

AI FOR

LONGEVITY

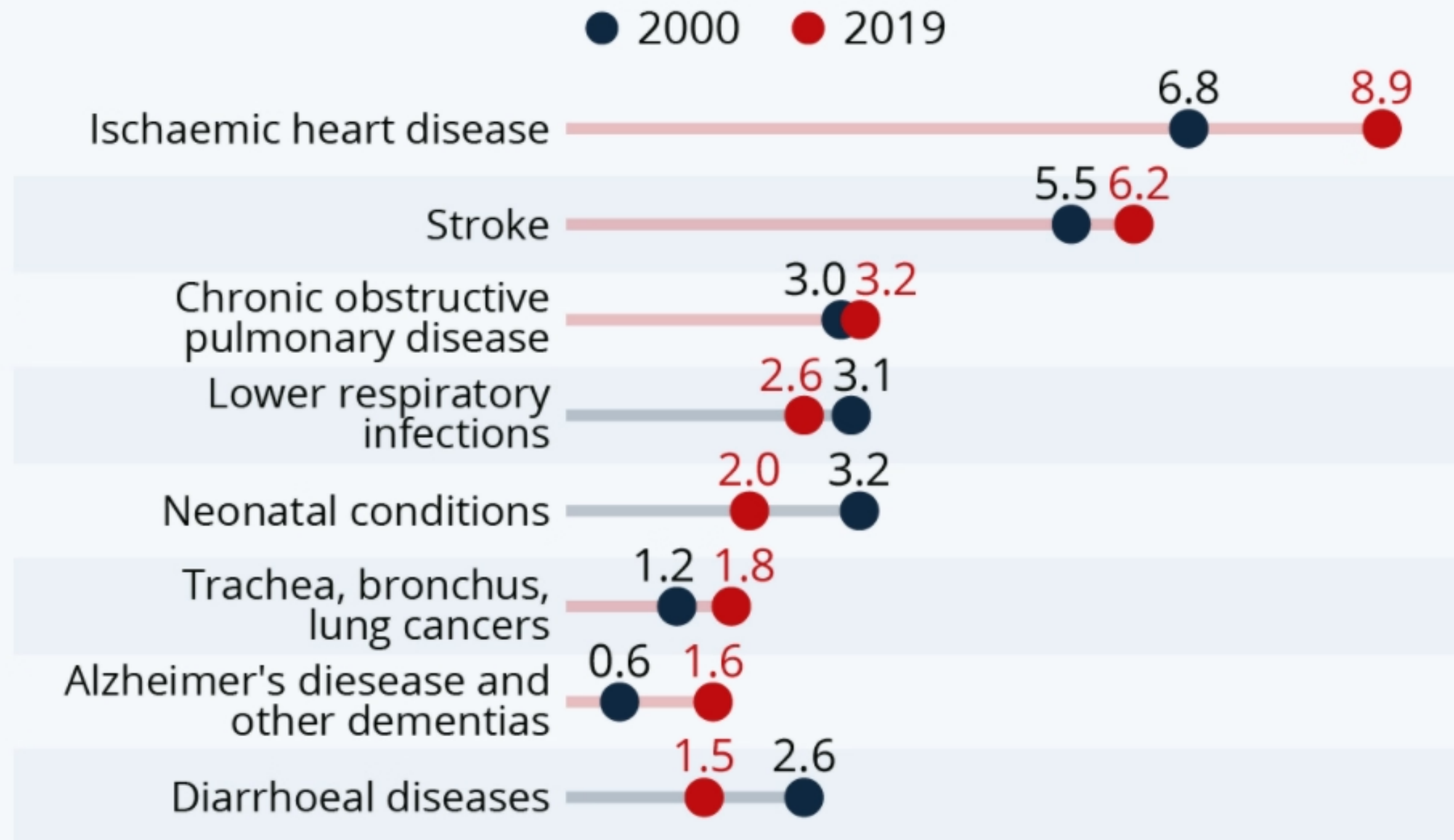
BY SIRAJ RAVAL



Amino Acids		Proline (P)		Alanine (A)	
A	10101				
C	0001011				
P	00011	CCA	0	GCA	111
S	0101	CCC	11	GCC	110
Y	01110	CCG	110	GCG	10
		CCT	10	GCT	0
Original DNA:		CCG GCC			
Protein:		P A			
Protein Code:		00011, 10101			
Triplet Code:		110, 110			
Final:		{00011, 110}, {10101,110}			

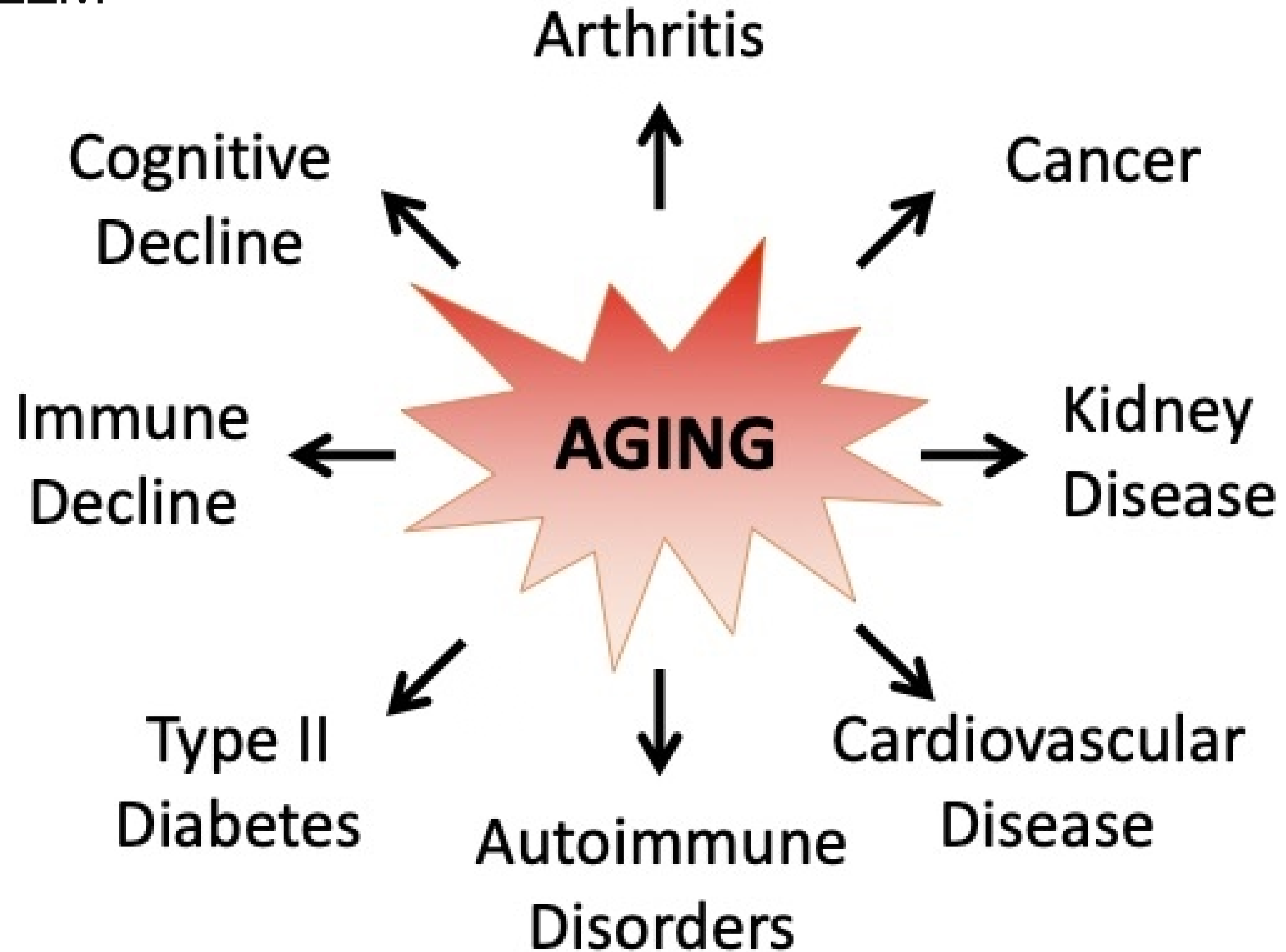
The World's Leading Causes Of Death

Total number of people who died from the following conditions (in millions)

