



Biotech Showcase 2019

January 9, 2019

Forward Looking Statements

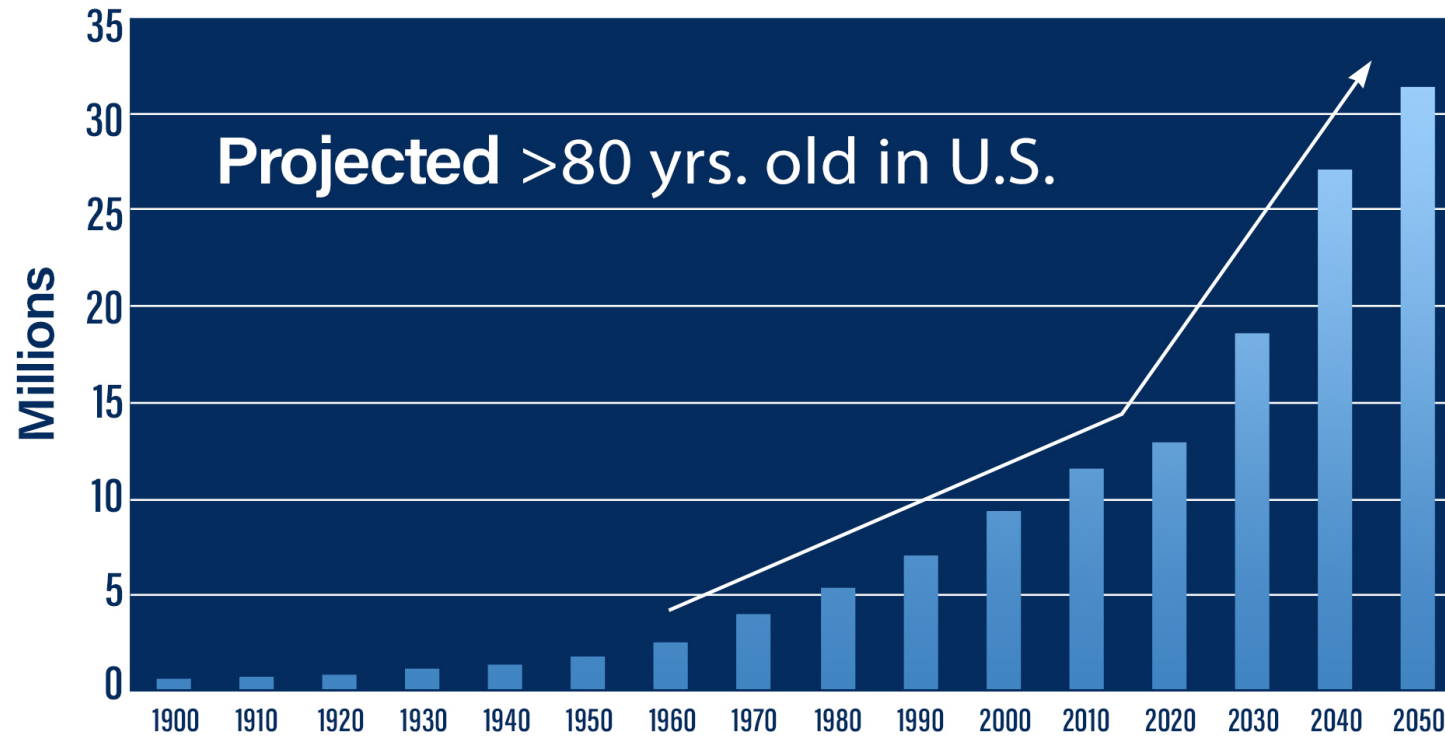
The matters discussed in this presentation include forward looking statements which are subject to various risks, uncertainties, and other factors that could cause actual results to differ materially from the results anticipated. Such risks and uncertainties include but are not limited to the success of AgeX Therapeutics and its affiliates in developing new stem cell-based products and technologies; results of clinical trials of such products; the ability of AgeX and its licensees to obtain additional FDA and foreign regulatory approval to market products; competition from products manufactured and sold or being developed by other companies; the price of and demand for such products; the ability of AgeX and its subsidiaries to maintain patent and other intellectual property rights; and the ability of AgeX to raise the capital needed to finance its current and planned operations. Any statements that are not historical fact (including, but not limited to statements that contain words such as "will," "believes," "plans," "anticipates," "expects," "estimates") should also be considered to be forward-looking statements. As actual results may differ materially from the results anticipated in these forward-looking statements they should be evaluated together with the many uncertainties that affect the business of AgeX and its other subsidiaries, particularly those mentioned in the cautionary statements found in AgeX's Securities and Exchange Commission filings. AgeX disclaims any intent or obligation to update these forward-looking statements.

