

AI FOR LONGEVITY

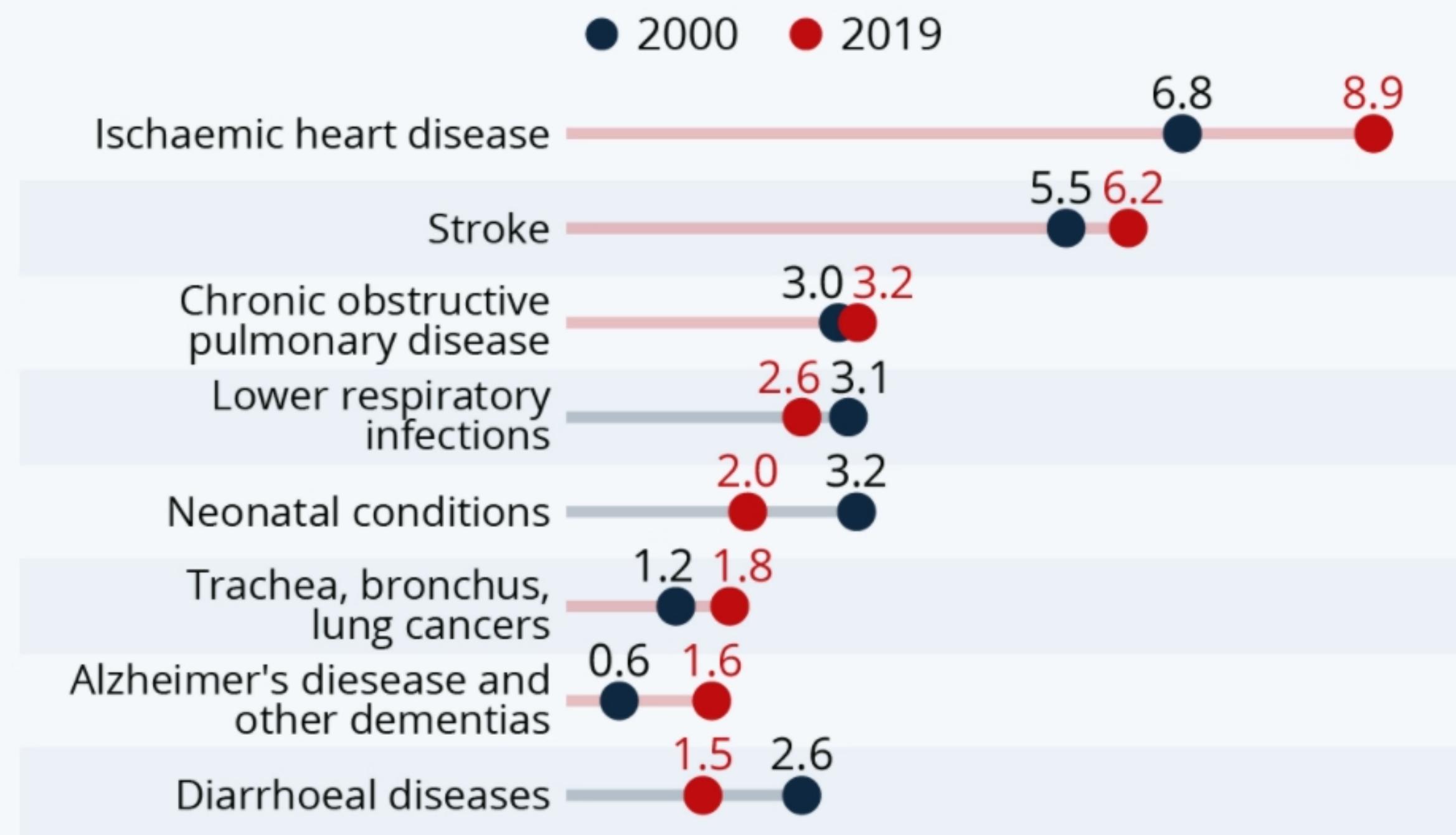
BY SIRAJ RAVAL



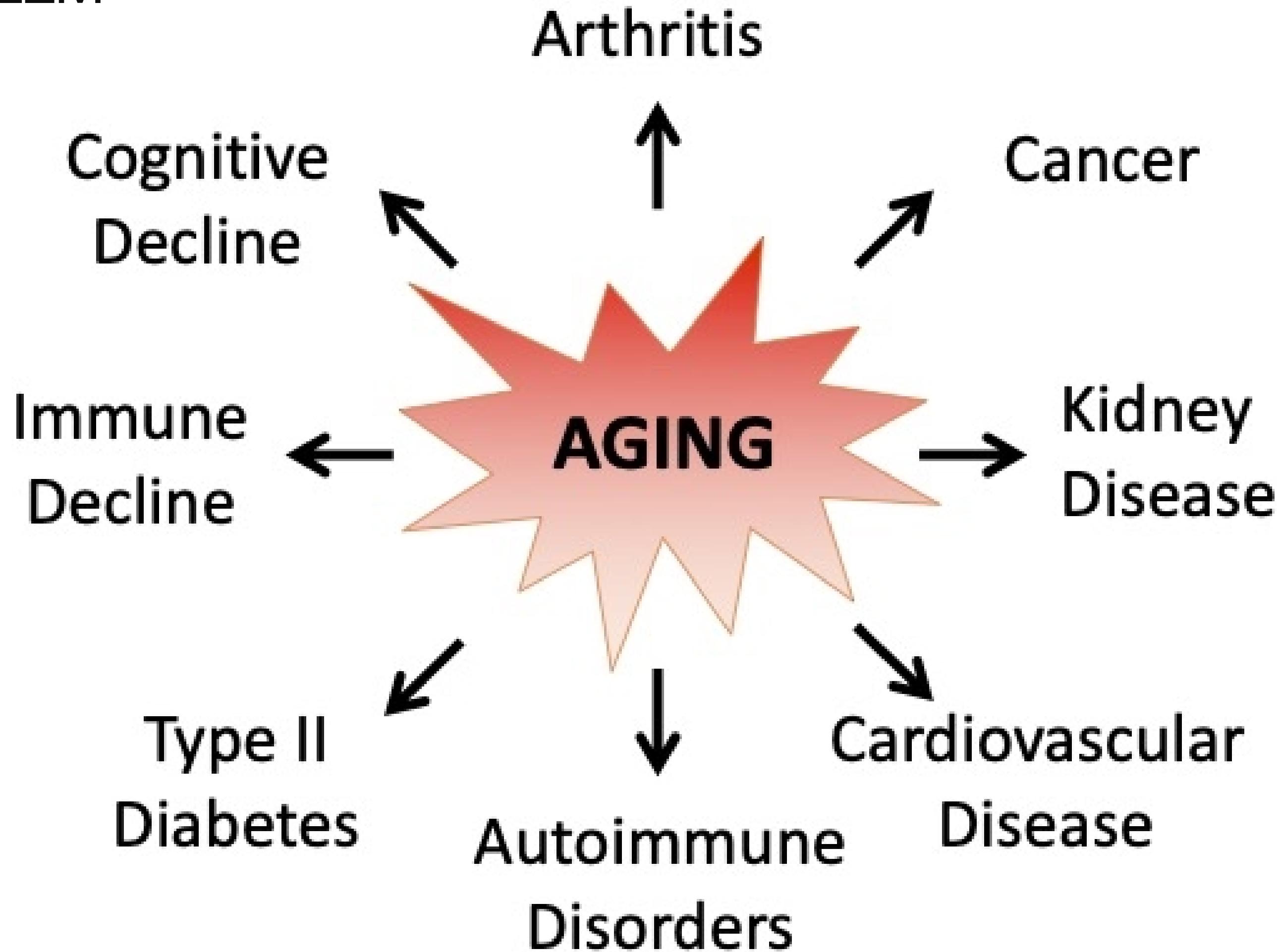
Amino Acids	Proline (P)	Alanine (A)
A 10101		GCA 111
C 0001011	CCA 0	GCC 110
.	CCC 11	GCG 10
P 00011	CCG 110	GCT 0
S 0101	CCT 10	
.		
Y 01110		
Original DNA:		
CCG GCC		
Protein:		
P A		
Protein Code:		
00011, 10101		
Triplet Code:		
110, 110		
Final: {00011, 110}, {10101, 110}		