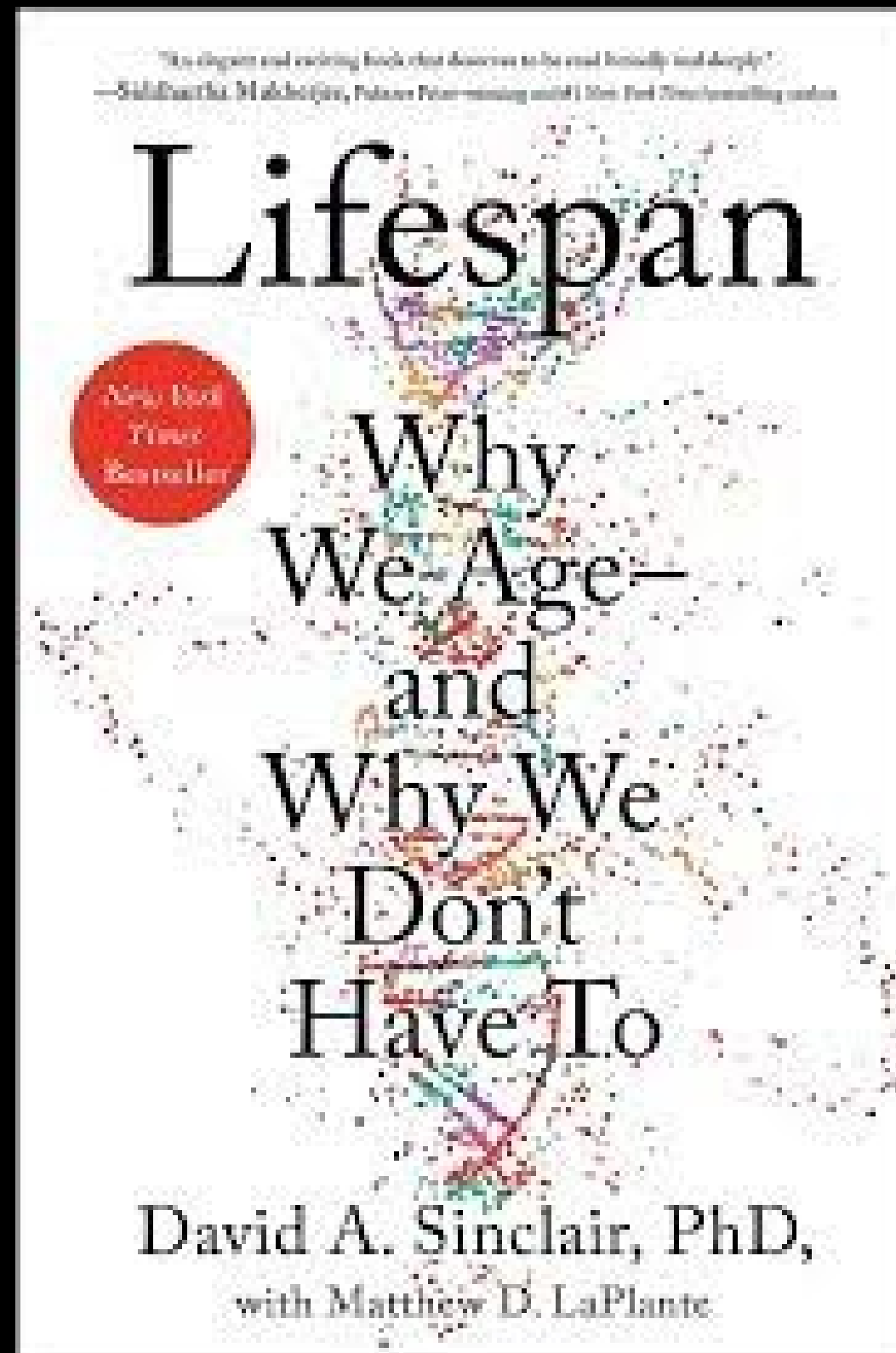
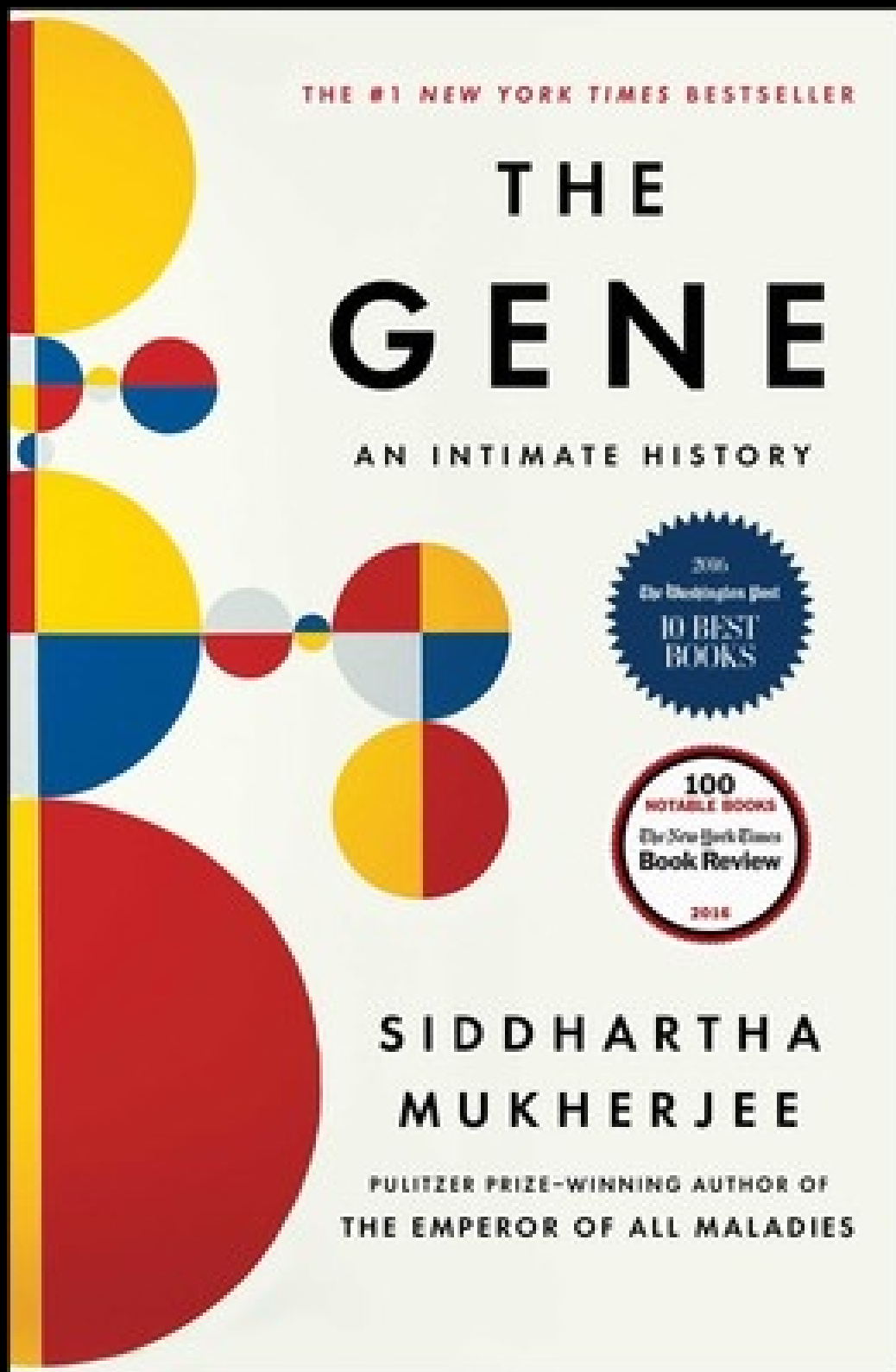


