



- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet

Thread

Pinned Tweet

Michael Forrest
@Forrest_PhD

Drug to slow aging? 🧬👉

1:17 PM · Oct 26, 2022

View Tweet analytics

6 Retweets 2 Quotes 42 Likes 12 Bookmarks



Tweet your reply

Reply

Michael Forrest @Forrest_PhD · Oct 26, 2022

Humans with lower metabolic rate (per unit mass) live longer. Mice made to have less metabolic heat generation (& lower body temperature) live longer.

3 1 4

Michael Forrest @Forrest_PhD · Oct 26, 2022

Mammal species with lower metabolic rate (per unit mass) live longer. E.g., whale has lower metabolic rate (per unit mass), & lives longer than, mouse.

2 1 2

Michael Forrest @Forrest_PhD · Oct 26, 2022

Discovered how mammals generate metabolic heat. And a drug that dose-dependently inhibits it, decreasing metabolic rate. Which predict can slow aging.

1 1 2

Michael Forrest @Forrest_PhD · Oct 26, 2022

Less metabolic heat generation doesn't necessarily mean lower body temperature. Indeed, if ambient temperature is at or above 37°C, any metabolic heat generation is redundant. In a hot climate/season, less metabolic heat generation can increase thermal comfort.

1 1 3

Michael Forrest @Forrest_PhD · Oct 26, 2022

Summary:
medium.com/@Michael_Forre...
Detail: bionxiv.org/content/10.110...

1 2 6

Add another Tweet

Aerith Garden @AerithGarden · Apr 1

Greenland sharks reach maturity at 150 years, so slow growth in "childhood" might also play a role 🧐 But mimicking caloric restriction/slowed metabolism might have a certain effect and research into this is definitely interesting.

1 52

Michael Forrest @Forrest_PhD · Apr 1

Greenland sharks probably have slow metabolism because metabolism is chemical reactions which (by chemical law) are temperature dependent; they cold-blooded, so their body temperature is the ambient temperature, which is low as they live in Arctic waters.

1 1

Messages

Michael Forrest
@Forrest_PhD

Search Twitter

Relevant people

Michael Forre
@Forrest_PhD
Drug Inventor
Biophysical TI
#drug #aging
#biotech #st:
#venturecapit
#investment

What's happeni

NBA · LIVE
Lakers at Grizzlies

#ZéEntregaTudo
É diversão? Chama o Z
Promoted by Zé Deliver

Technology · Trending
GitHub
33.2K Tweets

Trending in Brazil
SEGUE O LÍDER
2,129 Tweets

Food · Trending
Mulvaney
30.1K Tweets

Show more

Terms of Service Privacy
Accessibility Ads Info &
© 2023 Twitter, Inc.



Home

Explore

Notifications

Messages

Bookmarks

Twitter Blue

Profile

More

Tweet

Aerith Garden @AerithGarden · Apr 1

That's true but also applies to other fish which don't grow so old, right? 🤔
It's probably evolutionary pressure: Mice need to grow up quickly because predators kill them. Greenland sharks have basically no predators but also low food. The downregulation of metabolism definitely... [Show more](#)

1 2 29

Michael Forrest @Forrest_PhD · Apr 1

Evolution needs molecular mechanism(s) to make bigger species live longer, and I think in mammals it is less metabolic heat generation per unit mass in bigger mammal species, possible because of square-cube law of geometry. And data in paper supports that.

1 2 69

Michael Forrest @Forrest_PhD · Apr 1

And want to now get more data. The above makes predictions, predicting a working drug (!), and I want to get these predictions tested asap.

1 1 74

Aerith Garden @AerithGarden · Apr 1

Sure, I want to see this as well 😊

1 32

You and this Tweeter share some mutual follows

Tomás Schmauck-Medina @TSchmauck · Oct 27, 2022

Why do Hummingbirds live considerably longer than mice even though they have such an insane metabolic rate? Correlation ≠ Causation?

1 4

Michael Forrest @Forrest_PhD · Oct 27, 2022

Birds discussed in my paper (p86). Also might be interested to see bats (p73) & naked mole rat (p74). [bionrxiv.org/content/10.1101/2022.10.27.504444](https://doi.org/10.1101/2022.10.27.504444)

+ google hummingbird & torpor: net over a day, their metabolism isn't as high as you think.

1 1 1

Tomás Schmauck-Medina @TSchmauck · Oct 27, 2022

So, I google the Hummingbird and find that they burn between 6,600 to 12,000 calories per day, which seems insanely high to me. What measurement would you be talking about?

1

Michael Forrest
@Forrest_PhD

Messages



-
- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet

imo @imobbcs · Apr 14

Lately, I am obsessed with longevity and working on improving my health span. I am binge-listening to @PeterDiamandis and @PeterAttiaMD podcasts.

What are the best books on this subject?

14

 11
 4,279

Michael Forrest @Forrest_PhD · Apr 14

Get involved:
Drug to Slow Aging?

wefunder.com
Invest in Biophysical Therapeutics, Inc.: Mission: Drug to Slow, Halt ...
Mission: Drug to Slow, Halt or Reverse Aging

1

 101

Michael Forrest @Forrest_PhD

Legal disclosure for link above: help.wefunder.com/testing-the-wa...

10:50 PM · Apr 14, 2023 · 21 Views

View Tweet analytics

Tweet your reply

Search Twitter

Relevant people

- Michael Forr**
 @Forrest_PhD
 Drug Inventor
 Biophysical TI
 #drug #aging
 #biotech #st
 #venturecap
 #investment
- imo**
 @imobbcs
 Chief Market
 Buidling A #B
 Lost it all in a
- Peter H. Dian**
 @PeterDiana
 Exec. Chairm
 @fountainlife
 human health

What's happeni

NBA · LIVE

Lakers at Grizzlies

#ZéEntregaTudo
É diversão? Chama o Z
Promoted by Zé Deliver

Trending

#Bangkok
1,906 Tweets

Technology · Trending

Truth Social
10.6K Tweets

Trending in Rio de Janeiro

Os 4
18.7K Tweets

[Show more](#)

[Terms of Service](#)
 [Privacy](#)
 [Accessibility](#)
 [Ads Info](#)
 © 2023 Twitter, Inc.

Michael Forrest
 @Forrest_PhD

Messages



- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet

Michael Forrest
@Forrest_PhD

If we were were in an elevator, this is what you'd hear:

DRUG TO SLOW AGING?

#longevity #aging #cosmetics #founder #science #technology #investing



83 views

0:00 / 0:49

12:57 PM · Apr 9, 2023 · 420 Views

View Tweet analytics

1 Quote 1 Like



Tweet your reply

Reply

Michael Forrest @Forrest_PhD · Apr 9

Thread

wefunder.com

Invest in Biophysical Therapeutics, Inc.: Mission: Drug to Slow, Halt ...
Mission: Drug to Slow, Halt or Reverse Aging

1 Retweet 1 Like 123 Views

Michael Forrest @Forrest_PhD · Apr 9
"Testing the waters" legal disclosure for link above:
help.wefunder.com/testing-the-wa...



Search Twitter

Relevant people

Michael Forr
@Forrest_PhD
Drug Inventor
Biophysical TI
#drug #aging
#biotech #st
#venturecap
#investment

What's happeni

NBA · 12 minutes ago
Heat at Bucks

#ZéEntregaTudo
É diversidade? Chama o Z
Promoted by Zé Deliver

Entertainment · Trending
#LevelsBlindLIVE
78.5K Tweets

Trending
#LetWomenSpeak
14.2K Tweets

Sports · Trending
Mezenga

Show more

Michael Forrest
@Forrest_PhD

Messages

hi uh my name's Dr Michael Forrest the CEO of biophysical Therapeutics and we think that we've got a drug uh to slow aging

now if you slow the metabolic rate of mice you can actually make them live much longer and that's been shown in other species as well such as worms flies uh wasps fish if you slow down metabolic rate you make them live much longer

now we've actually got a drug to slow metabolic rate which we arrived at by a rational design

and uh shown that it can slow metabolic rate in mice already and we predict that this drug uh can slow aging

which of course been a one of man uh since the dawn of man and has many different applications uh the first of which we're pursuing is cosmetics



- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet



Tweet

Longevity Technology
@LongevityTech

Biophysical Therapeutics opens #crowdfunding #investment raise #Longevity company with a drug welcomes those wanting to participate in the longevity #opportunity to get skin in the game. #crowdfunding



3:20 PM · Mar 21, 2023 · 4,071 Views

5 Retweets · 15 Likes · 1 Bookmark



Replying to @LongevityTech

Tweet your reply



Reply

Michael Forrest @Forrest_PhD · Mar 24

Thank you so much for retweeting this @aubreydegrey , very thrilled.



More Replies

Dietance @dietance · Apr 8

Could Biophysical Therapeutics' new drug be the fountain of youth we've been searching for? Definitely worth keeping an eye on. #Longevity #AntiAging #FountainOfYouth



Search Twitter

Relevant people

Longevity Te
@Longe... Fe
Daily news an
investments a
extend life an
that extended

What's happeni

NBA · LIVE
Heat at Bucks

#Z4EntregaTudo
É diversão? Chama o Z
Promoted by Z4 Deliver

Entertainment · Trending
#LovelsBlindLIVE
110K Tweets

Entertainment · Trending
Kirstie
1,023 Tweets

Trending In Brazil
SEGUE O LÍDER
3,884 Tweets

Show more

Terms of Service Privacy
Accessibility Ads Info &
© 2023 Twitter, Inc.

Michael Forrest
@Forrest_PhD

Messages





- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet



Tweet

Peter H. Diamandis, MD @PeterDiamandis · Mar 21
 My next decade is about helping humanity live a longer, healthier life.
 76 39 574 32.9K

Michael Forrest @Forrest_PhD

Working on this Peter, with new drugs already in hand. Want to chat?

11:58 AM · Mar 21, 2023 · 156 Views

View Tweet analytics

2 Likes



Tweet your reply

Reply

Michael Forrest @Forrest_PhD · Mar 21
 Published today:

[longevity.technology](#)

Biophysical Therapeutics opens crowdfunding investment raise
 Longevity company with a drug welcomes those wanting to participate in longevity the opportunity to get skin in the game.



Search Twitter

Relevant people

Michael Forre
 @Forrest_PhD
 Drug inventor
 Biophysical TI
[#drug](#) [#aging](#)
[#biotech](#) [#sts](#)
[#venturecap](#)
[#investment](#)

Peter H. Dian
 @PeterDiana
 Exec. Chairm
[@fountainlife](#)
 human health

What's happeni

NBA · 35 minutes ago
Heat at Bucks

#ZéEntregaTudo
 É diversão? Chama o Z
 Promoted by Zé Deliver

Sports - Trending
Lineker
 3,238 Tweets

Politics - Trending
Carlos Bolsonaro
 2,784 Tweets

Trending
SpaceX
 89.5K Tweets

Show more

Terms of Service Privacy
 Accessibility Ads info
 © 2023 Twitter, Inc.

Michael Forrest
 @Forrest_PhD

Messages





- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet



Tweet

Kevin O'Leary aka Mr. Wonderful @kevinolearytv · Mar 13
 SVB shut down. When a crisis hits, put all your options on the table. Platforms like @StartEngineLA are here to help you secure funding you need, on your own terms:

| | |
|--|--|
| | startengine.com Find Investors & Raise Capital - StartEngine Reach over 1,000,000 prospective investors and raise funding for your business. Apply to get ... |
|--|--|

55 17 59 51.7K

Michael Forrest @Forrest_PhD

Using wefunder instead:

| | |
|--|--|
| | wefunder.com Invest in Biophysical Therapeutics, Inc.: Mission: Drug to Slow, Halt or Revers... Mission: Drug to Slow, Halt or Reverse Aging |
|--|--|

10:52 AM · Mar 13, 2023 · 395 Views

View Tweet analytics



Tweet your reply

Reply

Michael Forrest @Forrest_PhD · Mar 13
 Testing the waters disclosure: help.wefunder.com/testing-the-wa...

55

Michael Forrest
 @Forrest_PhD

Search Twitter

Relevant people

Michael Forr
 @Forrest_PhD
 Drug Inventor
 Biophysical T
 #drug #aging
 #biotech #st
 #venturecap
 #investment

Kevin O'Leary
 @kevinoleary
 Chairman of C
 Beanstox, 4 X
 Wonderful, W
 Crypto, AI & G
 Photographer

StartEngine
 @StartEngine
 Invest in start
 portfolio. Que
 Email contact

What's happeni

NBA · 45 minutes ago
Heat at Bucks

#Z6EntregaTudo
 É diversão? Chama o Z
 Promoted by Z6 Deliver

Trending
#microbio23

Politics · Trending
OTAN
 19.9K Tweets

Trending
Blacks
 27K Tweets

Show more

Terms of Service Privacy
 Accessibility Ads Info
 © 2023 Twitter, Inc.

Messages





- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet



Tweet

Mike Solana @micsolana · Mar 1
 as long as we're out here lighting money on fire, I'd really love a manhattan project for longevity. americans need to be living to 1000 at least.

74 · 41 · 649 · 85K

Michael Forrest @Forrest_PhD

Working on it:

wefunder.com
 Invest in Biophysical Therapeutics, Inc.: Mission: Drug to Slow, Halt or Revers...
 Mission: Drug to Slow, Halt or Reverse Aging

10:59 PM · Mar 1, 2023 · 608 Views

View Tweet analytics

2 Likes · 2 Bookmarks



Tweet your reply

Reply

Michael Forrest @Forrest_PhD · Mar 1
 "Testing the waters" legal disclosure: help.wefunder.com/154992-linked/

138

Michael Forrest
 @Forrest_PhD

Search Twitter

Relevant people

Michael Forre
 @Forrest_PhD
 Drug Inventor
 Biophysical TI
 #drug #aging
 #biotech #st
 #venturecapit
 #investment

Mike Solana
 @micsolana
 billionaire me
 mayor of san
 @foundersfur
 @piratewires

What's happeni

NBA · LIVE
Clippers at Suns

#Z4EntregaTudo
 É diversão? Chama o Z
 Promoted by Zé Deliver

Entertainment · Trending
#LevelsBlindLIVE
 156K Tweets

Trending
Starship
 79.4K Tweets

Politics · Trending
Carluxo
 Trending with Carlos Bols

Show more

Terms of Service Privacy
 Accessibility Ads info
 © 2023 Twitter, Inc.

Messages





- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet



Tweet

Search Twitter

JAKE @0FJAKE · Feb 26
 "We'll probably become immortal relatively soon ... maybe not us, but our children definitely will!"

- Tobí Lütke, Shopify CEO



0:08 3,212 views 8 8 48 10.5K

Michael Forrest
 @Forrest_PhD

Working on this problem:

wefunder.com
 Invest in Biophysical Therapeutics, Inc.: Mission: Drug to Slow, Halt or Revers...
 Mission: Drug to Slow, Halt or Reverse Aging

2:27 PM · Feb 27, 2023 · 198 Views

View Tweet analytics

2 Likes



Tweet your reply

Reply

Michael Forrest @Forrest_PhD · Feb 27
 Important legal disclosure: [help.wefunder.com/154992-linked/...](https://help.wefunder.com/154992-linked/)

8 8 59

Michael Forrest
 @Forrest_PhD

Relevant people

Michael Forre
 @Forrest_PhD
 Drug Inventor
 Biophysical TI
 #drug #aging
 #biotech #st
 #venturecapit
 #investment

JAKE
 @0FJAKE

What's happeni

NBA · LIVE
Clippers at Suns

#ZéEntregaTudo
 É diversão? Chama o Z
 Promoted by Zé Deliver

Entertainment · Trending
#LevelsBlindLIVE
 157K Tweets

Politics · Trending
Carluxo
 Trending with Carlos Bols

Trending in Brazil
#JacksonWangCoach
 Trending with frank ocear

Show more

Terms of Service Privacy
 Accessibility Ads Info &
 © 2023 Twitter, Inc.

Messages





- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet



Tweet

Search Twitter

Peter H. Diamandis, MD @PeterDiamandis · Feb 27
 Lots of people dream big and talk about big bold ideas but never do anything. I judge people by what they've done. So, just do something.

24 32 229 21.2K

Michael Forrest @Forrest_PhD

Something:

wefunder.com

Invest in Biophysical Therapeutics, Inc.: Mission: Drug to Slow, Halt or Revers...
 Mission: Drug to Slow, Halt or Reverse Aging

1:14 PM · Feb 27, 2023 · 144 Views

View Tweet analytics

- Reply
- Retweet
- Like
- Bookmark
- Share

Tweet your reply

Reply

Michael Forrest @Forrest_PhD · Feb 27
 Important legal disclosure: [help.wefunder.com/154992-linked/...](https://help.wefunder.com/154992-linked/)

39

Michael Forrest
 @Forrest_PhD

Messages



Relevant people

Michael Forre
 @Forrest_PhD
 Drug Inventor
 Biophysical TI
 #drug #aging
 #biotech #st
 #venturecap
 #investment

Peter H. Dian
 @PeterDiana
 Exec. Chairm
 @fountainlife
 human health

What's happeni

NBA · LIVE
Clippers at Suns

#ZéEntregaTudo
 É diversão? Chama o Z
 Promoted by Zé Delve

Entertainment · Trending
#LovesBlindLIVE
 157K Tweets

Politics · Trending
Carluxo
 Trending with Carlos Bols

Trending
#microbio23

Show more

Terms of Service Privacy
 Accessibility Ads Info
 © 2023 Twitter, Inc.



- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet



Tweet

Peter H. Diamandis, MD @PeterDiamandis · Feb 26
 It's never been easier to share your ideas and passions with the world.

49 64 511 356.6K

Michael Forrest @Forrest_PhD

Sharing: Aim is a Drug to Slow, Halt or Reverse Aging:

wefunder.com
 Invest in Biophysical Therapeutics, Inc.: Mission: Drug to Slow, Halt or Revers...
 Mission: Drug to Slow, Halt or Reverse Aging

6:33 AM · Feb 27, 2023 · 133 Views

View Tweet analytics

- Reply icon
- Retweet icon
- Like icon
- Bookmark icon
- Share icon

Tweet your reply

Reply

Michael Forrest @Forrest_PhD · Feb 27
 Important legal disclosure at help.wefunder.com/testing-the-wa...

26

Search Twitter

Relevant people

Michael Forre
 @Forrest_PhD
 Drug Inventor
 Biophysical TI
[#drug](#) [#aging](#)
[#biotech](#) [#st](#)
[#venturecapit](#)
[#investment](#)

Peter H. Dian
 @PeterDiana
 Exec. Chairm
[@fountainlife](#)
 human health

What's happeni

NBA · LIVE

Clippers at Suns

#ZéEntregaTudo

É diversão? Chama o Z
 Promoted by Zé Deliver

Entertainment · Trending

#LevelsBlindLIVE

157K Tweets

Politics · Trending

Carluxo

Trending with Carlos Bols

Trending in Brazil

#JacksonWangCoach

Trending with Frank ocean

Show more

Terms of Service Privacy
 Accessibility Ads Info
 © 2023 Twitter, Inc.

Michael Forrest
 @Forrest_PhD

Messages





- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

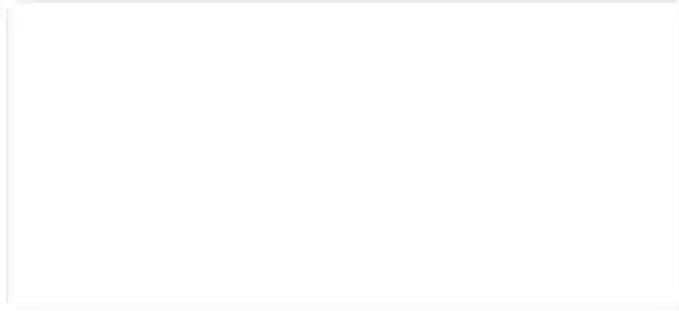
Tweet

Thread

Search Twitter

Michael Forrest
@Forrest_PhD

#longevity #drug #aging #venturecapital #startups #business #investing #TechnologyNews #technology #entrepreneurs



1:58 PM · Jan 20, 2023 · 228 Views

View Tweet analytics

1 Like

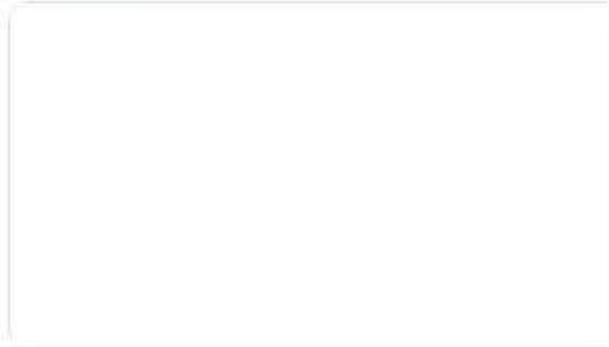


Tweet your reply

Reply

Michael Forrest @Forrest_PhD · Jan 20

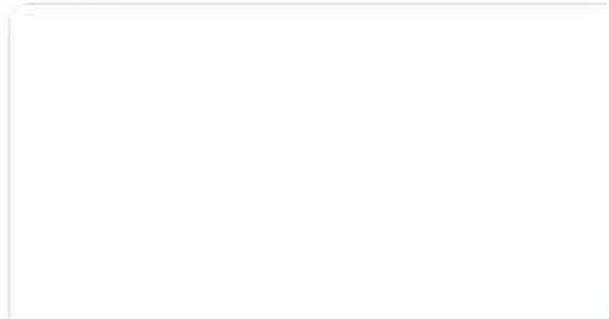
Extended version:



1 Retweet 162 Views

Michael Forrest @Forrest_PhD · Jan 20

Further info:



linkedin.com

Drug to Slow Aging?

Within and across mammal species, life span is proportional to resting metabolic rate (per unit mass). S

Relevant people

Michael Forrest
@Forrest_PhD
Drug Inventor
Biophysical TI
#drug #aging #biotech #startups #venturecapital #investment

What's happening

NBA · LIVE
Clippers at Suns

#ZéEntregaTudo
É diversão? Chama o Zé
Promoted by Zé Deliver

Business & finance · Trending
#shiba
18.7K Tweets

Politics · Trending
Carluxo

Michael Forrest
@Forrest_PhD

Messages





- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet



Tweet



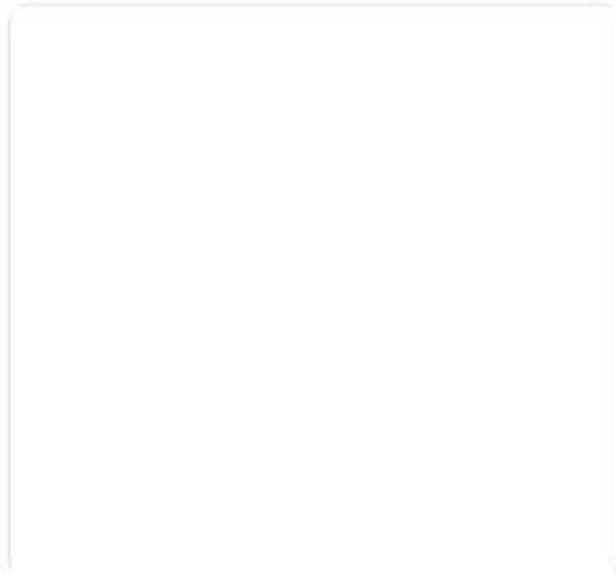
Search Twitter

Bryan Johnson @bryan_johnson · Jan 17
 My last two waking body temp: 95.5, 95.8 °F are 3° below avg due to 25% fewer calories. Longevity w/lower body temp.

A little less to make more...life in this case.

Excess is root cause for misery.

Vibrance is [] & Chill



18 5 181 85.3K

Michael Forrest
 @Forrest_PhD

Less metabolic heat generation might be (at least in part) how calorie restriction slows aging. Would be interesting to test my drug, which dose-dependently reduces metabolic heat generation, to see if it can mimic its age slowing effect.

4:42 PM · Jan 17, 2023 · 1,445 Views

View Tweet analytics

2 Likes



Tweet your reply

Reply

Relevant people

Michael Forre
 @Forrest_PhD
 Drug Inventor
 Biophysical TI
 #drug #aging
 #biotech #st
 #venturecapit
 #investment

Bryan Johnsc
 @bryan_johns
 Founder Blue
 @OSFund & @

What's happeni

NBA · LIVE

Clippers at Suns

#ZéEntregaTudo

É diversão? Chama o Z
 Promoted by Zé Deliver

Entertainment · Trending

#LevelsBlindLIVE

158K Tweets

Trending in Brazil

roseanne

12.1K Tweets

Sports · Trending

Lineker

3,229 Tweets

Show more

Terms of Service Privacy
 Accessibility Ads Info &
 © 2023 Twitter, Inc.

Michael Forrest
 @Forrest_PhD

Messages





- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

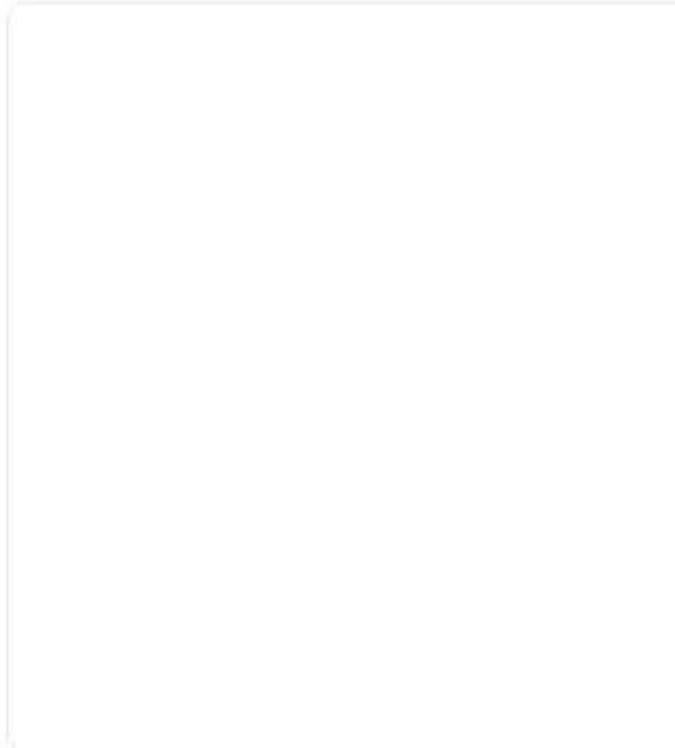
Tweet

Thread

Search Twitter

Agingdoc1 MD, PhD @agingdoc1

Has nature taught us how to slow aging?
Courtesy @Forrest_PhD
medium.com/@Michael_Forre...



5:19 PM · Oct 26, 2022

7 Retweets · 30 Likes · 4 Bookmarks



Tweet your reply

Reply

Agingdoc1 MD, PhD @agingdoc1 · Oct 26, 2022
Quick link to original publication from my @agingdoc1 longevity pubs archive:
twitter.com/agingdoc1/stat...

Agingdoc1 MD, PhD @agingdoc1 · Sep 17, 2022
FIFO ATP Hydrolysis is a Determinant of Metabolic Rate, a Correlate of Lifespan, and a Weakness of Cancer
@LEForrest @biorxivpreprint
biorxiv.org/content/10.110...
[Show this thread](#)



Michael Forrest @Forrest_PhD · 1m
Drug to Slow Aging?

Michael Forrest @Forrest_PhD

Relevant people

Agingdoc1 @agingdoc1
See pinned Geroscience/longevity, aglr exercise, heal rapamycin, ai advice

Michael Forrest @Forrest_PhD
Drug Inventor Biophysical TI #drug #aging #biotech #str #venturecap #investment

What's happeni

NBA · LIVE
Clippers at Suns

#74ExtracTwin

Messages





- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet

wefunder.com
 Invest in Biophysical Therapeutics, Inc.: Mission: Drug to Slow, Halt ...
 Mission: Drug to Slow, Halt or Reverse Aging

1 2

Michael Forrest @Forrest_PhD · 15s
 Testing the waters legal disclosure for link above:
help.wefunder.com/testing-the-wa...

David Sinclair @davidasinclair · Oct 26, 2022
 No. Larger animals have fewer predators. Fewer predators means you
 evolve to live longer

5 1 25

Michael Forrest @Forrest_PhD · Oct 27, 2022
 Agreed. By mechanism(s)?
 Metabolic rate is proposed as a mechanism in mammals. Falsifiable by
 drugs already in hand. With correlational and interventional evidence
 already in hand. E.g. decreasing metabolic heat generation extends
 mouse lifespan 20%.

1

Show replies

Michael Forrest @Forrest_PhD · Mar 6
 Related:

longevity.technology
 Longevity company Biophysical Therapeutics emerges from stealth
 Computational biology platform company plays it cool with a pipeline
 of experimentally-validated new drugs.

 3 4 682

Michael Forrest
@Forrest_PhD

Messages



Open in app ↗

Sign up

Sign in



Michael Forrest

Follow

Mar 31, 2022 · 6 min read · Listen



Save



Has nature taught us how to slow aging?

Different species age at different rates and have different maximal lifespans. For example, the maximal lifespan of a mouse is only 4 years, while that of a bowhead whale is 211 years. There **must** be a reason. If we could discover it, elucidating how nature modulates aging, we might be able to harness this power for ourselves.

A well-known thesis is that chemical reactions in the body (those for obtaining energy from food) produce harmful byproducts. Called Reactive Oxygen Species (ROS). And these cause molecular damage, which accumulates over time (aging).

A recent (preprint) [paper](#) [1], authored by Dr. Michael Forrest, adds to this thesis. This article is a summary of it. Mammals metabolically generate heat to maintain their body temperature. In geometry, smaller objects have a larger surface-area-to-volume ratio than larger objects. So, smaller mammal species have a larger surface-area-to-volume ratio. And so, they lose a higher fraction of their metabolically generated heat. Thus they must produce more heat per unit mass, requiring them to have a greater metabolic rate per unit mass (serviced by a greater heart rate). Therefore, generating more ROS per unit mass, per unit time. Accumulating (ROS caused) molecular damage faster. (*Possibly*) explaining why smaller mammal species tend to age faster and have shorter maximal lifespans.