The World's Leading Causes Of Death

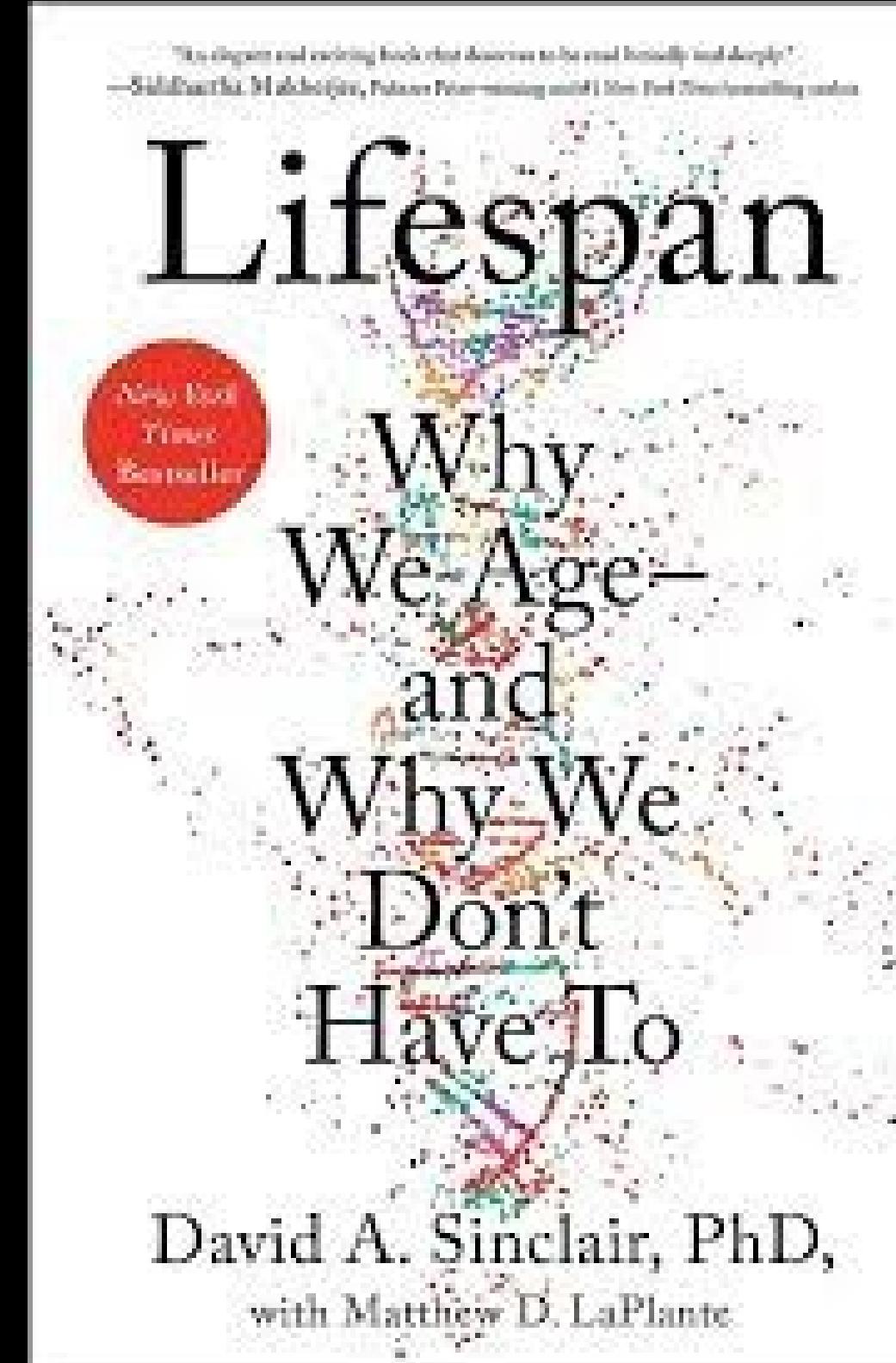
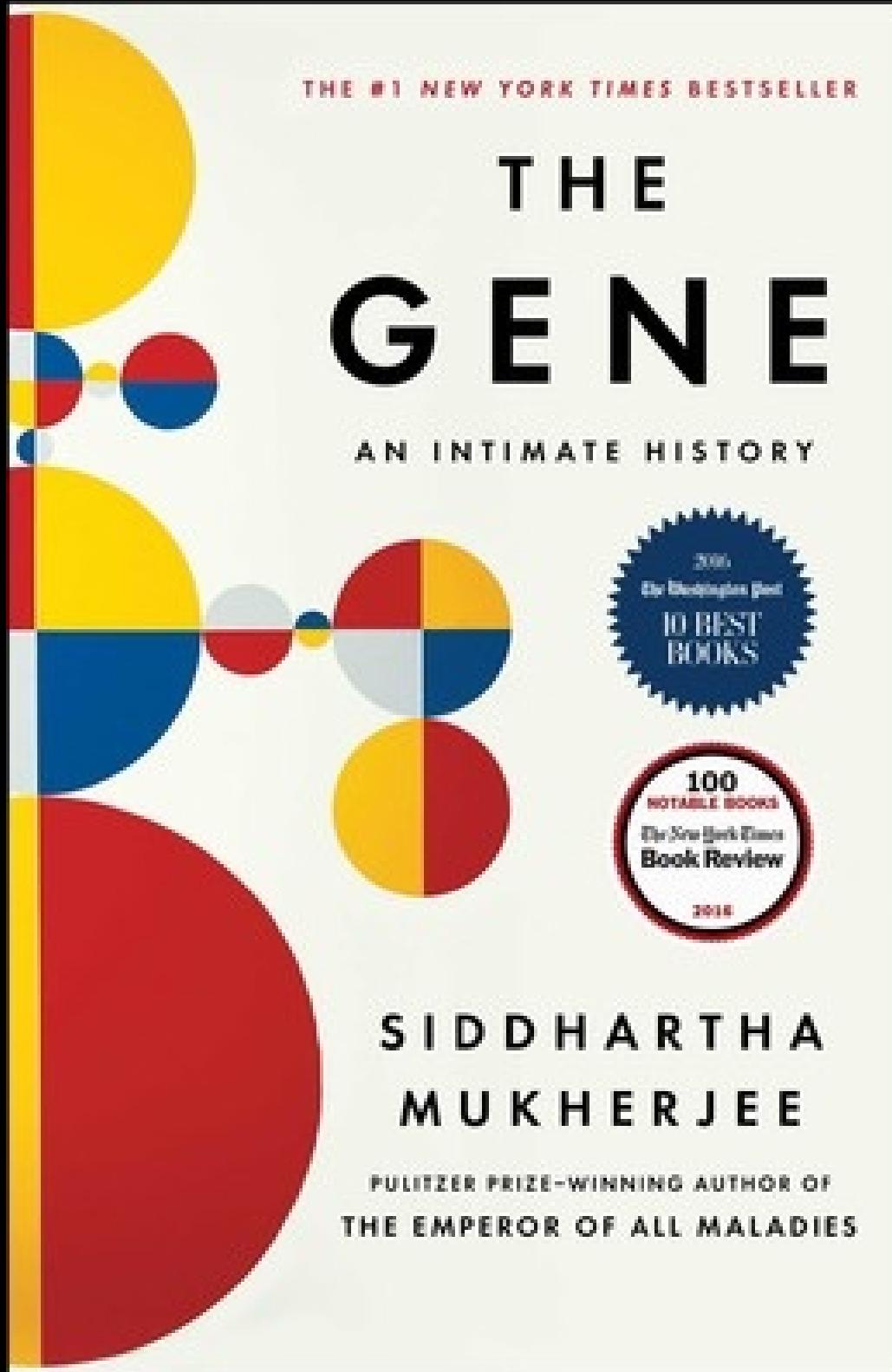
Total number of people who died from the following conditions (in millions)