Source: World Health Organization

ROOT PROBLEM

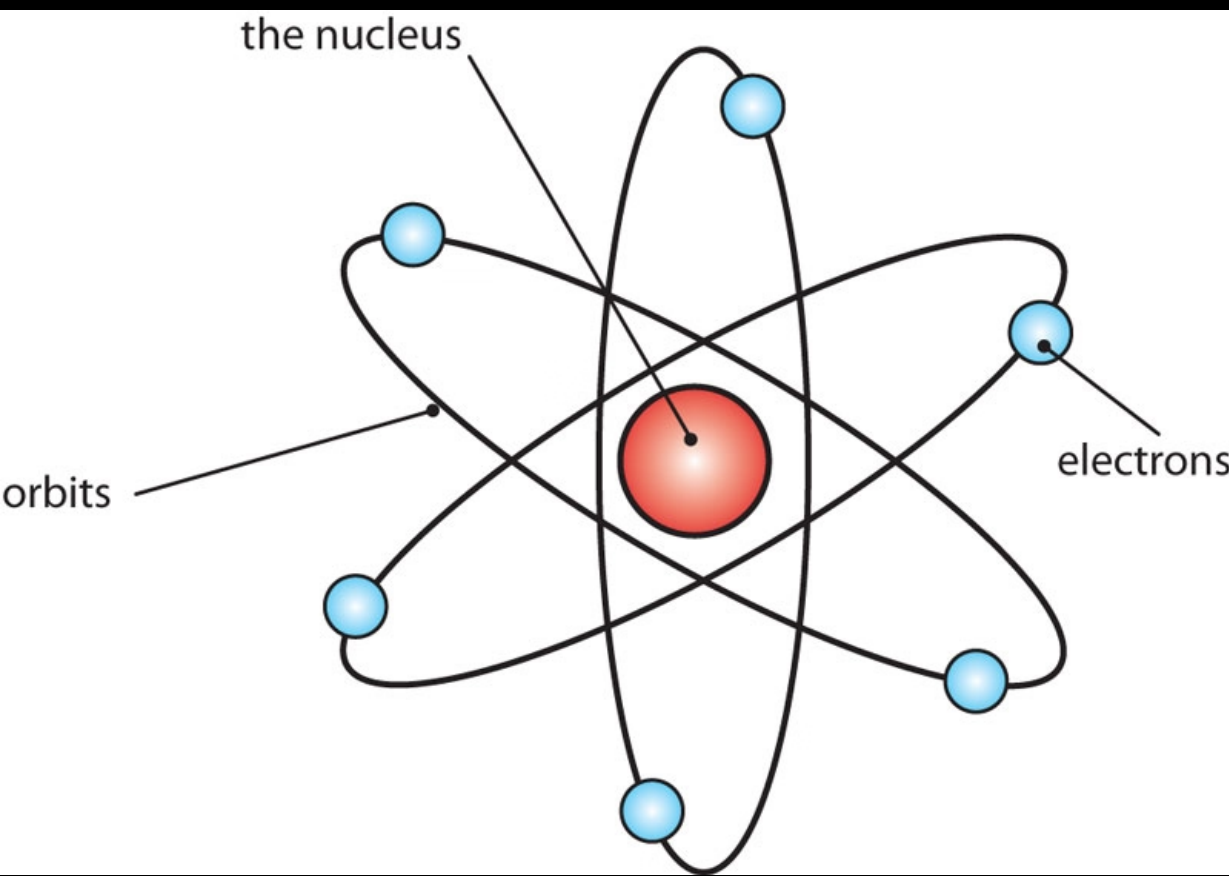


BACKGROUND



3 Units of Information

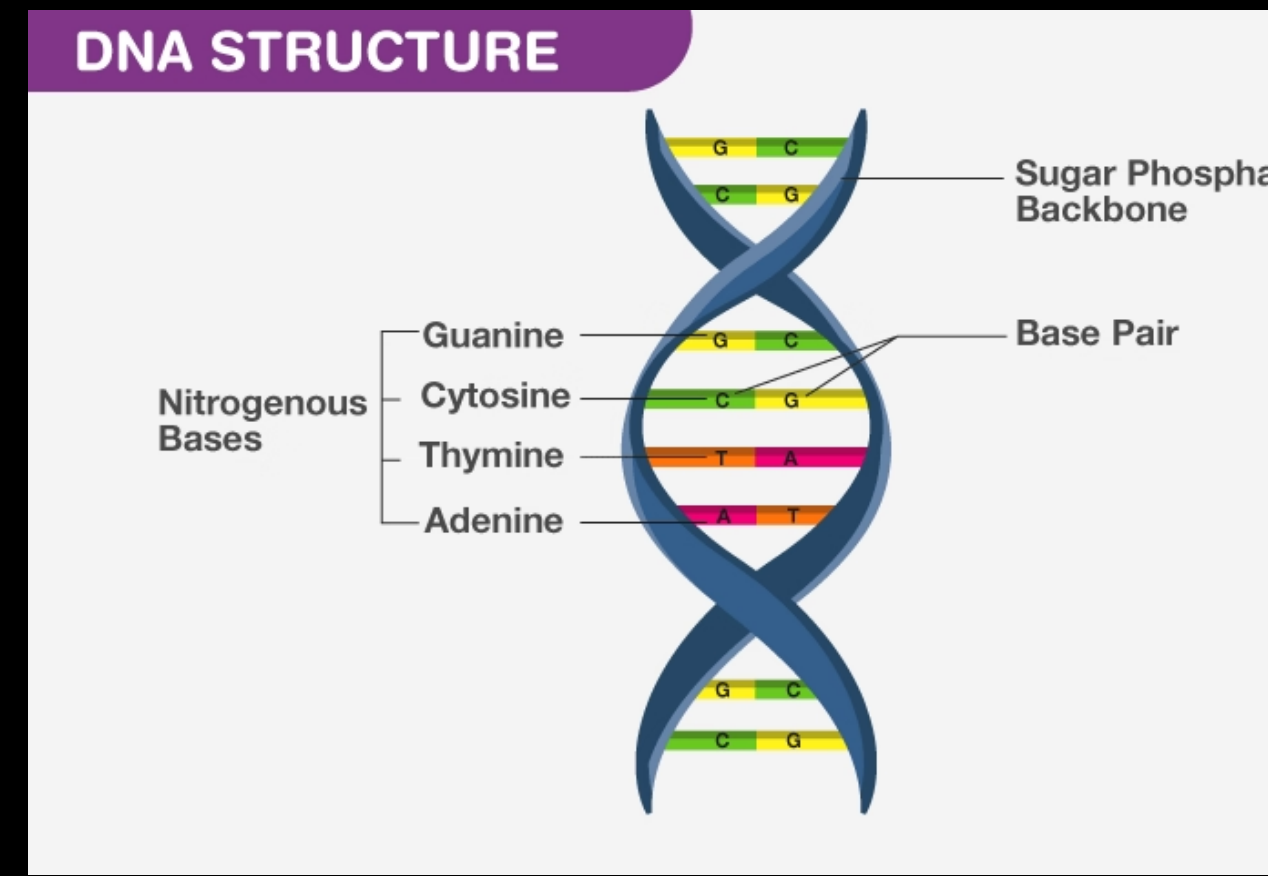
The Atom



The Byte

00010100100001001010
10001010010101010110
01001100010001010001
01010000101001010011
10011010010000001010
01010010010010010100
10010010101010101100
10101010000100010011
00101000100101001001