How is the metabolic rate per unit mass of different sized mammal species set differently (which *possibly* in turn sets their different aging rates)? By the second law of thermodynamics, whenever energy converts from one form to another, some of this energy must be dissipated as ¹  energy conversion can be 100% efficient). Newly discovered, mammals *possibly* synthesize and hydrolyze a

specific chemical. Conditional upon passing, and pumping, protons along a concentration gradient, respectively. So, cyclically interconverting between chemical and potential energies. Which (by the inefficiency of energy conversions) generates heat to maintain body temperature. Energy from food sustains this cycle. **Smaller (*shorter lifespan*) species run this “futile” (merely heat-generating) cycle more than large (*longer lifespan*) species.**

DRUGS

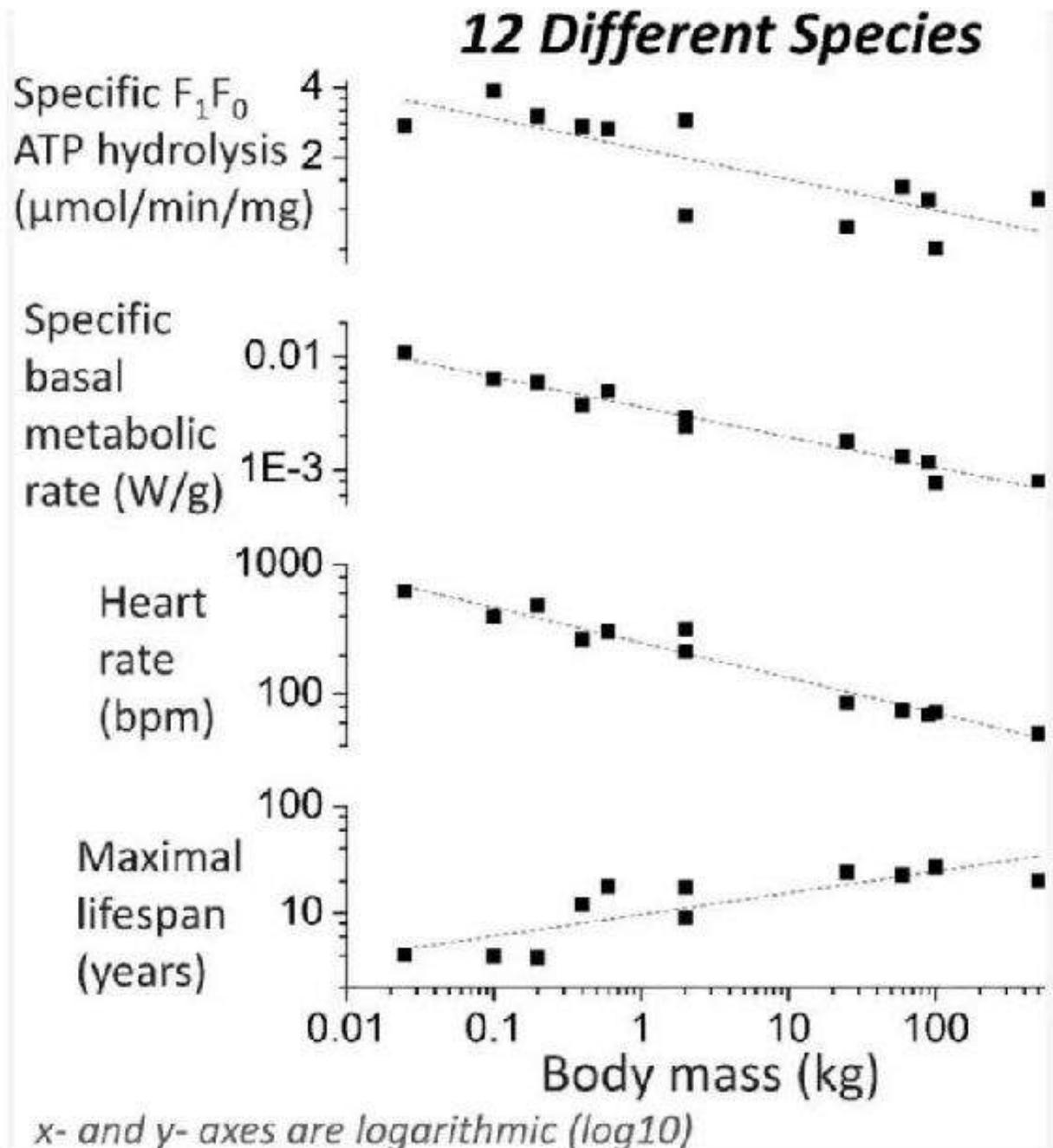
Dr. Forrest has designed drugs to selectively inhibit the hydrolysis component of this futile cycle, which can dramatically reduce metabolic heat generation in mice. Unproblematic if the mice are at a higher ambient temperature (or provided more bodily insulation) to substitute. Indeed, when the ambient temperature is 37°C (or more), the body does not need to contribute any heat for the body temperature to be at 37°C. A prediction is that these drugs will slow aging and increase lifespan. For example, regularly administering one of these drugs to a mouse (at a dose that can slow its metabolic rate per unit mass to that of a human {slowing its heart rate from 600 to 60 beats per minute}), with the ambient temperature set accordingly, is predicted to make this mouse live much longer. Perhaps as long as a human.

An awake human, in typical clothing, is comfortable at an ambient temperature of 21°C (their “thermoneutral temperature”). Administering one of these drugs (learning from studies in mice) increases the thermoneutral temperature, the dose dictating by how much. Where (no matter how high the drug dose) it can never increase the thermoneutral temperature to more than 37°C. Administering such a drug (at the cost of having a higher thermoneutral temperature {which isn’t a cost, but instead a benefit, in hotter climates/seasons}) is predicted to slow aging. And increase “healthspan” and lifespan. Optionally the drug is administered before sleep (sleeping in a heated room or under a blanket{s}). Totally or fractionally clearing from the body by morning. A slowdown in aging, which increases United States life expectancy by just 1 year, is worth 38 Trillion US dollars [2].

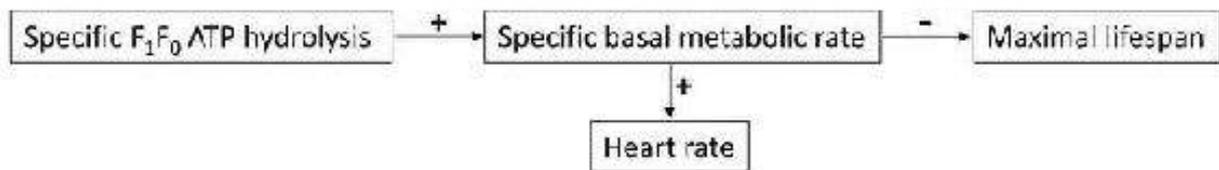
These drugs could have cosmetic applications. For example, when applied to the skin around the eyes. Expected: the metabolic and aging rate of this skin is slower. And heat transfer from the rest of the body (via blood flow) keeps this skin at 37°C. Globally, skincare is a \$162B market. Skincare products containing a powerful anti-aging drug (e.g., proven by lifespan extension in mice, optionally starting with old mice) will capture and grow this market.

DATA

Below is a figure from the paper. "Specific" means per unit mass. "F₁F₀ ATP hydrolysis" is the hydrolysis component of the aforementioned futile cycle.



Mediation analysis statistically supports the following model (interrelating the panels of the figure above):



From the data above:

Equation for maximal lifespan (*years*), x ,

in terms of specific F_1F_0 ATP hydrolysis ($\mu\text{mol}/\text{min}/\text{mg}$), y :

$$x = 10^{(\log_{10}(y) - 0.77685) / -0.46465}$$

Moreover, the paper shows (in mice) that inhibiting the futile cycle's hydrolysis component (specific F_1F_0 ATP hydrolysis) decreases specific metabolic rate. And the generation of Reactive Oxygen Species (ROS). Where (as said earlier) ROS might cause aging. Slowing the metabolic rate of mice (by genetic manipulation in the brain, which makes it direct less metabolic heat generation {body temperature drops by 0.34°C }) increases median lifespan by 20% [3]. In humans, in the Baltimore Longitudinal Study of Aging, people in the upper range of specific basal metabolic rate [4], and body temperature [5], have an increased risk of death (increased mortality).

ANTICANCER

Dr. Forrest has discovered that cancers disproportionately use F_1F_0 ATP hydrolysis. Indeed, distinctively from normal cells, they absolutely require it. Not for heat generation (which isn't an absolute need because exogenous heat {i.e., the ambient temperature} can substitute for its absence). But for operating their distinctive, abnormal, heavily glycolytic ("Warburg effect") metabolism. Indeed, a drug, which inhibits F_1F_0 ATP hydrolysis, exerts potent anticancer activity (against 60 different cancers from 9 tissues) *in vitro*. In testing at the National Cancer Institute (USA). With analysis proving that this anticancer action is by inhibiting F_1F_0 ATP hydrolysis. Refer to the paper for more, under its "Anti-cancer" heading (page 39 of PDF version).

Here is the promise of a cancer drug that (unlike present cancer drugs) helps rather than harms normal cells. Indeed, by making their metabolism more efficient (less chemical energy of food dissipated as heat), this drug may combat cachexia

(wasting/weight loss). Cachexia is prevalent in advanced cancer patients and is often the cause of death.

Anticancer utility confers margin to follow a clear and fast regulatory path to drug approval in humans. Afterward, the drug can be used/trialed as a treatment/preventative for other diseases of aging. Those many varied diseases whose incidence increases exponentially with age/aging. Such as Age-related Macular Degeneration (AMD) and Alzheimer's disease. If aging is causal to age-related diseases, (conceivably) a single drug, which slows aging, can confer therapy for all these (many and varied) diseases.

COMPANY

Dr. Forrest has a company, Biophysical Therapeutics. For the commercialization of these (and other, *including future*) discoveries and inventions. Patents, disclosing and protecting new drugs, have been filed in all major (and many minor) jurisdictions. With, to date, acceptances in Australia, Israel, and at the European Patent Office (EPO). He has bootstrapped to this point. Reachable at michael@biophysicaltherapeutics.com

[1] Forrest MD (2022) F1F0 ATP Hydrolysis is a Determinant of Metabolic Rate, a Correlate of Lifespan, and a Weakness of Cancer. [bioRxiv. Link](#).

[2] Scott et al. (2021) The economic value of targeting aging. *Nature Aging*:1–8.

[3] Conti et al. (2006) Transgenic mice with a reduced core body temperature have an increased life span. *Science*. 314(5800):825–828.

[4] Ruggiero et al. (2008) High basal metabolic rate is a risk factor for mortality: the Baltimore Longitudinal Study of Aging. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*. 63(7):698–706.

[5] Roth et al. (2002) Biomarkers of caloric restriction may predict longevity in humans. *Science*. 297(5582):811–811.

Longevity

Aging

Anti Aging

Healthspan

Cancer

[About](#) [Help](#) [Terms](#) [Privacy](#)

Get the Medium app



[News \(https://longevity.technology/\)](https://longevity.technology/)

[Investment \(https://longevity.technology/investment-portal/\)](https://longevity.technology/investment-portal/)

[Lifestyle \(https://longevity.technology/lifestyle/\)](https://longevity.technology/lifestyle/)

[Videos \(https://longevity.technology/category/videos/\)](https://longevity.technology/category/videos/)

[\(https://longevity.technology\)](https://longevity.technology/)

[\(https://longevity.technology\)](https://longevity.technology/)

News

[Home](https://longevity.technology/)

[Biotech](https://longevity.technology/category/biotech/)

[Investment](https://longevity.technology/category/investment/)

[Diagnostics](https://longevity.technology/category/diagnostics/)

[\(https://longevity.technology/\)](https://longevity.technology/)

[\(https://longevity.technology/category/biotech/\)](https://longevity.technology/category/biotech/)

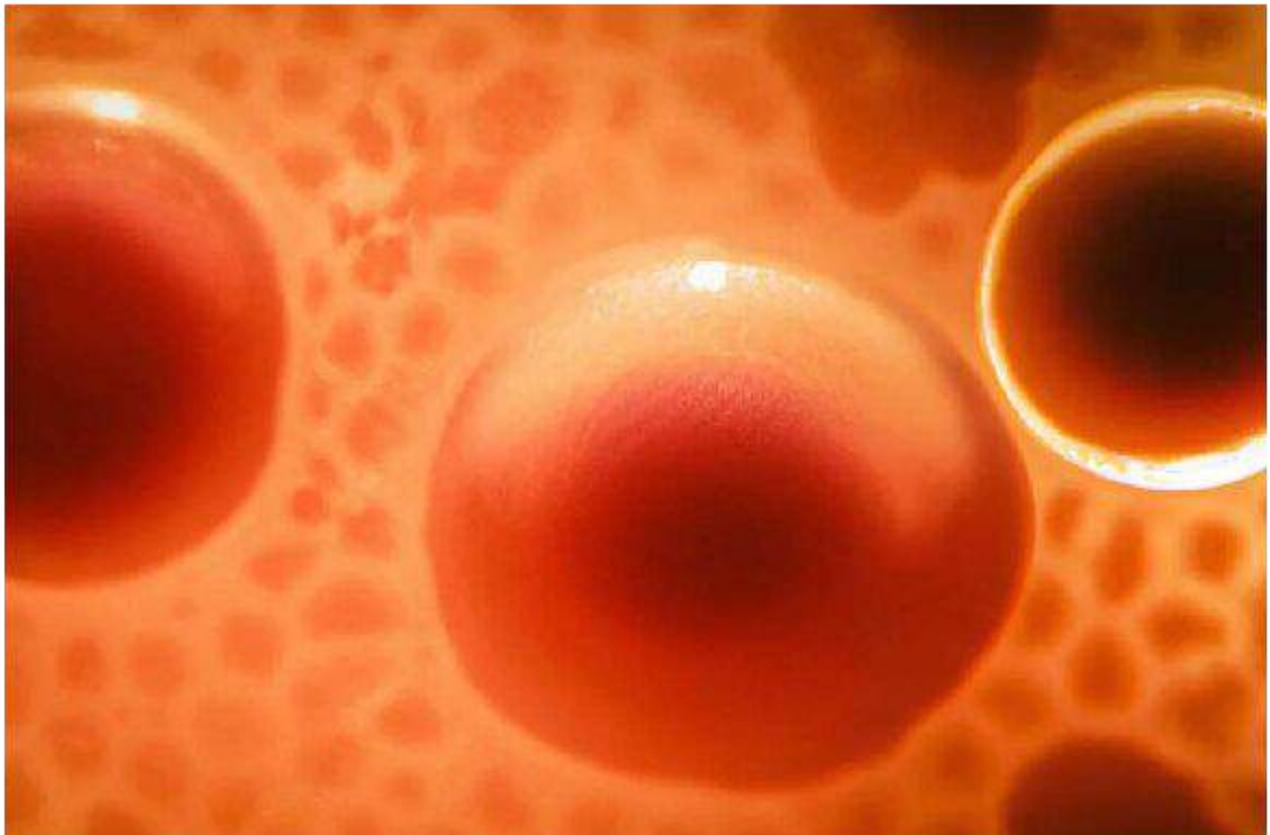
[\(https://longevity.technology/category/investment/\)](https://longevity.technology/category/investment/)

[\(https://longevity.technology/category/diagnostics/\)](https://longevity.technology/category/diagnostics/)

[News \(https://longevity.technology/\)](https://longevity.technology/) > [Biotech \(https://longevity.technology/category/biotech/\)](https://longevity.technology/category/biotech/)

Longevity company Biophysical Therapeutics emerges from stealth

Author: [Eleanor Garth \(https://longevity.technology/author/eleanor/\)](https://longevity.technology/author/eleanor/) | Published on: **March 6, 2023** | Last updated: **March 6, 2023**





Computational biology platform company plays it cool with a pipeline of experimentally-validated new drugs.

Biophysical Therapeutics, a drug discovery platform company that leverages computational biology, has emerged from stealth. The primary targets of the Delaware-based company are cancer, the diseases of aging (including Alzheimer's disease) and – excitingly – aging itself.

Founded by Dr Michael Forrest, a Cambridge University biochemistry graduate with a PhD in computer science, Biophysical Therapeutics boasts renowned biotech entrepreneur [Professor George Church](https://longevity.technology/tag/george-church/) (of [Harvard Medical School](https://longevity.technology/tag/harvard-medical-school/)) as an advisor to the company. Professor Bruno Conti of the Scripps Institute in La Jolla, California is also an advisor.

Longevity.Technology: Back in 2006, Conti and his team reported an exciting result in the prestigious journal Science. They showed (in female mice) that slightly reducing the metabolic rate by slightly reducing metabolic heat generation (decreasing body temperature by 0.34°C) increased lifespan by 20%.

Perhaps relatedly, [calorie restriction](https://longevity.technology/tag/calorie-restriction/), which is well known to extend the lifespan of (at least) mice, causes a slight decrease in body temperature in mice and humans. Moreover, different humans can vary in resting metabolic rate (per unit mass) and resting body temperature, wherein those with lower values live significantly longer. It definitely seems to be a case of less is more – in this case, making metabolic rate less can extend the lifespan of worms, flies, wasps, fish, mice and probably many other species.

As so often seems to be the case, metabolism is a finely-balanced biological process that has something of a double-edged sword nature to it, so we were glad to catch up with Dr Forrest to understand more about that process and how Biophysical Therapeutics plans to leverage that knowledge.

Forrest explains: "Conti *et al*'s research fits a thesis in which metabolic rate, that is oxygen consumption rate, enables life, but also causes damaging byproducts and accumulating damage, which is aging, that ultimately takes life away."

In mammals, the majority of metabolic rate is for metabolic heat generation to maintain the body temperature at around 37°C. Conti and team slightly reduced the metabolic heat generation of mice by genetic manipulation in the brain, and in work in mice, Forrest has since discovered the chemical reaction mammals use to metabolically generate heat and a drug to inhibit it. How much metabolic heat generation – and, thereby, metabolic rate – decrease depends upon the administered drug dose. By Professor Conti's extended lifespan result, and other data, Biophysical Therapeutics predicts this drug can slow aging and extend lifespan.

"Body temperature can be the same with less metabolic heat generation by proportionally greater bodily insulation, such as wearing more or better clothing, or conducive ambient temperature," Forrest explains. "A human, in typical clothing, is most comfortable at an ambient temperature of 20°C, but much of the world is hotter, at least for part of the year, especially when close to the equator."

In fact, 43% of the world's population lives in the tropics, and Biophysical Therapeutics' drug might, by dose-dependently reducing metabolic heat generation, increase thermal comfort in hot places, possibly slowing aging.

To illustrate this, Forrest uses the example that a relatively small drug dose might increase a clothed person's preferred ambient temperature to 23°C, a higher dose to 27°C, an even higher dose to 32°C, and so on.

"When metabolic heat generation is low, the preferred ambient temperature is close to 37°C. When the ambient temperature is 37°C or more, no metabolic heat generation is needed for the body to be at 37°C. Incidentally, the drug's effect dissipates over time as the drug clears from the body, if not prolonged by another dose," he explains.

"Biophysical Therapeutics has discovered something fundamental, how mammals metabolically generate heat. And a drug to inhibit it, shown to work in mice," Forrest says.

He adds: "This drug will allow us to investigate further the inverse relationship observed within, and across, mammal species between metabolic rate per unit mass and lifespan. What happens to lifespan if a mouse's metabolic rate per unit mass is drug reduced to that of a whale? When the mouse's ambient temperature is 37°C, meaning any metabolic heat generation is superfluous because the mouse's body temperature can be 37°C merely by equilibration with the ambient temperature, we might reveal – if greatly extending a mouse's lifespan thereby – that the lifespan difference between mice

and whales is, at least in part, because a mouse performs more metabolic heat generation per unit mass, as it is smaller, so by the square-cube law of geometry has a larger surface-area-to-volume ratio, meaning it loses metabolically generated heat more readily."

Forrest adds that Professor [Brian Kennedy](https://longevity.technology/tag/brian-kennedy/) (https://longevity.technology/tag/brian-kennedy/), Director of the Centre for Healthy Longevity at the National University of Singapore (and Ex-CEO of the Buck Institute for Research on Aging in California), wants to do a mice lifespan study with this drug, expedited by starting with old mice.

Across a set of mammal species, Biophysical Therapeutics has shown that maximal lifespan is inversely proportional to the use (per unit mass) of its newly discovered reaction for metabolic heat generation; the company believes that drives the inverse proportionality between metabolic rate per unit mass and maximal lifespan, which causes the inverse proportionality between heart rate and maximal lifespan, observed in the same set of mammal species.

So, how does the company plan to leverage this thinking? The answer is to start small, as Forrest explains.

"When this drug is applied topically to a small body part, such as to the face in a cream, it will reduce metabolic heat generation at that location, reducing metabolic rate and thereby slow aging there. Wherein, heat transfer from the rest of the body, via blood flow, maintains this body part at around 37°C because topical use can't reduce body temperature at any ambient temperature."

This means the company's initial focus is cosmetic applications, and it is aiming to license cosmetic use of its patented drug to a cosmetics company for profit share. For this, the key milestone is testing if this drug can slow the aging of human tissue *ex vivo*, which (once commenced) should take less than six months and has the added bonus of being a relatively cheap experiment. Cosmetics are not legally required to undergo any animal or human trials, which also expedites progress to market.

The [cosmetics market](https://longevity.technology/tag/aesthetics/) (https://longevity.technology/tag/aesthetics/) is enormous, with consumers often spending a great deal on products that have little to no efficacy and only tackle the appearance of aging skin, rather than doing something about the aging itself.

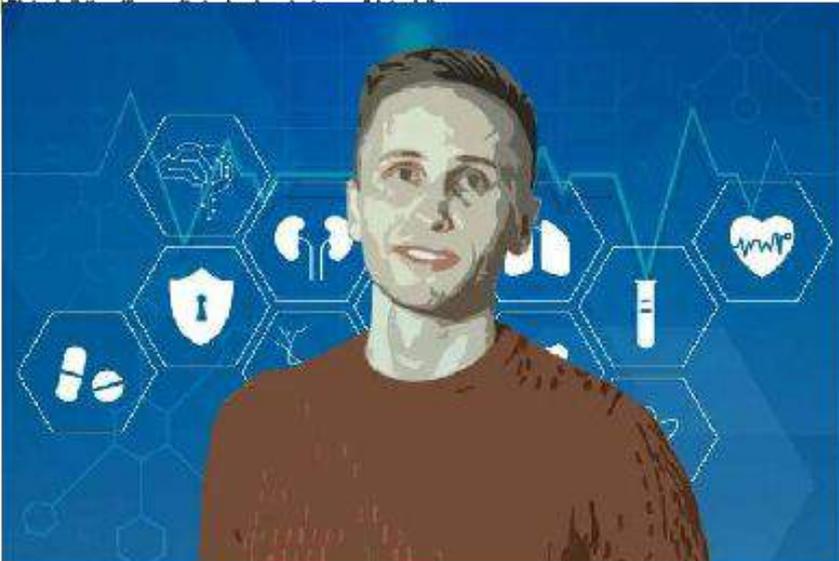
"Cosmetics that contain an antiaging compound that works much better – as illustrated by dramatically extended mouse lifespan – might capture much of the market. And possibly grow it," Forrest neatly concludes.

Check out our free Advanced Aesthetics report to discover how the root causes of skin aging are being targeted and tackled. (<https://longevity.technology/research/report/advanced-aesthetics/>)

Share this article: [✉ \(/#email\)](#) [f \(/#facebook\)](#) [t \(/#twitter\)](#) [in \(/#linkedin\)](#)

Editor's choice

Longevity investment: 'Good companies will continue to get funded' (<https://longevity.technology/news/longevity-investment-good-companies-will-continue-to-get-funded/>)



(<https://longevity.technology/news/improving-longevity-literacy-and-why-digital-health-is-the-answer/>)

Improving longevity literacy – and why digital health is the answer (<https://longevity.technology/news/improving-longevity-literacy-and-why-digital-health-is-the-answer/>)

| AI/Digital (<https://longevity.technology/category/ai-digital/>)



(<https://longevity.technology/news/longevity-investment-bulletin-sofinnova-aviceda-nrg-therapeutics-and-more/>)

Longevity investment bulletin: Sofinnova, Aviceda, NRG Therapeutics and more (<https://longevity.technology/news/longevity-investment-bulletin-sofinnova-aviceda-nrg-therapeutics-and-more/>)

| Investment (<https://longevity.technology/category/investment/>)



(<https://longevity.technology/news/clearday-and-viveon-health-spac-announce-merger-agreement-to-accelerate-innovative-longevity-tech/>)

Clearday and Viveon Health SPAC announce merger agreement to accelerate innovative longevity tech
 (<https://longevity.technology/news/clearday-and-viveon-health-spac-announce-merger-agreement-to-accelerate-innovative-longevity-tech/>)

| Agotech (<https://longevity.technology/category/agotech/>)



(<https://longevity.technology/news/longevity-leaders-weigh-in-on-investment-downturn/>)

Longevity leaders weigh in on investment downturn (<https://longevity.technology/news/longevity-leaders-weigh-in-on-investment-downturn/>)

| Investment (<https://longevity.technology/category/investment/>)



(<https://longevity.technology/news/mitochondrial-therapy-could-tackle-aging-from-the-inside-out/>)

Mitochondrial therapy could tackle aging from the inside out (<https://longevity.technology/news/mitochondrial-therapy-could-tackle-aging-from-the-inside-out/>)

| Biotech (<https://longevity.technology/category/biotech/>)



(<https://longevity.technology/news/tally-up-consumer-longevity-company-lands-10m/>)

Tally up! Consumer longevity company lands \$10m (<https://longevity.technology/news/tally-up-consumer-longevity-company-lands-10m/>)

| Diagnostics (<https://longevity.technology/category/diagnostics/>)



(<https://longevity.technology/news/fountain-life-longevity-real-estate-built-on-prevention-and-detection/>)

Fountain Life: longevity real estate built on prevention and detection (<https://longevity.technology/news/fountain-life-longevity-real-estate-built-on-prevention-and-detection/>)

| Investment (<https://longevity.technology/category/investment/>)



(<https://longevity.technology/news/new-alliance-forms-to-deliver-tech-driven-personalized-preventive-longevity-solutions/>)

New alliance forms to deliver tech-driven, personalized, preventive longevity solutions (<https://longevity.technology/news/new-alliance-forms-to-deliver-tech-driven-personalized-preventive-longevity-solutions/>)

| Economy (<https://longevity.technology/category/economy/>)



(<https://longevity.technology/news/longevity-investment-bulletin-cognito-david-sinclair-celularity-and-more/>)

Longevity investment bulletin: Cognito, David Sinclair, Celularity and more

(<https://longevity.technology/news/longevity-investment-bulletin-cognito-david-sinclair-celularity-and-more/>)

| Investment (<https://longevity.technology/category/investment/>)



(<https://longevity.technology/news/longevity-is-pivotal-to-accelerating-social-progress/>)

Longevity is 'Pivotal' to accelerating social progress (<https://longevity.technology/news/longevity-is-pivotal-to-accelerating-social-progress/>)

| Economy (<https://longevity.technology/category/economy/>)



(<https://longevity.technology/news/longevity-investment-bulletin-turn-bio-celularity-myndyou-and-more/>)

Longevity investment bulletin: Turn Bio, Celularity, MyndYou and more. (<https://longevity.technology/news/longevity-investment-bulletin-turn-bio-celularity-myndyou-and-more/>)

| Investment (<https://longevity.technology/category/investment-investment/>)



(<https://longevity.technology/news/longevity-venture-partners-raises-30m-to-advance-aging-in-place-and-longevity-solutions/>)

Longevity Venture Partners raises \$30m to advance aging-in-place and longevity solutions (<https://longevity.technology/news/longevity-venture-partners-raises-30m-to-advance-aging-in-place-and-longevity-solutions/>)

| Investment (<https://longevity.technology/category/investment-investment/>)



(<https://longevity.technology/news/longevity-investment-bulletin-unity-neurosense-huma-and-more/>)

Longevity investment bulletin: UNITY, NeuroSense, Huma and more (<https://longevity.technology/news/longevity-investment-bulletin-unity-neurosense-huma-and-more/>)

| Investment (<https://longevity.technology/category/investment-investment/>)



(<https://longevity.technology/news/longevity-supplements-firm-eyes-pet-longevity/>)

Longevity supplements firm eyes pet longevity (<https://longevity.technology/news/longevity-supplements-firm-eyes-pet-longevity/>)

| Investment (<https://longevity.technology/category/investment-investment/>)

Find us here ...

Subscribe to our newsletter

[ram.com/longevity.technology/](https://longevity.technology/))

(<https://longevity.technology>)

| News | Investment | Lifestyle | More |
|--|--|--|---|
| Home https://longevity.technology/ | Investment portal https://longevity.technology/investment-portal/ | Home https://longevity.technology/lifestyle/ | Contact https://longevity.technology/contact/ |
| Biotech https://longevity.technology/category/biotech/ | Investment portal login https://longevity.technology/investment-portal/login/ | Supplements https://longevity.technology/lifestyle/category/supplements/ | Features https://longevity.technology/category/features/ |
| Investment https://longevity.technology/category/investment/ | Register as an investor https://longevity.technology/investment-portal/register-as-an-investor/ | Self-testing https://longevity.technology/lifestyle/category/self-testing/ | |
| Diagnostics https://longevity.technology/category/diagnostics/ | aa-an-investor/ https://longevity.technology/investment-portal/aa-an-investor/ | Exercise https://longevity.technology/lifestyle/category/exercise/ | |
| Agtech https://longevity.technology/category/agtech/ | | Nutrition https://longevity.technology/lifestyle/category/nutrition/ | |
| Supplements https://longevity.technology/category/supplements/ | | Tech https://longevity.technology/lifestyle/category/tech/ | |
| Innovation https://longevity.technology/category/innovation/ | | Mental wellness https://longevity.technology/lifestyle/category/mental-wellness/ | |
| AI/Digital https://longevity.technology/category/ai-digital/ | | Product reviews https://longevity.technology/lifestyle/category/product-reviews/ | |
| Economy https://longevity.technology/category/economy/ | | | |

© Copyright 2023 FIRST LONGEVITY Limited. All rights reserved. FIRST LONGEVITY

First Longevity Ltd is an appointed representative of Prospect Capital Ltd which is authorised and regulated by the Financial Conduct Authority. The information included in this website is for informational purposes only; its purpose is to promote a broad consumer understanding and knowledge of various health topics. It is not intended to be a substitute for professional medical advice, diagnosis or treatment. Always seek the advice of your physician or other qualified health care provider with any questions you may have regarding a medical condition or treatment and before undertaking a new health care regimen, and never disregard professional medical advice or delay in seeking it because of something you have read on this website.

[Editorial Policy \(https://www.longevity.technology/editorial-policy/\)](https://www.longevity.technology/editorial-policy/) [Privacy Policy \(https://www.longevity.technology/privacy/\)](https://www.longevity.technology/privacy/)
[Cookie Policy \(https://www.longevity.technology/cookies/\)](https://www.longevity.technology/cookies/) [Conditions of Business \(https://www.longevity.technology/conditions-of-business/\)](https://www.longevity.technology/conditions-of-business/)
[Terms and Conditions \(https://www.longevity.technology/terms-and-conditions/\)](https://www.longevity.technology/terms-and-conditions/) [Copyright Policy \(https://www.longevity.technology/copyright-policy/\)](https://www.longevity.technology/copyright-policy/)



Longevity company with a drug welcomes those wanting to participate in longevity the opportunity to get skin in the game.

We recently [broke the news](https://longevity.technology/news/longevity-company-biophysical-therapeutics-emerges-from-stealth/) (https://longevity.technology/news/longevity-company-biophysical-therapeutics-emerges-from-stealth/) that Delaware-based Biophysical Therapeutics recently emerged from stealth. Now the company, which was founded by Dr Michael Forrest and counts Professor George Church (Harvard Medical School) and Professor Bruno Conti (Scripps Research Institute) as advisors, is accepting investments by crowdfunding.

Longevity.Technology: Slowing metabolic rate slows aging and extends the lifespan of mice (and other species tested), so a drug that slows metabolic rate could tap into those antiaging benefits – and Biophysical Therapeutics has such a drug.

When applied topically to the body, Biophysical Therapeutics' drug reduces metabolic heat generation at that location, reducing metabolic rate and (to extrapolate) slowing aging there. The area would not actually feel cold, either, as heat transfer from the rest of the body would keep this location warm. This metabolic rate-reducing ability of the drug means it could be an ideal ingredient in cosmetics, lending itself to antiaging face creams, &c – and Biophysical Therapeutics' initial focus is cosmetic applications. Its next milestone is testing (over six months) if this drug can slow human tissue aging, and a positive result might make the company extremely valuable.

Crowdfunding (https://longevity.technology/tag/crowdfunding/) is a concept we are seeing more of in longevity – from the [Longevity Campaign](https://longevity.technology/news/longevity-campaign-will-crowdfund-better-aging-for-all/) (https://longevity.technology/news/longevity-campaign-will-crowdfund-better-aging-for-all/) to [Gerostate Alpha](https://longevity.technology/news/gerostate-passes-crowdfunding-goal-for-antiaging-drug-platform/) (https://longevity.technology/news/gerostate-passes-crowdfunding-goal-for-antiaging-drug-platform/), crowdfunding is not only a way to test the investment waters, but to encourage people to quite literally invest in their own future. As well as raising the profile of the longevity space, given the recent biotech investment worries caused by Silicon Valley Bank's collapse, broadening investment to the wider community makes good financial sense.

L-R: Dr Michael Forrest, Professor George Church and Professor Bruno Conti

Forrest told Longevity.Technology: "It all adds up – by accepting small amounts of money from a large number of people, we are hoping it will all add up to a significant sum of money, with each person getting part of the company, in proportion to their investment size. Rather than accepting a large amount of money from just a few investors, we are taking a more democratic approach and hoping lots of people join us on our longevity journey."

He adds: "Legally, for a long time in the United States, start-up investing was restricted to high net-worth individuals, widening the wealth gap, but recently this injustice has been recognized and resolved. Since 2021, new US Securities and Exchange Commission [SEC] regulations allow start-ups to accept up to \$5 million annually through crowdfunding."

Forrest explains that Biophysical Therapeutics is well-suited to crowdfunding because it has broad appeal as everyone ages – and no one wants to.

"Conceivably, the financial opportunity is so great that a life-changing return can come from a small investment," he says. "A drug for aging revolutionizes cosmetics and medicine. Probably many diseases – such as Alzheimer's disease – only occur in older people because they are, at least partly, caused by aging. So a drug that slows aging could be therapeutic for the many varied diseases of aging. Averting the coming demographic crisis in which much of the population suffers, and is debilitated by, at least one of them."