ROOT PROBLEM



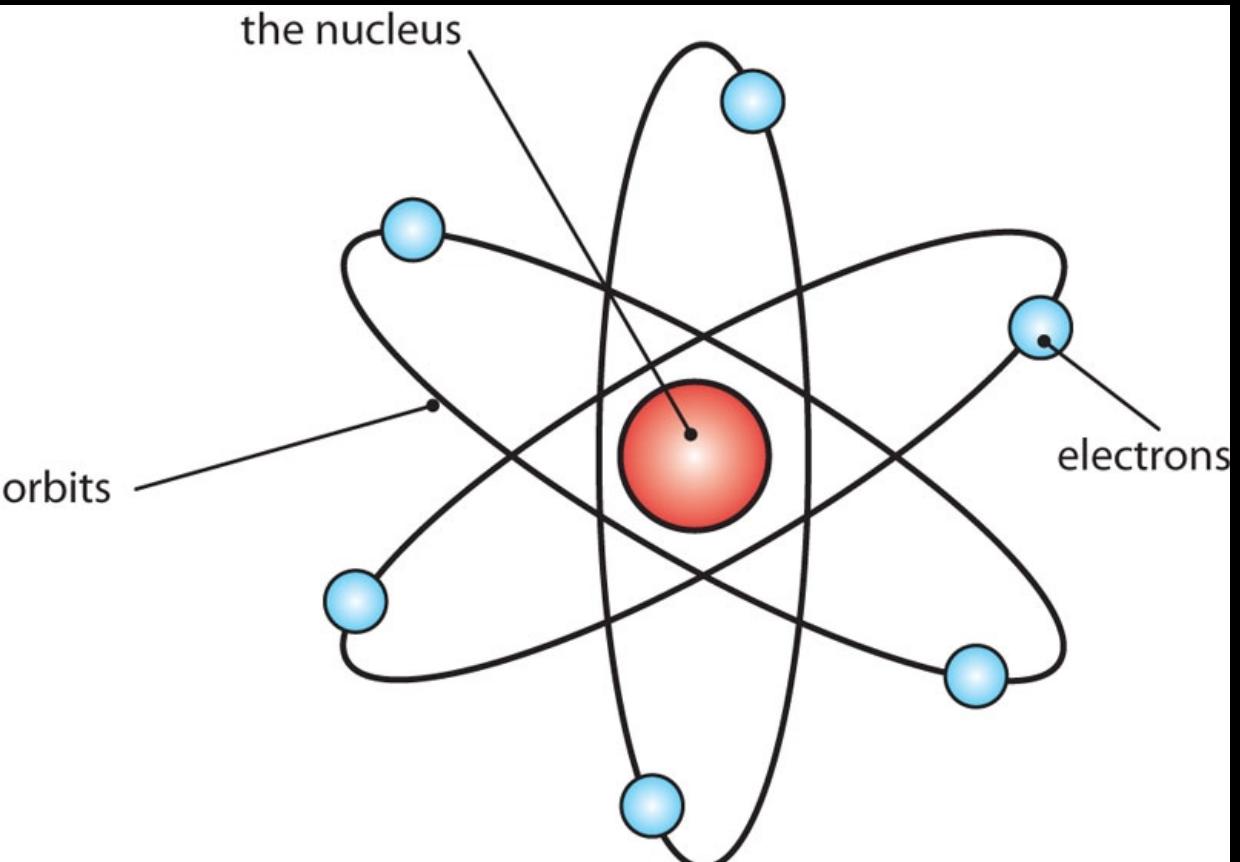
BACKGROUND



CONTEXT

3 Units of Information

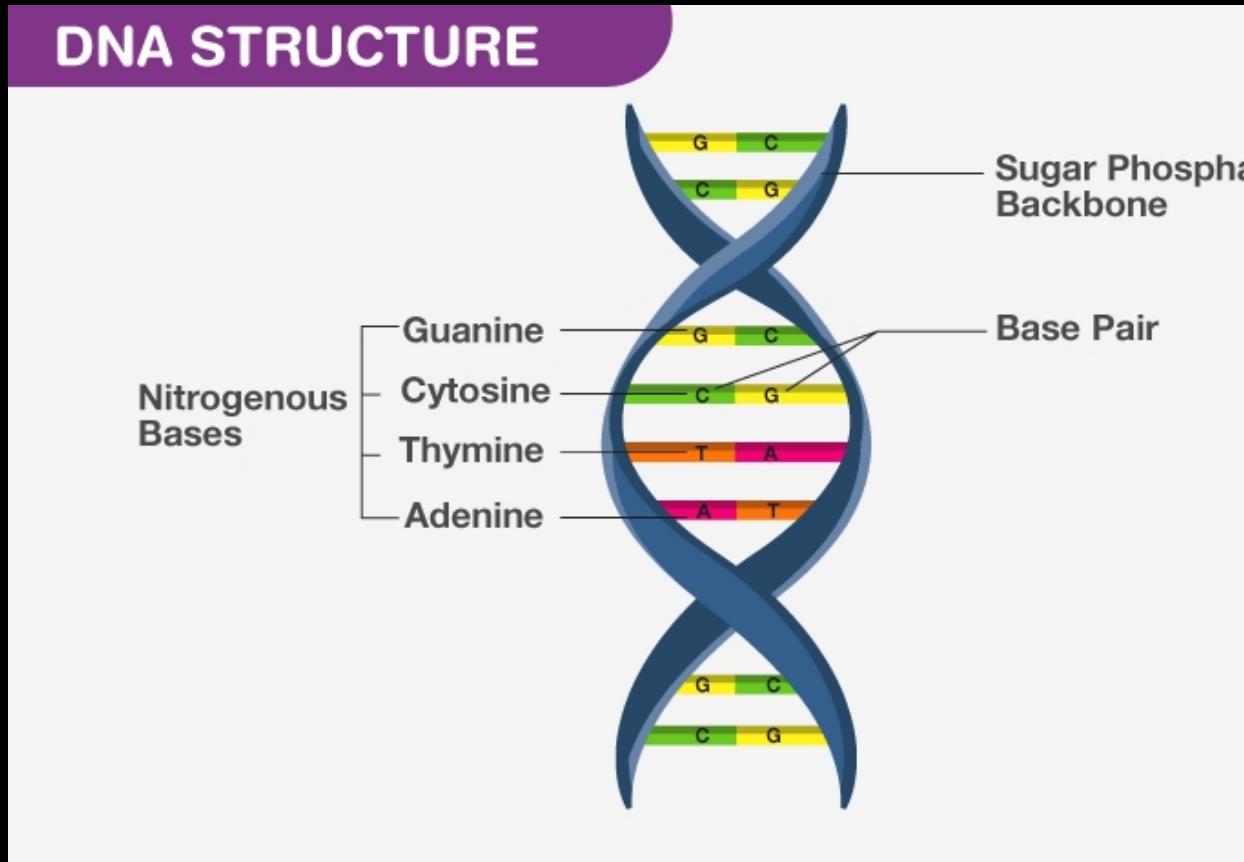
The Atom



The Byte

```
0001010010001001010  
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](#)

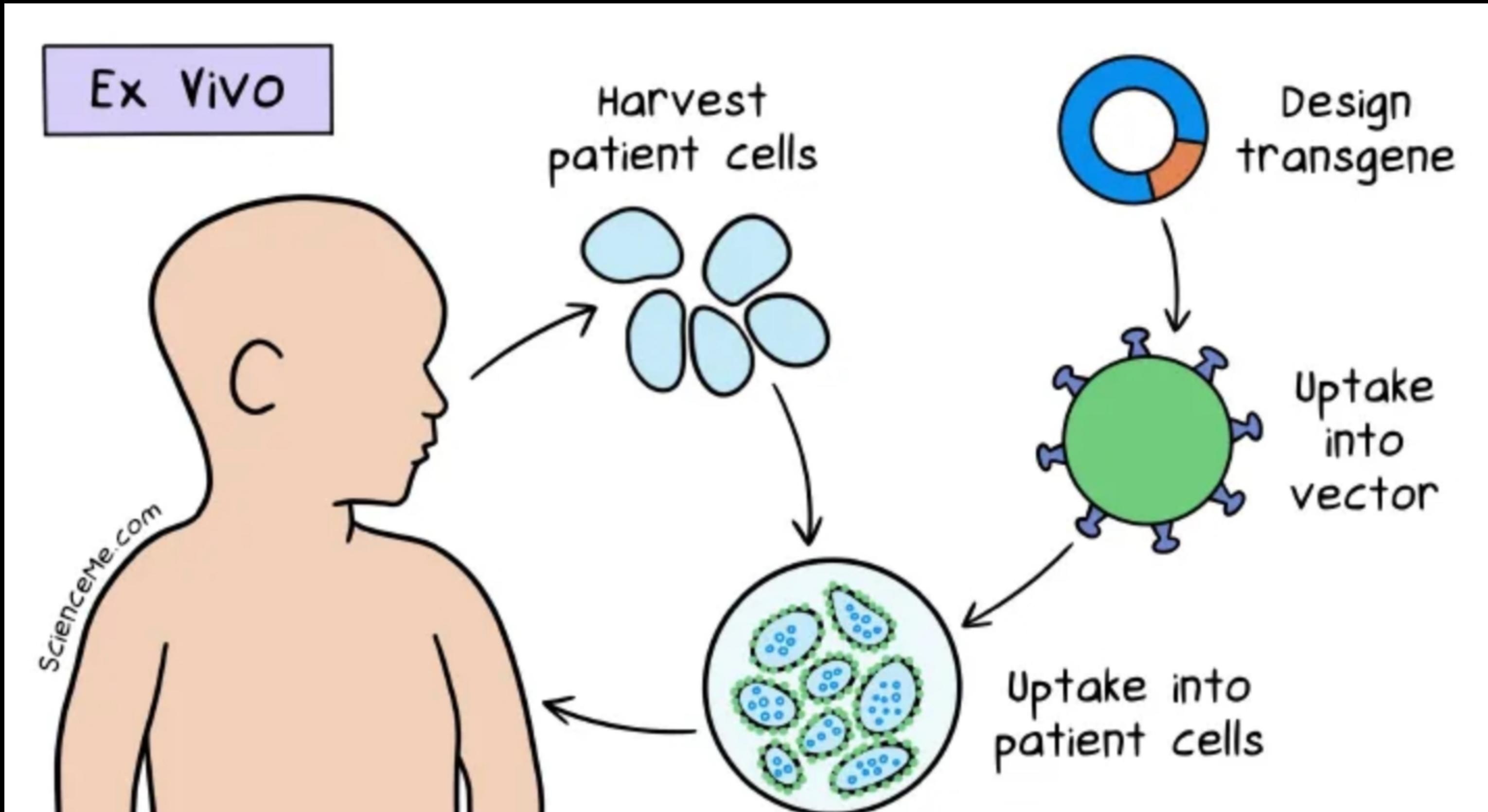
Figure 1.
Hair Repigmentation in Patient Number 5

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

Nucleotide & Protein Metabolism