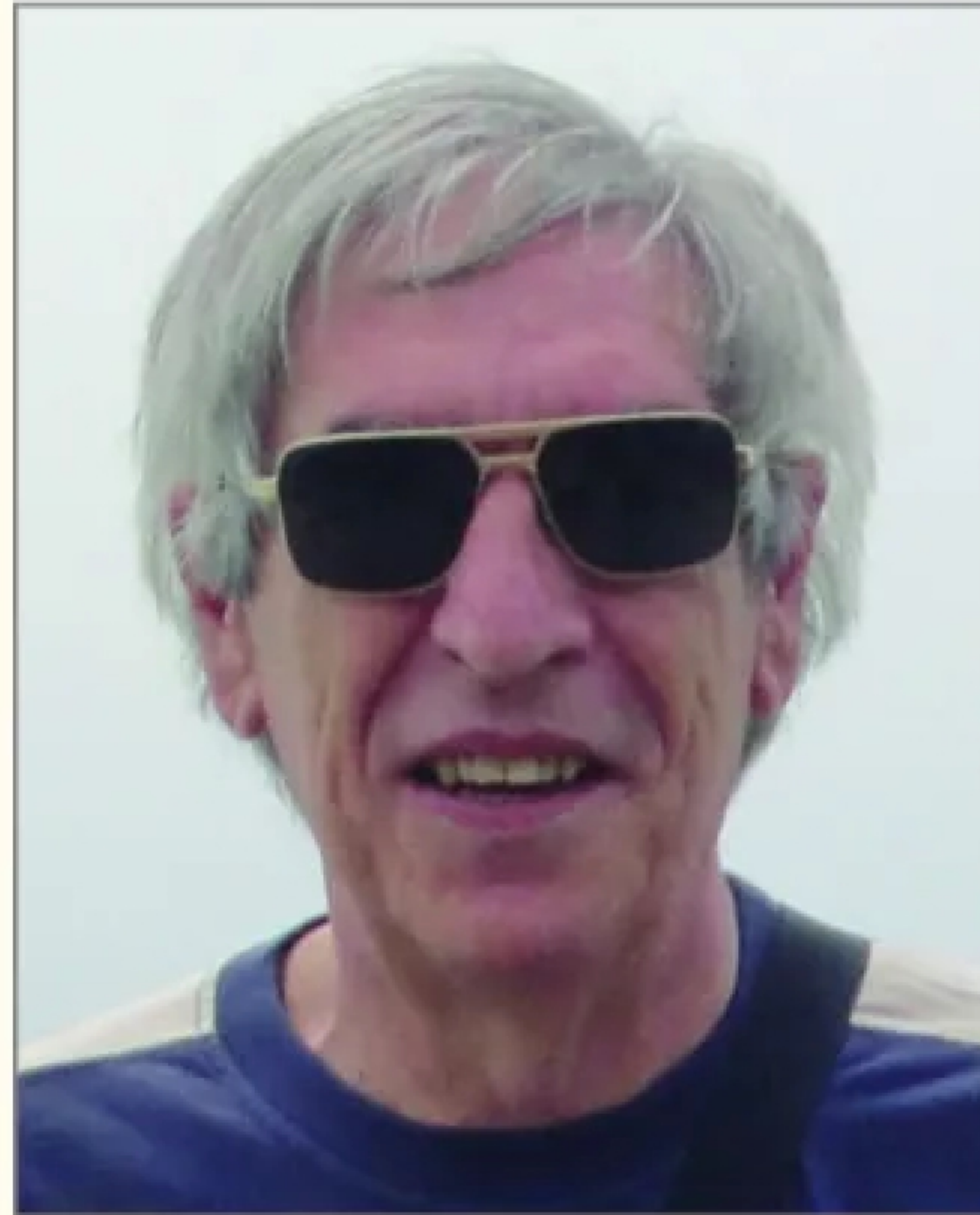
The Gene



EVIDENCE

AGE REVERSAL FROM GENE THERAPY

A Patient image pretreatment



B Patient image posttreatment



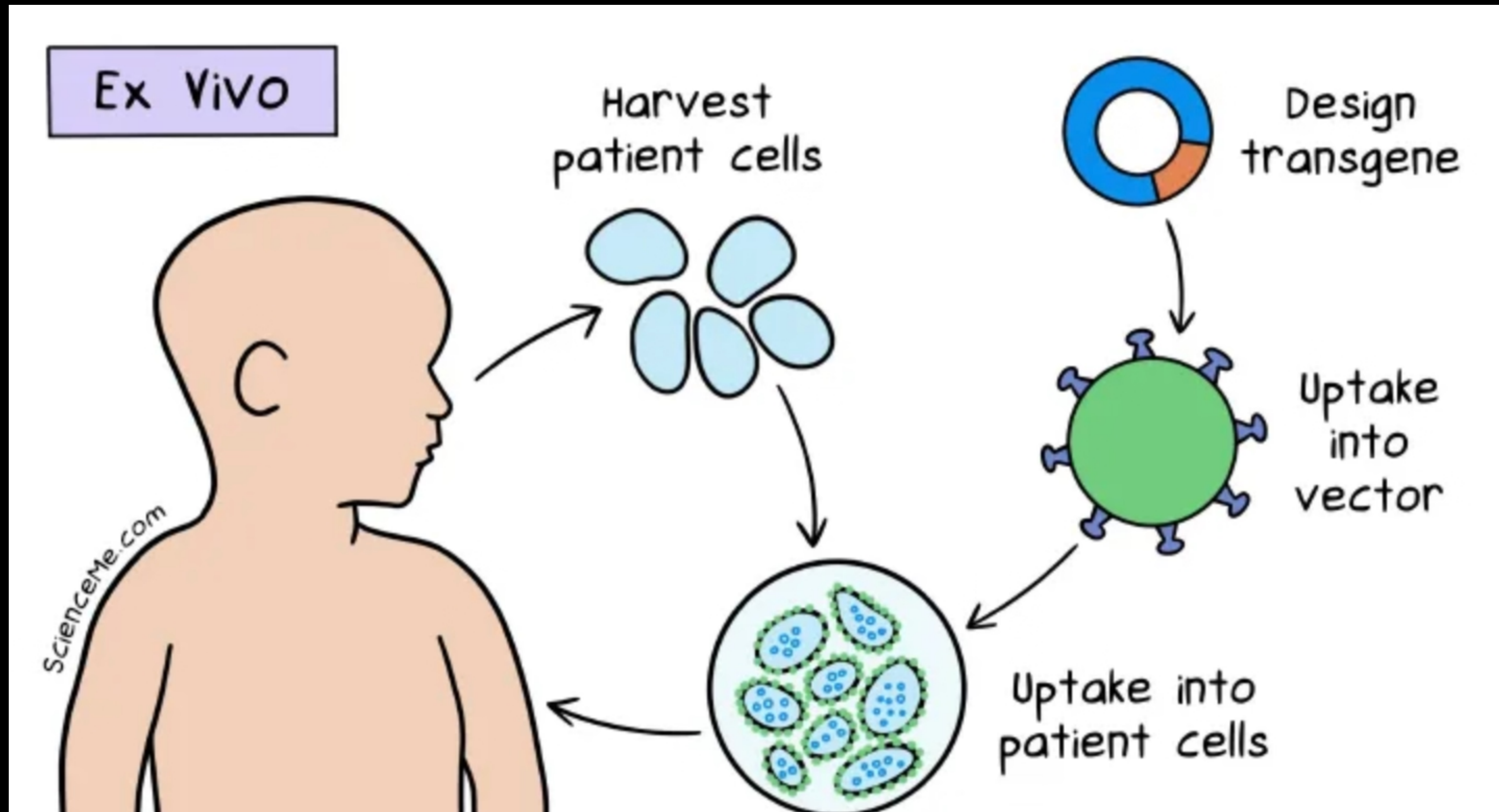
[Open in a separate window](#)

Figure 1.

Hair Repigmentation in Patient Number 5

A, Picture provided by the patient from before starting therapy. B, Picture taken during the follow up with a clear repigmentation.