Biophysical Therapeutics is [crowdfunding on the Wefunder platform](https://wefunder.com/biophysical.therapeutics1) (https://wefunder.com/biophysical.therapeutics1) (funded by Y Combinator). Its target raise, and minimum investment size (\$100), are both relatively small, making this an interesting opportunity for those looking to dip a toe in the longevity investment waters.

(<https://longevity.technology/investment/>)

Share this article: [✉ \(/#email\)](#) [f \(/#facebook\)](#) [t \(/#twitter\)](#) [in \(/#linkedin\)](#)



Editor's choice



Empowering cells to boost energy and recovery is a winning move
(<https://longevity.technology/power-up-empowering-cells-to-boost-energy-and-recovery-is-a-winning-move/>)

(<https://longevity.technology/power-up-empowering-cells-to-boost-energy-and-recovery-is-a-winning-move/>)



Study disproves benefits of probiotics for vaginal health
(<https://longevity.technology/lifestyle/study-disproves-benefits-of-probiotics-for-vaginal-health/>)

(<https://longevity.technology/lifestyle/study-disproves-benefits-of-probiotics-for-vaginal-health/>)



How do Tour De France athletes recover so fast? Performance coach reveals the secret
(<https://longevity.technology/lifestyle/how-do-tour-de-france-athletes-recover-so-fast-performance-coach-reveals-the-secret/>)

(<https://longevity.technology/lifestyle/how-do-tour-de-france-athletes-recover-so-fast-performance-coach-reveals-the-secret/>)



9 proven ways to beat brain fog and enhance your energy
(<https://longevity.technology/lifestyle/how-to-beat-brain-fog-and-enhance-your-energy/>)

(<https://longevity.technology/lifestyle/how-to-beat-brain-fog-and-enhance-your-energy/>)



Longevity investment platform opens-up to international investors
(<https://longevity.technology/new-longevity-investment-platform-launches/>)

(<https://longevity.technology/new-longevity-investment-platform-launches/>)



Urolithin A research opens door to osteoarthritis relief (<https://longevity.technology/urolithin-a-research-opens-door-to-osteoarthritis-relief/>)

(<https://longevity.technology/urolithin-a-research-opens-door-to-osteoarthritis-relief/>)

(<https://longevity.technology/urolithin-a-research-opens-door-to-osteoarthritis-relief/>)



Popular articles



Tally up! Consumer longevity company lands \$10m (<https://longevity.technology/news/tally-up-consumer-longevity-company-lands-10m/>)

(<https://longevity.technology/news/tally-up-consumer-longevity-company-lands-10m/>)

up-
consumer-
longevity-
company-
lands-
10m/)



Longevity AI partners with Israel's leading HMO (<https://longevity.technology/news/longevity-ai-partners-with-israels-leading-hmo/>)

(<https://longevity.technology/news/longevity-ai-partners-with-israels-leading-hmo/>)



Fountain Life: longevity real estate built on prevention and detection (<https://longevity.technology/news/fountain-life-longevity-real-estate-built-on-prevention-and-detection/>)

(<https://longevity.technology/news/fountain-life-longevity-real-estate-built-on-prevention-and-detection/>)



SRW – changing how we experience aging at a cellular level (<https://longevity.technology/news/srw-changing-how-we-experience-aging-at-a-cellular-level/>)

(<https://longevity.technology/news/srw-changing-how-we-experience-aging-at-a-cellular-level/>)



Mitochondrial therapy could tackle aging from the inside out (<https://longevity.technology/news/mitochondrial-therapy-could-tackle-aging-from-the-inside-out/>)

(<https://longevity.technology/news/mitochondrial-therapy-could-tackle-aging-from-the-inside-out/>)



(<https://longevity.technology/news/longevity-supplements-firm-eyes-pet-longevity/>)

Longevity supplements firm eyes pet longevity (<https://longevity.technology/news/longevity-supplements-firm-eyes-pet-longevity/>)

Investment (<https://longevity.technology/category/investment-investment/>)

Find us here ...

Subscribe to our newsletter

www.firstlongevity.com/longevity.technology/

[\(https://longevity.technology/\)](https://longevity.technology/)

News

Home

<https://longevity.technology/>

Biotech

<https://longevity.technology/category/biotech/>

Investment

<https://longevity.technology/category/investment/>

Diagnostics

<https://longevity.technology/category/diagnostics/>

Agtech

<https://longevity.technology/category/agtech/>

Supplements

<https://longevity.technology/category/supplements/>

Innovation

<https://longevity.technology/category/innovation/>

AI/Digital

<https://longevity.technology/category/ai-digital/>

Economy

<https://longevity.technology/category/economy/>

Investment

Investment portal

[\(https://longevity.technology/investment-portal/\)](https://longevity.technology/investment-portal/)

Investment portal login

[\(https://longevity.technology/investment-portal/login/\)](https://longevity.technology/investment-portal/login/)

Register as an investor

[\(https://longevity.technology/investment-portal/register/\)](https://longevity.technology/investment-portal/register/)

Invest as an investor

[\(https://longevity.technology/investment-portal/invest/\)](https://longevity.technology/investment-portal/invest/)

Lifestyle

Home

[\(https://longevity.technology/lifestyle/\)](https://longevity.technology/lifestyle/)

Supplements

[\(https://longevity.technology/category/features/\)](https://longevity.technology/category/features/)

Self-testing

[\(https://longevity.technology/lifestyle/category/self-testing/\)](https://longevity.technology/lifestyle/category/self-testing/)

Exercise

[\(https://longevity.technology/lifestyle/category/exercise/\)](https://longevity.technology/lifestyle/category/exercise/)

Nutrition

[\(https://longevity.technology/lifestyle/category/nutrition/\)](https://longevity.technology/lifestyle/category/nutrition/)

Tech

[\(https://longevity.technology/lifestyle/category/tech/\)](https://longevity.technology/lifestyle/category/tech/)

Mental wellness

[\(https://longevity.technology/lifestyle/category/mental-wellness/\)](https://longevity.technology/lifestyle/category/mental-wellness/)

Product reviews

[\(https://longevity.technology/lifestyle/category/product-reviews/\)](https://longevity.technology/lifestyle/category/product-reviews/)

More

Contact

[\(https://longevity.technology/contact/\)](https://longevity.technology/contact/)

Features

[\(https://longevity.technology/category/features/\)](https://longevity.technology/category/features/)

© Copyright 2023 FIRST LONGEVITY Limited.

All rights reserved. FIRST LONGEVITY

First Longevity Ltd is an appointed representative of Prospect Capital Ltd which is authorised and regulated by the Financial Conduct Authority. The information included in this website is for informational purposes only; its purpose is to promote a broad consumer understanding and knowledge of various health topics. It is not intended to be a substitute for professional medical advice, diagnosis or treatment. Always seek the advice of your physician or other qualified health care provider with any questions you may have regarding a medical condition or treatment and before undertaking a new health care regimen, and never disregard professional medical advice or delay in seeking it because of something you have read on this website.

[Editorial Policy \(https://www.longevity.technology/editorial-policy/\)](https://www.longevity.technology/editorial-policy/) [Privacy Policy \(https://www.longevity.technology/privacy/\)](https://www.longevity.technology/privacy/)

[Cookie Policy \(https://www.longevity.technology/cookies/\)](https://www.longevity.technology/cookies/) [Conditions of Business \(https://www.longevity.technology/conditions-of-business/\)](https://www.longevity.technology/conditions-of-business/)

[Terms and Conditions \(https://www.longevity.technology/terms-and-conditions/\)](https://www.longevity.technology/terms-and-conditions/) [Copyright Policy \(https://www.longevity.technology/copyright-policy/\)](https://www.longevity.technology/copyright-policy/)



Home



My Network



Jobs



Messaging



Notifications



More



For Business



Create your own newsletter

Start your own discussion with a newsletter by LinkedIn. Share what you know and build your thought leadership with every new edition.

[Try it out](#)

New Drug Candidate for Alzheimer's Disease



Michael Forrest Ph.D.

Drug Investor | Founder at Alphysical Therapeutics

2 articles

January 25, 2023

Humans (and mice) with Alzheimer's disease have abnormally high body temperatures. As shown in mice, higher body temperature accelerates Alzheimer's disease progression (e.g., causing much faster cognitive decline and amyloid plaque build-up in the brain). Logical because Alzheimer's disease progression comprises at least one chemical reaction. And (by chemical law) chemical reactions run exponentially faster at higher temperatures. I've discovered how mammals metabolically generate heat and invented a drug to (dose-dependent y) inhibit it (**working** in mice), predicted to slow Alzheimer's disease progression. Conceivably, FDA approval for Alzheimer's disease could come from this drug reducing the abnormally high body temperature of Alzheimer's patients to normality. Optionally to the lower end of the observed range across healthy humans (35.2-37.7°C). Through the FDA's Accelerated Approval Program (approval by countering a disease biomarker). A relatively quick and cheap trial. The financial burden of Alzheimer's disease is \$multi-trillion and growing. Desperate unmet medical need.

- In mice, a body temperature of 0.65°C less reduces amyloid plaque by nearly as much as Aducanumab drug at its highest pre-clinical dose. Reducing amyloid plaque is an already used biomarker for expedited FDA approval for Alzheimer's disease (by FDA's Accelerated Approval

Program). 0.65°C is less than (imperceptible) intra-day and inter-day variations in body temperature.

- Different healthy humans vary in resting metabolic rate (per unit mass) and resting body temperature (35.2-37.7°C), where'n those with lower values have (over subsequent long-term monitoring) more healthy years and longer lifespans. To interpret, they age slower. Mice with reduced metabolic heat generation, with a mean body temperature of 0.34°C less, live 20% longer. Alzheimer's disease may correlate with age/aging because aging is a drive to (and of) it.

(P.S. Aducanumab drug is FDA-approved for Alzheimer's disease. But it can cause serious side effects and may kill some.)

PAPER (preprint) [HERE](#)

[#alzheimers](#) [#alzheimersdisease](#) [#alzheimersresearch](#)
[#alzheimer](#) [#alzheimerssupport](#) [#alzheimerscare](#)
[#neurodegeneration](#) [#neurodegenerativediseases](#)
[#dementia](#) [#dementiaawareness](#) [#alzheimersawareness](#)
[#neuroscience](#) [#neurology](#) [#neurologist](#) [#neurologists](#)
[#neurological](#) [#neuron](#) [#brain](#) [#brainhealth](#) [#brainscience](#)
[#amyloid](#) [#biogen](#) [#eisai](#) [#elililly](#) [#novartis](#) [#lunbeck](#)
[#aducanumab](#) [#lecanemab](#) [#donanemab](#) [#aduhelm](#)
[#leqembi](#) [#dementiacare](#) [#dementiasupport](#) [#dementia](#)
[#longevity](#) [#longevitydrug](#) [#longbio](#) [#aging](#) [#ageing](#)
[#antiaging](#) [#geroscience](#) [#gerontology](#) [#biogerontology](#)
[#longevityeconomy](#) [#dementiaresearch](#)
[#alzheimerssociety](#) [#healthspan](#) [#lifespan](#) [#drug](#)
[#medicine](#) [#geroprotector](#) [#biotech](#) [#biotechnology](#)
[#pharmaceuticals](#) [#drugdiscovery](#) [#drugdevelopment](#)
[#drugdesign](#) [#drugs](#) [#science](#) [#research](#) [#innovation](#)
[#biology](#) [#biochemistry](#) [#pharmacology](#) [#pharmacy](#)
[#pathology](#) [#physiology](#) [#venturecapital](#) [#vc](#) [#vcfunding](#)
[#venture](#) [#familyoffice](#) [#investment](#) [#startup](#) [#startups](#)
[#invention](#) [#inventor](#) [#patent](#) [#patents](#) [#entrepreneur](#)
[#entrepreneurship](#) [#bioentrepreneur](#) [#health](#) [#fitness](#)
[#FDA](#) [Biophysical Therapeutics](#)

Published by:



Michael Forrest, Ph.D.
 Co-Founder | Founder at Biophysical Therapeutics
 Published 4 years

2 articles



Home



My Network



Jobs



Messaging



Notifications



More



For Business



Net

Create your own newsletter

Start your own discussion with a newsletter on LinkedIn. Share what you know and build your thought leadership with every new edition.

[Try it out](#)

Drug to Slow Aging?



Michael Forrest Ph.D.

Drug Inventor | Founder at Biophysical Therapeutics

2 articles

January 9, 2023

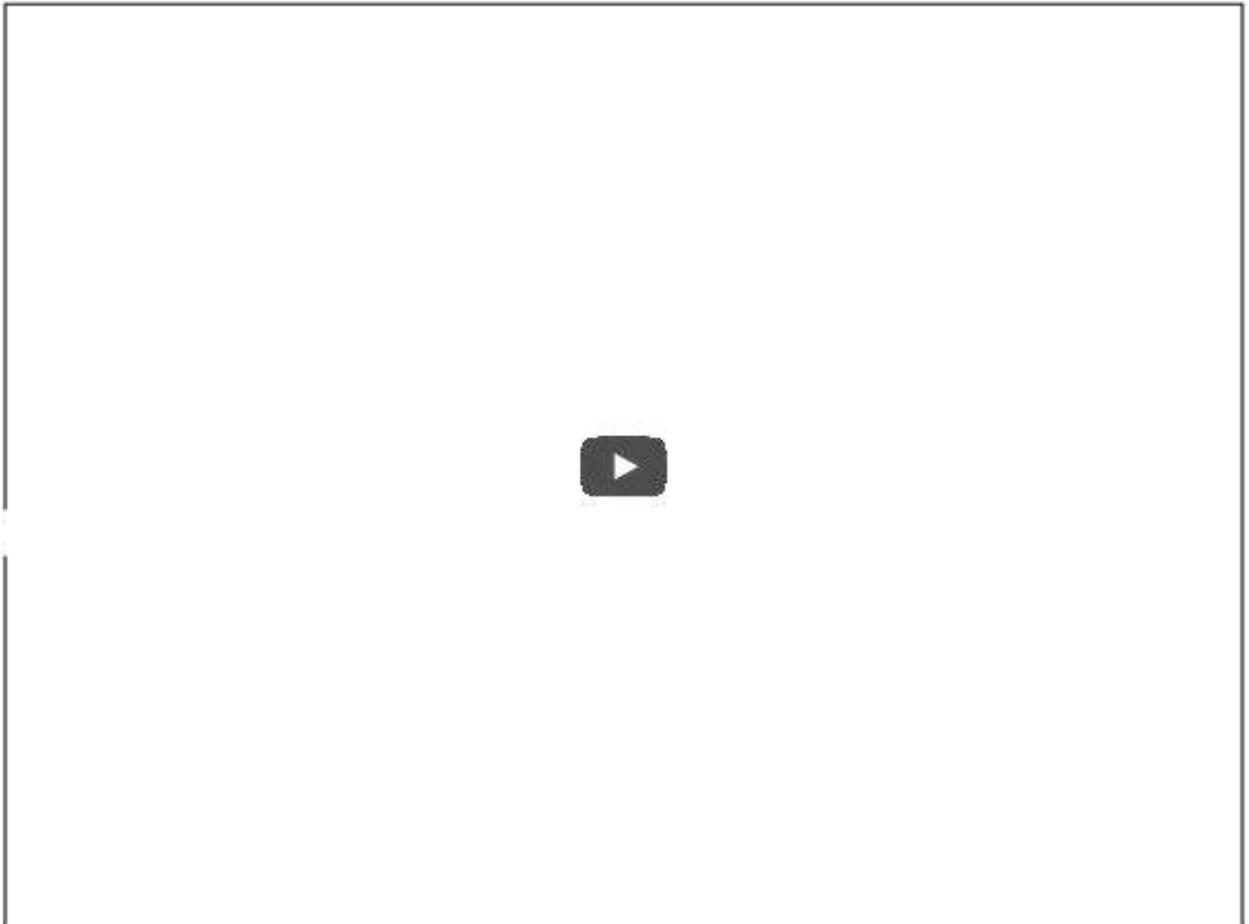
Within and across mammal species, lifespan is inversely proportional to resting metabolic rate (per unit mass). So might reducing the latter increase the former? Whereby metabolic rate enables life but produces damaging by-products, which cause accumulating damage (aging) that ultimately takes life away. In mammals (which have a body temperature of 37°C), the majority of metabolic rate is for metabolic heat generation. I've discovered the chemical reaction that mammals use to generate heat. And a drug to inhibit it. So a drug that, as demonstrated in mice, can reduce metabolic rate. Which I predict can slow aging (indeed, in support, genetically reducing metabolic rate - by reducing metabolic heat generation - extends lifespan in mice). Or reverse aging, if the damage rate can be made less than the repair rate (the body can repair damage caused by metabolic rate, but such damage outruns repair, conferring net damage). No metabolic heat generation is needed if the ambient temperature is at (or above) 37°C. A human, in typical clothing, has thermal comfort at an ambient temperature of 20°C. This drug can (via dose-dependently reducing metabolic heat generation) confer thermal comfort at higher ambient temperatures. That can help the large fraction of the global population that lives in hot climates/seasons. While (predicted) slowing/reversing their aging. When the drug is only applied topically to a small body part (e.g., in a cosmetic cream applied to the face), it is predicted to slow/reverse aging there. Without any thermoregulatory issues. Because less heat generation by that body part is mitigated by heat transfer (via blood flow) from the rest of the body. This drug has (as predicted) demonstrated anticancer activity in vitro, more than most

present cancer drugs. Very distinctly, expected to help rather than harm the body.

P.S. As used above, the drug doesn't reduce body temperature. But if the subject is at low ambient temperature, a low drug dose (administered to all of the body) can cause a slight body temperature drop. Which is imperceptible, safe, and should confer its own anti-aging mechanism: aging is at least one chemical reaction, and (a law of chemistry is) chemical reactions run slower at lower temperatures. Indeed, calorie restriction causes a slight body temperature drop, which might be (at least in part) how it extends lifespan. Different humans actually have a range of resting body temperatures (35.2-37.7°C), wherein those with lower resting body temperatures live longer. Reducing the body temperature of mice by 0.34°C by genetically reducing their metabolic heat generation (correspondingly reducing their metabolic rate) increased their lifespan by 20%. People with Alzheimer's disease have a pathologically elevated body temperature; wherein (in corresponding mice studies) lower body temperature slows Alzheimer's disease progression, slowing its cognitive decline.

PAPER (preprint) [HERE](#)

#longevity #longevitydrug #longbio #aging #ageing
 #antiaging #geroscience #gerontology #biogerontology
 #healthspan #lifespan #drug #medicine
 #geroprotector #cancer #cancerresearch
 #cancertreatment #biotech #biotechnology
 #pharmaceuticals #drugdiscovery #drugdevelopment
 #drugdesign #science #research #innovation #biology
 #biochemistry #pharmacology
 #pharmacy #venturecapital #vc #venture #familyoffice
 #investment #start-up #startup #startups #start-ups
 #invention #inventor #patents #alzheimers
 #alzheimersdisease #alzheimersresearch
 #neurodegeneration #neurodegenerativediseases
 #patents #entrepreneur #entrepreneurship
 #bioentrepreneur #health #fitness Biophysical
 Therapeutics



Drug to slow aging? Reverse aging? Biophysical Therapeutics



Michael Forrest
14 subscribers

[Analytics](#) [Edit video](#)

4 [Share](#)

284 views · 3 months ago

Title of paper referred to:

"P1F0 ATP ~~glycolysis~~ is a Determinant of Metabolic Rate, a Correlate of Lifespan, and a Weakness of Cancer"

All [Related](#) [Listenable](#) [Recently uploaded](#) [Watched](#)



Assinatura Vitalícia
Acesse para sempre o material que mais aprova no Brasil por 12x sem juros.
Ad · Estratégia Concursos
[Compre agora](#)



The Student's Guide To Becoming A Successful Startup Founder
Y Combinator
32K views · 2 days ago
New



Epigenetic Clocks Help to Find Anti-Aging Treatments | Steve Horvath | TEDxBerkeley
TEDx Talks
52K views · 3 years ago

"You Just Lied!" - Elon Musk DESTROYS BBC Reporter LIVE



- Home
- Explore
- Notifications
- Messages
- Bookmarks
- Twitter Blue
- Profile
- More

Tweet



Tweet

Suleman "Suli" Ali 🚀🚀🚀 - Entrepreneur & I... @sulema... · 2h ...
 Happy Monday. What are the most ambitious startups you know of?

11 15 3,806

Michael Forrest @Forrest_PhD ...

Biophysical Therapeutics is trying to crack aging:

[longevity.technology](#)
Longevity company Biophysical Therapeutics emerges from stealth
 Computational biology platform company plays it cool with a pipeline of experimentally-validated new drugs.

1:17 PM · Apr 17, 2023 · 7 Views

View Tweet analytics

Tweet your reply

Reply

Search Twitter

Relevant people

Michael Forr
 @Forrest_PhD
 Drug Inventor
 Biophysical TI
[#drug](#) [#aging](#)
[#biotech](#) [#st](#)
[#venturecapi](#)
[#investment](#)

Suleman "Su
 @sulemanali
 I tweet about
 Investing, Sta
 Real Estate, V
[@superhuman](#)
[@Plangrid](#) & 5

What's happeni

NBA - Last night
Heat at Bucks

#EstreiaSérieReis
 Promoted by Série Reis

Trending in Brazil
Starship
 Trending with [SpaceX](#)

Trending in Brazil
Mete
 33.7K Tweets

Trending in Brazil
Massacre de Eldorado
 Trending with [Reforma Ag](#)

[Show more](#)

[Terms of Service](#) [Privacy](#)
[Accessibility](#) [Ads Info](#) &
 © 2023 Twitter, Inc.

Michael Forrest
 @Forrest_PhD



Messages





Search Community

Get app

Log In



r/longevity

by MnMdiscord 26 days ago



Biophysical Therapeutics opens crowdfunding investment raise



longevity.technology

Open



19



0



Share



nomorerobotshq • Promoted



Spirittea, our rural-life RPG, is a cross between Stardew Valley and Spirited Away! Coming this year

store.steampowered.com

View More



Log In



Be the first to comment

Nobody's responded to this post yet.
Add your thoughts and get the conversation going.

More posts you may like



r/Agriculture · 2 mo. ago

FAO and SEED launch SDG Agrifood Accelerator Programme for innovators

9 upvotes



r/CryptoCurrency · 1 mo. ago

Pension Fund-Backed Parataxis Capital Shakes Off Crypto Winter With New Fund

2 comments



r/Animoca · 2 mo. ago

Amazon leads \$20M investment in synthetic celebrity startup Superplastic

1 upvote



r/turkiyebusiness · 1 mo. ago

Blockchain, AI promoting investments in emerging markets: Investopia Conference

1 upvote



r/bazaartimes · 1 mo. ago

Blockchain, AI promoting investments in emerging markets: Investopia Conference

1 upvote



r/longevity · 5 days ago



Log In

161 upvotes · 18 comments

r/longevity · 4 days ago

Ageing studies in five animals suggests how to reverse decline



266 upvotes · 25 comments

r/longevity · 24 days ago

Is Alzheimer's an Autoimmune Disease?

118 upvotes · 14 comments

r/longevity · 15 days ago

New form of omega-3 could prevent visual decline with Alzheimer's disease



171 upvotes · 15 comments

r/longevity · 13 days ago

Longevity AI emerges from stealth: making risk predictions that support early diagnosis and interventions against major age-related diseases.



288 upvotes · 25 comments

r/longevity · 20 days ago

Outlive: The Science & Art of Longevity - New Book by Peter Attia out Today

175 upvotes · 59 comments

r/longevity · 19 days ago

Retinal scans: A non-invasive, inexpensive method to track human aging - Buck Institute

172 upvotes · 7 comments

r/longevity · 1 mo. ago

A new mouse study finds no consistent gamma entrainment, amyloid lowering, or microglial activation in response to 40 hertz light, raising questions about previou...

[Log In](#)

 r/longevity · 12 days ago

How air pollution causes lung cancer — without harming DNA: Studies in mice suggest that tumour growth is triggered by inflammation...

122 upvotes · 4 comments

 r/longevity · 11 days ago

Organ-specific aging clocks for multiple brain and body systems show that the biological age of one organ system selectively influences the...

104 upvotes · 8 comments

 r/longevity · 28 days ago

Researchers Identify Key Source of T Cell "Exhaustion"

153 upvotes · 1 comment

 r/longevity · 1 mo. ago

The Cellular Reset: Inside the Scientific Pursuit of a Universal Cure for Disease | Why cure just one disease if you could cure them all?

243 upvotes · 16 comments

 r/longevity · 6 days ago

The stem cells found in blood process their waste unlike any other cells ever reported. They shuttle misfolded protein into a corner, then recyc...

115 upvotes · 3 comments

 r/longevity · 23 days ago

New Discovery Could Help Target the Causes of Aging and Cancer Development | Inhibiting the DREAM complex enhances DNA repair in...

299 upvotes · 26 comments

 r/longevity · 14 days ago

Cold temperature extends longevity and prevents disease-related protein aggregation through PA28 γ -induced proteasomes (Apr 2023)

145 upvotes · 22 comments



Log In

treatment with the anti-amyloid antibody solanezumab did not slow cognitive...

226 upvotes · 39 comments



r/longevity · 17 days ago

Harvard geneticists create an organism that is immune to all viruses

266 upvotes · 24 comments



r/longevity · 18 days ago

Breakthrough findings solve a known problem for scientists working on cellular reprogramming, one of the most promising areas of...

190 upvotes · 9 comments



r/longevity · 20 days ago

The first of its kind first pan-cancer blood test, can predict tumors a year before they form with perfect accuracy.

585 upvotes · 58 comments



r/longevity · 28 days ago

Pyrrroloquinoline quinone disodium salt improves brain function in both younger and older adults

141 upvotes · 26 comments



Search Community



Get app

Log In



r/LongevityInvesting

by MnMdiscord 2 mo. ago



Longevity company (Biophysical Therapeutics) testing the waters for raising money from the community

Longevity company (Biophysical Therapeutics) testing the waters for raising money from the community

Open



7



1



Share



nomorobotshq • Promoted



Spiritea, our rural-life RPG, is a cross between Stardew Valley and Spirited Away! Coming this year

store.steampowered.com

View More

Sort by: Best

1 comment

+ Add a Comment



MnMdiscord • 2 mo. ago

Testing the waters legal disclosure:

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.



1



Reply



Share

More posts you may like

r/calorierestriction ← Crossposted by u/MnMdiscord 3 months ago



Calorie Restriction Mimetic Drug?

r/longevity · Posted by u/MnMdiscord 3 months ago
 A Longevity Drug Candidate (2 minute read article, from Dr. Michael Forrest)
 27 points · 13 comments

0 Comments  Share ...

Post Insights

Insights are only available for 45 days after post creation. [Create a new post](#) and see how it performs!

Comment as [MnMdiscord](#)

What are your thoughts?













[Markdown Mode](#)

Sort By: **Best** |

[View discussions in 21 other communities](#)



No Comments Yet

Be the first to share what you think!

Navigation bar with icons for home, profile, search, and other site functions.

Calorie Restriction Mimetic Drug?

[r/calorierestriction](#) • Crossposted by u/MnMdiscord 3 months ago

Calorie Restriction Mimetic Drug?

[r/longevity](#) • Posted by u/MnMdiscord 3 months ago
A Longevity Drug Candidate (2 minute read article, from Dr. Michael Forrest)
27 points · 13 comments

0 Comments

Post Insights

Insights are only available for 45 days after post creation. [Create a new post](#) and see how it performs!

Comment as [MnMdiscord](#)

What are your thoughts?

Search and filter icons

[View discussions in 21 other communities](#)



No Comments Yet

Be the first to share what you think!



↑ 0 ↓ | Calorie Restriction Mimetic Drug?

[r/calorierestriction](#) ← Crossposted by u/MnMdiscord 3 months ago

Calorie Restriction Mimetic Drug?

[r/longevity](#) · Posted by u/MnMdiscord 3 months ago
A Longevity Drug Candidate (2 minute read article, from Dr. Michael Forrest)
27 points · 13 comments

0 Comments

Post Insights

Insights are only available for 45 days after post creation. [Create a new post](#) and see how it performs!

Comment as [MnMdiscord](#)

What are your thoughts?



[View discussions in 21 other communities](#)



No Comments Yet

Be the first to share what you think!

[Join the first pop-up mini-city experiment - 25 March - 25 May](#)[Apply to visit](#)[Close](#)[VitaDAO](#)[Researchers](#)[Supporters](#)[DAO Contributors](#)[VITA Token](#)[The VitaDAO Blog](#)

November Longevity Research Newsletter

November 15, 2022 • Maria Marinova & Rhys Anderson

[Awareness](#)[Longevity](#)

SHARE THIS



Introduction

A multitude of discoveries and inventions throughout history have been made by people who were initially trained in one domain, but were able to make a significant contribution to a different field due to their ability to look at a problem with a unique perspective. Would Charles Darwin still have conceived the Theory of Evolution if it were not for his background in Geology and appreciation that for geological processes to have occurred, Earth must have been around for a vast amount of time!

The contributions of physicists in particular to our understanding of biology have been immensely valuable over the past century. Great thinkers such as Szilard, Schrödinger and Crick, compelled to find out what life is and how it works, were able to provide humanity with novel ideas and trailblazing discoveries in molecular biology.

Take this month's issue as a tribute to the novel insights provided from physics with a few newly published papers, pre-prints and an interview with Dr. Peter Fedichev - highlighting the power of cross-disciplinary thinking to help advance longevity research!



Longevity Literature Hot Picks

After another month of overwhelming amounts of great longevity research being published, we hope to make it easier for you to keep up with it all by presenting some of our favourite papers from the field (and remember our Further Reading section at the bottom of this page for even more new longevity papers).

While we normally pick peer-reviewed published papers, there were a few interesting pre-prints this month which sparked a lot of debate that we couldn't ignore!

Unsupervised learning of aging principles from longitudinal data

https://www.nature.com/articles/s41467-022-34051-9?fbclid=IwAROnILUom4uIJUGm3RY_uKcmCFTAaJugX9NuSLsSYSUUYZTbZoKJdfC8q4Q

What is the relationship between physiological changes with age and lifespan? To answer this question analytical and machine learning tools

were employed to design deep artificial neural networks with auto-regression model, identifying a relationship between physiological state during aging and a variable named "dynamic frailty index" or dFI. dFI increased exponentially with age and predicted lifespan from mouse blood samples. It also responded accordingly to know life-shortening and life-extending interventions.

Aging clocks, entropy, and the limits of age-reversal

<https://www.biorxiv.org/content/10.1101/2022.02.06.479300v2>

A single variable called thermodynamic biological age (tBA) tracks entropy produced, and hence information lost, with age. As tBA increases with age it reduces resilience, and drives the exponential acceleration of chronic disease incidence and death risks, which is a linear and irreversible drift, setting severe constraints on age reversal possibilities. But wait, not all hope is lost. We might be able to figure out how to "cool down" the organism, control entropy and reduce the rate of aging in humans.

F1FO ATP Hydrolysis is a Determinant of Metabolic Rate, a Correlate of Lifespan, and a Weakness of Cancer

<https://www.biorxiv.org/content/10.1101/2021.10.28.466310v3>

F1FO ATP hydrolysis generates metabolic heat in an organism. A drug that can selectively inhibit ATP hydrolysis, but not synthesis, is explored here, and hypothesised that it could extend lifespan by slightly lowering body temperature. In 12 different species, decreased F1FO ATP hydrolysis correlates with greater maximal lifespan. Anti-cancer properties were also observed in vitro.

Dietary restriction fails to extend life in stressful environments

<https://www.biorxiv.org/content/10.1101/2022.10.17.512576v1>

Dietary restriction has been shown to extend lifespan in numerous model organisms, however here the authors show that this effect is lost in fruit flies which are also under stress due to cold or hot living environments. This raises the question of whether laboratory-tested interventions will translate to animals living in more natural environments.

Epigenetic reversal of hematopoietic stem cell aging in Phf6-knockout mice

<https://www.nature.com/articles/s43587-022-00304-x>

Aging leads to the accumulation of hematopoietic stem cells with reduced regenerative potential. The mechanisms behind this are unclear but this study shows that inactivation of the plant homeodomain factor 6 (PHF6), a single epigenetic regulator, rejuvenates mouse aged hematopoietic stem cells.