3 KNOWN LONGEVITY GENE PATHWAYS

1. mTOR
2. SIRTUINS
3. AMPK

Inhibits mTOR

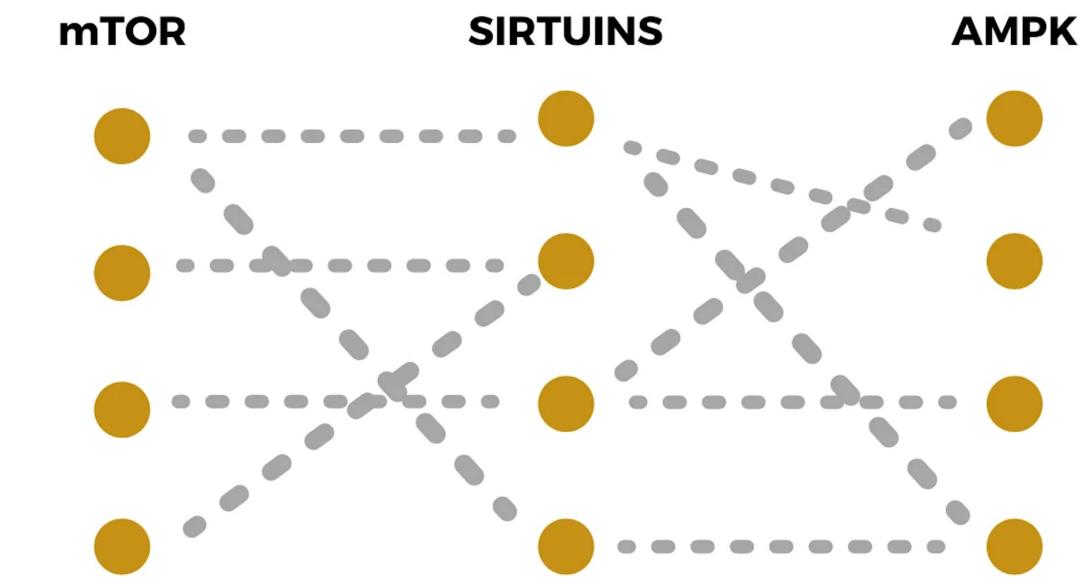
Energy Stress
Calorie Restriction
Exercise
Resveratrol

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

Biomarker	Result	Impact on InnerAge
Calcium Bone health	9.4 mg/dL	+ 1.2 years  Younger Older
SHBG Sex hormone carrier	63 nmol/L	+ 1.1 years  Younger Older
Albumin Serum protein	4.6 g/dL	+ 0.4 years  Younger Older