Mission

AgeX Therapeutics is focused on the development of young cell-based regenerative therapies for the treatment of human aging.

The Target Market

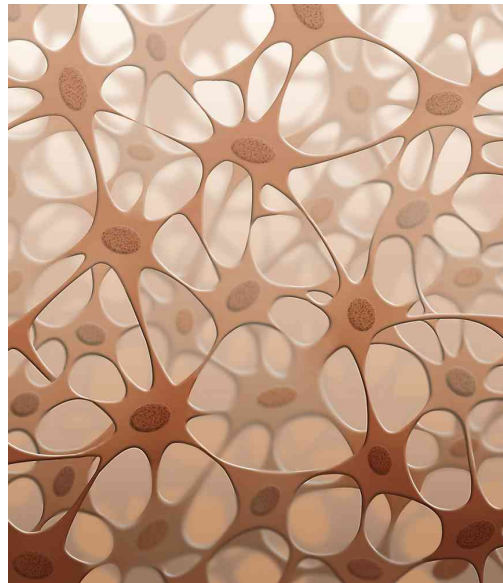
Aging and chronic degenerative disease



- 80% of \$2.5T health care costs associated with chronic disease.
- 80% of elderly have at least one chronic disease, 68% have two or more.

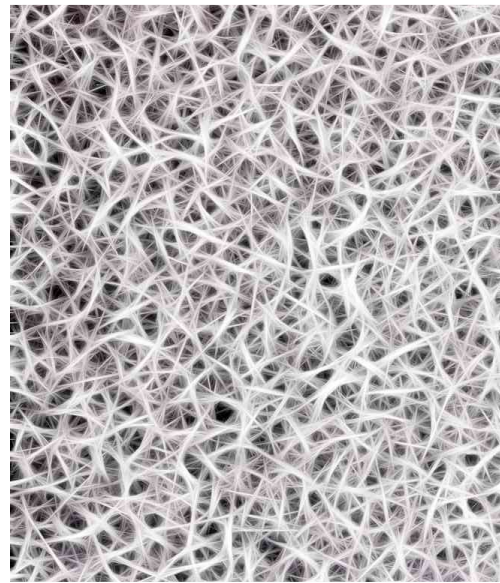
The Ideal Technology Platform

- Young replacement cells of all kinds
- Cells capable of regeneration
- A path to an off-the-shelf product
- An injectable mix of cells/matrix to regenerate 3-D tissue



Young Cells

+



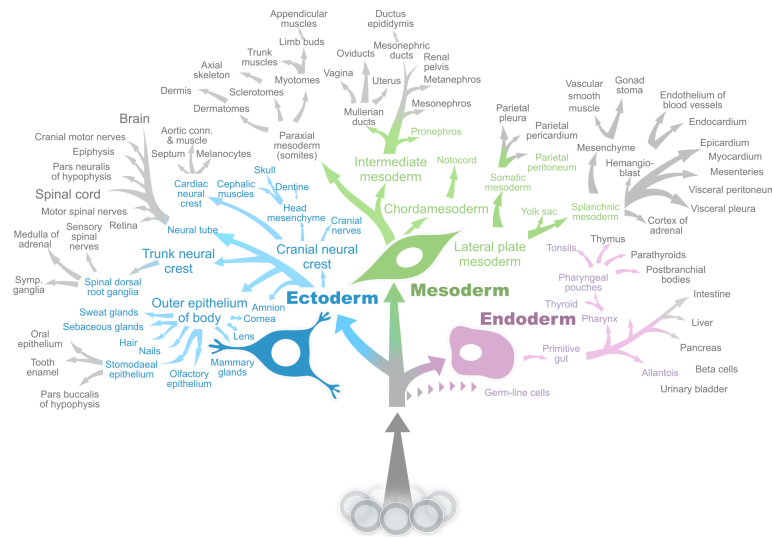
Matrix

= Regenerative
Medicine
For Age-Related
Degenerative
Disease

The Ideal Technology Platform

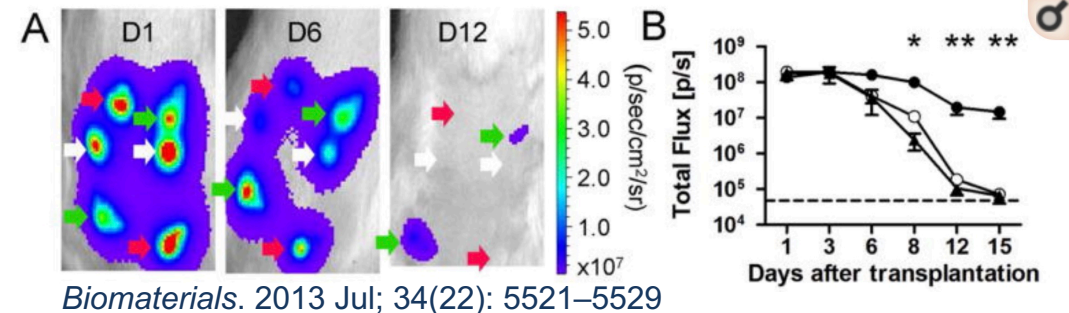
Twin Technologies: Cells & Matrix

Pluripotent Cell- Based Therapeutics



- Pluripotent Stem Cells (PSCs) allow the manufacture of all young human cell types on an industrial scale
- Engineered for allogeneic use
- Our cells are government (NIH) approved