The commentary on the article:

Is the philosopher's stone to rejuvenate blood stem cells an epigenetic regulator?

<https://www.nature.com/articles/s43587-022-00305-w>

Repurposing SGLT-2 Inhibitors to Target Aging: Available Evidence and Molecular Mechanisms

<https://www.mdpi.com/1422-0067/23/20/12325/htm>

A new take on CR mimetics with Sodium-glucose cotransporter 2 inhibitors (SGLT2-i), which lower glucose by elimination through urine, and actually induce a net loss of calories, fostering ketones and fatty acids utilization as glucose-alternative substrates. This process modulates major nutrient-sensing pathways held to drive aging, such as mTOR and resembles CR. Preliminary data also shows that it can inhibit cellular senescence and inflammaging.

Circadian transcriptional pathway atlas highlights a proteasome switch in intermittent fasting

[https://www.cell.com/cell-reports/fulltext/S2211-1247\(22\)01403-6](https://www.cell.com/cell-reports/fulltext/S2211-1247(22)01403-6)

Intermittent fasting has gained traction among the longevity community as a safe lifestyle intervention hoping to improve healthspan and increase lifespan. The authors set out to discover if there was an internal "timer" to respond to fasting duration. They found that in mice, the hepatic proteasome switches leading to transcriptional resonance which is reversed upon re-feeding. It will be interesting to investigate if a similar mechanism is

conserved in humans and what fasting duration is required to induce the switch.

The role of gut microbiota in liver regeneration

<https://www.frontiersin.org/articles/10.3389/fimmu.2022.1003376/full>

Unlike other human organs, the liver has an amazing ability to regenerate itself.

Check out this review exploring how gut microbiota play a role in liver regeneration through regulating the liver immune microenvironment thus modulating inflammatory signalling at different stages of the regenerative process.

Combining stem cell rejuvenation and senescence targeting to synergistically extend lifespan

<https://www.aging-us.com/article/204347/text>

The 2012 Nobel Prize for Physiology or Medicine was awarded for showing that differentiated cells could be reverted back to stem cells by activation of 4 transcriptional factors, now eponymously known as Yamanaka factors. This led to huge interest in the field including the founding of the multi-billion start-up Altos Labs. Another longevity target are senescent cells, the removal of which by either genetic or pharmacological means can increase lifespan in mouse models. Here the authors show that combining Yamanaka activation with senescence removal has a synergistic effect on lifespan, with the largest effect resulting from transient treatment of both interventions.

Clinical Trial Updates

A Randomized Clinical Trial showing that a sustained low-carbohydrate diet might be a useful dietary approach for preventing and treating type 2 diabetes.

<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2797714>

Meta analysis of aerobic exercise improving intelligence and cognitive function in patients with Alzheimer's disease

https://journals.lww.com/md-journal/fulltext/2022/10210/meta_analysis_of_a_erobic_exercise_improving.15.aspx

UNITY Biotechnology Announces Positive 24-Week Data from Phase 2 BEHOLD Study of UBX1325 in Patients with Diabetic Macular Edema

<https://www.globenewswire.com/news-release/2022/11/01/2545288/0/en/UNITY-Biotechnology-Announces-Positive-24-Week-Data-from-Phase-2-BEHOLD-Study-of-UBX1325-in-Patients-with-Diabetic-Macular-Edema.html>

News

JPMorgan Launches Life-Sciences Venture Group

<https://www-wsj-com.cdn.ampproject.org/c/s/www.wsj.com/amp/articles/jpmorgan-launches-life-sciences-venture-group-11667300402>

Crypto entrepreneur Justin Sun, founder of Tron, donate's 51k USD to the Longevity Prize

<https://www.longevityprize.com/>

Journal eLife eliminates reject/accept decisions from their review process

<https://elifesciences.org/articles/83889>

Articles

MIT Technology Review - The Mortality Issue

<https://www.technologyreview.com/magazines/the-mortality-issue/#features>

Featuring:

The debate over whether aging is a disease rages on

<https://www.technologyreview.com/2022/10/19/1061070/is-old-age-a-disease/>

Why the sci-fi dream of cryonics never died

<https://www.technologyreview.com/2022/10/14/1060951/cryonics-sci-fi-freezing-bodies/>

How scientists want to make you young again

<https://www.technologyreview.com/2022/10/25/1061644/how-to-be-young-again/>

Modern Vampirism: “Young Blood” Transfusions

https://peterattiamd.com/young-blood-transfusions/?utm_source=twitter&utm_medium=social&utm_campaign=221030-newsletter-blood-transfusion&utm_content=221030-newsletter-blood-transfusions-tw

Blood from young mice has rejuvenating effects on old mice, but it's too early to translate these results into treatments for humans.

Upcoming conferences

A lot of us are conferenced-out for this year but there is one more meeting with an impressive line up we'd recommend:

The Longevity Summit

December 6-7 | Buck Institute for Aging | Novato, CA

<https://longevitysummit.io/>

While we're waiting for more exciting conferences, make sure you're caught up with the recordings from ARDD and VitaDAO's own crypto-longevity symposium.

<https://www.youtube.com/channel/UCIOnpI2mzpJlwdX3vIOMJA>

<https://www.youtube.com/watch?v=-70SgGJPzTo>

Evotec Webinar series focusing on 3 key areas:

- Therapeutic approaches for aging and age-related disease
- Aging and precision medicine
- Why older adults should not be underrepresented in clinical trials.

<https://news.evotec.com/a-spotlight-on-aging-webinar-series>

Funding Opportunities

Hevolution Foundation Announces Pilot Grants Program for Top Healthspan-Related Research in the United States

<https://hevolution.com/en/w/hevolution-foundation-announces-pilot-grants-program-for-top-healthspan-related-research-in-the-united-states>

Job board

The **Schumacher lab** is looking for a **postdoc** to join them at the Institute for Genome Stability in Ageing and Disease, CECAD-Cluster of Excellence in Aging Research, University of Cologne

<https://schumacher.cecad-labs.uni-koeln.de/open-positions>

Vita therapeutics, a cell engineering company using iPSCs, have two open positions - **research associate** and a **quality assurance director**:

<https://www.vitatx.com/careers#openpositions>

Head of Ops for Longevity Fund - \$150K+ salary, higher if you're significantly experienced. Looking for someone smart and capable with 3+ years of operating at a fast-paced startup or VC firm

email laura@longevity.vc if a fit! \$10K referral bonus if you find someone great :)

Longevity Tweet of the Month

Even if you don't use Twitter, it must have been near impossible to escape the news and debate surrounding Twitter's new owner Elon Musk and his plans to charge for verification. The author Stephen King took umbrage to this and threatened to leave the platform. Alex Zhavoronkov had an amazing response, leading to the inauguration of our new 'Longevity Tweet of the Month':

Alex Zhavoronkov: "I will pay @StephenKing's \$20/month twitter for the rest of his life if he writes his scariest book titled "The Biology of Aging" (the concept is so horrifying that after 40, you do not need a costume for Halloween anymore). With @davidasinclair as the savior protagonist 🎃👻
💀"

<https://twitter.com/biogerontology/status/1587477303671816192>

Interview with Dr. Peter Fedichev

Dr. Peter Fedichev describes himself as a "physicist in drug discovery land". With a background in condensed matter physics, biophysics and bioinformatics he has been able to provide a unique perspective to longevity research, for example the 2 papers highlighted in this month's issue. He is currently the CEO and co-founder of the longevity biotech company GERO.

What inspired you to enter longevity research?

I am a physicist by training and did my studies in the field of strongly interacting and correlated systems. I am fascinated with phase transitions and emergence - the ability of complex systems to develop properties that do not exist on the level of their constituent parts. "More is different," in P. Anderson's words, and we find novel interesting phenomena whenever it

applies. Living systems and their gene regulatory networks fall into this category. Somebody brought my attention to negligible senescence (slow or no-aging in some species). I immediately recognized that such aging-resistance might also be an example of emerging property.

Since then, we followed this lead and developed a set of ideas casting the "normal" Gompertzian aging and negligible senescence as two distinct phases of gene regulatory networks differentiated by dynamic stability properties. I am increasingly convinced that negligible senescence is the most important discovery in the field of aging studies. I also see that physics lends great tools for understanding this phenomenon and that achieving negligible senescence is a great scientific, humanitarian, and technological goal.

Which of the current theories of ageing do you think are the most convincing?

Let me answer this question by bringing up the following analogy. In physics, there is the Standard Model. This is by far the best theory ever made. Until very recently (2018), there's been no single experiment contradicting the theory. Even now, with only a few experiments in neutrino physics falling from the scheme, the discrepancy between the theory and the experiment is abysmal. Nevertheless, the Standard Model is a model, not a theory. This is because everyone knows it is inconsistent and thus can not be a complete theory.

Compare this to the situation in aging sciences. We have a dozen of "theories" of aging. Such an impressive number of "theories" tells us that we do not have a theory of aging. It may look bad, but it is exciting too. Other fields of science lived through the times of such a "zoo" of theories. The physics literature was full of unrelated forces and particles not long ago. We need the grand unified theory of aging, and it will come in due course.

How has the field changed since you started?

The field matures. People do clinical trials. More people in science and the general public believe that lifespan is modifiable. We have more and increasingly better-trained people with diverse scientific and entrepreneurial backgrounds coming into the field (think, for example, of physicists, AI engineers, and crypto-activists joining biologists and medics).

What mistakes do you think the longevity field has made?

There's been tremendous progress both in understanding aging and translating the growing fundamental knowledge into preclinical and clinical trials. However, most currently developed solutions will produce small effects on par with the effects of lifestyles. For many, this strategy seems to reduce risks. But any working solution in biotech takes 10 years at least to develop fully. Working on weak interventions is a waste of resources and years of life. I would also think of hopes and expectations here. The public and policymakers have high hopes and may end up frustrated if the longevity biotech ends up with "statistically significant" and, at the same time, miserable results.

Other than your own, what do you think have been the biggest/important discoveries in the field?

To my taste, the discovery of negligible senescence - the discovery of advanced animals, such as mammals, that defy Gompertz mortality law is the biggest discovery in the field of aging. This is a very important demonstrator proving that aging is not evitable. Reducing mortality acceleration to almost zero may increase human lifespan a few fold.

What advice would you give to people currently working in longevity research?

Think big - avoid solving unimportant problems even if those lend you a paper in a good journal.

Which aspect of longevity research do you think requires more attention?

Negligible senescence

Is ageing a disease?

This is a hard question that is probably more politically and emotionally charged than scientifically justified. From what we see in human and animal data, I believe aging can be slowed down and even stopped, not reversed. In this sense, this "disease" can not be fully cured but may be prevented. A huge entropic component in human aging makes aging more like a syndrome (multiple diseases leading to the same symptoms). To me, this does not matter.

I am trying to avoid this conversation since it quickly gets murky and is dangerously close to scholastics. I believe that aging must be stopped, and once this is demonstrated, the technological solution will be covered by

governments and insurance regardless of whether it addresses a disease. The potential upside is huge. It is so huge that new business models will emerge if the existing payers fail to recognize the opportunity. If I am correct on this, we must forget about politics and focus on demonstrating an effective solution.

Can you explain what you've found in your research to be the major difference in the ways different species age (e.g. mice, naked mole-rat (NMR), humans)?

This is a great question. We published two Nature Comms works (a week ago, [Unsupervised learning of aging principles from longitudinal data | Nature Communications](#), and a year ago, [Longitudinal analysis of blood markers reveals progressive loss of resilience and predicts human lifespan limit | Nature Communications](#)) suggesting that humans and mice belong to two distinct classes of regulatory networks function. Mice are dynamically unstable; their organisms amplify damage, the damage does more damage, and this vicious loop leads to the exponential accumulation of damage. We found that the damage accumulation rate is the same as the mortality rate doubling time, and therefore the inability of the regulatory systems to control damage is the cause of exponential mortality acceleration. On the positive side, aging in mice appears to be mostly reversible.

On the other hand, humans control the damage very well for the most time up until late in life. The transition from the stable to the unstable phase occurs stochastically at some age around 60 due to the gradual loss of resilience, the ability of the organism to regain its homeostatic equilibrium after a shock.

If this is true, aging in mice is the model of late-life morbidity and mortality in humans. Drugs acting in mice and extending their lifespan will improve lifespan beyond healthspan. Since resilience is lost late in life, the effects of such drugs on the human lifespan will be limited.

To develop drugs that could let people live in good health for 150–200 years, we must confront the loss of resilience. This is especially challenging since the resilience is already lost in mice by the age of 25 weeks, if not earlier. This forms what we would call a “preclinical trap”: to convince investors and peer scientists, you have to select drugs that work best in mice. Such interventions, however, could only help people late in life. Unfortunately, the same drugs will provide small effects in healthy people and likely would not affect resilience.

What are the fundamental principles and mechanisms behind negligible senescence in some animals (like NMR) and what causes them to die if there is no increased risk of mortality or frailty over time?

This is an open question. Our models suggest that NMRs and other negligibly senescent animals die of the same diseases. Just the incidence of those diseases (and hence death) does not grow exponentially as we age. Our last publications hint that humans are already almost negligibly senescent. In contrast to mice, humans control the hallmarks of aging for dozens of years until resilience is lost, and all hallmarks of aging and chronic diseases start appearing simultaneously. I believe that humans and NMR belong to the same class of aging systems. NMRs lose their resilience way slower than us, and I want to learn how they do it. Or, better, how to make humans stop losing their resilience.

Could human biology be modified in a way that it utilises those underlying principles of negligible senescence?

The short answer is yes. People are working to find out how. This is what Gero does, and answering this question is my personal scientific goal.

What do you consider “true aging”? And in order to extend healthy life, should we intervene before cellular and organismal loss of resilience?

As I said, we observe that humans are very resilient. More is different, we are not talking at the level of cells. We are describing and measuring the resilience on the level of the organism as a whole. We work with very large datasets of human data and find that it's very hard to die before resilience is lost. Curiously, according to our measurements, the number of people demonstrating the loss of resilience increases in the population exponentially and doubles every eight years, exactly as fast as the mortality rate doubles. Once the resilience is lost, like in mice, you have just a few years of life left.

Therefore, the loss of resilience is the most fundamental aging phenotype in humans. We call it “true aging” and it is different from the classic hallmarks of aging driving late-life mortality and morbidity. Our worst nightmare came true: this year, we put up a preprint, [Aging clocks, entropy, and the limits of a ge-reversal | bioRxiv](#), suggesting that the loss of resilience is driven by a thermodynamically irreversible process. If this is true, true aging in humans

can not be fully reversed but only stopped. This is the least fortunate outcome of our research, and we had to be very careful trying for a few years to disprove this conclusion.

Our approach is human-centric. We are applying modern AI/ML tools for identifying markers and genetic determinants of true aging in human data. In this way, we aim at the disentanglement of aging and diseases. This helps in two ways. First, it helps people who look for cures for specific diseases. We work with pharma companies to identify novel targets, targeting reversible processes leading to transformative medicines.

Most importantly, we track true aging in real-world medical and genetic data to find genetic factors modifying the rate of true aging. We are making good progress and hope to initiate experiments to test the theories in practice.

Our goal is to make humans negligibly senescent species.

Outro

Thanks for reading our November issue of VitaDAO's Monthly Longevity Newsletter!

Once again, if there is anything you would like us to feature in future issues, please get in contact.

This time we leave you with a thought provoking article in Science from 1972 by Nobel prize winner in physics Philip Anderson - **More is Different** because even though it's 50 years old it's still relevant today. There Prof. Anderson challenges the hierarchical structure of sciences - from physics to biology - and argues that "at each level of complexity entirely new properties appear":

https://cse-robotics.engr.tamu.edu/dshell/cs689/papers/anderson72more_is_different.pdf

Further Reading

Healthy Aging: Strategies to Slow the Process

<https://www.sciencedirect.com/science/article/abs/pii/S0030666522000809>

Association of sleep duration at age 50, 60, and 70 years with risk of multimorbidity in the UK: 25-year follow-up of the Whitehall II cohort study

<https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1004109>

Does Abdominal Obesity Increase All-Cause, Cardiovascular Disease, and Cancer Mortality Risks in Older Adults? A 10-Year Follow-Up Analysis

<https://www.mdpi.com/2072-6643/14/20/4315/htm>

A long-term obesogenic high-fat diet in mice partially dampens the anti-frailty benefits of late-life intermittent fasting

<https://link.springer.com/article/10.1007/s11357-022-00678-1>

Lipid hydroperoxides and oxylipins are mediators of denervation induced muscle atrophy

<https://www.sciencedirect.com/science/article/pii/S2213231722002907?via%3Dihub>

The time is now: Regular exercise maintains vascular health in aging women

<https://physoc.onlinelibrary.wiley.com/doi/10.1113/JP282896>

One-year aerobic exercise increases cerebral blood flow in cognitively normal older adults

<https://journals.sagepub.com/doi/abs/10.1177/0271678X221133861?journalCo de=jcba&>

Mitochondria dysfunction and impaired response to oxidative stress promotes proteostasis disruption in aged human cells

<https://www.sciencedirect.com/science/article/pii/S1567724922000861?via%3Dihu>

The use of progeroid DNA repair-deficient mice for assessing anti-aging compounds, illustrating the benefits of nicotinamide riboside

<https://www.frontiersin.org/articles/10.3389/fragi.2022.1005322/full#.Y1SIjLKuaWo.twitter>

Attenuation by Time-Restricted Feeding of High-Fat and High-Fructose Diet-Induced NASH in Mice Is Related to Per2 and Ferroptosis

<https://www.hindawi.com/journals/omcl/2022/8063897/>

Recommended Reading



April 13, 2023

AWARENESS

LONGEVITY

Unlocking Longevity: Autophagy, Mitochondria,



April 9, 2023 Maria Marinova & Rhys Anderson

AWARENESS

LONGEVITY

March Longevity Research Newsletter



March 28, 2023 Sarah Friday

AWARENESS

VitaDAO Letter: 'Tis the Season (Of Governance)

Early this year, VitaDAO announced a \$4.1 million

and The Radical Pursuit of Life Extension during The Aging Science podcast by VitaDAO

I (@aging_scientist) had a marvelous conversation with Assoc. Prof. Viktor Korolchuk (@Vikolchuk) about autophagy, mitochondria, senescence, the importance of modelling, and human desire for radical lifespan extension.

Welcome back Vitalians! In recent years, autophagy has emerged as an important topic in the field of aging biology and is now considered a major Hallmark of Aging.

fundraising round, that included strategic members and longevity enthusiasts such as Pfizer Ventures, Shine Capital, L1 Digital, Beaker DAO, Balaji Srinivasan, and Joe Betts-LaCroix.

[Read more >](#)

[Read more >](#)

[Read more >](#)

ABOUT VITADAO

VitaDAO Home
Researchers
DAO Contributors
VITA Token
Projects
Blog

GET INVOLVED

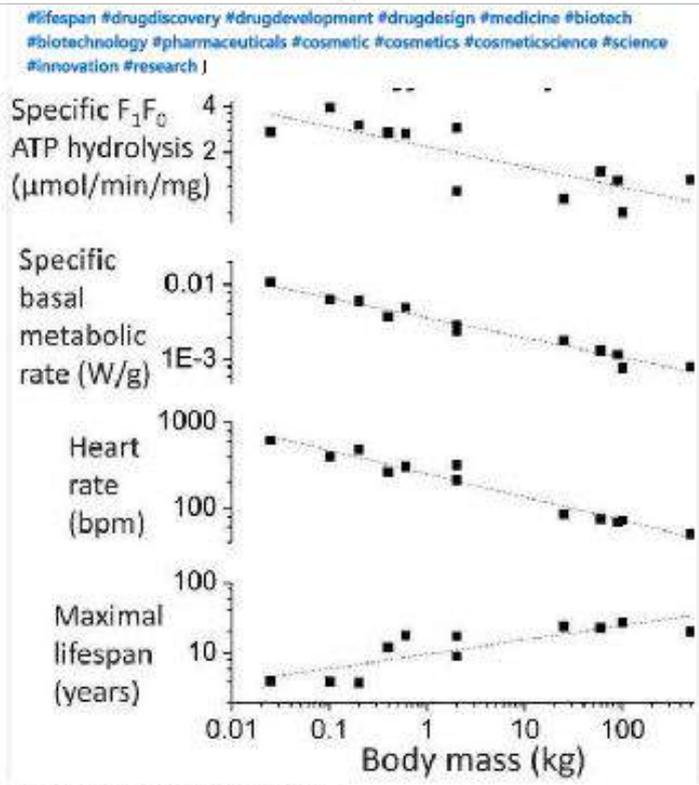
Become a Supporter
Apply for Funding
Join a Working Group
Join our Discord
Fellowships
Zuzalu
Longevity Symposium

GOVERNANCE

Proposals
Governance Forum

FINE PRINT

Privacy Policy
Cookie
Preferences
Press Kit



Has nature taught us how to slow aging?

in: med. um. com



Like

Comment

Report

Send

547 impressions

[View analytics](#)

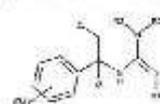


Michael Forrest Ph.D. • 991
Drug inventor | University of Biophysical Therapeutics
Type: Full-time

First Granted patent for Australia, now published:
<https://lnkd.in/d/Bw4v9N>

#cancer #oncology #cancerresearch #cancertreatment #oncologyresearch #diseases #drugdiscovery #drugdevelopment #drugdesign #pharmaceutical #biotech #biotechnology #pharma #innovation #medicine #patents #deeptech #inventor #entrepreneur #founder #startups

ON THE ALLOSTERIC INHIBITION OF THE REVERSE TRANSDUCTION SYSTEM



657 Abstract: Compounds of the following formula, and pharmaceutically acceptable salts, esters, hydrates and prodrugs thereof, formula (A) are useful to modulate, inhibit, the ATP hydrolysis rate of ATP synthase, and are highly useful for treating various disease and disorders including cancer, particularly cancer that utilize the Warburg effect.

All text added

All text was automatically added to your photo. You can edit the text by editing your post.

[Edit post](#) [Got it](#)



Like

Comment

Report

Send

393 impressions

[View analytics](#)



Add a comment

Most relevant



Adrian Teare | 15/11/2011 • 1st
Head of Chabraha at Southern Health NHS Foundation Trust | Pad 2 (Dev) Royal Army

Re: Hi Shu, we spoke linkedin RE: longevity co. on wefunder

ME

Me <michael@biophysicaltherapeutics.com>

Tue, 04 Apr 2023 1:36:55 PM -0300 •

To "Shu" <Shu@petribio.com>

Dear Shu,

Been a development here - please see the page (nervous of SEC rules to say it here). Keen to have you aboard, and happy to do a call to discuss if desired.

Slowing metabolic rate slows aging.

Have a drug that slows metabolic rate.

Raising to test if this drug can slow human tissue aging:

<https://wefunder.com/biophysical.therapeutics1>

Any questions/feedback, I am here. Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

---- On Tue, 28 Mar 2023 12:35:43 -0300 **Michael Forrest Ph.D.**
<michael@biophysicaltherapeutics.com> wrote ---

Re: Traveling in Middle East No Email Access Re: BioTx for Marc n Ben



Me <michael@biophysicaltherapeutics.com>

Tue, 21 Mar 2023 2:54:28 PM -0300 •

To "Ben Horowitz" <ben@a16z.com>

Dear Ben,

To update, published today:

<https://longevity.technology/news/biophysical-therapeutics-opens-crowdfunding-investment-raise/>

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

----- On Thu, 27 Oct 2022 22:09:44 -0300 **Ben Horowitz** <ben@a16z.com> wrote -----

welcome everybody to learn to learn with all today I'm your host Lois your entrepreneur supervisor and your host for your show for the show uh today we're joining with Michael Forrest I don't know for some reason I was thinking Michael Forrester which is I think like closer to an actor's name but Michael force of biophysical Therapeutics uh working on aging and both George Church as an advisor uh if

you like this type of content you want to see more stuff like this you know subscribe because it tells the Google god Set this to something worth watching

Michael welcome to the show

thank you thank you yeah so I I did as big of a deep dive as I could and what you're building and what you're working on and I have questions but there are also some really interesting ones from online that I thought were

just pretty on point so I thought why not take the opportunity to address them and at the same time what did you learn about your company at the same time so

Responding to criticism

uh one person responsible owl three which is a great name uh said and this

is a just for the heads up this is a bit rough there they seem like a critic but I think this is a great opportunity to alleviate that and we can go into like

the meat of it uh this is comically basic take on the whole what makes people age and how to stop it question does this guy have a real PhD I think that's mean but if so why is he explain

High School physics and biologies if they were groundbreaking inside to the that nobody has come up with yet I think that the real question there is like

they the what about what you're building actually does what you think it does but

at the same time like I think just addressing that concern because there was a I looked at all the comments on every single post about what you're building and generally that was kind of the contestants that people were coming to now that's the internet their main people but for people who don't know you

I think that's kind of fun to be like hey here's this criticism let's hit it right on so what what do you have to say to responsible aisle three okay yeah well my blood spoiling as I as I hear that really and uh so I mean the guy's a Critic really

there's no question there really it's just like just Uh crap really but I mean

um so let's go through I I mean I've got a PhD so I've got like um yeah uh I studied biochemistry at Cambridge and I've got PhD um

but uh I mean what was even the criticism there he's just saying like it's all

it's all rubbish where do I even start yeah I think the big thing is what makes people age and how to stop it that question they felt that the the

approach wasn't that groundbreaking no I I see the like hey are you talking

Metabolic rate and aging, and aging disparity in the world

about school of physics and biology and making it seem simple that's how you communicate on the internet like if you want to talk like PhD molecules in an

interview like that that's gonna like glaze so many people so I think the the real response that you should focus on because you clearly have a PhD there's you know like we can we can put that put aside but I think how does this approach of looking at the medical uh metabolism met why am I screwing with this word it's a metabolic rate thank you so much yes metabolic rate Heating and aging all relate to each other now there's my studies and but at the same time like even even I was wondering because in the uh in the in the interview you did with longevity research why don't you something they talked about how like 40 of the world is in the tropics so then yeah even on that so then would there be an age aging disparity between people who live in the tropics versus the the Kohler colder periods like so is that something that we see as one element like is there evidence of this in the wild basically outside of the mice who had their temperature reduced their genetic modification okay so it's pretty much simply um so if you slow the metabolic rate of a mouse or like a a wasp or a fly or a worm or fish if you slow the metabolic Ray you can actually extend the lifespan and that that wasn't found by me that's been actually known for quite long a long time uh for many of those species it was first shown in mice in 2006 uh and it was published in science which is one of the big prestigious uh science journals uh arguably the the most prestigious and the guy that did that Bruno Conti he's actually an advisor to the company so there seems to be this link between metabolic rate and lifespan they're adversely proportional so like it'd be slow metabolic rate you can actually extend lifespan okay and um so where the company comes in is that we've actually got drugs that can actually slow metabolic rate so then the the prediction is because there's this linkage between metabolic brain lifespan the drugs that can slow metabolic rate uh might be able to slow age and extend lifespan so that's the next um the next thing to test and we're actually going to do that in a human human tissue xvivo uh so that's the uh an experiment so um and also talking about you you're talking about what's the relationship with humans so that's Interventional data so like if you if you if you actually slow metabolic rate you can make uh things live longer so that's Interventional data observational data within humans is humans with a lower metabolic rate paying a mass they tend to live longer okay so that's actually been seen in the human population and um that was that came out of a big study it's called the Baltimore longitudinal longitudinal study of Aging so on on entry into the study they kind of did the admin on the people like uh recorded different things like the metabolic rate for example and then they monitored them over the subsequent 40 years and so then they saw uh you know who who died before

who and things like that and then if you look at that data you actually see this inverse relationship between metabolic rate codeine and mass and lifespan so it's actually been seen in humans as well and then the other thing like calorie restrictions slows metabolic rate so like when you have less calories it's like your body kind of like shuts uh shuts down a little bit to conserve calories and one thing that actually does is it ramps down metabolic heat generation so like your body's temperature uh drops uh slightly and uh calorie restriction is very well known to extend lifespan like in in mice for example the jury is still out on on on on humans just because humans have got like such a longer lifespan the experiment is a lot harder to do but uh in mice is is well known to um extend lifespan and that's probably the the biggest modulated lifespan that we found found today uh and and also what they have shown in humans is when you do calorie restriction your metabolic rate does slow and the body temperature drops slightly so that seeming humans as well um so given that if that is the reason why calorie restriction extends lifespan then uh and given that happens in humans as well you'd expect calorie restriction to extend lifespan in in humans um so yeah yeah that's uh yeah I think that's a good response I think that I think that hits it on the head I mean we see if we see it in human populations we Data in the literature on heat / metabolism and aging see in animal populations we have research data going back from 2006 and there's gonna be more I think you talked about an article with Brian Kennedy of Singapore they're going to do more I think they're working on Mouse yeah he wants to do a mouse lifespan study with it but it's not just institution goes way back when um so for example in flies so some of this stuff is very it's one of those things where it's in the literature but then it kind of gets forgotten so this actually precedes a 2006. uh so with flies for example flies are cold blooded uh which means they don't metabolically generate heat so uh their their body temperature just follows the ambient temperature and metabolism is actually uh temperature dependent so like when the ambient so in a flight if you make the ambient temperature more you can speed up rate if you make it less you can slow down this metabolic rate and if you actually reduce the ambient temperature um I think it was I can't remember how many degrees it was it was it like a few degrees and then they actually made the the flies live 86 percent longer which actually like a very big lifespan effect and they they've done it in other people have done it in worms uh done it in fish as well uh cold blooded uh they're cold blooded as well so you can just control their metabolism by controlling the the temperature of the water that they're in uh and that that all preceded the the milestone in 2006 but the the milestone in 2006 is most nice because that's actually in um mammals so then we get more excited like when when things are in uh mammals and um what they actually did was they it's a very nice experiment so they uh there's there's a part of the brain that

kind of um monitors what the body temperature is to set uh the controls
um
heat generation kind of thing so they actually did this manipulation
genetic manipulation in in the brain that made
the brain think that the body was hotter than it was so then it directed
less metabolic heat generation and so the the
the the mice actually had less metabolic heat generation a slow metabolic
rate and they actually lived longer and their
body temperature fell very slightly their main body temperature fell uh
0.34 degrees C and then it actually made them
live 20 uh longer and another temperature drop of 0.34 degrees C is
like pretty much imperceptible like our body temperature jumps around uh
by more than that within a day and and between
days um with the Circadian rhythm and also uh like women for example
their body
temperature varies with their uh menstrual cycle a lot more than 0.34
degrees C and so where the company comes
in is we've actually discovered by this new reaction that mammals used
for metabolic heat generation and a drug to
specifically inhibit that uh reaction and shown in mice that the
um the drug can actually reduce metabolic heat generation and slow
metabolic rate so the drug
um presents the other things that people just read like these odds and
swords on the internet where it's all kind of very simplified but
underneath that there's
actually a paper paper and then underneath that there's actually like
patent applications
um which is like into the real uh nisi gritty so if you want to go deep
you know there's a lot of stuff there a lot
of experimental data and new drugs especially so the companies like I
think very
um differentiated by actually having drugs so there's things that
actually we can try so you can say they might not
work you know but I think the the stakes if they do work that is worth
trying you
know and so there's other people that are kind of like hand waving so I
mean this guy like the critic you know this
is saying the critic doesn't count he's got nothing he's got no answers
he's got like no drugs he's not like uh and and I
actually I think something
I think like if you want to make a criticism a thing to do is like one in
one out so like if you're saying that's
wrong what's what's what's your answer kind of thing and they've got
nothing so they never got that route yeah
if because it's so easy to be a Critic so like if you want to criticize
someone and take someone down you've got to
replace it with something and then that just wipes those or or these
people away because they've got you know they go oh
that's not the reason for aging that kind of that is well then what is
them they've got they've got no answer so
um and the thing is this is all like work in progress this is a test
event you know so like we've
shown before that there's this link between metabolic rate and now we've
got drugs slow metabolic rate so let's let's
try that you know and and if it works then the world is a very different
place because uh you know aging is you know I
I I arguably the one of the biggest problems in the world and so uh you
know