Free testosterone Active testosterone	8.38369 ng/dL	+ 0.1 years  Younger Older
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



BIO AGE



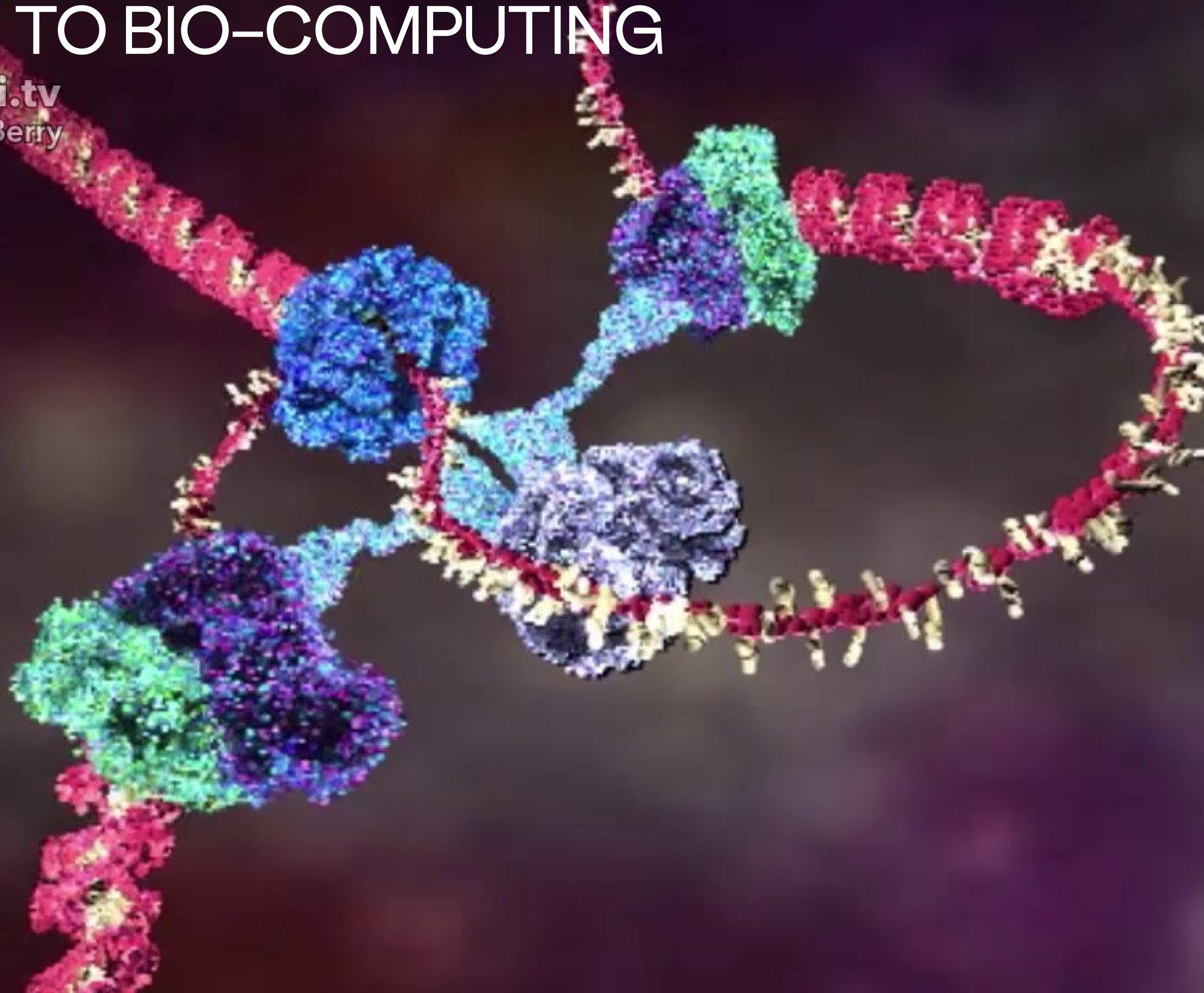
biosplice



INTRO TO BIO-COMPUTING

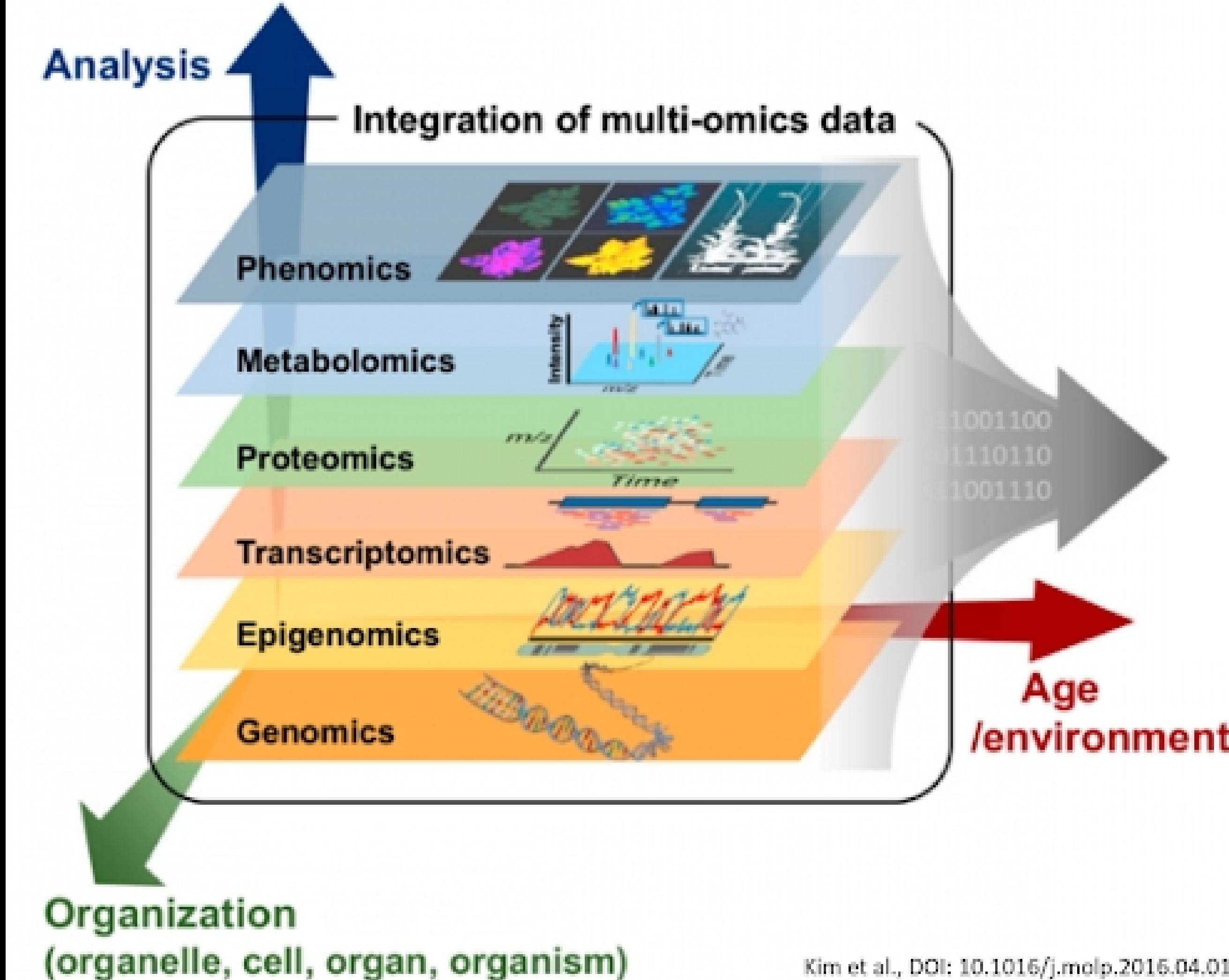
wehi.tv

DrewBerry



Biology is Software

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



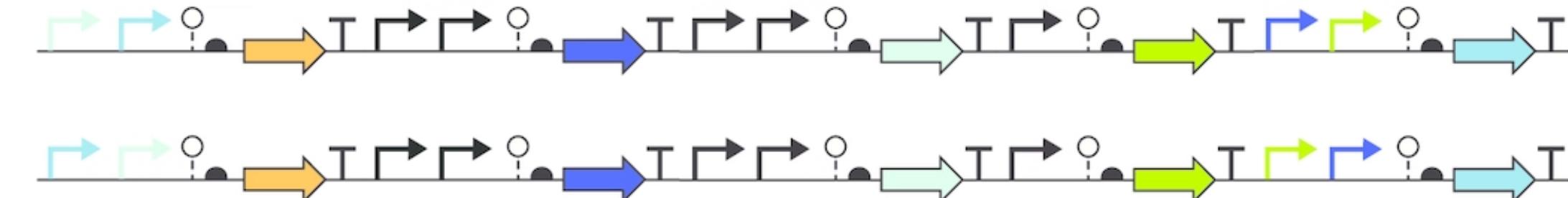
GENE THERAPY FOR LONGEVITY... IN 9 LINES OF PYTHON

Panel 1