HOW? GENE THERAPY



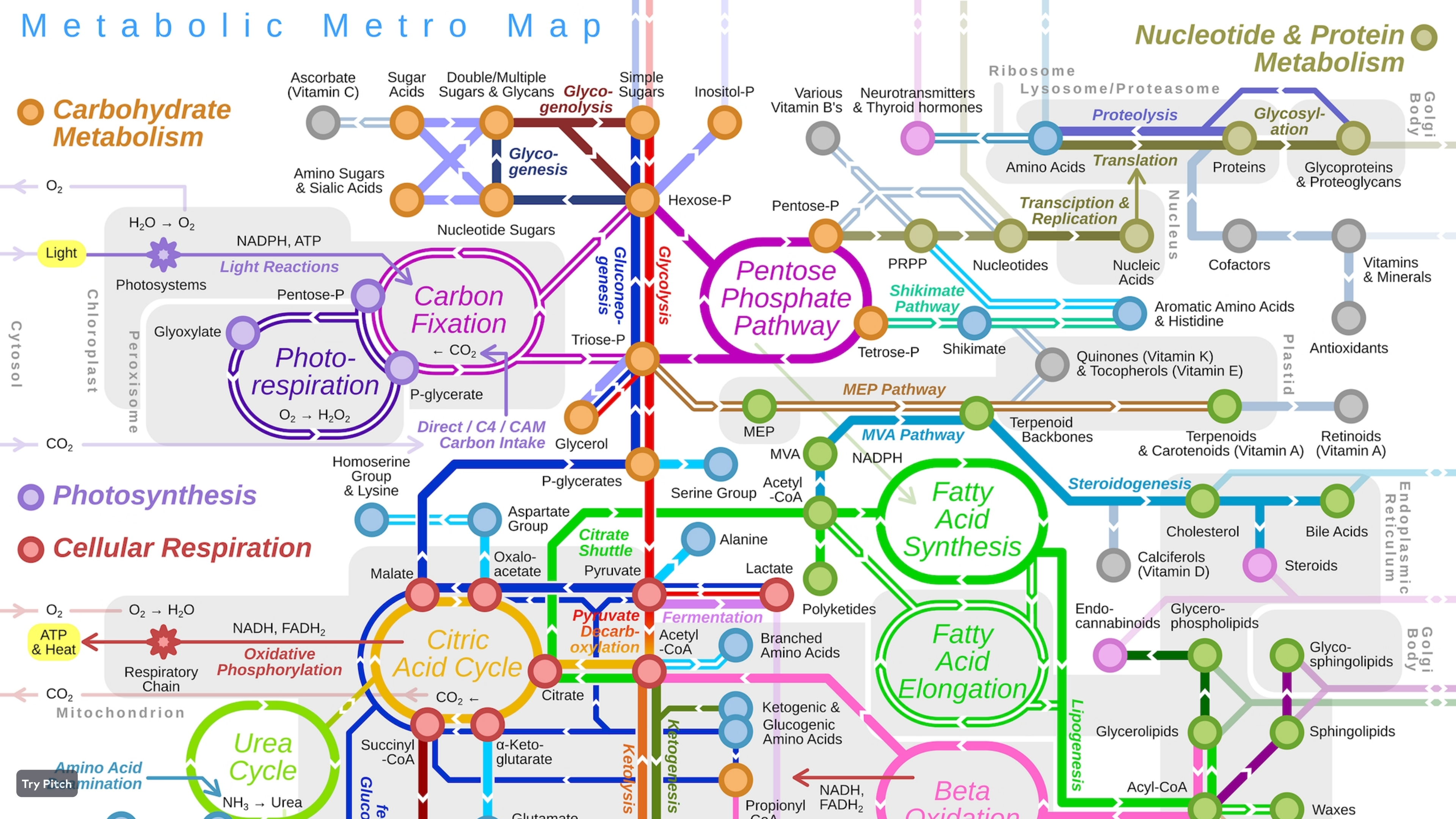
Metabolic Metro Map

Carbohydrate Metabolism

Photosynthesis

Cellular Respiration

Nucleotide & Protein Metabolism



3 KNOWN LONGEVITY GENE PATHWAYS

1. MTOR
2. SIRTUINS
3. AMPK

Inhibits mTOR



Energy Stress
Calorie Restriction
Exercise
Resveratrol



AMPK
(Energy Sensor)



Activates FOXO



Increases NAMPT
expression

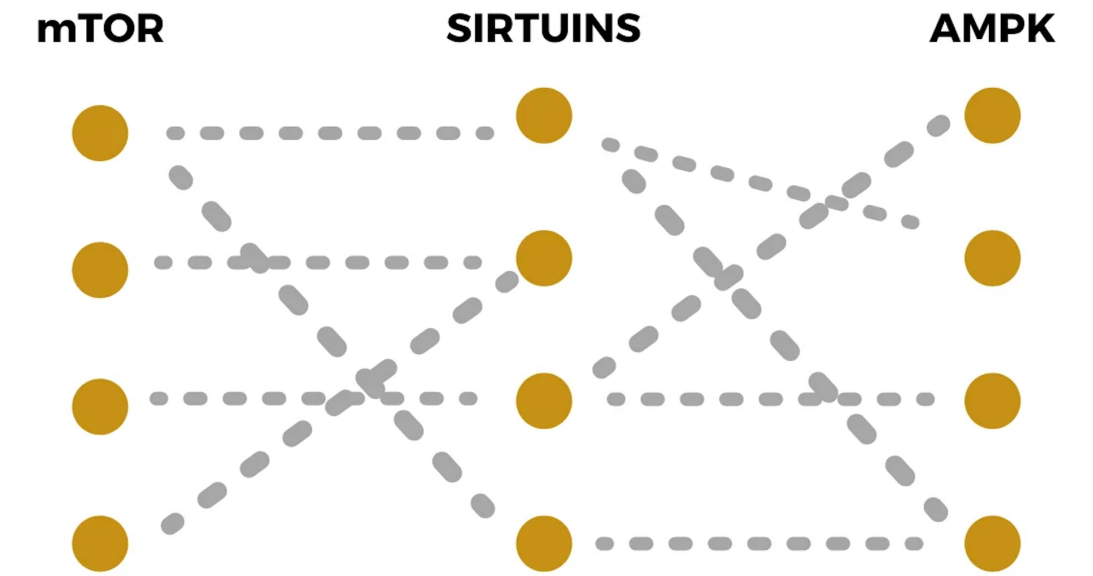


Increases
NAD⁺ levels



Increases SIRT
activation

Dr Sinclair's 3 Longevity Genes

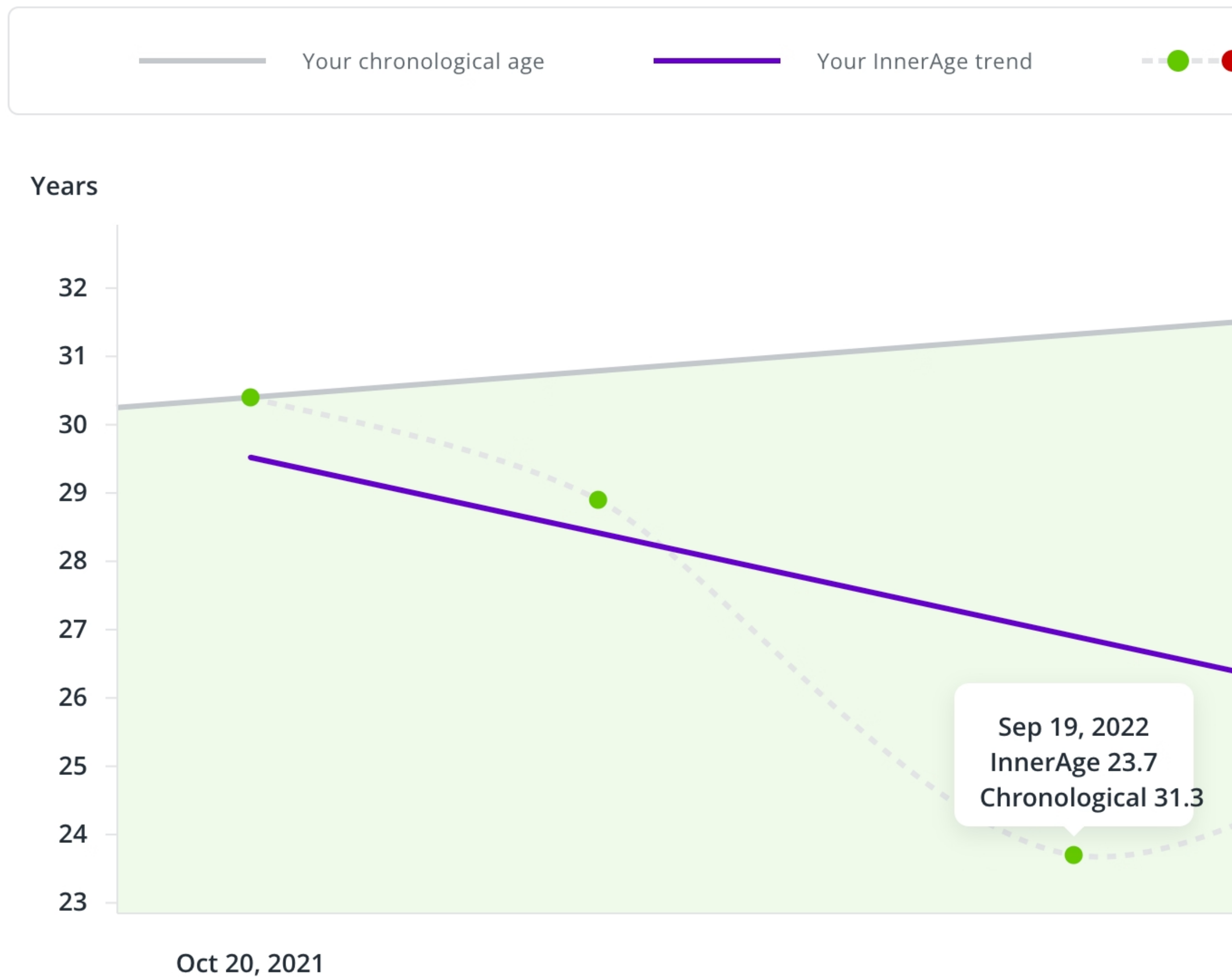


MY RESULTS

My 8 year age reversal in 11 months

- Diet
- Exercise
- Sleep
- Relationships

Try Pitch



BLUE ZONES



MY DATA

AGING CLOCK MEASURED WITH BLOOD TEST

Try Pitch

Biomarker	Result	Impact on InnerAge
Calcium Bone health	9.4 mg/dL	+ 1.2 years 
SHBG Sex hormone carrier	63 nmol/L	+ 1.1 years 
Albumin Serum protein	4.6 g/dL	+ 0.4 years 
Free testosterone Active testosterone	8.38369 ng/dL	+ 0.1 years 
MCHC	33.5 g/dl	No impact 

SIDE NOTE

BE WEARY!