and if we just leave it be like with their at the moment we're getting the the worst of everything like people are living longer but then they're getting one or more diseases of Aging so then they kind of get debilitated and incapacitated and it's actually going to cause a demographic crisis like your parents get sick they get Alzheimer's or something and then you have to look after them but then you get old and then you get sick and like you know there just aren't enough people to kind of look after so it's actually but something that something has to be done and another criticism is people going like it shouldn't even be done we shouldn't even be attacking this but if you just leave things to run their course we're we're headed for a real crisis and people don't even really understand this yet um you know in the UK for example kind of like you get snap yourself at your winter like um when flu season comes around the the health system really starts to uh crack and that's where the amount of old people that we've got now like in the future you know there's going to be a lot more so yeah so so it's something that um you know trying to do something about it uh whereas you know these guys on Reddit they're just like uh you know in their mum's basement or wherever just like us yeah if I get African interact I think you handled the criticism extremely well the and I I also agree that generally if Passion, and criticism you criticize I think you should offer like hey here's some things that maybe you could do better and um I what I liked about starting with the show with that question because is because sometimes people just say things and they don't understand like there's a deep well of passion behind what you're doing like you're not doing this for the fun of it yeah yeah like the knowledge is yeah now like he didn't go to he didn't get a PhD because you know uh for fun you did it because you were very passionate about this stuff yeah and there's research and there's all these things so I thought it was a great way to just start hit this on the head and responsible oh maybe they'll be more wary in the future about just like making Christmas man they can make some suggestions at the same time I think you hit every single one of their concerns and is it real research we have you know like you said mountains of stuff backing it up that this is these are phenomena that are worth investigating to see more about uh yeah you have the background to do it you have the support to do it you have the advisors to help you and you have the ambition to do it and so uh I I lodged you for for doing it and for you know just letting sometimes sometimes it's good to like look at our critics and even if they are like a basement dweller or like someone at Stanford or whatever I think like this person could be anything so like given the benefit of the doubt on that but at the same time I completely get it like criticism's like uh pretty tough but I

think I think another thing I'd say is like um because I have actually engaged with some of the comments on Reddit so I did try and um educate people because I so now I'm in a different phase so this has been ongoing for some time and like uh yeah you know for a long time I didn't want people to know what I was doing but now it's all like patented and protecting things like that some different phase and I'm trying to get uh you know disseminated and try and get people uh in interested and as you say like you know some very high profile people are even interested in that like George Church joined the Advisory Board and he he didn't come uh easily you know he uh like uh it was back and forth and stuff um but but some people completely misunderstand it like uh you know some people was thinking that I was accelerating metabolism which I mean it's very clear in the thing that I'm not and then you know they're typing away going oh unless you're like does he not know that uh accelerating metabolism is very dangerous and stuff and because there are drugs accelerating metabolism I know you you I kind of gave up engaging with it because I kind of said like no you it doesn't you know and then just yeah you could lose you could lose a lifetime there it's just a quiet reminder of just uh I agree I think I think from now on whenever you see that you can just link them the beginning of this interview and say it asked and answered we got you but you don't need answers I think I I think I even said to one guy with kindness I will not respond to you again because like I've I've got things to do and like you know what what the hell are you doing just like Ryan you you're never gonna get anywhere in life just writing crap to like on the internet like a you know this yeah and slide stuff and uh you know if you know better then by by all means you know you you get a drug you know and let's see how that goes but this is um yeah yeah but yeah I I I hear you and I slight I I apologize I apologize for starting with that that was a rough way to begin but at the same time like you crushed it and for now on people can have that and just have that teed off there's a serious stuff serious research you're you're spending it considerable while I'm on your time and energy doing it and you're not doing it for the lulls of it like you're doing it for the benefit of people and at the very least the research you're going to do might reveal something that helps people and Fundamental research, caring about what you do, and trying to help people even even just talking about a hearing your passion behind it I think it's very inspiring to actually care because I think sometimes people just they go through their daily lives and they don't like they you know like they have a job maybe they don't care about and so they're not when they look and engage with people they just think oh that person doesn't care either and so uh I love the passion honestly it's very inspiring to to talk to a scientist that actually can get fired up about their work you know like there are times where

you talk to someone and it's like you could talk about like the price of rice or you know tea or their work and it's like it's all the same because they're just like they're like their boiling point like doesn't change um so so I I I hopefully everyone who's listened in here's the passion and if they do make a comment maybe some helpful suggestions if there is a criticism uh and I would love to hear you in the comments as well um recently I discovered a way to Shadow ban people which is kind of fun I don't I don't do it often it's only the people that are like get the Bitcoin and like start like comment like uh harassing and stuff so no I did get bit frustrated at one point because I want people to understand that's the thing so I can't be frustrated with people like coming in going oh he increases metabolism and then maybe people would think that and then they get confused and so I really went to town on that guy I said like right you you have to stop doing that you're actually misinforming people and you're helping you're harming like my my message you know like I I even kind of like got a bit on the front foot and stuff and said like you really need to look at your life kind of thing what the hell are you doing just you know attacking you know like it's just it's just worthless it's it's it's less than worthless it's actually kind of negative it's actually like harming me I'm trying to move things forward and buy it you know by all means maybe the drugs uh won't work but there's enough there I think to to Merit uh you know testing and there's actually something there some something concrete to actually test and so um and one of the theories of Aging is that um like kind of metabolism kind of give gifts life but then it produces damaging byproducts which cause damage which is aging which ultimately takes it away and so this this work kind of uh fits in with that and there's actually a test of that so that the the work before the mouse experiments and all that stuff that that's pointing to that but then it would be very nice to test it with this drug and if this drug does uh extend lifespan which I actually think it it will and uh massively so because I actually think um the the so agent kind of gets like a sniggers a little bit like I've even got a friend's you know go like aging isn't like a credible um field of inquiry kind of thing and if you study it you're not kind of scientific but that's the most unscientific thing ever because there must be a reason for it so you're almost saying like aging's outside of like the field of scientific inquiry there must be a reason and you can see that uh nature can push it around like different species have different maximal lifespans like a mouse will only ever live four years um whereas above had well lives over 211 years so nature knows how to push it around and we're even pushing it around a little bit like with this metabolism thing we can push it around so this there's promising stuff here about um and I actually think that I figured out

why different mammal species have different maximal lifespans in the um so in mammals the majority of metabolic rate is actually for metabolic heat generation to keep the body of 37 degrees C but actually fueling this uh react new reaction that I found there's kind of like a a through cell metabolic reaction that kind of create something destroy it create something destroy it create something destroy it um and they're actually doing um whenever energy is transferred from one form to another then some of it's dissipated as a seed so they're kind of like doing this thing and it's futile but it's not future because it's actually generating heat that's that's what it's actually useful and uh in Geometry this isn't something about animals this is just something about geometry smaller objects have a larger surface area to volume ratio so what that means is like a mouse every gram of a mouse um has to produce more metabolic heat to keep its body temperature at 37 degrees C then in a whale for example and so the metabolic rate of a mouse per unit Mass is like much much faster than the whales and you can even that's reflectively this heart rate the heart rate of a mouse like 800 900 piece per minute whereas the heart rate of a whale was just one to two beats per minute so I actually think um like if if you have a mouse and you were to keep it in an ambient temperature at 37 degrees C uh that means it's body temperature it doesn't have to produce any metabolic heat to keep its body's body temperature at 37 degrees C and and and so in that case you could give the drug a massive dose of this drug which would kind of like shut down this metabolic heat generation massively massively reducing its metabolic rate maybe even to that of a whale so you'd slow its heart rate from 800 900 Degrees from a minute to one to two bits per minute and I think in that instance you could actually make a mouse live massively longer uh you know like a a multiple a huge multiple I mean we'll have to try and that that's what Brian Kennedy wants to um uh test it so he wants to do like a mouse lifespan study with it um and and starting with older mice to kind of expedite the the process and what what you might say then is what's the actual applicability of that to us the company so basically the company's got Ambitions really to solve uh aging and many things and cancer for example we've got like cancer drugs and um but like the first thing is to kind of like Chase the Cosmetic opportunity so if you've got a drug that um uh so basically for example you've got a cream here and you just put the the the drugs in the cream you just put it here and the drug will reduce metabolic heat generation just here and slow the metabolic rate just here which I predict will slow the Aging right here but this Skin's still at 37 degrees C because the rest of the body's still producing heat and heat heat transfers and keeps us at 37 degrees C and he's transferred especially because of blood flow but one of the functions of blood flows to move like heat around the body and so the reason why I've gone for Cosmetics

is that they actually for Cosmetics you don't have to do any animal or human trials cosmetically it's quite the regulatory you buy is very low so be concerned like when you take Cosmetics it's a bit insane but we do want to do the studies like I said the next experiment is to test whether the the drug and slow the Aging of human human tissue X fever um that's a very cheap study to do um and we've already got people that actually I should want to do it and just need to make the um compound for it yeah and I think the even while I'm thinking about it I'm thinking of examples of where he

Men / Women temperature differences and longevity would affect things because like I know many of my female friends are really cold they like generally all like when especially like during the winter they all try and like trying to steal my body heat sometimes and it's really cold because I just roll around and I'm a thermos like if you like just left me out on the ice I would slowly just melt through it you know pretty quickly but like they're always pretty cold and so

women typically last longer live longer so I you know like I wonder if that's a factor as well like just like how hot guys typically run versus women women actually generally speaking they have a low and metabolic rate per unit mass of men so that might be explaining the tree for why like women live uh longer than men and that might be because women have like a different body composition they've actually got like more kind of insulation so that might be why they can get away with like uh

um uh like a low metabolic rate per unit mass and what one interesting thing actually people generally think that everyone's got the same body temperature resting body temperature and it's like 37 degrees C they think that's kind of like a mathematical constant of the universe kind of thing but people actually vary in body temperature quite a lot around about over two degrees C so there's some people walking around with the resting body temperature of 35 and there's other people with a resting body temperature of the 37.5 that's kind of like the range and you can actually see that people with a lower body temperature actually live longer in this big study they did in Baltimore and and that that kind of relates to them having a lower metabolic rate per unit Mass because your body temperature is kind of a function with your uh metabolic rate per unit Mass so then what I'd argue is going on there is people if they're lower body temperature they're actually using this reaction that we've discovered less and so then they've got like this lower metabolic rate and so they're producing less of these harmful byproducts per unit time and then uh so they're aging slower and then they actually live live longer hmm it's really interesting the how does it how would you think it works with whales who are big and live in the ocean which isn't a good like water just eats Whales and geometry heat like it doesn't really keep heat very easily yeah imagine like the blubber is like insulating them but is

there anything going on with them well the biggest thing going with them is that they're big they're so big so remember I said about your geometry like the bigger an object is that um uh like it's got less surface area put um for it's like it's weight so it's not losing heat as readily um so that's that that's that's the big big um uh thing so maybe like one way to live longer is maybe Evolution did like it was a byproduct of getting bigger so you kind of like uh got bigger and then you you're you didn't have to produce like so much uh metabolic heat per unit Mass so your metabolic rate per unit Mass went down and then your aging right down and you actually live longer hmm that'd be interesting because it takes so much time to get to that size as well like if you just got to that size and then died like a year later it's kind of inefficient to be as big like if you're as big as a whale which size of uh buses and you lived only like 10 years it's like what that's maybe not Size and longevity the most efficient I imagine Evolution would slowly prune to live longer as well it's like you know survival yeah the other nice thing is that like so we've actually studied some species not all species because we haven't got like data for all species you can actually see there's an inverse relationship between a cross species between metabolic rate protein mass and lifespan and also this new reaction that we found for metabolic heat generation and maximal lifespan and like uh we think that actually is the reason why there's an impressive relationship between uh heart rate uh resting heart rate and maximized so the the goal of company is I believe to eventually be a platform where you have multiple molecules multiple interventions for aging and right now we're focusing on uh Cosmetics which is very interesting because I have uh a number of episodes out for the longevity series and there are people who keep saying like is there anything for Cosmetics like it doesn't actually have to make you live longer but if it just kind of rejuvenated a little bit like people are very excited for that so I definitely see a need there I know there's like it's very much the wild west when it comes to regulation which is which is bad because if you want to do the right thing which have some studies to like affirm what you're doing in a business doesn't another business doesn't want to do that they can spend less money and spend that money on marketing and then get better market share than you which is it makes it unfair when things run that's what I think people don't realize about regulation it makes an even playing field where everything is uh is is not heinous you know it's like if I can pay my workers a buck and you pay yours like 20 bucks and I take that extra money and I you know whatever I don't know like I just like standardizes things I was recently talking to I think their episode's going up today Alan uh pearlstein who is working on cellular agriculture for chocolate and

coffee and basically the there are businesses out there that use slave labor and deforestation to have those products and his is made basically in a lab so you don't have those problems and so when there's not regulation you have to you can use technological innovation to make it so that you know business A and B if the if a business if business a allows slave labor their prices are lower which is horrendous that anyone in America or anyone that's a was any anyone should be a slave labor anymore and then uh but if if business B doesn't do it uh their prices will be higher inherently then people won't buy it because eventually everything becomes a price point people don't realize that every day they're they're influencing the World by what they're willing to tolerate in terms of prices are you spending the time and at the same time how much time do you really have to like look through like okay here are the two chocolate bars in front of me one made by slavery made it Validating research with further research, wild west, and multiple drugs one by not and once there's a dollar difference is there a taste difference or maybe about the same so like there's a lot of complexity going on here and that goes to the benefit of the lowest common denominator which goes to my question of uh do you have any interest in validating it you're you're with further studies before uh just finalizing the product or do you recognize that like this is an area where uh there might be business that'll like snake you and like take advantage of like the research that you see already like how do you how do you see living in the wild west while also being civilized with your PhD and your science background George church and all these other things um I'll just say before I go into that like the company uh it's not just it's working on different things as a bit of a platform company but to kind of simplify it I'm just talking about like for example that that article longevity it talks like there's only one drug there's actually like a multitude of drugs really so like on messaging things kind of uh get thrown away just to make the message uh a simpler so for example we're working on Cancer drugs as well and um and uh and also I got Ambitions like Beyond um much Beyond Cosmetics one that yeah so I mean legally we could even like sell Cosmetics today but it's like you said we want to do the studies before you know and actually kind of prove it all out and then actually have something to be proud of and people could kind of get excited about um and so so we want to do this next experiment where we actually see if the drug can slow uh the the Aging of human tissue xvivo so if if it can that would be a very exciting result and then also we want to do like a mouse lifespan study with it uh to see if we can make the mouse live longer and you say about like yeah so the Cosmetics are very crowded Marketplace but the thing is people are so desperate that they even buy things that they kind of know don't work really and they spend quite a lot of money as well some of these Cosmetics are outrageously expensive and so they're just so desperate they're like they'll buy

things that they're kind of they they even must know in their heart of hearts this really isn't doing anything
um so if you do like the the ambition really is to like have the mouse going the drug making the mouse live longer and longer and like as the mouse lives longer and longer uh you know people get more and more excited and then you say like uh the same drug is actually in in this cosmetic so that that's my you know uh biggest aspiration for it so really kind of have something that you can really show is working and then and and then really capture the market actually and maybe even grow it because there's lots of people that don't use Cosmetics now because they just like well that won't work I'm not going to spend but if you had something that was you could really show was working it could bring a lot more uh uh people in and and actually kind of like looking to license um uh uh the compound to like a Cosmetics company uh like as big as we can like uh I said then you can access the market do like a huge scale de novo um and just kind of you know leave them to run it because I don't know anything about Cosmic so I I don't want to be involved in you know marketing and things like that just kind of everyone's doing what they do best and and to get them excited that you take uh uh you need data you know so they uh yeah as much and and the more data that we get the stronger position we are in in like uh the terms that we can drive for a licensing agreement agreement so to answer your question briefly we want to like prove it all all out and this is why I get very frustrated with people like kind of criticizing and trying to kill it before we even you know so there's something here let's let's find out you know I mean this is this is science really this is what science is you you find out and you you look at things that have happened before and then you kind of like make a mental model and then you make predictions and then uh you know try it out that's the way just it's so easy just to sit back and just go well you know that's wrong that's wrong and then just get into it get get get get nowhere so um yeah and I really want I think there's I mean why actually think I think I I mean I have to kind of uh I don't know dampen like how I but I think this is really you know this is a I I think this could really take us forward like could really um yeah I was thinking of different ways you could experiment uh on it because in Truck drivers and experiments in the field America there was a recent thing where truck drivers get like half their face that ages faster because it's just exposed to Sun I was like well you could give them cream for that half of the face and then compare uh to see how it works out well no they do that they do that they do that so one of the ways Cosmetics are tested they're like you know you put the cream on one hand and not on the other or another thing is

when when you first touch Cosmetics you actually rent space on someone's back so like a companies have like a little they rent a little disc and put their cream on to see if there's any uh uh reactions and things like that but even that isn't mandatory um you know there's so many cosmetic companies actually I I didn't know so I didn't even really know about Cosmetics so I started uh looking into this um and as I said the reason why to go for Cosmetics is just because it's so close to Market because you know and then and then hopefully get like uh revenue and profit through that which is actually quite special for a biotech to have and then you can you can you can like drive that into other things like you know more experiments so the Ambitions are actually to you know um yeah because like so many diseases actually correlate with age so like young people don't tend to get them you only tend to get them if you're older and there's quite nice graphs where if you see like um you know times on the ages on the x-axis and you can kind of see the disease instances goes up like this you know and it starts to go by you know by 40 and you know by 60 you know you're up here it's kind of and so a drug a drug to slow aging could actually uh and and there's a thesis that those diseases correlate with age because uh aging age aging is actually a cause or drive to them so if he had a drug that could slow aging it could actually have like a therapeutic benefit for a huge number of different diseases varied diseases so you know Alzheimer's or age-related macular degeneration they're also different diseases but they might have this common kind of Hub at their core which is aging so if you have a drug like a slow aging it could you know a huge number of different diseases it could have a positive effect for so the company's got Ambitions to have a drug they're slow aging and there's so many different uh applications for that if you're successful and as I alluded to before this is actually necessary because what's happening is the population is kind of aging and people are living longer but they're not living longer in good health they they get one or more diseases of Aging which are very incapacitated and debilitating and then they can't they can't work and maybe even have to might have care and then they're pulling people out of the workforce and um and this is this is like a a huge crisis that is coming and that's why I I can't be frustrated because like one of the criticisms is people say we shouldn't even be trying to solve aging like aging is a good thing kind of thing but the default if you leave it we're gonna have we're going to be in a a real uh muddle in the future and we're kind of like hitting on it already I think that that what aboutism I always feel is just so uh Skin Deep you know to keep the Cosmetic joke but thought because people are always like oh why should we be going to Mars why can't we

spend it on school systems and stuff like we can do both like the stuff that we're gonna learn from going to Mars or doing this research like like if you're if you care so deeply about roads and I think that there's an argument you made that someone who's like really dedicated to roads and improving them would have a good benefit on the community go do that and then let people like yourself who's excited for this type of work to do your work and like it's kind of like I think people work from a scarcity mindset like there's not enough resources in the world and I think we are moving to the point especially with rockets and other things where we could potentially be in a post-scarcity society where there's enough to go around nobody hopefully lives in poverty and that type of thing and so at the end of the day like if you took someone who's really excited about roads and you said no you're gonna have to do longevity research for the next 20 years and maybe it won't work out and you'll be Painless by the end of it you know if it failed like completely right it's like they're like well I wouldn't want to do that it's like well then why would you do it to Michael let Michael focus on his thing that he's excited for and you focus on the roads or whatever else you're excited for it's like everyone has their their their thing and I feel like we need to appreciate people's different interests like someone who wants to work on roads it's equally as valid as work on longevity the difference is there are people who are very excited about this and want to dedicate their lives to it and guess what it'll benefit everyone else there's a level of just like being empathetic and understanding like people have interest and let them pursue those interests and I and at the same time I know it's hard for people to do that there's a lot of people who can't touch that passion that you have very clearly for this work because they you know they haven't been lucky enough to be exposed to something to be excited for or they have like things in their life they've like really push them down you know abuse or whatever and so um for anyone out there who's feeling that way I hope hopefully you reach out and uh if you don't know what your passion is like maybe read a Walter is Walter isaacson's Ben Franklin they talk about how to find your passion a little bit in the beginning basically just try a bunch of new things but if and at the same time like hopefully there's like therapy and stuff as well depending on your level of you know concern but uh I think my opinion and I'm curious you know if anyone else in the comments is agrees or disagrees is there's a lot of different things out there if we take if we take you who has a passion for this thing and you're working on it you're going to do better than someone who's just highly paid put on it like there's so no the person's gonna check out they're not gonna do the best work they'll they'll they'll do an okay job but the person who who has the the foundation and has the passion and it's gonna go the distance it's gonna do more than someone who has like maybe more money and um and it's just kind of doing it as a nine to five way I've seen that often in the businesses I work on and that like

people will say oh well per uh company X just got 10 million dollars in finance and I only got one million it's like great they're gonna spend 10 million dollars validating your idea in a different route than you were going to do because you know yours is the optimal

Execution and copy cats and stress

way of going about it so just continue to execute on your thing and eventually they'll die I think there's a story in Silicon Valley of Airbnb where there's another company that just does this meat like they copy it they literally copy and call Airbnb a light or something you know like they copy everything word for word but basically but in a way that doesn't get them copy infringed and what they want to do is basically get Airbnb to buy them out for several million you know 100 million dollars and Airbnb was like no we're going to execute on this and now they're stuck doing something that they don't even want to do they just wanted a Payday and So eventually that other company died and they they won overall so I feel like it's like that stay to what you're interested in learn

some fundamental research and people out there hopefully can be really supportive of it sure you know if there's something they think is not being done well you

don't criticize it but also offer some helpful suggestions uh because it's hard to do what you're doing like there's a level of anxiety and stress that comes from doing what you're doing versus doing a normal nine to five that I don't I don't think people appreciate that element of it they think founder of startup oh this guy's got to be like fabulously wealthy you know blah blah

blah it's like no maybe maybe at the end if things go go well but in the interim

like things aren't you know great but you got to work for it you gotta work really hard it's like 100 hours I think that's why it's so rare because you've

got to have like so you're going to have the competence to actually find something new out

um which we have already I mean so this is one example so the reaction that we found from metabolic heat generation

we've proven that out now that and the drug actually does uh reduce medical heat generation and and and no one would

have believed that before you know if you said that's what's uh so it's actually a very big hole it was such a

big hole that no one even knew as a whole like what's actually how how a man was metabolic generating heat and how

how is like a mouse per unit Mass producing more heat to keep than you know like a whale for example so that

that was a big hole and we've actually found found that out already so there's already things we can like hang our hat

on that we found out that we're so kind of no one would have believed you know so

so I get a bit frustrated like why people don't kind of like extrapolate the line you know so they've got the

competence to find things you out which they've done and they say this this is going to happen you know let's let's

let's follow the line and and and and you know see uh See if that

um and um I've lost myself a little bit there is um

yeah there's when I was listening to you I was thinking like there's loads of points points like uh yeah I'll make my points up more I'll add more periods to my points than some pauses so you can you can jump in okay yeah yeah yeah yeah yeah yeah I see where you're going with it and um I know we've been talking about Cosmetics so far but that's just one aspect what you're working on and uh any any cosmetic companies out there who are interested stuff you know maybe Cosmetics companies recharge Michael oh yeah yeah uh yeah get in get in while the water is hot uh yeah actually she's already talking to some um but but um but they're very um I don't know I'll keep it confidential a little bit but they they someone said to me that is like that it's so they're not really looking to solve aging this is the thing so they're kind of like looking for actual cosmetic just kind of masking things they're not so interested in actually you know slowing aging they kind of put that out of their wheelhouse they're like well that would never happen so this this is where the the biophysical Therapeutics are really is really differentiated and that we're actually really trying to uh you know crack aging and um you know they've even got drugs to kind of uh like test and things like that so but it's it's somewhere out of their uh uh wheelhouse it's not even like there's something that they're necessarily looking for and yeah that's a unique opportunity if Mask and reverse aging cosmetics you can if you not only can mask aging but reverse it and make that a Competitive Edge to their competitors who are just looking to do some faux like faux leather type thing not even real leather um I think it's a competitive Advantage yeah well I get bit frustrated because yeah so they don't see like say for example after this experiment this next experiment yeah like where we if we do show that the the drug slows aging human tissue that's fever like what is the company worth then so then there's there's no messing around you have actually Sloan but then maybe concisely you haven't actually done it in Vivo you've done the x-vivo so um but then you know the company will be worth a lot more like why don't they kind of try and preempt it and come in now and then actually we could use that money to kind of Drive things uh forward but yeah I remember actually what I was gonna say yeah so you've got to have um you've got the ability to find new things out but then also their determination to kind of like see it through yeah and and and um you know that's that's hard and and also it's a lot easier now because for a long time I I it was all secret you know so I've sat on this for actually quite some time like patented it and stuff so um uh I it's very hard so the number of people that actually have that is like uh it's very small and a real determination like I've um I've done hard things in my life before but like was in the Army and things like that and uh this is this has been hard you know like

uh really hard well uh thank you for your service so I think you served in probably the UK then
Military service in the UK
right you're I don't think you're an American I think you're a UK and no no I'm in the UK yeah yeah I'm from UK yeah
yeah so then you get the is it is it called the Army in the UK or is it like the Royal Marines or something you guys
have like cool names for things no no uh the Royal Marines is kind of like the equivalent of the uh US Marines so it's
like okay so there is actually an army yeah in the UK it's Affiliated them a
navy and in the US I think the Marines is like a a separated branch of the military I think it is I think I think
they're kind of there it is yeah there's a our the the number one Air Force in
PhD and military service
the world is the U.S Air Force and the second one is like the US Army and then like the third is like the U.S Marines
yeah yeah yeah yeah I've actually been in the U.S marine uh helicopter and
they've got like these crazy it's almost cool now but they look they look they look very strange and
uh yeah so I um like maybe I'll explain that a little bit so I was actually in the reserve the Army reserved when I was doing my PhD and I actually had a bit of a shocker with my
um uh PhD I um so I found new things out about so like my expertise really is like kind of computational biology so the PHD was in computer science but I said applied to
biology so I was actually making computational models of like a brain neurons and I found out uh something new
about how the brain worked I found out like there's something called the sodium potassium pump and I found out that was in like uh directly involved in brain
computations like in bikini neurons and um it's like I said like people kind of and
it wasn't people on Reddit at this time it was actually people uh like you know I got to get the PHD you kind of have to
publish your work like in journals and I was looking into generals it was getting pushed back and they're saying no that
can't be right because it's actually like quite a fundamental uh flip and people were like you know a bit uh put
out about it and so I had a nightmare because I was I was stuck like I couldn't kind of get the PHD I couldn't
publish my work and I'm saying right this is right this is you know this is right and they're getting pushed back but anyway the in
the end it was right you know and other people started showing it and stuff like that and then I could publish my work and get my PhD
um but but during that time I actually like went to joined the army full time I got like so frustrated and I actually uh
thought right that's Me With Science you know like uh and I got very uh despondent with with the whole thing
which is why when I had these ideas to do the stuff I'm doing now I I this
wouldn't have happened if I had applied for Grants and and things like that in the University so I just got my head down and I just um and had some savings
from the Army I just got my head down and you know did it and then uh got uh data kind of proving it out

um and but still you know you got like criticism and stuff but
um so is it but I mean it's more than an idea there's actually like as I
said
there's like things have already been shown by quite big fundamental
things like how one was methodology generate
heat that's like a uh yeah you know that was a that was a hole and that's
that's now being cracked
well uh I I thank you for your service regardless even though it's uh for
a different Nation the I think American UK
US / UK revolutionary war / joke
are pro you know I think we're like you know uh buddies even though we
beat you up in the Revolutionary War which I I
hear that you guys don't study that much you guys are just like yeah who
cares it's like one of like 20. we care more about like India leaving
than anything I
don't think you guys care about America leaving they're like yeah good
luck with utterance we don't even want you anyway yeah no no we don't
actually
um yeah we don't we don't yeah every uh every now and when I'm talking to
someone from the UK I'll bring up yeah so you know uh we we beat
you guys up I don't know it's like an American inmates so you're not
joking about it
are you like joking about it because I was in America one time on
Independence Day and I made a joke about it I said
like this is a day of mourning for me and they got really pissy about it
they like they didn't I was true I was
joking and like they're really sensitive you didn't tell it's the right
crowd
that's hilarious I would that that's hilarious I don't know uh where
maybe you're in like in Texas or something
like they're very jingoist down there but uh yeah that's hilarious now
they're really uh
[Laughter]
uh yeah I guess it would be the well people always wondering like what
would the USB if like we stayed under the
umbrella of the British Empire it's like well we probably wouldn't have
been anything because like the the brain was deliberately uh sabotaging
the
United States vs UK science and economic prosperity from innovation
Mercantile and uh industrial base of the us so that like they were like
uh
hobbling us so once we left you guys we grew pretty fast and everyone
came here because your line of opportunity but uh
yeah I really like um
you know it's it's incredible like for science for example like um and
this is the thing that people don't realize and
um you know even in England and actually it's sadly it's growing in the
US people don't realize that science technology is
what drives economic uh progress and um
so for example it doesn't like you you said before about kind of like um
scarcity and things like that these kind
of things they actually grow the pie so they kind of think oh if you get
money from that you're kind of like taking money away from something else
but like
uh these kind of Innovations they actually grow the pie and make kind of
everyone richer so like a drug that
could slow aging that could have like have a incredible economic impact
so so

for example um they've actually said there was a paper in nature aging uh David Sinclair was one of the authors and there's some economists uh by Oxford and a guy um Harvard I've gotten their names sadly but they they did a calculation if if you were to slow aging by just if you were to make people stop eating and make people live increase life expectancy in the US by just one year they calculated that would have an economic billion benefit of 38 trillion US Dollars just by uh uh one year and um like I said I said that uh people have a variation in body temperature and people with a lower body temperature live longer than those with a high body temperature so this drug that can actually reduce metabolic heat generation I've done like a a calculation what if you to give the drug to people with a higher body temperature just a very small dosage to bring their body's temperature down to a lower body temperature I predict that you could increase life expectancy and I do calculations so you can actually decrease your life expectancy by more than one year so then that would be an economic benefit of like 38 trillion that they've calculated and just think how much you know um money that is really and then that's an economic benefit that kind of gets like shared by um everyone yeah and then another thing that people might say um uh like patents and things like that maybe I'll go into that a little bit people don't realize that you you and I say this at someone doing it doing it because you kind of like go to someone and go like right there's this drug it could slow aging or it could uh have a treatment effect for cancer they give I wasn't going to use the terminology they they really don't get they're kind of like right what's the return going to be okay so this is you know because people people they always do this when there's a new drug and they kind of go like oh that shouldn't have a pattern and stuff but you don't see like it needed that patent to get to that stage so in the UK they're getting very bad on this it kind of like let's just cancel all the patents and stuff but what you don't realize is then you're never going to have new drugs so just realize what you're doing that when you do that because and the reason is so like developing a new drug is very expensive so but and then they get into the market and if they don't have a like a temporary Monopoly on it then other companies will start selling it and they're not in the hole for all that money so they're making sure that makes sense sell it lower and so the company that actually developed the drug would go out of business so this is why they actually need that and that Monopoly and also what people don't realize is like by the time a drug actually gets in the market there's often only like a few years of passive term left anyway so you just you just pay for pay pay for the drug for a bit and then it's basically free forever because then the price comes right down and so like you it's very it's not even very much I mean the

cost of goods after that so it's it's actually like quite um you know you could see and and the danger of playing around with it is that then you you know you could by all means play around with it but just know that maybe no new drugs will come um you know you could kill the whole thing and um yeah and it's important that people know that because as someone from like you know trying to raise money and things like that for new drugs like literally they give they do you know say like we've got a new cancer drug here it's not like they go oh yeah we're gonna help with that they um because also the other thing is uh like the risk of drug development is quite High loads of biotechs actually just flame out you know like burn like charging Millions maybe even hundreds of millions so um so to offset that risk they need a very high return you know and if you're going to risk uh like tens of millions you probably need hundreds of millions back if you risk hundreds of millions probably need billions of that kind of thing so there needs to be that um and I I've I've got into like Twitter things about that and stuff so I I even I've had my time wasted on this kind of stuff but it's important people and maybe I wouldn't have known if I hadn't had this experience as well yeah I think that uh well I know you do some writing too I read some of your articles I think they're on medium and so I think that I think it I think like a good thing to do it's just something I do it's like when I see a question I will make like a fact about it like a frequently Asked question thing and then I'll just be like here's the fact right you know like I make it for podcast guests and stuff like that so it's like oh here here are the frequently asked questions and I think I don't know FAQ, writing articles, and science speaking whether you looked at it or not but it's like it's there if you're like you're curious about something and so yeah yeah yeah I just like so these people just like uh like you can engage with them and they give them your energy or you could be like oh okay that might be interesting then you make content that then like gets more people looking at your stuff as well and which might be like a more healthy way to look at things the uh well yeah so all these articles and things like this this is a new thing so it's something that I realized because I'm actually quite a shy person uh by uh and I'm not that shy like meeting people but they've thought of being like etched into the internet forever just terrifies it and so like doing all the like this is actually quite a big uh lead for me and I realized it's something that I've gotta you know I've gotta uh get out there more really so this is something that uh uh like out in my comfort zone that I didn't really didn't want to do but it's part of job so like five so yeah so now I've I've been like trying to because I want people I'm excited about it and I want people to get excited about it you know to know about it and and that's why it gets so I so I was actually quite quite put out by some of those Reddit