```
gate_PhIF BEFORE gate_BetI AND  
gate_BetI BEFORE gate_AmeR AND  
gate_AmeR BEFORE gate_HlyIIR AND  
gate_HlyIIR BEFORE gate_AmtR AND  
FORWARD gate_PhIF 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 ... CGCCGCCGGATCACTCTGGCATGGACGAGCTGTACAAG
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



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Try Pitch



Welcome back!





OpenSea

Drops

Stats

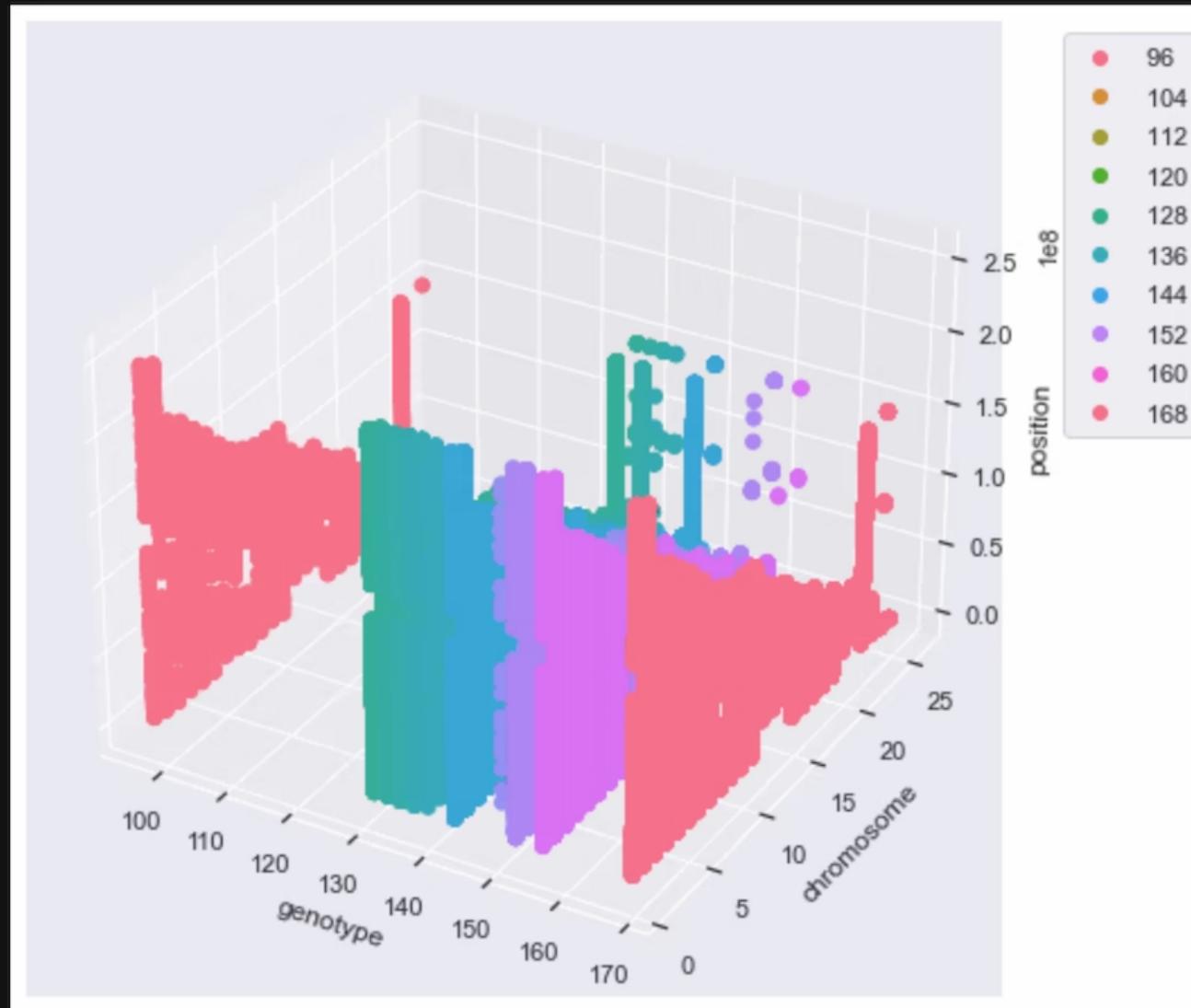
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MONETIZATION STRATEGY