GET A JOB

Meet 20 of the Best-Funded Biotech Startups Pioneering Age Reversal

Retro
BIOSCIENCES

e γ genesis
ENGINEERING HOPE

 **Calico**

 **NewLimit**

BIOAGE

life
BIOSCIENCES

 **Cambrian**

 **DECIDUOUS**
THERAPEUTICS

 **Elevian**
REIMAGINE AGING

 **turn.bio**

 **Juvena**
THERAPEUTICS
Tissue Regeneration for the Elderly

ALTOSTM

UNITY
BIOTECHNOLOGY

 **HUMAN**
LONGEVITY

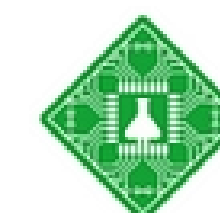
 **REJUVENATE BIO**

 **LyGenesis**

biosplice

 **Rubedo**

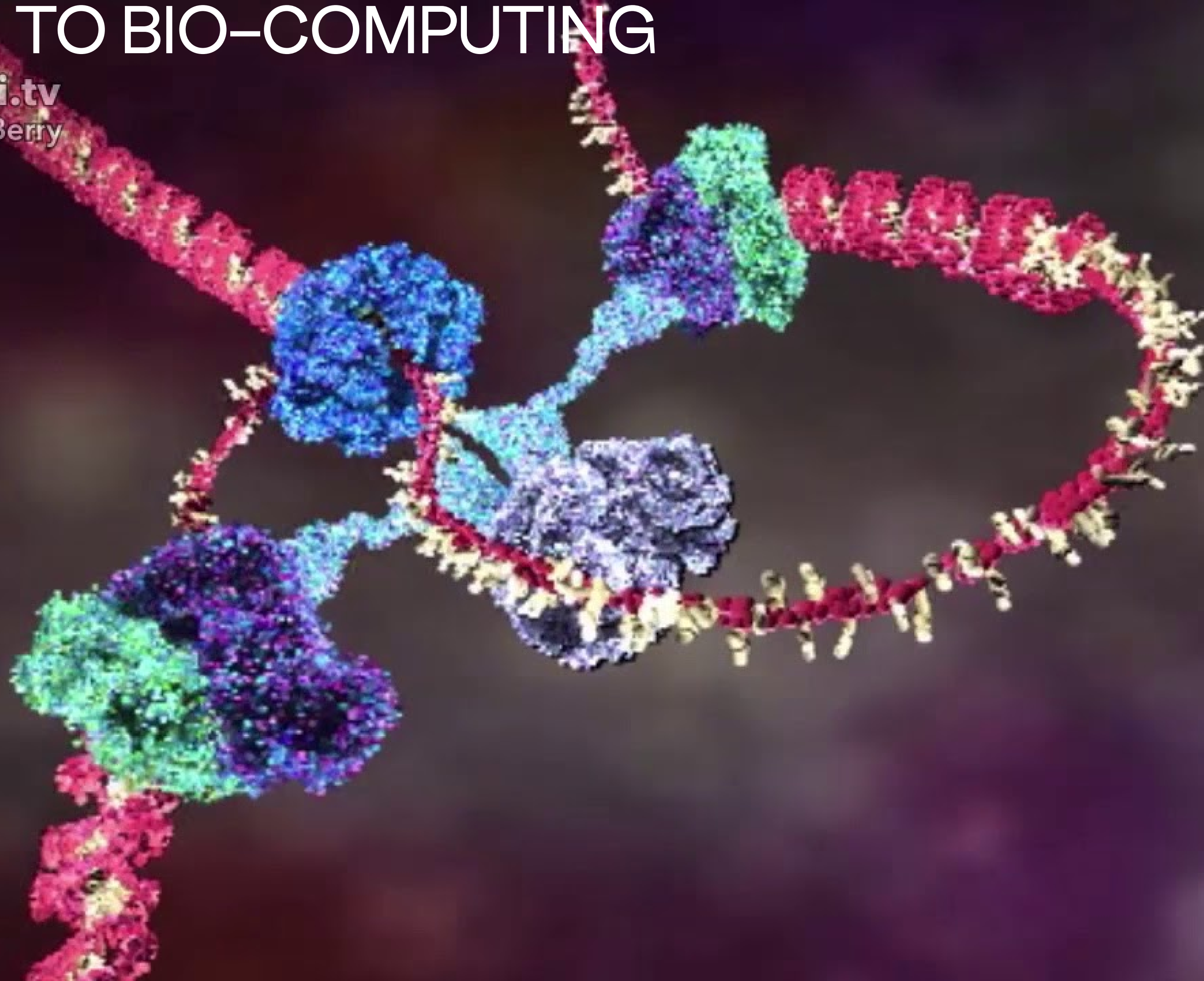
 **JUVENESCENCE**



Insilico Medicine

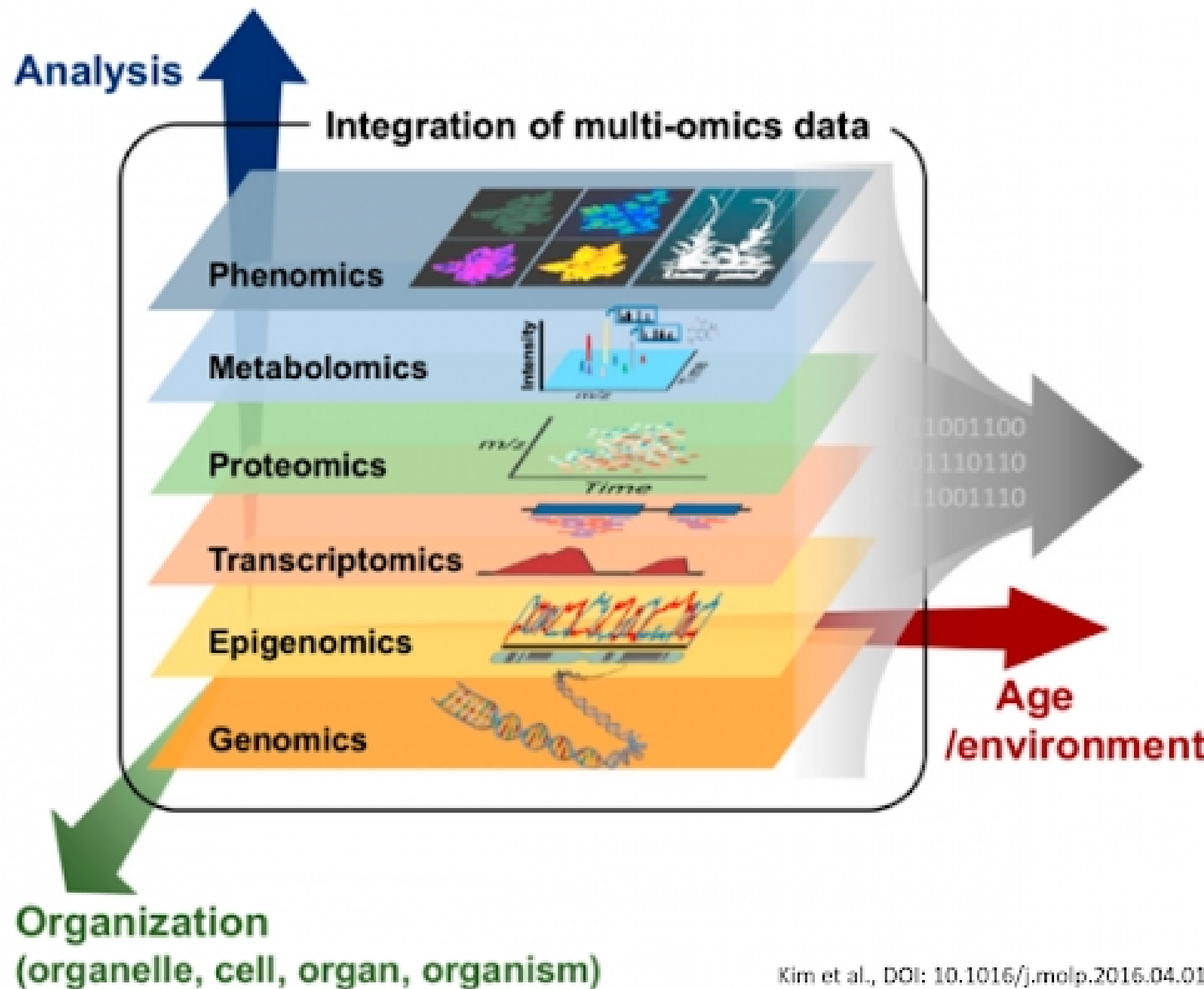
INTRO TO BIO-COMPUTING

wehi.tv
DrewBerry



Biology is Software

- Proteome (Apps)
- Metabolome (Process Monitor)
- Transcriptome (Interpreter)
- Epigenome (Disk Reader)
- Genome (Hard Disk)