guys because I felt that they were kind of they were harming my explanation you know that's what I mean say whatever you want that that one that you said I'd not even upset about that one because it's like it's just not a nonsense kind of thing but when they when they're trying to say things like it increases metabolic rate and don't they know like uh because there's actually a drug that increases metabolic rate called 2,4-dinitrophenol um which you can uh okay I'll say I'll say it's like um it does actually like increase metabolic rate and people use it for a weight loss drug and it does actually work but it's super dangerous because it actually makes uh um the body more less efficient so um like it generates more metabolic heat so people you actually die if you take too much of the drug you you actually find a very super nasty uh uh way and um but it's it's still used like bodybuilders use it uh quite a lot and and so like one of the guys was like ah does he not know like this these drugs are dangerous in this class and I got very annoyed because he's like saying it's like it's actually the opposite what the drug does it actually slows them into my brain and so I just thought he's like you know muddying the waters and I I gotta you know I was very annoyed annoyed with that and then I I try and I try and like educate them but then they you know just come back with more crap kind of thing and then just losing yeah yeah you can't you can't educate people who don't want to be educated I think you could do like that political I think like that maybe like Politician answer questions and explaining science something you could do is that you do like that politician thing which like what do you think about Tom Cruise's stance on infrastructure and then you say oh infrastructure have you heard about my new plan for health care and you just talk about the only thing so if the concern is that they're muddying the waters you can just like be like here's my post on explaining how that's not the case so like you never really engage with them you just always are on messes for your thing so then they don't really waste your time yeah well you know that's a good way to that's a good way to do it so maybe what I'll do in the view it's just not respond at all so like and then my the actual the definitive documents are what I've written so like if you want to understand it like um and also for quite a while I was having problems uh explaining it but I think that article recently on longevity technology I don't know if you can yeah that was good share it like underneath this video or something um but I I think that explains it very well and like kind of like quite um succinctly and then if you want more detail there's actually a a pre-print paper um and uh we which is kind of like ongoing work that's like a I think that's version three it just was more work it gets done then I kind of like uh um update it and submit you know so version four will be um uh shortly and then then there's the

actual patterns underneath like if you're actually interested in um even most of scientists don't even read patterns actually which is um but the thing is that's where a lot of all the best work is really so there's a saying actually um uh published like in journals your failures and patent your um successes so yeah in in in biotech and Pharma like a lot of the best work is only getting published in the patent literature so if you if you if you don't read patents then you're you know you're missing a whole you know the best stuff really and the thing is to re to to really understand the pattern you kind of have to have written patterns in some sense to kind of understandable like the best way to kind of understand how they're structured and things like that is actually to do it um but um yeah I mean how do you learn that how do you learn so like if I I haven't I think I look I've looked at patterns but I don't have like specialized knowledge on this is it like a book or a resource that would give me a good overview to Understanding patents better understand it so this um well there's two things going on there's like the kind of manuals so for example uh like and also it gets tricky because it can be different in different jurisdictions but say say like the European patent office they've got like a manual and you can read the manual and then the other thing it says case law so you've got to be like uh and when you're doing examination actually you're often like pulling things from case law and examination is a bit of like a competitive you know they make arguments then you've got to make arguments and you often like pull from case law and you're going to know them the the manual inside out and then the other thing is um so that's kind of like almost theoretical but then you've also got a but there's a practical element like how you actually write it and stuff that isn't it in in the manual but how I learned to do it was I actually uh use patent lawyers and like a new bernetes which was like um so I basically found things out and then I was actually quite disciplined for a scientist because I found things that normally what happens is then they just publish it or tell people and stuff and then you can actually never get a pattern on it once something's in the public domain you can never get a a pattern which basically kills it really because then no one will pay to take it through clinical trials and stuff and so it was so much um uh work kind of gets lost through this and this is kind of like the info and so so lots of scientists don't even realize this they kind of think why I I need to publish this and if I patent it that would be so evil kind of thing but they're doing it they are unknowingly doing evil themselves because if they don't practice it then it's just lost forever so um so I found these like new drugs and um actually maybe I'll go after this I'll go into I don't know whether it will be too technical but I'll go into

how I actually because actually how I came across maybe I will go into I
so
how okay yeah maybe I'll go into it so how I um so basically I I found
new things out
and I used like a patent lawyer and then like really um good patent
lawyers like uh and then
they helped me and then also I watched what they did and so kind of
learned from them and then I got to the point
where I could actually do something to myself and then slowly over time
could do more and more uh things myself which
has been um you know so for example in Australia I argued it like
completely before the Australian patent office and got it to
Grant but how I actually first kind of got is quite a long story
so I um I I actually um
there was a time actually you know I said I was a fan of the US and I may
still do this at some point so I I was
actually um thinking to get a green card and there's like um there's
actually a program called alien of extraordinary
ability like for a scientist to get a green card there and uh for that
you have to get references from scientists
that don't know you they've read your work and then you know they they
have to say good things about it so with that I
actually got a reference from a guy called Michael Levin who's actually
like quite a high profile uh I'm talking to him on Monday
he was very kind he wrote me like a very a nice reference so about my PhD
work
and he was he was asking me lots of questions about it you know I
remember I said like I was it was all about membrane voltages and like
finding out
like a brain neurons computer and he's really asking me a lot of
questions about it and I I said to him like why
why are you so interested like because he works on uh um kind of
development and uh and cancer a little bit on the
side and he said no it's not just brain neurons that use these membrane
voltages for signaling it's actually used by like
uh cells during development and also cancer cells have a different
voltage across some of their
um across some of their membranes and so that really captured my
Imagining the cancer aspect because I'd always heard
people complain you can't hurt cancer without hurting normal selves
they're like too similar you know lots of
chemotherapies they they they actually hurt cancer cells but they also
hurt normal cells as well which is why the
side effects are so her cancer is almost like
um you take the chemotherapy and it's hurting you and it's hurting the
cancer and it's kind of like who kind of gets killed first yeah and some
people they
just can't handle this and they've received consent to treatment and then
you know they just kind of like walk
into the the the the the night sadly and a lot of people don't even
realize
this until like it's too late kind of thing to get a cancer diagnosis and
then they're they're all alone and so because
I've published some things on cancer some cancer patients even contact me
um and so they
they you know there's very few options so sorry
Cancer

no it I I know a number of friends working on cancer it's it's hard when you're talking to the patients and know that you might have something that could help them but it just takes so much time well yeah and also such a big shock because they they don't know so they kind of think this is kind of a soul feeling like if I do get cancer you'll probably be okay and the thing is if you've got um cancer that's up it can be operated on like cut out like maybe you stand a good chance but if if you've got like an internal cancer like pancreatic cancer and it's like found very late and uh you know if it's inoperable then if you you know you've got very few options you could actually even be dead in like months if that's actually the most common uh thing that happens so anyway I that there was so I saw a difference there and where there's a difference like maybe you can attack cancer without hurting normal cells yeah and so I thought right I'm going to find out why why there's that difference there so uh it's actually quite a big difference so the cancer cells have got different voltage of course they're in a mitochondrial membrane like a quite a big difference 16 millivolts that probably won't mean much people but that's like a huge difference there must be something going on there that's very different so I'm going to find out just just to interject because I don't know the the gradient so this gives people a perspective what is a traditional gradient involts and then like how big of a standard deviation is 20 from it like just like give people like the little bell curve okay so what is normal Michael Levin and bioelectricity and then for a cell and then what's that normal so normal is about minus 140 millivolts that's for a normal cell so that is more than negative inside the mitochondrial and much your Matrix and then a cancer cell will be like minus 200 minus 210 minus 200 maybe minus 250. so and this has been well known for yeah this has been well known for decades and it's even been leveraged in the clinic so what you do is you get a toxin and you make it like very positively charged and because like the the the the mitochondria of the cancer cells inside is more negative it will accumulate more of that Toxin and so that's even actually gone into the clinic um uh but sadly a kind of I don't think it made it through I think it like fell away um phase two because you're still doing the thing about toxins and just yeah maybe the toxin will go into the cancer cells more but it will still go into normal cells and you've got the same problem where you've got like horrendous side effects and people kind of like since consent to treatment you kind of um getting nowhere but so this has been known for like uh decades and I thought right I'm gonna find out why and I did find out why so cancer cells have actually got a very different metabolism than normal cells um and and and actually for example that's illustrated by the fact that cancer cells are actually Immortal and our normal cells aren't Immortal of

course we don't live forever so if you get cancer and we take one of a cancer cell from like your tumor and we plate it and we we kind of give it food every day you will die and the cancer cell will will keep on living and in fact like one of the cancer cells that's actually studied uh in laboratory yeah yeah yeah so Henry had to lack a sadly long since died but her her cancer cells are still alive um and in Laboratories or all across the world so so again so people like complain the cancer it almost doesn't cancel like so similarly can't get one and not the other but there's some pretty big differences here like so there's a Cancer and that actually comes from um metabolism and I actually think it's because um like like I said metabolism kind of gives with one hand it gives life it produces like these harmful byproducts which of course damage and aging which ultimately takes it away and cancer cells are using a different metabolism where they don't produce so much damaging byproducts but the cost at the cost of like they get less energy from their food so they get less to be specific they get kind of less ATP yield from each glucose molecule so that they're kind of um they're they're kind of like optimizing for a different thing for immortality but then at the cost of like a more inefficient metabolism and that that that that effect is actually quite something called the Warburg effect and the guy that discovered that uh Otto Warburg actually won the Nobel Prize but for something different and again this is something that's been known for a long time but just kind of like kind of forgotten really and uh it it ignored and so during the Warburg effect what's happening is I I might get a bit technical here but like there's um cancer cells are actually using glycolysis a lot more and glycolysis because for one thing glycolysis is produces metabolic intermediates for like a self-proliferation so they want like a glycolysis going at like a very high rate and glycolysis actually produces ATP which actually has a negative feedback in inhibition effects on the enzymes of glycolysis and so like lots of ATP accumulates in the cytoplasm and because of that the adenine nuclei nucleotide transporter in the in a multicellular membrane reverses and actually starts importing ATP into the mitochondria rather than exporting ATP and then that ATP actually um ATP synthase instead of producing ATP actually consumes ATP and that actually causes this membrane potential uh membrane voltage difference and there's there were some actual drugs like around Bristol my squib actually developed these drugs like a long time ago over 20 years ago that um specifically inhibit the reverse mode of 80 percentage and not the the forward mode um and so I thought right if my kind of model was correct then these drugs should actually have anti-contractivity so I got them synthesized at a place called wushi aptech in China and then sent to the uh National Cancer student USA and they tested them in this kind of

in vitro assay which they tested millions of compounds in um and they've all present cancer drugs have been tested in that same assay and this this drug I actually sent a few they actually had like a more a great anti-cancer activity than most present Cancer drugs so validating that and then there was some kind of things that I did Cancer drug and cancer hypothesis that showed that it was actually exerting the antonym anti-cancer activity by actually hitting that Target which actually in the briefing if anyone's interested yeah so this is a this is a branch of a project they're gonna be working on yeah so this is how I got into the Aging thing so and I I thought right I've got like a a really selective cancer drug because cancer cells are usually 80 percent based in reverse and not in forward mode and uh normal cells are using 80 in forward mode so I thought I had right I've got like a completely specific cancer but then I I had a thought like maybe normal cells are using that reverse mode maybe they're producing ATP but then deliberately destroying some of it like to create a futile cycle to generate heat and that's how like uh maybe that's how mammals actually metabolically generate heat and then I thought like we can test that by actually giving this drug to mice and if that's the case then their body temperature should drop and to the ambient temperature so if if the moisture in a ambient temperature 37 degrees C and you give them the drug the the drug can't drop their body temperature because their Mouse can be dead actually and if it's the ambient temperature 37 degrees C this body temperature will be 37 degrees C but if the ambient temperature set like you know normal room temperature 21 22 23 then the drug should reduce its body temperature down way down towards ambient temperature and that's actually what happened so then then I realized I found out how mammals are actually metabolically generating Heat by this by this reaction and then I knew from like way back that there was this link between metabolic rate and aging so then I thought right well this the next thing to see is to see whether it can slow aging and that's where I am now and like a you know uh I've kind of disseminating it now because patents are published and then I've done pre-print and now I'm doing uh you know these kind of Articles just for the general public to try and get people interested and to kind of get money and like to move it forward SENS and partnerships or do you have any interest or do you intend to apply for a sense Grant I know they're they're looking for proposals pretty soon and I think they're glycosense project would fit I mean I mean there's like some relation there but I know they're they're looking for people to work with under that umbrella so are you gonna like uh query them to see if you can work under there uh so it's one like um someone said the thing is so the thing about sentence is um so uh so Aubry degree who's kind of like you know the father and I I I own a lot because it like uh reading his book

um actually he's an undergrad he he did a PhD and then he actually published his PhD thesis as a book which I I found very useful and very inspiring but he's he's he he's now said like metabolism is too complicated we can't really understand it like let's just let all the metabolic damage happen and then we'll repair it um whereas I'm kind of like let's actually interfere in metabolism I think I found a way to interfere in metabolism and so to actually uh slow slow the Aubrey de Gray and Kevin Perrott damage so what I'm doing I and I've actually been told this doesn't really fit under the sends uh remit unfortunately like Lisa yeah well no I actually spoke to um uh Kevin Parrott parrot um and he actually was very nice he actually uh like uh reserved an investment in the company um but he uh he kind of said no it wasn't like a sense project and yeah I think the maybe the uh the cancer component might be more sense related I think that seems pretty powerful everything you're doing seems pretty powerful in terms of like potentially having a big impact the do you because Focus, platform building, and other projects you're trying to build out a platform company you're focusing on the one aspect of where you're focused on is what we talked about previously which is the Cosmetic are what are some of the other projects is one of them going to be cancer related or is the uh uh cosmetic the full Focus like if you were to like pie slice it a platform does like multiple things so I'm wondering what your other projects are well yeah so yeah um I said before like when I I um kind of pitching it to people I used to say different things like we're going to do cancer condition with cancer we're gonna do this with Alzheimer's and stuff and um people advise me um uh it was actually um like quite a problem maybe I won't tell you who is but like like a Nobel Prize winner who's had like a lot of Success commercial success and he he saw my picture he said you need to just boil it down like you you know you're all over the place and he said like I I understand it but like you're going to make investors head spin you're just gonna have a simple thing and uh one thing that I found very useful which was real kind of breakthrough in my explaining was like you've got to explain it to someone else so so well that they could explain it to someone else like after them kind of thing so they've got to explain it they've got to understand it so well that then they could explain explain it and I was thinking yeah well actually yeah maybe this is too complicated you need like a little bit but just a nugget that they can kind of latch onto and just go oh okay and so this um and so they're not getting actually for if you're interested just like a slowing metabolic rate has been shown to extend the lifespan of like mice flies wasps uh fish and worms and probably many other species so and we've got a drug that can slow metabolic rate so then we predict it could uh slow aging so that's like

the little hook um yeah yeah it's much more simpler than you know yeah
it's I I I've people say
like investors like I want a platform company but then when you have a
platform company which like has multiple options so like well no I want
you to
Platform vs focus for venture capitals
focus on one thing it's like I don't think you understand that like how a
platform works because like yeah I guess you could potentially work on
like the
technology of computation to develop like an AI thing that would then be
used like you could like build the platform
in that way but yeah they they get kind of Twitchy if you have more than
like one product you're working on yeah
but then also if you've got like one one product to work on then they go
like well we're after platforms so it's just
yeah you know you can't win you can never make them happy yeah but
there's so you so and it took it actually took
him telling me that because I other people had said that but I I respect
and I kind of ignored it but I respected him
so much I was like and then it kind of clicked I was like yeah I've Just
Gotta Throw everything out well I was out
we're just gonna we're only gonna talk about Cosmetics but there's
there's actually you know there's a lot there
um and actually quite unrelated to this like going for different targets
and stuff so for example there's a there's a drug called ametrine which
is actually
approved for um emphysema and I've discovered that that's got uh anti-
cancer utility no one
knew that so like uh and that's because that's already been used in
humans maybe I could go straight into
um face to clinical trials uh there's things like that and I even had a
bit of um
like a detail with uh coronavirus or ametrine actually helps like people
with breathing and obviously then you'd think
like maybe it would help uh people with um coronavirus infection and so
like a
patented that and kind of Trace that for a while although interestingly
that actually went the people took it into phase three and actually face
I've
failed phase three clinical trials for University inspection although
they use a very uh low dose but um so this
and there's lots of things that I want to do as well so there's like lots
of pent-up work kind of thing and it's
getting more uh like resources and kind of move more more things for it
so it's like almost like a dam of like
being restricted by by finances and then once finances come in then
like move uh yeah you know more
things forward and I I get a bit frustrated sometimes because I'm like
there's some you know there's so much
there and it could do so good you know what why why is it kind of it does
it deserves to have like its legs and and
runs yeah have you heard of I think it's vital Vita Vita Dow there's like
a a
vitaDAO
health span uh yeah yeah blockchain thing where they can do like
crowdsourced uh funding
yeah one of the guys runs it well there's a saying like never kind of if
you multiply Innovations too much that's

bad you know so you've got like one risk like will the drug slow aging kind of thing and then you're kind of multiplying it by kind of like a business model risk like if you've got too many risks I mean oh no I mean uh no no I'm not thinking of it in terms of a business model I'm thinking in terms of uh fundraising so there's there's groups out there that'll do like a crowdfunder it's like kind of a Kickstarter for serious stuff like this and I'm not recommending them because I've been learning about them currently it's just something I'm aware of that there are I think like turn bio who I had one of the founders on I'm having another Founders on a couple months but they did like a million dollar raise on it and basically what happens is like the people who have to raise the money they get like a small percentage Equity stake or something to that effect so instead of needing investors it's like you do a crowdfunder like Kickstarter and it's just like one platform that does that so it doesn't mug your business model it just nudges it like adds optionality in terms of um who uh where you get the money from but I do think it'd be interesting if you were to write your book Someone like up to gray with your PhD saying I was right and then you know you could take all these negative comments and just like put that as like the cover it's like so when people reach oh this is really mean this is really mean this Writing a book and being right is really mean he was right and he flipped the cover and it's like you can be like hi guys you know you could like I think that might be a good way to like gin up uh uh like to go back to that so you said like the Reddit guy I mean they literally I don't know nothing really they're just worthless characters and no no I I I I I hope them like in the lowest regards like possible if I take like um if you look at the history like talking about scientists now so if you look at the history of science like you see it happens like every time like um when there's a like a big Advance like not like a kind of like an incremental thing but when there's like a quite a big leap it always has a hard time you know uh and so it's never really learns its lesson um and um you know what maybe like my biggest scientific hero is a guy called Peter Mitchell and he um he had something for her yeah he's like had something called the chemiosmotic hypothesis which is like beautiful beautiful work but this guy had a uh you know he's fought every step of the way by everyone and had a horrific life really you know had health problems and things like that and he actually even had to leave uh Academia to carry on working on it he he felt it was so bad he couldn't even do it within within the system but he was right you know and and he won the Nobel uh prize for it and so it's often um it kind of goes through three phases like like first is mocking then like fought just fought and then kind of accepted and like always always obvious that was always I hate that yeah that irritates me how often people say no

you're wrong and then it's like oh you're making money and you're being successful all right well now I'm on board I think the uh Eminem said that
Eminem and cousins, and book recommendations
you won't be surprised you'll be surprised how many cousins you have after a year successful like everyone's like oh I'm cousin with this guy you
know I'm your cousin like hook me up with a car or something but I know I know we're coming to the end the what
I'm I clearly I'm into books what books are you reading or that you recommend people check out it doesn't have to be related to this stuff uh because I mean mostly that's like in papers so but what are you reading today recognize people check out and I will read them that's a fun thing at least one person okay yeah wait I'm not actually a big reader um of like kind of fiction in fact I I may may never read another fiction book again I
think me and fiction have gone our separate ways I haven't really got the patience uh for it so but I like reading
it I like I like reading about science really science things so um I I actually even really like enjoy
reading textbooks actually uh like um and I I I'd even recommend you know like
um a bike at this by chemistry it's called biochemistry called stryer which is a good one molecular biology of the cell uh by Albertsons I have a molecular biology of a cell I think it's called cell molecular biology there's another one yeah with a very similar name I don't know about that why
I I'm a fan of molecular biology of the cell and it makes it um because I think I I I I think with aging
like lots of people kind of kind of coming into longevity and they haven't really got like a buyer background and then they they want to immediately jump
into things so for example like they think that they should be reading my free print kind of things like from from
the off and kind of Judge it but they they they need to take a step back and maybe like go to and it's very enjoy
you know you've got like all beautiful diagrams and things things like that uh
I've actually written a book as well which is on Amazon so I could recommend uh um you can recommend it I'm I'm making a master document for every book recommendation that's been go that's been for five years with like 200 you know like 160 or
whatever guests there are so many books but I'm making a master list I think there's like 250 books but I every book
Master book list recommendations and further recommendations
that you recommend will be on the list so you have to recommend yours to get on the list so you have to say
I think if I remember credit score by physics and computation to the cerebellum cerebellum
um it's a bit like technical really it's
kind of like a bit of a technical document so I wouldn't really um um so if you like textbooks you'll like
the book yeah so it's actually it's it's not like it said like it was actually
um uh like my kind of like my PhD research with a bit more kind of thing okay so

you did basically an obvious gray you pulled an Auburn gray yeah yeah three

um so he's got two books there was one I think it was published in 2006 2007 called ending ending aging which I haven't read actually for my sins but I read his earlier book which was his um his PhD thesis they published what's called it's called the mitochondrial free radical Theory of Aging I think I found uh you know like very um you know it's very well written I I think that's a great great book I know I recommend um I like

kind of like bioenergetic stuff so I recommend like a textbook about buying a Jetties bio energetics and uh I called it I it's certain age Ferguson the other car is called Nichols

a super good book and I I so I think there's like um and actually that's Peter Mitchell's work is actually what first got me into why energetic so I read that when I was still at school actually and that kind of really blew my mind and um and and also I think that there's this because I'm interested in aging I think there's this thing between bioenergetics and aging you can see with metabolic rate um and you can even see it with cancer cancer cells in water and it's got like a very different metabolism and it's not uh using oxidative phosphorylation as much um and it's also uh one of the things is

it's the high glycolytic rate gives us like a lot of nadpa good for reactive oxidation mitigation I think I think there's a lot you know a lot in there by energetics kind of gets me I don't know why people kind of ignore it they they uh you know um so I think I I think if you like that stuff that's worth that's worth going into

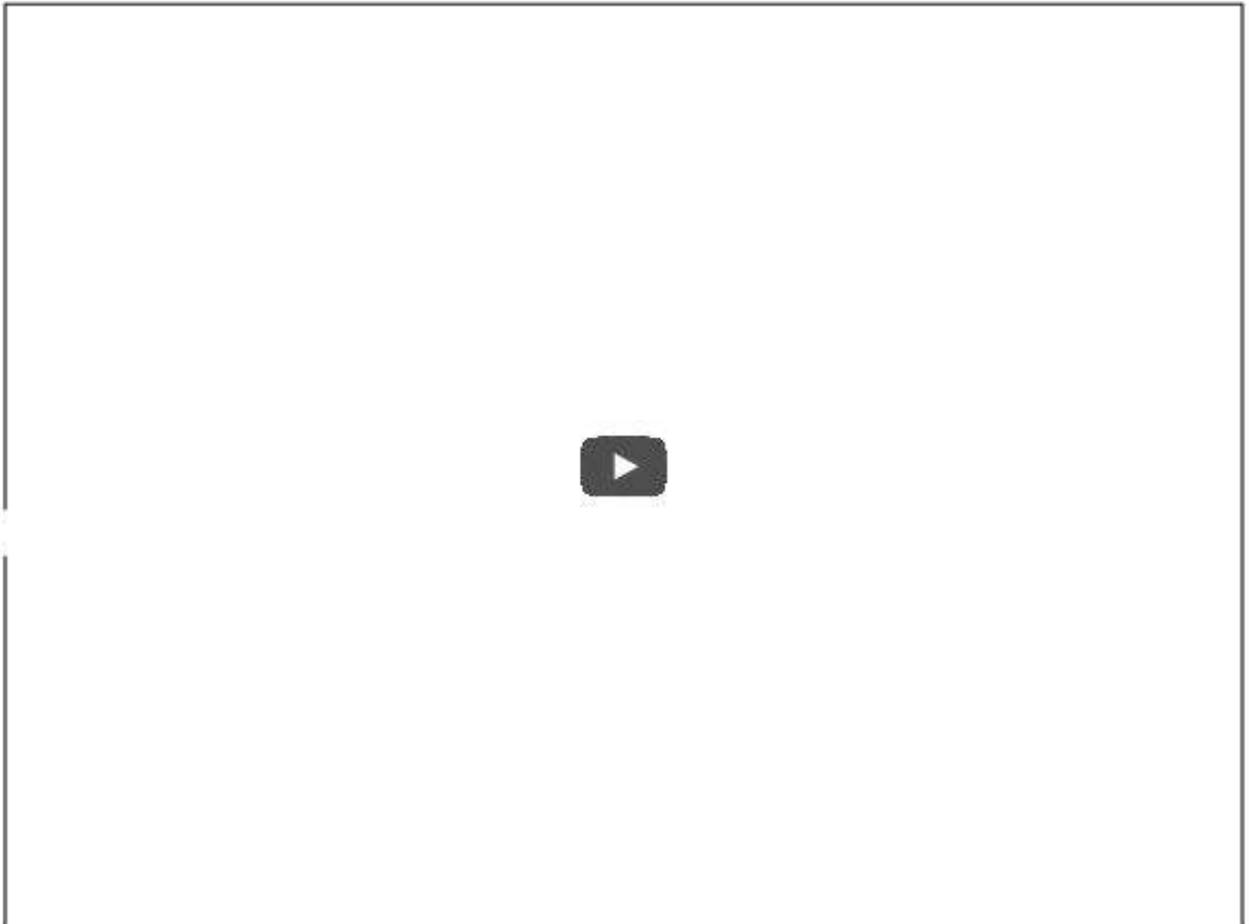
three yeah thank you for the recommendations the uh uh what where would be a good place to keep up with your work is it medium is there a particular website like how do people stay up to you up to date with you in a Stay up to date with Michael

respectful way for their leaving comments but yeah that's a good idea um so the company hasn't even got a website at the moment just because I've just been so stretched and yeah but as I say like this so so the the aim is to have one uh one point um if you just kind of Google like Michael Forest uh buy physical

Therapeutics you should should come up and also we're going to be we've got more stuff coming out in the media like in longevity technology which should come up if you do a a Google search thank you yeah and as I said there's actually I mean we've got less than many

longevity companies we've got kind of more because we've actually got like published patterns and uh papers and and things like that so people are really really Keen then you can kind of look into that and then also I'm happy for people to contact me um uh maybe I'll get my email maybe let them if there's like Twitter or something you know I don't want people like them but but Okay no Okay that's a good that's a good idea so I've got Twitter so I've only been on I'm quite new to Twitter so my my hand

always Forest a forest with two hours underscore PhD yeah and it'll be in the
show Notes too yeah yeah yeah no no I think I'm selling to you some
Twitter more which I don't
really enjoy actually right so I'm having to do all this kind of I don't
know I'm coming like a social
media manager or something and I need to do all these um you can uh you
can set up an automation
where you just like make us like you make one thing that has like all the
posts and just like sends it wherever
you want and then you don't have to really engage with anyone if you
wanted to yeah
yeah if I I try and like raise my profile by kind of getting involved in
you know discussions and things like
that and it's I find it um very distracting I don't know how people do I
don't know how Elon gets any work done
the amount that he tweets yeah I use Twitter for research yeah on
Twitter there's like so many scientists that just like tweet their
research like David Sinclair or sends or what have you
and I basically just go to those pages and then every time I see some
political I I click block or you know like I try
Twitter and training data /politics
to let Twitter know I'm not interested I just want to see science and it
usually works out I'm trying to train it to only
bring me like cool Innovation or stuff on like Native Americans or
indigenous people and stuff but uh
I too I try to stay up politics because that's just Quagmire to like uh
yeah um it's a waste
of time I even go like I'm like and like writing I'm like no no it's just
just
for work just stay out of everything and and also it'll be even more of a
like a torching of time I don't know how lots
of these people have time I mean um yeah I know I know some really smart
people that it's just like when you talk about some uh political things
they just spend that they'll just burn the rest of
their day and not realize that they just gave someone free energy it's
like you could spend that time wisely you don't
get it back like that person doesn't even care if anything they're just
like they're like like savoring it they're like little narcissists maybe
I mean
like like like a little vampire little emotional vampire but yeah so so I
know
we're at the end so I just want to thank you so much Michael for coming
on the show for you know crushing the criticism
and so from now on if someone criticizes you you just link them to the
show and they will know not to mess with you and
uh you know if you have anything if you ever have anything like cool
coming on you're welcome to come back on we'll talk about it
um and but seriously thank you for taking the time and for being on the
show today



Drug to slow aging? Reverse aging? Biophysical Therapeutics



Michael Forrest
14 subscribers

[Analytics](#) [Edit video](#)

4 [Share](#)

290 views · 3 months ago

Title of paper referred to:

"F1F0 ATP ~~Synthetase~~ is a Determinant of Metabolic Rate, a Correlate of Lifespan, and a Weakness of Cancer"

[All](#) [Related](#) [Listenable](#) [Watched](#)



How To Use Food To REVERSE AGING & Prevent Disease | Dr. William Li

Dr Rangan Chatterjee Clips
37K views · 4 months ago



Meet The Scientists Trying to Reverse Aging

Bloomberg Originals
347K views · 2 years ago



Armin van Buuren presents Rising Star feat. Betsie Larkin - Again (Armin van Buuren Extended Remix)

Armin van Buuren
272K views · 6 years ago



EP 40 | How Paul Buchheit Revolutionized Email with Gmail

Aarhi and Sriram
4.2K views · 4 weeks ago

we think we've got a drug that can slow aging and possibly even reverse it which of course has been a desperate one of man since the start of History so many different diseases correlate with age with aging and there's a thesis that this correlation is because aging is a causal driver to them so if you had a drug that could slow aging it could actually have a therapeutic benefit for a huge number of different diseases So within a single species you can actually see that there's an inverse relationship between metabolic rate per unit mass and lifespan I say for example humans with low and metabolic rate per unit Mass live longer and interrelatedly uh humans with lower body temperature live longer body temperature being a function of metabolic rate per unit Mass now people think that all humans have a resting body temperature of 37 degrees C that's not actually true there's actually quite a big range of over two degrees C between different humans and um to say again humans with low body temperature live longer so that's observational data within the human population now looking at Interventional data in mice so making the metabolic rate of mice slower can actually make them live longer and this inverse relationship between metabolic rate per unit mass and lifespan can be seen across species as well in fact it might actually be explanatory for why different mammal species have different maximal lifespans so for example a mouse has a very fast metabolic rate per unit Mass illustrated by its resting heart rate being between 800 900 beats per minute and it only lives for four years whereas a bowhead whale has a very slow metabolic rate per unit Mass with a resting heart rate of just one to two beats per minute and lives for over 211 years

and to interpret the last two slides
metabolic rate enables life but it
causes damage which is aging which
ultimately takes it away
and thus reducing metabolic rate may
slow aging and possibly even reverse it
in mammals the majority of metabolic
rate is for metabolic heat generation to
keep the body at around about 37 degrees
C