Untitled Collection #82554975

Siraj's Genome

Owned by 986F9A

219 views

Includes unlockable content

Make offer

Price History



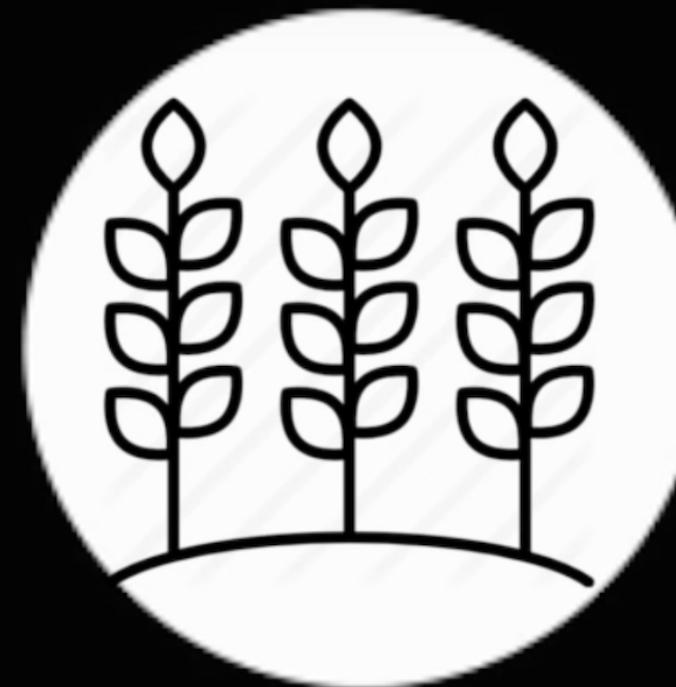
Listings

Description

Try Pitch

POSSIBILITIES

GENE EDITING



Abundant Food