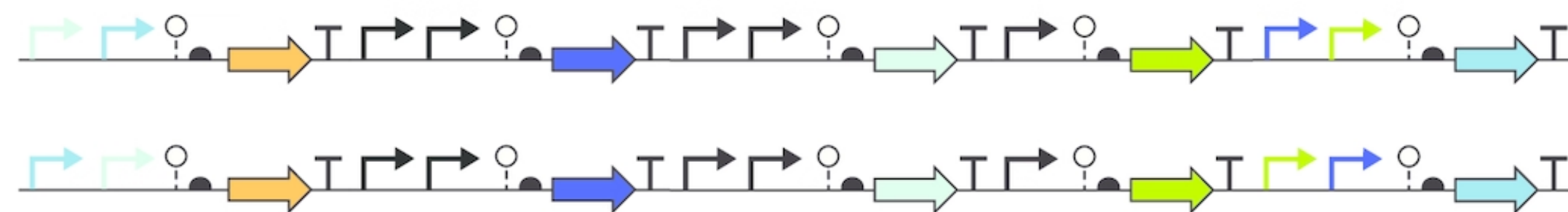
GENE THERAPY FOR LONGEVITY... IN 9 LINES OF PYTHON

Panel 1

```
gate_Ph1F    BEFORE gate_BetI    AND
gate_BetI     BEFORE gate_AmeR    AND
gate_AmeR     BEFORE gate_HlyIIR  AND
gate_HlyIIR   BEFORE gate_AmtR    AND
FORWARD gate_Ph1F    AND
FORWARD gate_BetI    AND
FORWARD gate_AmeR    AND
FORWARD gate_HlyIIR  AND
FORWARD gate_AmtR    AND
```

Fixed repressor order, and all gates in the forward orientation

4 solutions



Panel 2

```
185  def molecule_prepare_resp2(  
186      ligand_file: BaseFile,  
187      cpu_num: Union[int, None] = None,  
188      charge: Union[int, None] = None,  
189      multiplicity: Union[int, None] = None,  
190      solvent: Union[str, None] = None,  
191      save_dir: Union[str, None] = None,  
192      overwrite: bool = False,  
193      keep_origin_cood: bool = False) -> tuple:
```

Panel 3

LIBRARIES

1. CORAL
2. CELLO
3. BIOPYTHON

For this tutorial, let's design primers that will amplify the gene EYFP.

```
In [1]: import coral as cor
```

First we read in a plasmid from Havens et al. 2012 and isolate the EYFP sequence.

```
In [2]: plasmid = cor.seqio.read_dna("../files_for_tutorial/maps/pGP4G-EYFP.ape")
eyfp_f = [f for f in plasmid.features if f.name == 'EYFP'][0]
eyfp = plasmid.extract(eyfp_f)
print len(eyfp)
eyfp
```

717

```
Out[2]: ATGGTGAGCAAGGGCGAGGAGCTGTTCACCGGGGTGGTGC ... CGCCGCCGGGATCACTCTCGGCATGGACGAGCTGTACAAG
TACCACTCGTTCCCGCTCCTCGACAAGTGGCCCCACCACG ... GCGGCGGCCCTAGTGAGAGCCGTACCTGCTCGACATGTTC
```

Designing primers is straightforward - you just call `design.design_primer` with a `sequence.DNA` object as the input.

```
In [3]: # Forward and reverse, one at a time using design_primer()
forward = cor.design.primer(eyfp)
reverse = cor.design.primer(eyfp.reverse_complement())
# Both at once using design_primers()
forward, reverse = cor.design.primers(eyfp)
# design_primer has many options, including adding overhangs
custom_forward = cor.design.primer(eyfp, tm=65, min_len=12,
                                   tm_undershoot=1, tm_overshoot=1,
                                   end_gc=True, tm_parameters="santalucia98",
                                   overhang=cor.DNA("GGGGGATCGAT"))

print forward
print
print custom_forward
```

ATGGTGAGCAAGGGCG

GGGGGATCGATATGGTGAGCAAGGGCGAGGAGCTGTTCAC



DEPLOYMENT SOLUTION

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Welcome back!



Try Pitch



MONETIZATION STRATEGY

🔗 0 ❤️

Untitled Collection #82554975

📁 📄 ⋮

Siraj's Genome

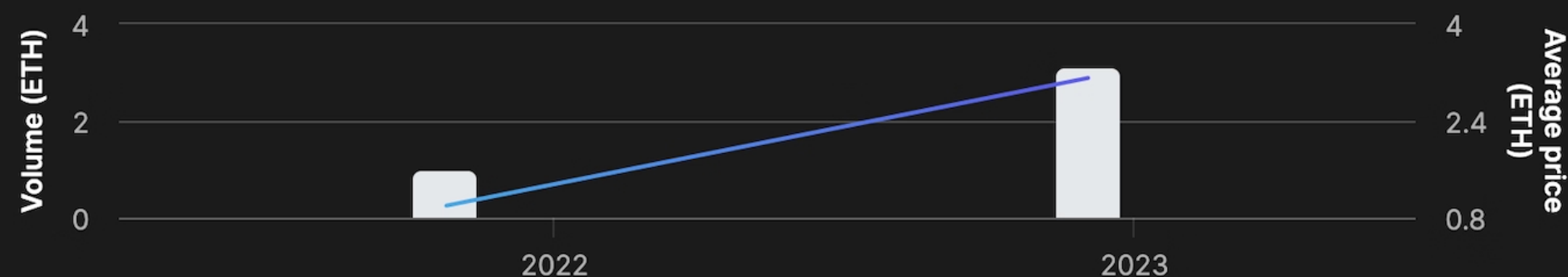
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👁 219 views