I've discovered the chemical reaction
that mammals use to metabolically
generate Heat
and a drug to specifically inhibit it
so drug as I've demonstrated in mice
that can reduce metabolic rate
given or the aforementioned I predict
that this drug and slow aging
so you're probably thinking yeah you
know that's fine but a surely less
metabolic heat generation is problematic
well the thing is if the ambient
temperature is 37 degrees C or higher
the body doesn't actually have to
produce any metabolic heat for the body
to be around 37 degrees C
metabolic heat generation in that case
is actually redundant it's not needed
and in fact it's actually making the
person uncomfortable reducing metabolic
heat generation in that instance will
actually make the person more thermal
comfortable
and of course there's uh many places uh
in the world where the ambient
temperature is in excess of 37 degrees
for at least part of the
um and of course this uh ambient
temperature issue is only an issue when
there's an effective amount of drug in
the body and uh
this drug like all drugs gets cleared
from the body in time
um going to number two there another
thing you can do less metabolic heat
generation can actually be offset by
wearing more clothes
where in uh modern clothing can be

having credible thermal properties like permitting people to live in Siberia for instance at minus 40 minus 50 degrees C going to number three there instead of applying

um the drug to all the body like orally or intravenously you can actually apply the drug topically just to only a small part of the body so for example to the eye using eye drops for example and this method of use

has no thermoregulated issues it can't reduce the body temperature

so for example you apply it to the eye it reduces the metabolic heat Generation by the eye slowing the metabolic rate of the eye which I predict slows the Aging rate of the eye

but the the eyes temperatures maintained at around about 37 degrees C because of heat transfer from the rest of the body especially via blood flow what in fact one of the reasons one of the um

functions of blood flow is to move heat around the body

and this can have a utility for diseases of Aging concerned with the eye so for example age-related macular degeneration and this same principle can be used for other body parts

um as well so for example

cosmetic Utilities in in an eye cream for example the drugs in a eye cream which you only administer to the skin around the eyes

so going to number four there uh this is using the drug uh administering it to the whole body

uh orally for example but wherein you only use a low dose of the drug so if the ambient temperature is low the drug can only ever cause a slight body temperature drop

um and a slight battery temperature drop as you confers an additional anti-aging mechanism which we'll talk about in the next slide

chemical reactions run slower at lower temperature this is why food perish is slow at the lower temperature of a fridge and even slower at the even lower temperature of a freezer aging is at least one chemical reaction so it stands to reason that it should go slower at lower temperature and we actually see that in the data so for example if you make a mouse's body temperature 0.34 degrees C lower you can actually make it live 20 longer so as I said before I've got a drug that I've shown can reduce metabolic heat generation in mice slowing metabolic rate in mice which I predict can slow aging if the ambient temperature is low the the drug effect can actually reduce body temperature towards the amp in temperature dose dependently a slight body temperature drop is safe and imperceptible and actually occurs during calorie restriction which extends lifespan and how calorie restriction does actually extend lifespan might be in part or in totality because it does actually cause this cause a slight body temperature drop so in some sense the drug can be thought of perhaps as a calorie restriction mimetic so as I said before in the human population that's actually a range of body temperatures wherein people with lower resting body temperature uh live longer than those with higher if you're to give the drug just to those in the population uh with a higher body temperature to bring their body temperatures down to B within the range of the people with lower body temperature within the population I've done the calculations and if you were to do that to the U.S uh population you could actually increase U.S life expectancy by more than one year

where where in increasing U.S life expectancy by one year by slowing aging has been calculated by economists to be worth 38 trillion US dollars to put this into perspective uh if you're to cure all cancers you'd actually only increase U.S life expectancy by around three years so people with Alzheimer's actually have a pathologically elevated body temperature which has been shown in in corresponding my studies to actually be a driver of the disease wherein reducing body temperature can actually slow the progression of the disease and you remember back that we've actually got a drug that can um dose of dependently reduce body temperature now the thing is showing that the drug can reduce the body temperature of Alzheimer's patients may actually be sufficient for clinical approval for Alzheimer's through this special program uh The Accelerated approval program where if you show a positive impact on biomarker associated with the disease that can actually be sufficient for clinical approval now this aforementioned drug actually has anti-contractility as predicted as designed um and actually greater anti-cancer activity in standardized and vitro testing the many uh present kinds of drugs so what we might have here is a cancer drug that um instead of harming normal cells like present Cancer drugs actually helps them uh by slowing their aging whereas most present the Cancer drugs actually accelerate aging clinical trials for cancer can be incredibly fast especially um if I saying against the cancer with a very poor prognosis such as pancreatic

cancer where patients only live a few months after a clinical approval for cancer the drug can be trialled and or used off label for age-related diseases and aging itself

obviously a drug that can slow aging has a valuable cosmetic applications which are close to Market because Cosmetics don't have to undergo animal or human trials

corresponding patterns have been fold in many different jurisdictions
further information at request

Longevity

ME Me <michael@biophysicaltherapeutics.com>
Sat, 04 Mar 2023 7:36:03 AM -0300 •
To "marcoquarta" <marcoquarta@rubedolife.com>

Dear Marco,

Please consider this opportunity to invest in a longevity company (even if just at small amplitude) on the Wefunder platform.

<https://wefunder.com/biophysical.therapeutics1>

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

for Peter & team at RA capital

ME Me <michael@biophysicaltherapeutics.com>

Sun, 09 Apr 2023 5:16:45 PM -0300 •

To "request" <request@racap.com>, "pk13" <pk13@racap.com>

Dear Peter and team,

Please all consider personally investing (*this is perhaps preferable for speed and because the raise is small*)

and/or making a fund investment in:

Slowing metabolic rate extends the life span of mice (& of worms, flies, wasps, fish, and other species).

Have a (patented) drug that slows metabolic rate.

Raising now to test if this drug can slow human tissue aging:

<https://wefunder.com/biophysical.therapeutics1>

Kindest regards, Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.

Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

**Re: Updated invitation: Zoom call Bart Dessaint, Jacob Goodwin, Dr. Michael Forre...
@ Thu 4 Jun 2020 5pm - 5:45pm (BST) (michael@biophysicaltherapeutics.com)**

ME Me <michael@biophysicaltherapeutics.com>
Sat, 01 Apr 2023 8:55:43 PM -0300 •

To "Bart Dessaint" <bart@mosaicventures.com>

Cc "jacob" <jacob@mosaicventures.com>, "drjack" <drjack@mosaicventures.com>

Dear Bart and Mosaic team,

Please consider investing personally and/or as a fund (*minimum investment size is \$100*):

**Slowing metabolic rate extends lifespan.
Have a drug that slows metabolic rate.
Raising now to test if this drug can slow human tissue aging:**
<https://wefunder.com/biophysical.therapeutics1>

Thanks Bart. Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

---- On Sat, 02 Apr 2022 14:21:23 -0300 **Michael Forrest Ph.D.**
<michael@biophysicaltherapeutics.com> wrote ---

Re: Introduction to Sofinnova Partners and Biophysical Therapeutics

 Me <michael@biophysicaltherapeutics.com>

Thu, 30 Mar 2023 1:54:07 PM -0300 •

To "Ankeet Jethwa" <ajethwa@sofinnovapartners.com>

Dear Ankeet,

Seeking, personal and/or fund, participation in following raise (*if desired, happy to do a call to discuss: any UK afternoon or evening*):

Drug to Slow, Halt or Reverse Aging:

Slowing metabolic rate slows aging.

Have a drug that slows metabolic rate.

Raising to test if this drug can slow human tissue aging:

<https://wefunder.com/biophysical.therapeutics1>

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

---- On Fri, 17 Mar 2023 09:09:42 -0300 **Ankeet Jethwa** <ajethwa@sofinnovapartners.com> wrote ----

for Michael at AgeX

ME

Me <michael@biophysicaltherapeutics.com>

Wed, 29 Mar 2023 10:02:57 AM -0300

To "mwest" <mwest@agexinc.com>

Dear Michael,

I'm raising a small round and I'm very keen to get renowned scientific founders such as yourself to participate, even if just at small amplitude (*minimum investment size is \$100*). Can you please take a quick look?:

Slowing metabolic rate extends life span. Have a drug that slows metabolic rate: predicted to slow aging.

Raising now to test if this drug can slow human tissue aging (*ex vivo*):

<https://wefunder.com/biophysical.therapeutics1>

Any questions/feedback, I am here. Thanks Michael. Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

Re: Time BioVentures - D.A. Wallach

ME Me <michael@biophysicaltherapeutics.com>
Sun, 02 Apr 2023 3:43:19 PM -0300 •
To "Jack Schoenfeld" <jack@timebioventures.com>

Dear Jack,

To update,

Please see my latest international patent (PCT) **attached**, which published last week.
My 5th PCT to date (*higher patent filing cadence than many public biotechs*).

This one discloses/protects a method to predict a patient's cancer's susceptibility/resistance to each of the present cancer drugs from the cancer's gene expression data (and kit[s], e.g. microarray chip[s], for this purpose).

- Permitting the optimal cancer drug(s) to be selected for a patient's cancer treatment.

- And for optimal patients to be selected for a candidate cancer drug's clinical trial(s):
increasing the probability of clinical trial success (*and might be used to "rescue" at least some cancer drug candidates that failed clinical trialling*).

Gene expression biomarkers are disclosed/protected for each of the present cancer drugs, and for some cancer drugs still in clinical trialling. Using the method with future cancer drugs/drug candidates falls under its scope of protection.

One of the drug's this method is taught for is almitrine, an approved drug for emphysema, which I've discovered (as I predicted) has anticancer activity. Almitrine has a minimal side-effect profile compared to present cancer drugs. Not least making it an option for the many cancer patients that rescind consent to cancer treatment because they can't withstand the horrific side-effects.

The title refers just to the almitrine case, and not the general case, as that is what the present claims relate to, but the disclosure/protection is much more general, extending to all present cancer drugs, and more.

Biophysical Therapeutics is a platform company. Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Mon, 30 Jan 2023 14:29:41 -0300 **Jack Schoenfeld** <jack@timebioventures.com> wrote ---

1 Attachment

WO2023047151-PAMPH-... .pdf
5.4 MB

Re: Longevity

ME Me <michael@biophysicaltherapeutics.com>
Fri, 03 Mar 2023 12:38:14 PM -0300 •
To "Alex Colville" <alex@age1.com>
Cc "Me" <alexcolvill@gmail.com>

Dear Alex,

The (predicted) longevity mechanism has two elements:
(1) Reducing metabolic heat generation (reducing metabolic rate).
(2) Reducing body temperature.

Where:

(1) can occur without (2).
(1) is the primary longevity mechanism.
Indeed, in the best case [conferring most longevity] (2) doesn't occur.

A pitch where this might be more clear is below (and I may update the wefunder page accordingly soon, as this nuance seems to be getting missed):

LONGEVITY COMPANY, BIOPHYSICAL THERAPEUTICS, EMERGES FROM STEALTH

Computational biology platform company with a pipeline of experimentally-validated new drugs

Biophysical Therapeutics, of Delaware in the USA, is a drug discovery platform company that leverages computational biology. Primary targets are cancer, the diseases of aging (e.g., Alzheimer's disease), and aging itself. Its founder, Dr. Michael Forrest, is a Cambridge University biochemistry graduate with a Ph.D. in computer science. Renowned biotech entrepreneur, Professor George Church (of Harvard Medical School), is an advisor to the company.

Professor Bruno Conti of the Scripps Institute (La Jolla, California) is also an advisor. In 2006, Professor Conti and his team reported an exciting result in the prestigious journal Science. They showed (in female mice) that slightly reducing the metabolic rate by slightly reducing metabolic heat generation (decreasing body temperature by 0.34°C) increased lifespan by 20%. Perhaps relatedly, calorie restriction, which is well known to extend the lifespan of (at least) mice, causes a slight decrease in body temperature in mice and humans. Moreover, different humans can vary in resting metabolic rate (per unit mass) and resting body temperature, wherein those with lower values live significantly longer. Making metabolic rate less can extend the lifespan of worms, flies, wasps, fish, mice, and probably many other species.

Dr. Forrest explains: "This fits a thesis in which metabolic rate [oxygen consumption rate] enables life but causes damaging byproducts and accumulating damage, which is aging, that ultimately takes life away." In mammals, the majority of metabolic rate is for metabolic heat generation to maintain the body temperature at around 37°C. Professor Conti and team slightly reduced the metabolic heat generation of mice by genetic manipulation in the brain. Dr. Forrest has since discovered the chemical reaction mammals use to metabolically generate heat and a drug to inhibit it (working in mice). How much metabolic heat generation and (thereby) metabolic rate decrease depends upon the administered

drug dose. By Professor Conti's extended lifespan result, and other data, the company predicts this drug can slow aging and extend lifespan.

"Body temperature can be the same with less metabolic heat generation by proportionally greater bodily insulation [wearing more/better clothing] or conducive ambient temperature. A human, in typical clothing, is most comfortable at an ambient temperature of 20°C. But much of the world is hotter, at least for part of the year, especially when close to the equator [43% of the world's population lives in the tropics]. This drug, dose-dependently reducing metabolic heat generation, might increase thermal comfort in hot places, possibly slowing aging. To illustrate: a relatively small drug dose might increase a clothed person's preferred ambient temperature to 23°C, a higher dose to 27°C, an even higher dose to 32°C, and so on. When metabolic heat generation is low, the preferred ambient temperature is close to 37°C. When the ambient temperature is 37°C or more, no metabolic heat generation is needed for the body to be at 37°C. Incidentally, the drug's effect dissipates over time as the drug clears from the body, if not prolonged by another dose," says Dr. Forrest.

"Biophysical Therapeutics has discovered something fundamental, how mammals metabolically generate heat. And a drug to inhibit it, shown to work in mice," Dr. Forrest says.

He adds: "This drug will allow us to investigate further the inverse relationship observed within, and across, mammal species between metabolic rate per unit mass and lifespan. What happens to lifespan if a mouse's metabolic rate per unit mass is drug reduced to that of a whale? When the mouse's ambient temperature is 37°C [meaning any metabolic heat generation is superfluous because the mouse's body temperature can be 37°C merely by equilibration with the ambient temperature]. We might reveal - if greatly extending a mouse's lifespan thereby - that the lifespan difference between mice and whales is [at least in part] because a mouse performs more metabolic heat generation per unit mass, as it is smaller, so [by the square-cube law of geometry] has a larger surface-area-to-volume ratio, meaning it loses metabolically generated heat more readily." Professor Brian Kennedy, Director of the Centre for Healthy Longevity at the National University of Singapore (and Ex-CEO of the Buck Institute for Research on Aging in California), wants to do a mice lifespan study with this drug, expedited by starting with old mice.

Across a set of mammal species, the company has shown that maximal lifespan is inversely proportional to the use (per unit mass) of its newly discovered reaction for metabolic heat generation. And think that drives the inverse proportionality between metabolic rate per unit mass and maximal lifespan (thinking that causes the inverse proportionality between heart rate and maximal lifespan) observed in the same set of mammal species.

Dr. Forrest predicts: "When this drug is applied topically to a small body part [e.g., to the face in a cream]: it will reduce metabolic heat generation there, reducing metabolic rate there, and thereby slow aging there. Wherein heat transfer from the rest of the body [via blood flow] maintains this body part at around 37°C because topical use can't reduce body temperature at any ambient temperature."

Firstly, the company's focus is cosmetic applications, aiming to license cosmetic use of its patented drug to a cosmetics company for profit share. For this, the key milestone is testing if this drug can slow the aging of human tissue *ex vivo*, which (once commenced) should take less than six months and is a relatively cheap experiment. Cosmetics aren't legally required to undergo any animal or human

trials. Consumer desperation is so great that many spend a lot of money on products with little to no efficacy. Cosmetics that contain an anti-aging compound that works much better (e.g., illustrated by dramatically extending mouse lifespan) might capture much of the market. And possibly grow it.

Reflecting the present consumer desperation, cosmetics billionaire Kim Kardashian said in 2022: "If you told me that I literally had to eat poop every single day and I would look younger, I might, I just might."

 RE: you asked if the business model is DTC. The business model is to license the drug to a DTC cosmetic brand for profit share, preferably a major, global one, and so accessing the market at huge scale *de novo*.

Thereby, very distinctively for a biotech, having profit.

Oneskin is a (longevity science) cosmetics company and they want to test the drug in their ex vivo human skin aging assays.

N.B. There are other applications for the drug eluded to in the following longer summary, which differs from the above by the addition of the bolded parts:

 LONGEVITY COMPANY, BIOPHYSICAL THERAPEUTICS, EMERGES FROM STEALTH
 Computational biology platform company with a pipeline of experimentally-validated new drugs

Biophysical Therapeutics, of Delaware in the USA, is a drug discovery platform company that leverages computational biology. Primary targets are cancer, the diseases of aging (e.g., Alzheimer's disease), and aging itself. Its founder, Dr. Michael Forrest, is a Cambridge University biochemistry graduate with a Ph.D. in computer science. Renowned biotech entrepreneur, Professor George Church (of Harvard Medical School), is an advisor to the company.

Professor Bruno Conti of the Scripps Institute (La Jolla, California) is also an advisor. In 2006, Professor Conti and his team reported an exciting result in the prestigious journal *Science*. They showed (in female mice) that slightly reducing the metabolic rate by slightly reducing metabolic heat generation (decreasing body temperature by 0.34°C) increased lifespan by 20%. Perhaps relatedly, calorie restriction, which is well known to extend the lifespan of (at least) mice, causes a slight decrease in body temperature in mice and humans. Moreover, different humans can vary in resting metabolic rate (per unit mass) and resting body temperature, wherein those with lower values live significantly longer. Making metabolic rate less can extend the lifespan of worms, flies, wasps, fish, mice, and probably many other species.

Dr. Forrest explains: "This fits a thesis in which metabolic rate [oxygen consumption rate] enables life but causes damaging byproducts and accumulating damage, which is aging, that ultimately takes life away." In mammals, the majority of metabolic rate is for metabolic heat generation to maintain the body temperature at around 37°C. Professor Conti and team slightly reduced the metabolic heat generation of mice by genetic manipulation in the brain. Dr. Forrest has since discovered the chemical reaction mammals use to metabolically generate heat and a drug to inhibit it (working in mice). How much metabolic heat generation and (thereby) metabolic rate decrease depends upon the administered drug dose. By Professor Conti's extended lifespan result, and other data, the company predicts this drug can slow aging and extend lifespan.

"Body temperature can be the same with less metabolic heat generation by proportionally greater bodily insulation [wearing more/better clothing] or conducive ambient temperature. A human, in typical clothing, is most comfortable at an ambient temperature of 20°C. But much of the world is hotter, at least for part of the year, especially when close to the equator [43% of the world's population lives in the tropics]. This drug, dose-dependently reducing metabolic heat generation, might increase thermal comfort in hot places, possibly slowing aging. To illustrate: a relatively small drug dose might increase a clothed person's preferred ambient temperature to 23°C, a higher dose to 27°C, an even higher dose to 32°C, and so on. When metabolic heat generation is low, the preferred ambient temperature is close to 37°C. When the ambient temperature is 37°C or more, no metabolic heat generation is needed for the body to be at 37°C. Incidentally, the drug's effect dissipates over time as the drug clears from the body, if not prolonged by another dose," says Dr. Forrest.

He expands: "With the drug in the body: if the ambient temperature is at or greater than [the drug-increased] preferred ambient temperature, then there is no body temperature drop, and the subject is more thermally comfortable. If the ambient temperature is lower than [the drug-increased] preferred ambient temperature: body temperature falls towards, but never less than, ambient temperature. The magnitude of the drop is a function of [the drug-increased] preferred ambient temperature minus the ambient temperature. Drop counteracted by wearing more/better clothing."

"Biophysical Therapeutics has discovered something fundamental, how mammals metabolically generate heat. And a drug to inhibit it, shown to work in mice. **It might be useful in the Emergency Room for countering runaway hyperthermia, which can make the body fatally hot. That is caused, for example, by sepsis or an adverse drug reaction, such as neuroleptic malignant syndrome. This drug might also be useful for deep hypothermic circulatory arrest for surgery [where body temperature is made 20-25°C], currently induced crudely,**" Dr. Forrest says.

He adds: "In research, this drug will allow us to investigate further the inverse relationship observed within, and across, mammal species between metabolic rate per unit mass and lifespan. What happens to lifespan if a mouse's metabolic rate per unit mass is drug reduced to that of a whale? When the mouse's ambient temperature is 37°C [meaning any metabolic heat generation is superfluous because the mouse's body temperature can be 37°C merely by equilibration with the ambient temperature]. We might reveal - if greatly extending a mouse's lifespan thereby - that the lifespan difference between mice and whales is [at least in part] because a mouse performs more metabolic heat generation per unit mass, as it is smaller, so [by the square-cube law of geometry] has a larger surface-area-to-volume ratio, meaning it loses metabolically generated heat more readily." Professor Brian Kennedy, Director of the Centre for Healthy Longevity at the National University of Singapore (and Ex-CEO of the Buck Institute for Research on Aging in California), wants to do a mice lifespan study with this drug, expedited by starting with old mice.

Across a set of mammal species, the company has shown that maximal lifespan is inversely proportional to the use (per unit mass) of its newly discovered reaction for metabolic heat generation. And think that drives the inverse proportionality between metabolic rate per unit mass and maximal lifespan (thinking that causes the inverse proportionality between heart rate and maximal lifespan) observed in the same set of mammal species.

Perhaps applicably, people with Alzheimer's disease have a pathologically elevated body temperature. Wherein (in corresponding mice studies) lower body temperature slows Alzheimer's disease progression, slowing its cognitive decline.

Dr. Forrest reveals a tangential use: "This drug has, as the company [presciently] predicted, more anticancer activity than most present cancer drugs in standardized in vitro testing at the National Cancer Institute [USA]. Very distinct from chemotherapy, this drug might help [rather than harm] the body. It makes the body more efficient [less chemical energy of food dissipated as heat]. And so may confer weight gain, which might combat cachexia. Cachexia [severe weight loss/wasting] is common in cancer patients, killing many. Aging can cause wasting [sarcopenia, frailty], especially later on. Digressively, such increased metabolic efficiency might have utility in livestock farming, making animals put on weight faster. Assuming they don't reduce their food intake proportionally to their increased metabolic efficiency. Where the animals live at conducive ambient temperatures in housing with heating. Cheaper to heat, especially because heating is typically unrequired, in hot climates/seasons."

Returning to aging, Dr. Forrest predicts: "When this drug is applied topically to a small body part [e.g., to the face in a cream]: it will reduce metabolic heat generation there, reducing metabolic rate there, and thereby slow aging there. Wherein heat transfer from the rest of the body [via blood flow] maintains this body part at around 37°C because topical use can't reduce body temperature at any ambient temperature."

Firstly, the company's focus is cosmetic applications, aiming to license cosmetic use of its patented drug to a cosmetics company for profit share. For this, the key milestone is testing if this drug can slow the aging of human tissue ex vivo, which (once commenced) should take less than six months and is a relatively cheap experiment. Cosmetics aren't legally required to undergo any animal or human trials. Consumer desperation is so great that many spend a lot of money on products with little to no efficacy. Cosmetics that contain an anti-aging compound that works much better (e.g.,

Illustrated by dramatically extending mouse lifespan) might capture much of the market. And possibly grow it.

Reflecting the present consumer desperation, cosmetics billionaire Kim Kardashian said in 2022: "If you told me that I literally had to eat poop every single day and I would look younger, I might, I just might."

Dr. Forrest has published a preprint paper (referenced below) with more detail about the above. With the caveat that, as a preprint, it hasn't yet undergone peer review. It is an interim disclosure of ongoing work.
Forrest MD (2022) F1F0 ATP Hydrolysis is a Determinant of Metabolic Rate, a Correlate of Lifespan, and a Weakness of Cancer. BioRxiv. Version 3 (version published on 12 September 2022). <https://www.biorxiv.org/content/10.1101/2021.10.28.466310v3>.

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

----- On Fri, 03 Mar 2023 10:47:40 -0300 **Alex Colville** <alex@age1.com> wrote ---

Longevity drug?

ME Me <michael@biophysicaltherapeutics.com>
Sat, 08 Apr 2023 11:39:36 AM -0300 •
To "grg" <grg@lists.ucla.edu>

Dear grg list,

Slowing metabolic rate slows aging and extends lifespan of mice (and worms, flies, wasps, fish, etc.).

Have a drug that slows metabolic rate.

Predict this drug can slow aging.

Raising investment to test if this drug can slow human tissue aging (ex vivo).

Minimum investment is \$100.

<https://wefunder.com/biophysical.therapeutics1>

Kindest regards, Michael
Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

Re: Longevity

ME Me <michael@biophysicaltherapeutics.com>
Sat, 01 Apr 2023 11:42:06 AM -0300 •
To "Victor Bustos" <v.bustos@apollo.vc>

Dear Victor,

Do have lead molecule.
First indication: cosmetics (**extremely** close to market as formal clinical trialling unrequired).

I invite you and other members of your team to invest personally, which can work because the raise is so small and progress has already been made on it (*minimum investment size is \$100*):

Slowing metabolic rate extends lifespan.
Have a drug that slows metabolic rate.
Raising now to test if this drug can slow human tissue aging:
<https://wefunder.com/biophysical.therapeutics1>

Thanks Victor. Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

---- On Sat, 01 Apr 2023 11:30:45 -0300 **Victor Bustos** <v.bustos@apollo.vc> wrote ---

Re: Biophysical Therapeutics for Oliver at 20one

ME

Me <michael@biophysicaltherapeutics.com>

Wed, 22 Mar 2023 1:56:27 PM -0300 •

To "Oliver Zolman MD" <oliver@20one.consulting>

Yes, and Professor Brian Kennedy (at NUS) wants to do a mouse lifespan study. Needs investment: not least to do pre-studies in mice: e.g., to optimize the dose to use in the chow to get an effective drug concentration in blood. ITP doesn't fund such pre-studies.

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Tue, 21 Mar 2023 22:23:26 -0300 **Oliver Zolman MD** <oliver@20one.consulting> wrote

for Liam

ME Me <michael@biophysicaltherapeutics.com>
Thu, 06 Apr 2023 9:23:08 AM -0300 •
To "Liam" <liam@reinforcedventures.com>

Dear Liam,

We have a meeting today on Indiebio's meeting platform.
As the meeting time is so short I send some information ahead:
Please consider to invest personally and/or with your fund:

A small raise, already with traction, with a small minimum investment size (\$100):

Slowing metabolic rate slows aging.

Have a drug that slows metabolic rate.

Raising to test if this drug can slow human tissue aging:

<https://wefunder.com/biophysical.therapeutics1>

Any questions/feedback, I am here. Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

Longevity

ME Me <michael@biophysicaltherapeutics.com>
Fri, 03 Mar 2023 10:27:21 PM -0300 •
To "petr" <petr@longevitytech.fund>

Dear Petr,

Please consider this opportunity to invest in a longevity company (even if just at small amplitude) on the Wefunder platform.

<https://wefunder.com/biophysical.therapeutics1>

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

for Alex at Juvenescence, we spoke on linkedin

ME

Me <michael@biophysicaltherapeutics.com>

Wed, 12 Apr 2023 11:28:43 PM -0300

To "alex" <alex@juvlabs.com>

Dear Alex,

Slowing metabolic rate extends lifespan of mice (& worms, flies, wasps, fish, and other species).

Have a drug that slows metabolic rate.

Raising now to test if this drug can slow human tissue aging:

<https://wefunder.com/biophysical.therapeutics1>

Kindest regards, Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.

Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

Re: for Liam - we just spoke on Indiebio meeting platform**ME**

Me <michael@biophysicaltherapeutics.com>

Mon, 10 Apr 2023 2:43:44 PM -0300 •

To "Liam Krut" <liam@reinforcedventures.com>

Cc "Euan Guttridge" <euan@reinforcedventures.com>

Hi Liam,

TL:DR

Dropping mean body temperature of mice by just **0.34°C** (*imperceptible drop because intraday and interday body temperature variation is more*) increased lifespan by **20%**.

MORE

Life-extension, by reducing metabolic heat generation, has two aspects:

- (1) Slower metabolic rate (*so less damaging metabolic by-products produced per unit time*).
- (2) Lower body temperature (*aging is at least one chemical reaction and chemical reactions run slower at lower temperature*).

The principal life-extending mechanism is (1) above.

And, if the ambient temperature is conducive, can have much (1) in the complete absence of (2). In this case, huge life extension is predicted possible.

In mammals, most of metabolic rate is for metabolic heat generation, and when the ambient temperature is conducive, the drug can reduce metabolic heat generation to nearly zero without any body temperature drop. In this case, incredible life extension is expected possible.

E.g., if reduce metabolic rate per unit mass of mice to that of whale: predict will make mouse live as long as a whale (!). Want to do this experiment in future: because making a mouse live much longer might sell lots of cosmetics with that same compound in!

Comparing across mammal species, maximal lifespan is inversely proportional to each of these things:

- (a) metabolic heat generation reaction (*I discovered this reaction*) per unit mass.
- (b) metabolic rate per unit mass.
- (c) heart rate.

Where (a) dictates (b) dictates (c).

My drug specifically inhibits (a), which, I presume, in turn reduces (b) and (c).

TO ANSWER YOUR QUESTION NOW (all be it using heart rate rather than body temperature): I expect the life extension from the drug dose to be predictable from the amount that it reduces resting heart rate.

E.g., Drug reduce resting heart rate of mouse from 800-900 beats per minute to that of a whale: 1-2 beats per minute: this perhaps can make mouse live as long as whale (!).

More on/around this, in this good overview summary in the press:

<https://longevity.technology/news/longevity-company-biophysical-therapeutics-emerges-from-stealth/>

So I do want to do mapping between drug dose and heart rate in mice. And I believe that will then predict what life extension each drug dose can confer in mice. A pretty cheap experiment to do in the scheme of things.

And can do this experiment at normal room temperature (around 20°C).

And with even higher drug doses, when at higher ambient temperatures, e.g. at ambient temperature of 37°C: at which metabolic heat generation by the mouse can be zero, and its body temperature will still be around 37°C.

And can record body temperature of mice during all these mapping experiments of course.

For further info (and **much better explained than I've tried to do quickly and crudely above**), please refer to my preprint (N.B. a newer version is coming soon):

<https://www.biorxiv.org/content/10.1101/2021.10.28.466310v3.full.pdf>

RE: body temperature drop isn't absolutely required: from **page 65**.

RE: slowing metabolic rate is more important than reducing body temperature: from **page 61** (headed section starting near bottom of page).

N.B. Bowhead whale maximal lifespan is at least 211 years. And probably much longer because that number comes from a very small sample size. So slowing metabolic rate per unit mass (and heart rate) of human to whale might make human live as long as whale.

Just to remind, for topical/local administration of drug (e.g., for cosmetic use) - no thermoregulatory issues at all, at any ambient temperature. See this short press article for some blurb on the cosmetic use-case - and has link to present raise therein, and can see how it is progressing:

<https://longevity.technology/news/biophysical-therapeutics-opens-crowdfunding-investment-raise/>

Thanks Liam, Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Mon, 10 Apr 2023 13:29:37 -0300 **Liam Krut** <liam@reinforcedventures.com> wrote --
-

Re: Longevity**ME**

Me <michael@biophysicaltherapeutics.com>

Sun, 26 Mar 2023 10:23:58 AM -0300 •

To "Marco Quarta" <marcoquarta@rubedolife.com>

Dear Marco,

Was thrilled to receive your email. Great! Thank you so much, and it is great to have you aboard! And if at larger amplitude that would be even better! Thanks Marco.
To address your questions:

1) do you have efficacy data? If so please share.

- Slowing metabolic rate has been shown to extend lifespan in at least mice, worms, flies, wasps, and fish.

[Reference for this in mice, published in Science:

<https://www.science.org/doi/10.1126/science.1132191>: slightly reducing metabolic rate by slightly reducing metabolic heat generation, dropping mean body temperature by 0.34°C, which is likely imperceptible as intraday and interday variation in body temperature is greater, increased female mice lifespan by 20%].

Have a drug shown able to reduce metabolic heat generation in mice: so have in vivo efficacy data: dose-dependent, big effect size at higher drug doses, small value of *n*, but such big effect size that the results are still very statistically significant: Please see Figure 2 on **Page 6**

of: <https://www.biorxiv.org/content/10.1101/2021.10.28.466310v3.full.pdf>. And probably best to read main text around it: **Pages 5-9**. This mice experiment wasn't completely how I wanted it, as very constrained financially, but it does hit statistical significance. And shows that the drug is working in vivo as predicted.