Human Enhancement

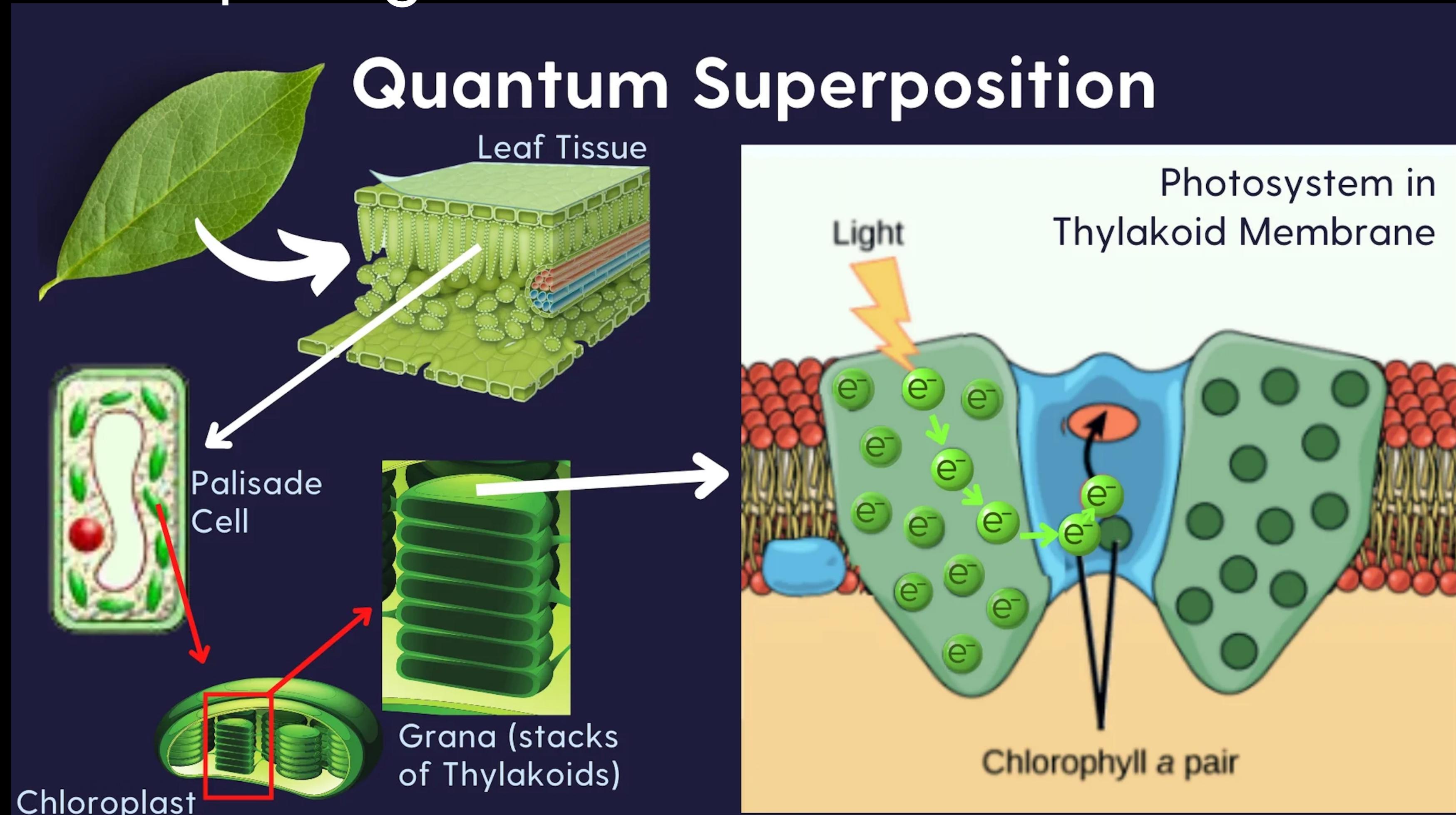


Clean Energy



Ending Disease

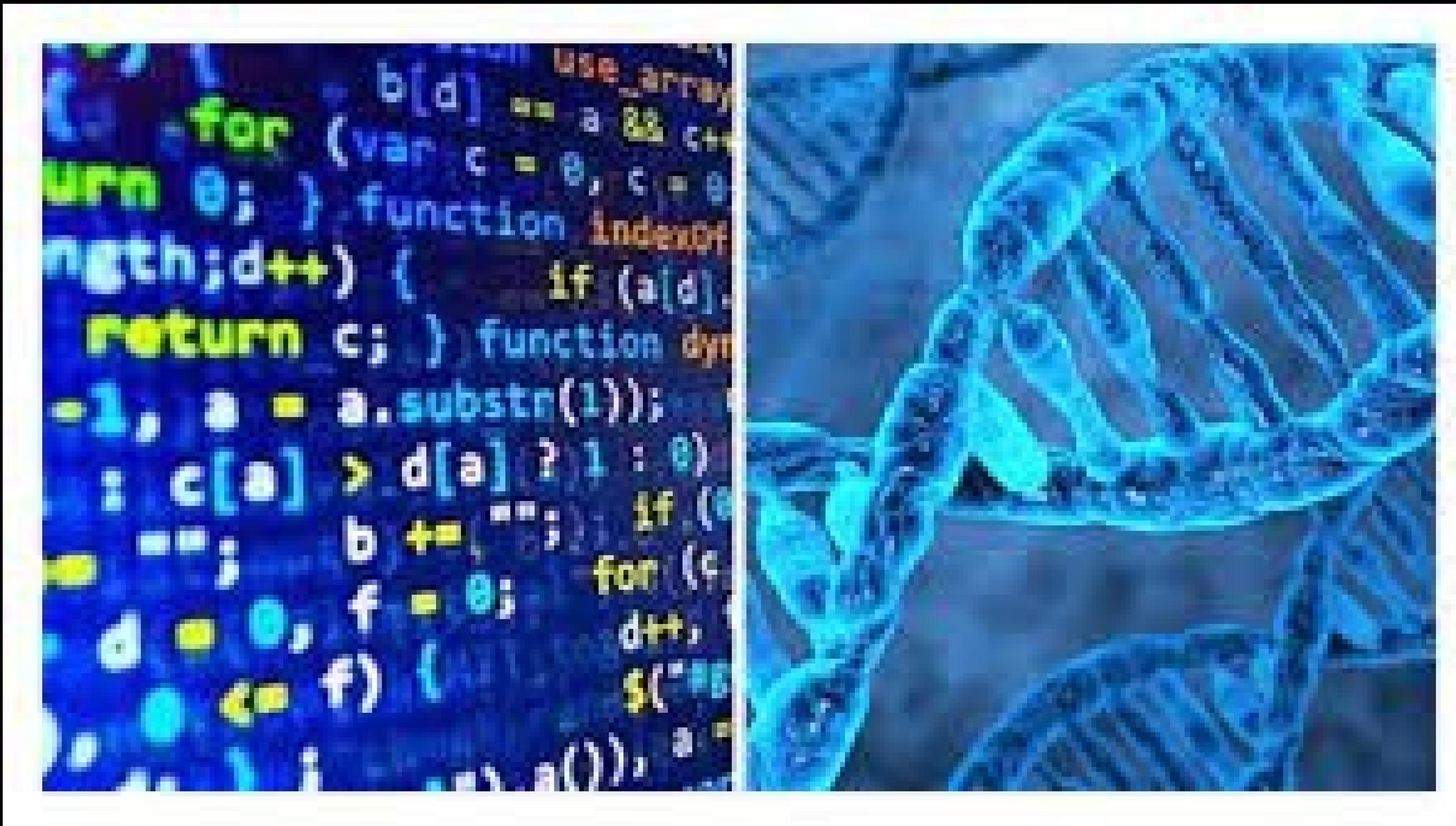
Plant Computing



PLANT DATA CENTERS



It's time to build...



Email Pitch Decks:
hello@sirajraval.com