🔒 Includes **unlockable content**

🏷 Make offer

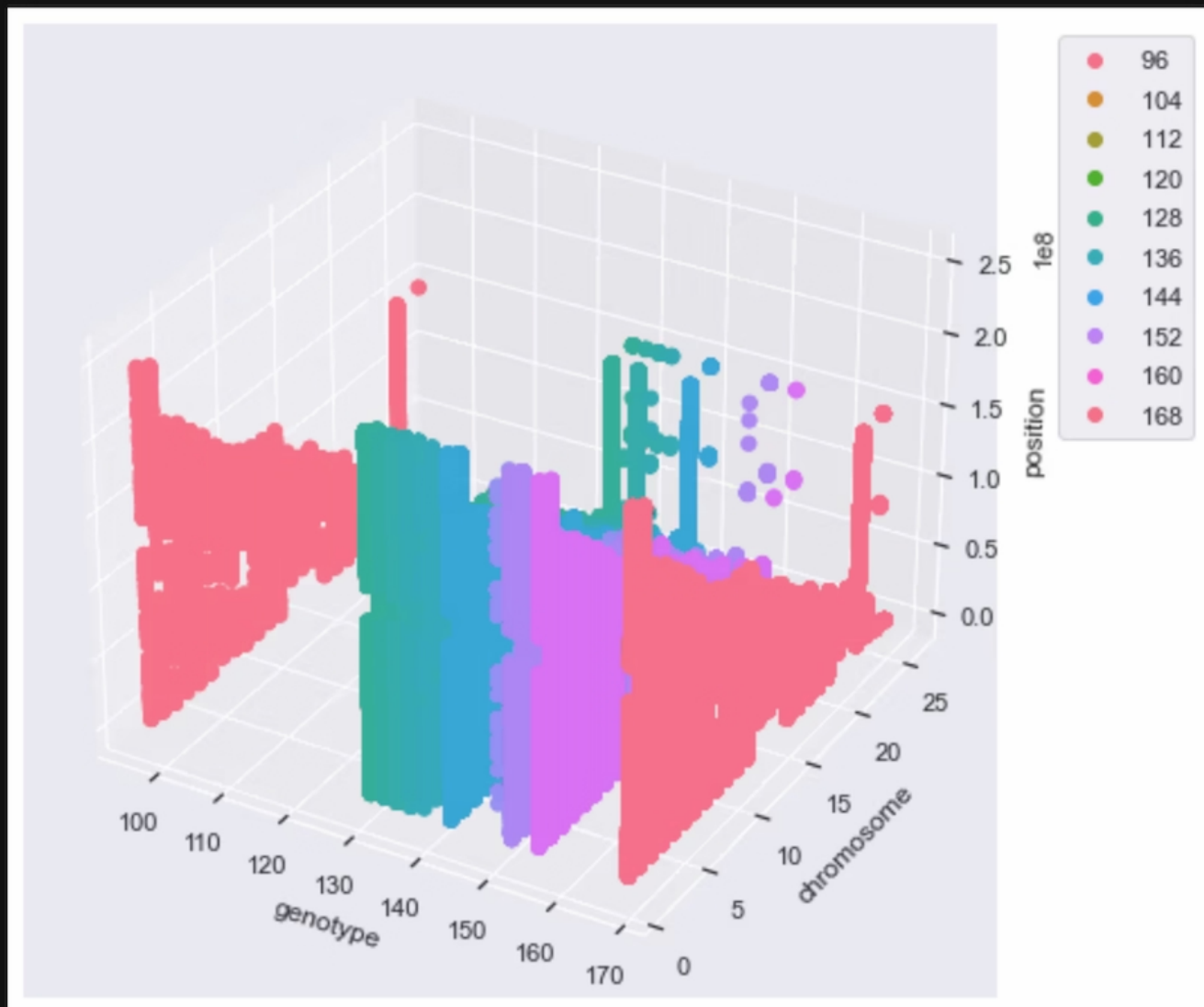
📈 Price History



🏷 Listings

☰ Description

Try Pitch



POSSIBILITIES

GENE EDITING



Abundant Food



Human Enhancement



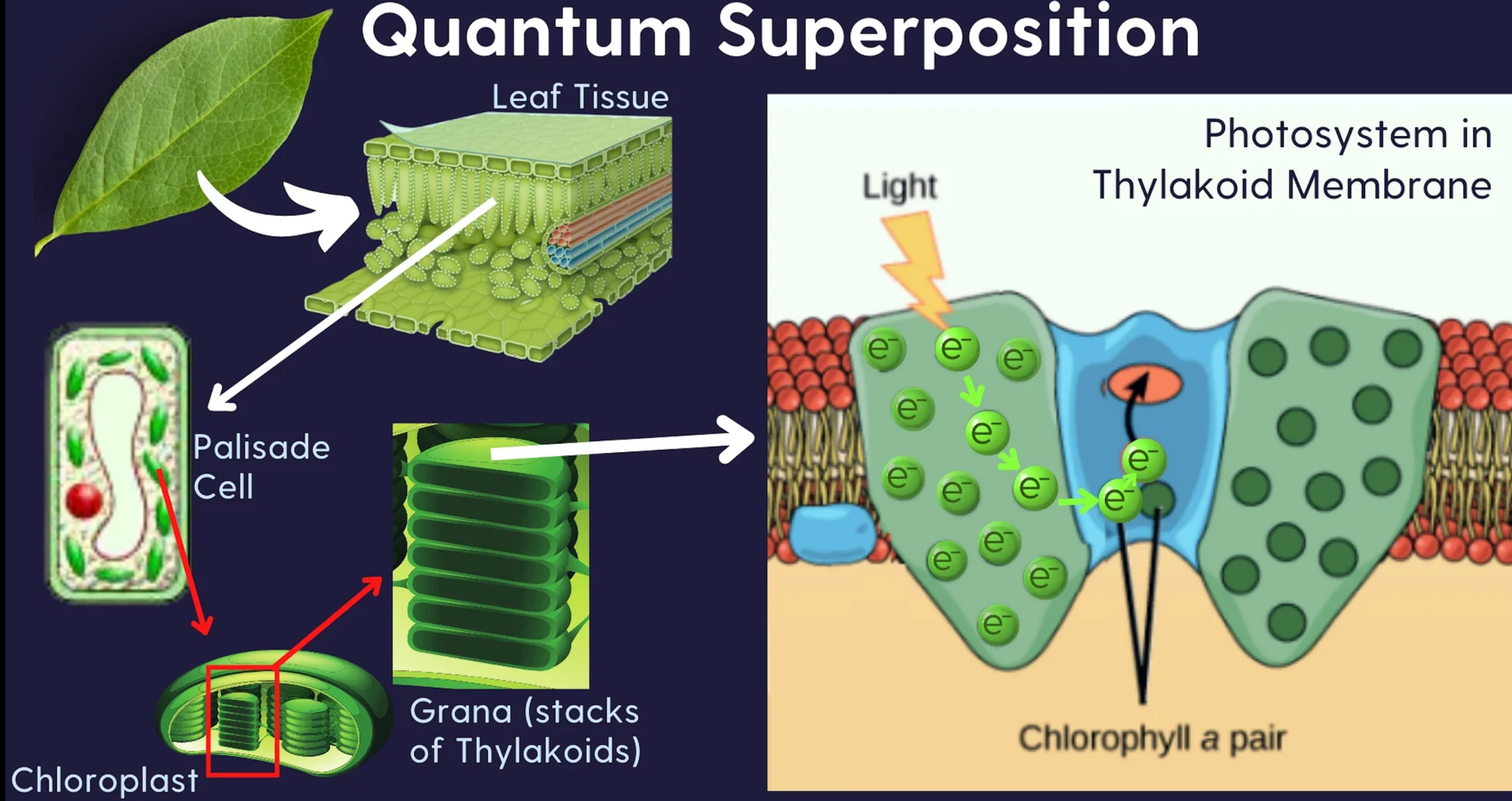
Clean Energy



Ending Disease

Plant Computing

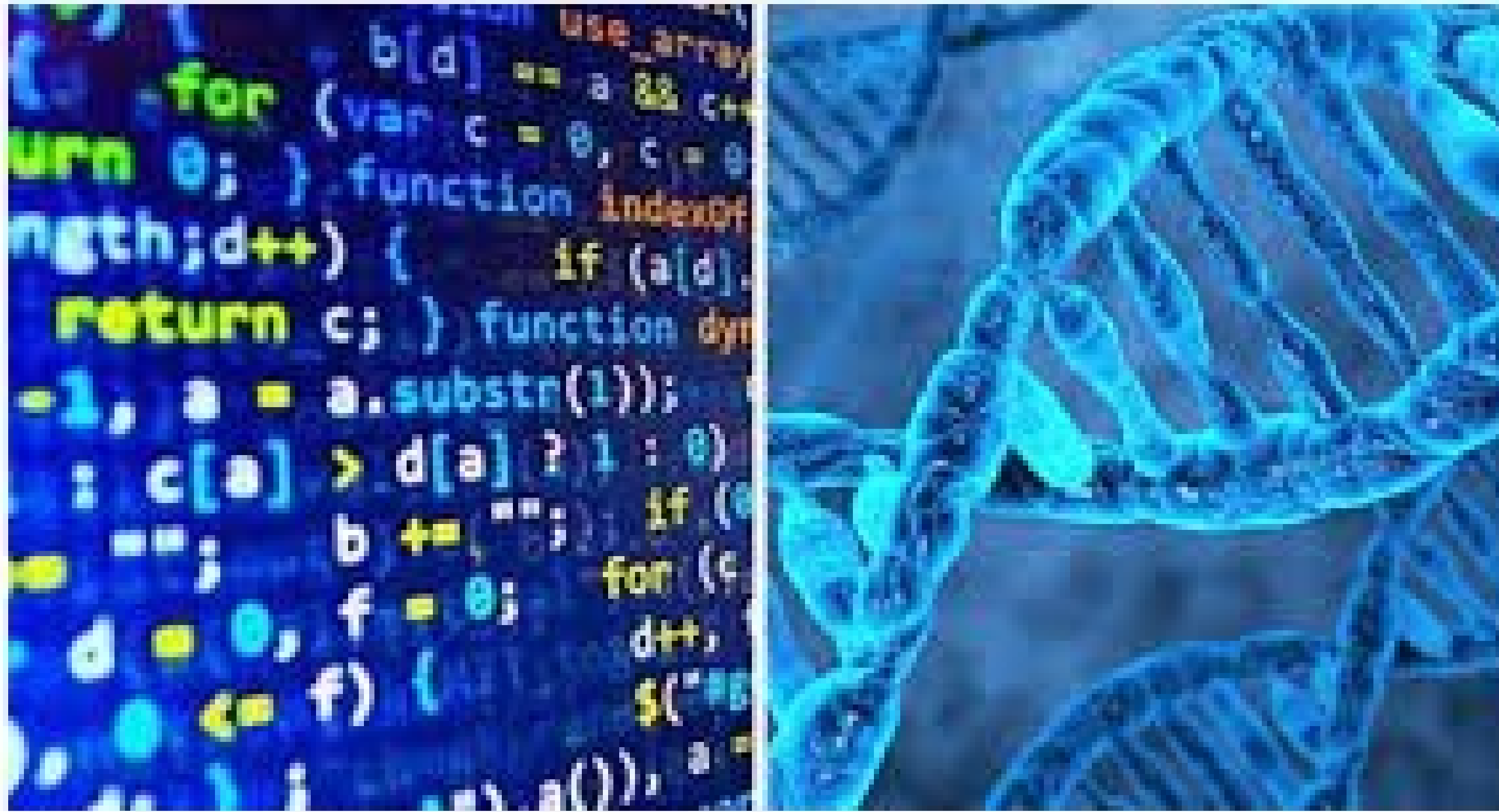
Quantum Superposition



PLANT DATA CENTERS



It's time to build...



Email Pitch Decks:
hello@sirajraval.com