine.

A strong public movement, as we can see from the experiences of the movements against cancer and HIV/AIDS, can become **a way to pressure the government in order to redirect governmental funding to support research on aging** and the creation of drugs that address the mechanisms of aging.

A public movement for preventative anti-aging medicine will also **foster the improvement of a regulatory framework** and help these innovative treatments to be implemented – while also **preparing the market** for their arrival.

Strategic partnerships

Lifespan.io is collaborating with famous science-oriented video blogs like **Kurzgesagt – in a nutshell (5 million subscribers)** with the aims of informing as many people as possible about how close science is to solving aging and encouraging them to crowdfund studies of aging.

How to Cure Aging – During Your Lifetime?

3.1M views • 5 months ago

Why Age? Should We End Aging Forever?

3.7M views • 5 months ago

https://youtu.be/GoJsr4IwCm4
https://youtu.be/MjdpR-TY6QU

We are one of the biggest newsmakers in the field of rejuvenation research

Blog & Newsletter: We explain rejuvenation science and related topics in plain language. We cover current studies, interview leading researchers, and discuss the social aspects of aging. Subscribe for free!

Scientific Journal Club: On this monthly science show chaired by Dr. Oliver Medvedik, we discuss the latest cutting-edge research. The main goal of the show is to ignite young researchers' interest in studying aging and to help inquisitive minds acquire deeper knowledge of this field. Each show is recorded and made available on our social media.

https://www.leafscience.org

Education activities

Events: running offline and online events focused on the advancement of anti-aging science.

Talks: Attending scientific and public conferences.

https://www.leafscience.org

Let's begin our collaboration, and together, we can eradicate age-related diseases for good!

Lifespan Hero Program: small recurring donations to support our work. The more resources are gathered, the more projects we can run, ultimately increasing the speed of research.

Engaging in partnerships with famous bloggers, promoting crowdfunding campaigns, attending and organizing conferences, starting partnerships with large mass media corporations, and simply paying the salaries of our employees to allow them to work full-time on our projects and accomplish them more quickly – this all requires funds, and we are immensely grateful to all our donors for their support.

https://www.lifespan.io/hero

Join us as a volunteer!

You don't need to be a scientist to help foster progress; our organization becomes stronger and can achieve more with every additional pair of hands.

We need help with the following activities:

- Writing popular news articles for the blog
- Managing social media
- Video editing and production
- Fundraising
- Managing local events
- Giving public talks to promote Lifespan.io

Developing a solution together can be exciting and fun. Please, click the link and fill out the form to tell us about your areas of interest, skills, and hobbies – and let's find out how to make use of them to make the world a healthier place!

www.leafscience.org/volunteer

Will we be known as the generation that managed to defeat aging?

It depends on us.

LIFE EXTENSION ADVOCACY FOUNDATION
WWW.LEAFSCIENCE.ORG

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Thank you!

If you have an interesting research project in mind to investigate one of the main mechanisms of aging or you would like to support such a project, you are welcome to contact us at info@lifespan.io.

Visit www.lifespan.io and www.leafscience.org to learn more about our work.

You are welcome to subscribe to our newsletter!

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