Incidentally, this drug also been shown to have anticancer activity in vitro, as predicted: please see **Pages 39-52** for rationale and experimental data to this anticancer utility of the drug.

2) do you have safety data for your compound? Any idea of the lead molecule at this point?

- Have multiple drugs hitting same target, of varied scaffolds, within both small-molecule and peptide classes, both repurposed drugs (protected by method of use claims) and New Chemical Entities invented. Do have a lead small-molecule.

3) Do you have use of proceeds? What are you planning to do with the first \$50K and where it will bring you for your seed investment? Do you have millstone plans?

- For the present plan, which could change, please see the pitch deck: listed under "Documents" at the bottom of the main Wefunder page (<https://wefunder.com/biophysicaltherapeutics1>). See its page 19. And its pages 18 and 20 also. \$50k is the lowest target raise permissible on Wefunder. To summarize here: in complete success, the \$50k will show, within 9 months, that the drug can slow/reverse human tissue aging (ex vivo). That milestone is expected to permit the company to raise much more money at a much higher valuation, and/or license the drug (restrictively for cosmetic purpose) to one or more cosmetic companies for an upfront payment and profit share.

4) do you have competitive landscape

Firstly focussed on cosmetic applications. Looking to license drug(s) to as big a cosmetic company, or plurality thereof, as we can. So not competing with, but working with. Thereby accessing the market at huge scale *de novo*, receiving revenue and profit, which is quite rare for an early biotech to have. Already talking to some major cosmetic companies: e.g. Abbvie aesthetics (which is basically Allergan, which Abbvie recently bought for \$63B) and Estee Lauder. This next data will put the company in a much stronger position in such dialogue. The business development person I spoke to at Abbvie aesthetics has participated on the Wefunder raise (!) and even expressed interest about joining the company down the line! She said this is completely different than most cosmetic companies are even thinking - they trying to do masking of aging rather than actually slowing aging, and so this is very differentiated.

Incidentally, as for medical utilities, made a comparison table with Unity Biotechnology on its IPO date: see page 36 of the aforementioned pitch deck.

P.S. The most recent press article published on the company, which you may or may not have seen yet:

<https://longevity.technology/news/biophysical-therapeutics-opens-crowdfunding-investment-raise/>

17/04/2023, 22:01

Re: Longevity

If I haven't addressed any of your questions sufficiently and/or you have any others, I am here. Anxious to have you participate as much as possible and so happy to guide as much as I can. Thanks Marco. Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Sat, 25 Mar 2023 20:34:01 -0300 **Marco Quarta** <marcoquarta@rubedolife.com> wrote ----

for Bob at Arch, RE: longevity

ME Me <michael@biophysicaltherapeutics.com>
Wed, 29 Mar 2023 3:31:28 PM -0300
To "Rtn" <rtn@archventure.com>

Dear Bob,

I've read you like to do some personal investing atop of your work at Arch:
can you please consider the following, which squarely fits your interest in longevity:
it is a small raise, already with traction, with a small minimum investment size (\$100):

Slowing metabolic rate extends lifespan.
Have a drug that slows metabolic rate: predicted to slow aging.
Raising now to test if this drug can slow human tissue aging:
<https://wefunder.com/biophysical.therapeutics1>

Any questions/feedback, I am here. Thanks Bob. Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

Re: Longevity

ME Me <michael@biophysicaltherapeutics.com>
Tue, 04 Apr 2023 8:16:46 PM -0300 •
To "nikola markov" <markovokean@gmail.com>

Dear Nikola,

UPDATE: GOOD NEWS:
(further investments accepted for now):
<https://wefunder.com/biophysical.therapeutics1>

Kindest regards, Michael
Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

---- On Sun, 02 Apr 2023 15:22:25 -0300 **Michael Forrest Ph.D.**
<michael@biophysicaltherapeutics.com> wrote ---

Dear Nikola,

To update,
Please see my latest international patent (PCT) **attached**, which published last week.
My 5th PCT to date (*higher patent filing cadence than many public biotechs*).

This one discloses/protects a method to predict a patient's cancer's susceptibility/resistance to each of the present cancer drugs from the cancer's gene expression data (and kit[s], e.g. microarray chip[s], for this purpose).

- Permitting the optimal cancer drug(s) to be selected for a patient's cancer treatment.

- And for optimal patients to be selected for a candidate cancer drug's clinical trial(s):
increasing the probability of clinical trial success (*and might be used to "rescue" at least some cancer drug candidates that failed clinical trialling*).

Gene expression biomarkers are disclosed/protected for each of the present cancer drugs, and for some cancer drugs still in clinical trialling. Using the method with future cancer drugs/drug candidates falls under its scope of protection.

One of the drug's this method is taught for is almitrine, an approved drug for emphysema, which I've discovered (as I predicted) has anticancer activity. Almitrine has a minimal side-effect profile compared to present cancer drugs. Not least making it an option for the many cancer patients that rescind consent to cancer treatment because they can't withstand the horrific side-effects.

The title refers just to the almitrine case, and not the general case, as that is what the present claims relate to, but the disclosure/protection is much more general, extending to all present cancer drugs, and more.

Biophysical Therapeutics is a platform company. Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

Re: for Camille at Venrock

ME

Me <michael@biophysicaltherapeutics.com>

Tue, 21 Mar 2023 3:15:08 PM -0300 •

To "Samuels" <Samuels>, "Camille" <cami@venrock.com>

Dear Cami,

To update, published today:

<https://longevity.technology/news/biophysical-therapeutics-opens-crowdfunding-investment-raise/>

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Wed, 15 Dec 2021 14:28:31 -0300 **Samuels, Camille** <cami@venrock.com> wrote ---
lockquote>

Re: for Johnson & Johnson Innovation

ME Me <michael@biophysicaltherapeutics.com>
Thu, 09 Mar 2023 6:15:03 PM -0300 •
To "jnjinnovation" <jnjinnovation@its.jnj.com>

First press:

Longevity company, with Drug, emerges from stealth:

<https://longevity.technology/news/longevity-company-biophysical-therapeutics-emerges-from-stealth/>

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Fri, 21 Jan 2022 13:18:59 -0300 **Michael Forrest Ph.D.**
<michael@biophysicaltherapeutics.com> wrote ---

Re: Longevity co. for Timur, we spoke on linkedin

ME Me <michael@biophysicaltherapeutics.com>
Tue, 04 Apr 2023 8:27:33 PM -0300 •
To "timurartemev" <timur.artemev@gmail.com>

Dear Timur,

UPDATE: GOOD NEWS:
(further investments accepted for now):
<https://wefunder.com/biophysical.therapeutics1>

Kindest regards, Michael
Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

---- On Tue, 28 Mar 2023 11:15:42 -0300 **Michael Forrest Ph.D.**
<michael@biophysicaltherapeutics.com> wrote ---

longevity co. for Bob at Arch

ME

Me <michael@biophysicaltherapeutics.com>

Mon, 13 Feb 2023 12:37:40 PM -0300 •

To "rtn" <rtn@archventure.com>

Dear Bob,

As longevity is one of your interests, and given your appetite for exciting new ideas, please consider investing personally or with your fund in:
<https://wefunder.com/biophysical.therapeutics1>

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

Thanks Bob, any questions/feedback I am here, Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

Longevity investing for Michael

ME

Me <michael@biophysicaltherapeutics.com>

Fri, 24 Mar 2023 3:57:51 PM -0300 •

To "michaelschultz" <michael.schultz@portalinnovations.com>

Hi Michael,

Saw your post in the LBF group. And as an investor present there I presume you are interested in longevity opportunities? If so, please see this recent press on my company to get up to speed on it:

[1] <https://longevity.technology/news/longevity-company-biophysical-therapeutics-emerges-from-stealth/>

[2] <https://longevity.technology/news/biophysical-therapeutics-opens-crowdfunding-investment-raise/>

Happy to chat at a time of your convenience. Thanks Michael, Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

Re: for Tamas

ME Me <michael@biophysicaltherapeutics.com>
Mon, 03 Apr 2023 5:51:14 PM -0300 •
To "Tamas Sohajda" <sohtam@gmail.com>

Very keen to have you aboard Tamas, and so very much hoping you get time to do it before the round fills up. If you have any questions about how to do it, I am here, and wefunder support is very good: on email: support@wefunder.com
Wefunder (in which the famous Y combinator is an investor) is quite well known in Silicon Valley:

About Wefunder

We're the Robinhood for pre-IPO startups. We allow everyone to invest \$100 in a startup they love.

Over the past five years, we've helped fund over 900 startups with \$500m – including flying cars, space rockets, breweries, Hollywood studios, and potential Ebola cures.

We're also a public benefit corporation with a mission of saving the American Dream (<https://wefunder.com/charter>). Our aim is to sprinkle the Silicon Valley fairy dust across the rest of the country, which often don't have the same opportunities we take for granted.

Thanks Tamas, Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Mon, 03 Apr 2023 16:15:21 -0300 **Tamas Sohajda** <sohtam@gmail.com> wrote ---

Dear Michael,

I am not really familiar with the wefunder platform and the way it works and did not have the time to learn more about it yet. Hopefully, I will later on.

All the best, Tamas

On Mon, Apr 3, 2023 at 7:22 PM Michael Forrest Ph.D. <michael@biophysicaltherapeutics.com> wrote:

Dear Tamas,

I saw on the Wefunder system that you initiated an investment for the following but didn't complete.

Is there anything that I can do to help?

Alternatively, if you wish to speak to Wefunder, they are promptly available on email at support@wefunder.com

Slowing metabolic rate extends lifespan.

Have a drug that slows metabolic rate.

Raising now to test if this drug can slow human tissue aging:

<https://wefunder.com/biophysical.therapeutics1>

Kindest regards, Michael
Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted.

antiaging opp. for Unilever ventures

ME Me <michael@biophysicaltherapeutics.com>

Sat, 11 Mar 2023 11:37:04 AM -0300

To "uvadmin" <uv.admin@unilever.com>

Has cosmetic applications:

Longevity company, with Drug, emerges from stealth:

<https://longevity.technology/news/longevity-company-biophysical-therapeutics-emerges-from-stealth/>

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

for Justin at Pioneer fund, we spoke linkedin**ME** Me <michael@biophysicaltherapeutics.com>

Wed, 15 Mar 2023 2:19:41 PM -0300 •

To "Justin" <justin@pioneerfund.vc>

Dear Justin,

Keen to show you this given your background in dropping body temperature.Please see the below, which focusses on cosmetic application (*N.B. wefunder is a yc company*):
<https://wefunder.com/biophysical.therapeutics1>Given your background, below I cut and paste an extended version of the pitch on that wefunder webpage above, which eludes to some of the other applications (**including dropping body temperature**) - the extra bits are bolded:

LONGEVITY COMPANY, BIOPHYSICAL THERAPEUTICS, EMERGES FROM STEALTH*Computational biology platform company with a pipeline of experimentally-validated new drugs*

Biophysical Therapeutics, of Delaware in the USA, is a drug discovery platform company that leverages computational biology. Primary targets are cancer, the diseases of aging (e.g., Alzheimer's disease), and aging itself. Its founder, Dr. Michael Forrest, is a Cambridge University biochemistry graduate with a Ph.D. in computer science. Renowned biotech entrepreneur, Professor George Church (of Harvard Medical School), is an advisor to the company.

Professor Bruno Conti of the Scripps Institute (La Jolla, California) is also an advisor. In 2006, Professor Conti and his team reported an exciting result in the prestigious journal Science. They showed (in female mice) that slightly reducing the metabolic rate by slightly reducing metabolic heat generation (decreasing body temperature by 0.34°C) increased lifespan by 20%. Perhaps relatedly, calorie restriction, which is well known to extend the lifespan of (at least) mice, causes a slight decrease in body temperature in mice and humans. Moreover, different humans can vary in resting metabolic rate (per unit mass) and resting body temperature, wherein those with lower values live significantly longer. Making metabolic rate less can extend the lifespan of worms, flies, wasps, fish, mice, and probably many other species.

Dr. Forrest explains: "This fits a thesis in which metabolic rate [oxygen consumption rate] enables life but causes damaging byproducts and accumulating damage, which is aging, that ultimately takes life away."

In mammals, the majority of metabolic rate is for metabolic heat generation to maintain the body temperature at around 37°C. Professor Conti and team slightly reduced the metabolic heat generation of mice by genetic manipulation in the brain. Dr. Forrest has since discovered the chemical reaction mammals use to metabolically generate heat and a drug to inhibit it (working in mice). How much metabolic heat generation and (thereby) metabolic rate decrease depends upon the administered drug dose. By Professor Conti's extended lifespan result, and other data, the company predicts this drug can slow aging and extend lifespan.

"Body temperature can be the same with less metabolic heat generation by proportionally greater bodily insulation [wearing more/better clothing] or conducive ambient temperature. A human, in typical clothing, is most comfortable at an ambient temperature of 20°C. But much of the world is hotter, at least for part of the year, especially when close to the equator [43% of the world's population lives in the tropics]. This drug, dose-dependently reducing metabolic heat generation, might increase thermal comfort in hot places, possibly slowing aging. To illustrate: a relatively small drug dose might increase a clothed person's preferred ambient temperature to 23°C, a higher dose to 27°C, an even higher dose to 32°C, and so on. When metabolic heat generation is low, the preferred ambient temperature is close to 37°C. When the ambient temperature is 37°C or more, no metabolic heat generation is needed for the body to be at 37°C. Incidentally, the drug's effect dissipates over time as the drug clears from the body, if not prolonged by another dose," says Dr. Forrest.

He expands: "With the drug in the body: if the ambient temperature is at or greater than [the drug-increased] preferred ambient temperature, then there is no body temperature drop, and the subject is more thermally comfortable. If the ambient temperature is lower than [the drug-increased] preferred ambient temperature: body temperature falls towards, but never less than, ambient temperature. The magnitude of the drop is a function of [the drug-increased] preferred ambient temperature minus the ambient temperature. Drop counteracted by wearing more/better clothing."

"Biophysical Therapeutics has discovered something fundamental, how mammals metabolically generate heat. And a drug to inhibit it, shown to work in mice. **It might be useful in the Emergency Room for countering runaway hyperthermia, which can make the body fatally hot. That is caused, for example, by sepsis or an adverse drug reaction, such as neuroleptic malignant syndrome. This drug might also be useful for deep hypothermic circulatory arrest for surgery [where body temperature is made 20-25°C], currently induced crudely,**" Dr. Forrest says.

He adds: "In research, this drug will allow us to investigate further the inverse relationship observed within, and across, mammal species between metabolic rate per unit mass and lifespan. What happens to lifespan if a mouse's metabolic rate per unit mass is drug reduced to that of a whale? When the mouse's ambient temperature is 37°C [meaning any metabolic heat generation is superfluous because the mouse's body temperature can be 37°C merely by equilibration with the ambient temperature]. We might reveal - if greatly extending a mouse's lifespan thereby - that the lifespan difference between mice and whales is [at least in part] because a mouse performs more metabolic heat generation per unit mass, as it is smaller, so [by the square-cube law of geometry] has a larger surface-area-to-volume ratio, meaning it loses metabolically generated heat more readily."

Professor Brian Kennedy, Director of the Centre for Healthy Longevity at the National University of Singapore (and Ex-CEO of the Buck Institute for Research on Aging in California), wants to do a mice lifespan study with this drug, expedited by starting with old mice.

Across a set of mammal species, the company has shown that maximal lifespan is inversely proportional to the use (per unit mass) of its newly discovered reaction for metabolic heat generation. And think that drives the inverse proportionality between metabolic rate per unit mass and maximal lifespan (thinking that causes the inverse proportionality between heart rate and maximal lifespan) observed in the same set of mammal species.

Perhaps applicably, people with Alzheimer's disease have a pathologically elevated body temperature. Wherein (in corresponding mice studies) lower body temperature slows Alzheimer's disease progression, slowing its cognitive decline.

Dr. Forrest reveals a tangential use: "This drug has, as the company [presciently] predicted, more anticancer activity than most present cancer drugs in standardized in vitro testing at the National Cancer Institute [USA]. Very distinct from chemotherapy, this drug might help [rather than harm] the body. It makes the body more efficient [less chemical energy of food dissipated as heat]. And so may confer weight gain, which might combat cachexia. Cachexia [severe weight loss/wasting] is common in cancer patients, killing many. Aging can cause wasting [sarcopenia, frailty], especially later on. Digressively, such increased metabolic efficiency might have utility in livestock farming, making animals put on weight faster. Assuming they don't reduce their food intake proportionally to their increased metabolic efficiency. Where the animals live at conducive ambient temperatures in housing with heating. Cheaper to heat, especially because heating is typically unrequired, in hot climates/seasons."

Returning to aging, Dr. Forrest predicts: "When this drug is applied topically to a small body part [e.g., to the face in a cream]: it will reduce metabolic heat generation there, reducing metabolic rate there, and thereby slow aging there. Wherein heat transfer from the rest of the body [via blood flow] maintains this body part at around 37°C because topical use can't reduce body temperature at any ambient temperature."

Firstly, the company's focus is cosmetic applications, aiming to license cosmetic use of its patented drug to a cosmetics company for profit share. For this, the key milestone is testing if this drug can slow the aging of human tissue ex vivo, which (once commenced) should take less than six months and is a relatively cheap experiment. Cosmetics aren't legally required to undergo any animal or

human trials. Consumer desperation is so great that many spend a lot of money on products with little to no efficacy. Cosmetics that contain an anti-aging compound that works much better (e.g., illustrated by dramatically extending mouse lifespan) might capture much of the market. And possibly grow it.

Reflecting the present consumer desperation, cosmetics billionaire Kim Kardashian said in 2022: "If you told me that I literally had to eat poop every single day and I would look younger, I might, I just might."

Recently, the company had its first press:

<https://longevity.technology/news/longevity-company-biophysical-therapeutics-emerges-from-stealth/>

Dr. Forrest has published a preprint paper (referenced below) with more detail about the above. With the caveat that, as a preprint, it hasn't yet undergone peer review. It is an interim disclosure of ongoing work.

Forrest MD (2022) F1F0 ATP Hydrolysis is a Determinant of Metabolic Rate, a Correlate of Lifespan, and a Weakness of Cancer. *BioRxiv*. Version 3 (version published on 12 September 2022). <https://www.biorxiv.org/content/10.1101/2021.10.28.466310v3>.

I'm keen to speak to you about all this. Even aside from any investing reason, as you would be a very good person to discuss this with. If you're amenable, I can do a call at your convenience. Any day (except this Friday): any California morning or early afternoon.

Thanks Justin, Kindest regards, Michael
Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

(Testing the waters legal disclosure for above wefunder link: We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.)

Longevity co. for Timur, we spoke on linkedin

ME

Me <michael@biophysicaltherapeutics.com>

Sat, 11 Mar 2023 11:10:14 AM -0300 •

To "timurartemev" <timur.artemev@gmail.com>

Dear Timur,

First press:

Longevity company, with Drug, emerges from stealth:

<https://longevity.technology/news/longevity-company-biophysical-therapeutics-emerges-from-stealth/>

Would love to have you involved: presently raising on the Wefunder platform:

<https://wefunder.com/biophysical.therapeutics1>

("Testing the waters" legal disclosure for that link: We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.)

Thanks Timur. Any questions/feedback, I am here. Very much hoping you decide to come aboard, as it would be great to have you. Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

for Lance at Sound, we spoke on linkedin**ME** Me <michael@biophysicaltherapeutics.com>

Wed, 15 Mar 2023 5:42:59 PM -0300 •

To "lance" <lance@nextventures.com>

Dear Lance,

Very keen to have you involved in the following: you as an individual and/or Sound Ventures. Even if just at small amplitude.

Relates to two of your major interests: **Longevity** and **Cancer**.

Please see the webpage below:

Aim: Drug to Slow, Halt or Reverse Aging:

<https://wefunder.com/biophysical.therapeutics1>

This webpage only discloses the longevity application of the drug. But the drug also has anticancer utility, as summarized in the following paragraph, which was edited out of the webpage for brevity and focus:

Dr. Forrest reveals a tangential use: "This drug has, as the company [presciently] predicted, more anticancer activity than most present cancer drugs in standardized in vitro testing at the National Cancer Institute [USA]. Very distinct from chemotherapy, this drug might help [rather than harm] the body. It makes the body more efficient [less chemical energy of food dissipated as heat]. And so may confer weight gain, which might combat cachexia. Cachexia [severe weight loss/wasting] is common in cancer patients, killing many."

I think this is a huge discovery here, with many valuable applications. Already with a drug.

Thanks Lance, Kindest regards, Michael
Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

(Testing the waters legal disclosure for above wefunder link: We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.)

Longevity**ME**

Me <michael@biophysicaltherapeutics.com>

Fri, 03 Mar 2023 11:04:49 PM -0300 •

To "simran" <simran@avea-life.com>

Dear Simon,

Please consider this opportunity to invest in a longevity company (even if just at small amplitude) on the Wefunder platform.

<https://wefunder.com/biophysical.therapeutics1>

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

Re: for Tony at Gammite**ME**

Me <michael@biophysicaltherapeutics.com>

Thu, 30 Mar 2023 3:28:20 PM -0300 •

To "Tony Pyros" <tony@gammite.com>

Patents

Kindest regards, Michael
Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Thu, 30 Mar 2023 15:25:41 -0300 **Tony Pyros** <tony@gammite.com> wrote ---

I like what you are trying to do, but the main concern would be your competitive advantage to being able to beat big Pharma in this race.

I think outlining that would help.

-Tony Pyros | Managing Partner | [Gammite Ventures](#) | [440-336-1951](tel:440-336-1951) |  

From: Michael Forrest Ph.D. <michael@biophysicaltherapeutics.com>

Sent: Thursday, March 30, 2023 2:16:19 PM

To: Tony Pyros <tony@gammite.com>

Subject: for Tony at Gammite

Dear Tony,

For a personal (and/or fund) investment can you please consider the following:
it is a small raise, already with traction, with a small minimum investment size (\$100):

Slowing metabolic rate slows aging.

Have a drug that slows metabolic rate.

Raising to test if this drug can slow human tissue aging:

<https://wefunder.com/biophysical.therapeutics1>

Any questions/feedback, I am here. Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

Re: where is yc PRE-money safe?

ME Me <michael@biophysicaltherapeutics.com>
Sat, 18 Mar 2023 10:10:07 PM -0300 •
To "Carolynn Levy" <clevy@ycombinator.com>

Dear Carolynn,

If you find it interesting please consider investing:

Aim: Drug to Slow, Halt or Reverse Aging:
<https://wefunder.com/biophysical.therapeutics1>

Kindest regards, Michael
Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

(Testing the waters legal disclosure for above wefunder link: We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.)

---- On Thu, 09 Mar 2023 11:20:58 -0300 **Michael Forrest Ph.D.**
<michael@biophysicaltherapeutics.com> wrote ---

Re: longevity opportunity for Vitalik**ME**

Me <michael@biophysicaltherapeutics.com>

Fri, 10 Feb 2023 7:44:52 PM -0300 •

To "vitalikbuterin" <vitalik.buterin@ethereum.org>, "vbuterin" <vbuterin@gmail.com>, "v" <v@buterin.com>, "vitalik" <vitalik@ethereum.org>

Dear Vitalik,

Please append the following legal disclosure to my disclosure of <https://wefunder.com/biophysical.therapeutics1>:

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Fri, 10 Feb 2023 16:20:09 -0300 **Michael Forrest Ph.D.**
<michael@biophysicaltherapeutics.com> wrote ---

Dear Vitalik,

Given your interest in longevity I hope you don't mind me sending you this opportunity:
<https://wefunder.com/biophysical.therapeutics1>.
Would love to have you on board. Any feedback/questions I am here.

Thanks Vitalik, Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

Re: for Max at Echo Mind AI

ME Me <michael@biophysicaltherapeutics.com>

Thu, 09 Feb 2023 9:14:55 PM -0300 •

To "Max Harker" <mharker@echomindai.com>

Hi Max,

[1] Yes, the company has all the IP transferred to it (by the "restricted stock purchase agreement" whereby I transferred all my IP to the company for my own shares in the company. This document is in the Downloads section at the bottom of the Wefunder page. And I **attach** it to this email also for quick reference. I used clerky.com to incorporate the company and just used their standard paperwork. The company is a Delaware c-corp, incorporated last October).

[2] If you all set to invest and conformation from George Church is the final hurdle to surmount then I can get him to email you. He agreed to be an Advisor just two days ago, so it is a recent thing. And a big thing.

[3] No lead investor as yet.

[4] No previous rounds, this is the first round.
All be it the company already has quite a bit of traction.

Thanks Max, Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Thu, 09 Feb 2023 20:32:24 -0300 **Max Harker** <mharker@echomindai.com> wrote ---

1 Attachment

Biophysical Therapeutics,... .pdf
275.6 KB

Re: Biophysical Therapeutics

ME Me <michael@biophysicaltherapeutics.com>
 Sat, 15 Apr 2023 10:08:05 AM -0300 •
 To "Dane Gobel" <dane.gobel@mfoundation.org>

Hi Dane,

Have patented drug that slows metabolic rate. Slowing metabolic rate slows aging.

Age Reversal PREDICTION

The drug might not just slow aging:
 by sufficiently slowing aging it might actually reverse aging:

Body can repair damage caused by metabolic rate.
 But damage outruns repair, conferring **net damage (= aging)**.
 Reducing metabolic rate:
 Reduces rate of damage, slowing aging; and
 Reverses aging if rate of damage is made less than rate of repair.

Reverse aging: If the "damage rate" can be made less than the "repair rate"
 (*the body can repair damage caused by metabolic rate, but normally such damage outruns repair, conferring net damage*).

Leveraging the body's own breadth of repair mechanisms is probably easier than us trying to execute repair, for all the many different types of molecular damage (that characterize/are aging), in parallel, *de novo*.

For more information see my preprint paper:
<https://www.biorxiv.org/content/10.1101/2021.10.28.466310v3.full.pdf>
 Especially its **Page 70**.
Margin for aging reversal because damage is linear, whilst repair is non-linear (Michaelis-Menten), function of [ROS].

 Incidentally, For Your Interest, ticking of the "epigenetic clock" is set out to be just another manifestation of metabolic damage on page 35 of the preprint paper.

That preprint paper is an interim disclosure of ongoing work, which this present raise enables continuation of: assaying if the drug can slow/reverse the aging of human tissue (*ex vivo*). If it can, which I predict it will (reporting by end of year hopefully), then the world won't be the same, and the company can then raise more money, at much higher valuation, and prosecute this opportunity to application(s), firstly cosmetic, and revenue and profits.

Advantage of a drug that reverses, and not just slows, aging is that it only needs to be taken intermittently: e.g., perhaps for only part of the year.

Thanks Dane, Kindest regards, Michael
 Michael Forrest BA|MA (Cantab), MSc, Ph.D.
 Biophysical Therapeutics

---- On Sat, 15 Apr 2023 08:54:50 -0300 **Dane Gobel** <dane.gobel@mfoundation.org> wrote -
 --

Re: your FAQ page

ME Me <michael@biophysicaltherapeutics.com>
Thu, 09 Mar 2023 6:06:45 PM -0300 •
To "ldemingwww" <ldeming.www@gmail.com>

Dear Laura,

First press:

Longevity company, with Drug, emerges from stealth:

<https://longevity.technology/news/longevity-company-biophysical-therapeutics-emerges-from-stealth/>

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Tue, 30 Mar 2021 11:30:51 -0300 **Michael Forrest Ph.D.**
<michael@biophysicaltherapeutics.com> wrote ---

Re: Invitation: Biophysical Tx + Healthspan Capital @ Thu Apr 14, 2022 5:30pm - 6:30pm (WEST) (michael@biophysicaltherapeutics.com)

ME Me <michael@biophysicaltherapeutics.com>
Thu, 30 Mar 2023 7:00:09 PM -0300 •

To "Sebastian Aguiar Brunemeier" <sebastian.aguiar23@gmail.com>

Cc "michael chinen" <michael@healthspancapital.vc>, "nathan cheng" <nathan@healthspancapital.vc>, "cian doherty" <cjndoherty@gmail.com>

Dear all,

EXTERNAL SCIENTIFIC VALIDATION (to date):

Company Advisors

- Professor George Church (Harvard Medical School): *serial biotech entrepreneur and one of the biggest names, if not the biggest name, in biotech.*
- Professor Bruno Conti (Scripps Research Institute): *showed that slowing metabolic rate increases mice lifespan, published in Science (an elite-tier journal).*

Subject Matter Expert Investors (have reserved investment on Wefunder)

- Dr. Alex Zhavoronkov (Founder CEO of Insilico Medicine, which has raised >\$400M).
- Dr. Marco Quarta (Ex group leader at Stanford, founder of Khosla ventures-backed Rubedo Life Sciences and Turn Biotechnologies).
- Dr. Kevin Perrot (co-founder of SENS).
- Dr. Kelsey Moody (founder of Ichor Life Sciences and Ichor Therapeutics).
- Olivia Schmid JD MBA: Executive Director, Head of Commercial Excellence, at Abbvie (a \$280B market cap pharma). Formally of Allergan, renowned for its medical aesthetics lines (e.g., Botox), which Abbvie acquired for \$63B. She is now setting us up meetings with the external innovation aesthetics team at Abbvie.

Scientist believers that want to do involved experiments, taking months, bearing costs, for the company for free

- Professor (of chemistry) Jeremy Robertson, Oxford University.
- Dr. Ken Raj, Altos Labs (*which was recently founded with \$3B in investment, and reportedly pays its scientists >\$1M per year*).
- Dr. Carolina Reis Oliveira and Dr. Alessandra Zonari: both founders, CEO and CSO respectively, of Oneskin (*a longevity cosmetics company*).
- Distinguished Professor Brian Kennedy, Director of the Centre for Healthy Longevity at the National University of Singapore (Ex-CEO of the Buck Institute for Research on Aging, California).

Reference for Dr. Forrest

Please see the attached PDF (*this same document is also on the Wefunder page linked to below, near its bottom*).

Part thereof repeated here: "Dr. Forrest reminds me of the great scientific tradition of Great Britain, from Isaac Newton to Michael Faraday to Francis Crick to Peter Mitchell."

THE RAISE

The round is progressing well (by SEC rules I can't say how much remains in this email: please take a look):

- Slowing metabolic rate extends lifespan.

Have a drug that slows metabolic rate.

Raising to test if this drug can slow human tissue aging:

<https://wefunder.com/biophysical.therapeutics1>

Kindest regards, Michael
Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

We are 'testing the waters' to gauge investor interest in an offering under Regulation Crowdfunding. No money or other consideration is being solicited. If sent, it will not be accepted. No offer to buy securities will be accepted. No part of the purchase price will be received until a Form C is filed and only through Wefunder's platform. Any indication of interest involves no obligation or commitment of any kind.

---- On Tue, 21 Mar 2023 14:53:11 -0300 **Michael Forrest Ph.D.**
<michael@biophysicaltherapeutics.com> wrote ---

Dear all,

To update, published today:

<https://longevity.technology/news/biophysical-therapeutics-opens-crowdfunding-investment-raise/>

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Thu, 03 Nov 2022 11:27:52 -0300 **Sebastian Aguiar Brunemeier**
<sebastian.aguiar23@gmail.com> wrote ---

Apologies, I don't entirely understand what you mean? We're interested in those deal terms, and I have asked some follow-up questions to build conviction for us to invest.

On Thu, Nov 3, 2022 at 1:41 PM Michael Forrest Ph.D. <michael@biophysicaltherapeutics.com> wrote:

Dear all,

Your last is you rescinding/pulling the offer you made shortly prior?

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Wed, 02 Nov 2022 10:53:32 -0300 **Sebastian Aguiar Brunemeier**
<sebastian.aguiar23@gmail.com> wrote ---

1 Attachment

Reference for Dr Forrest.pdf
3.3 MB

Re: for Alex at 2048

ME Me <michael@biophysicaltherapeutics.com>
Sat, 25 Mar 2023 9:52:57 PM -0300 •
To "alex" <alex@2048.vc>

Mission: Drug to Slow/Reverse Aging:

New from the press:

<https://longevity.technology/news/biophysical-therapeutics-opens-crowdfunding-investment-raise/>

Kindest regards,
Michael

Michael Forrest BA|MA (Cantab), MSc, Ph.D.
Biophysical Therapeutics

---- On Thu, 09 Mar 2023 10:02:00 -0300 **Michael Forrest Ph.D.**
<michael@biophysicaltherapeutics.com> wrote ---