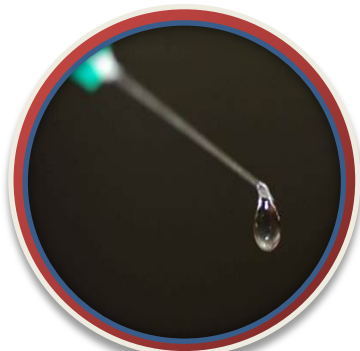
HyStem® Matrix Delivery



Biomaterials. 2013 Jul; 34(22): 5521–5529

HyStem – Unique Properties & Applications

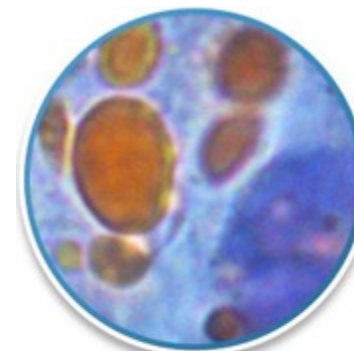
Injectable



Stays as liquid
for ~ 20 minutes



Polymerizes
safely *in vivo*

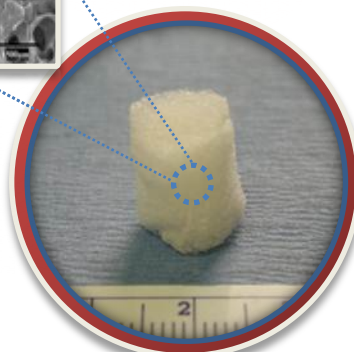
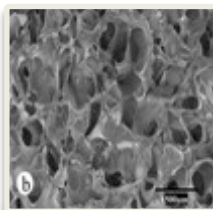


Supports cells including
adipocytes in 3-D

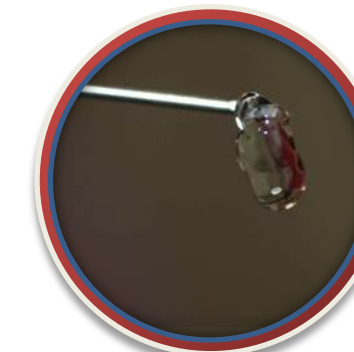
Multiple Formulations



Durable Films



3-D Lattices
or Electrospinning



Heparin-mediated
Slow Release

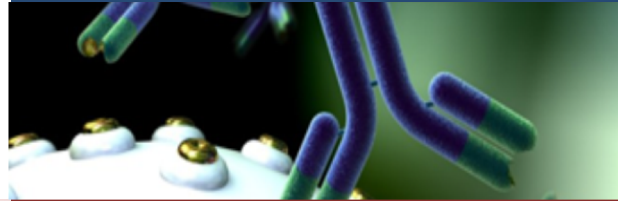
History of the Biotechnology Revolutions

Recombinant DNA Technology



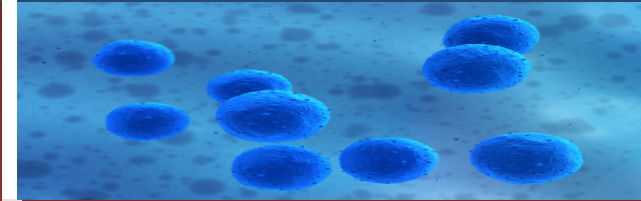
- 1974 – Gene cloning technology developed
- 1976 - Moratorium on rDNA research initiated led to established guidelines on rDNA research
- 1989 – First \$B product EPO
- Today, products from the use of rDNA technology are ubiquitous
- >140 clinical trials
- Current Global Market \$75 B

Monoclonal Antibodies



- 1975 - Hybridoma technology developed
- 1997- First \$B Product Rituximab
- Advances in Mab Engineering
- Today, eight of the 20 best-selling biotechnology drugs in therapeutic monoclonal antibodies
- > 200 clinical trials
- Current Global Market \$44 B

Regenerative Medicine



- 1998 – First Pluripotent Stem Cells isolated
- 2001 – U.S. Federal funding restriction (reversed in 2009)
- 2010 – 1st hES Clinical trial
- Future – 1st \$B product

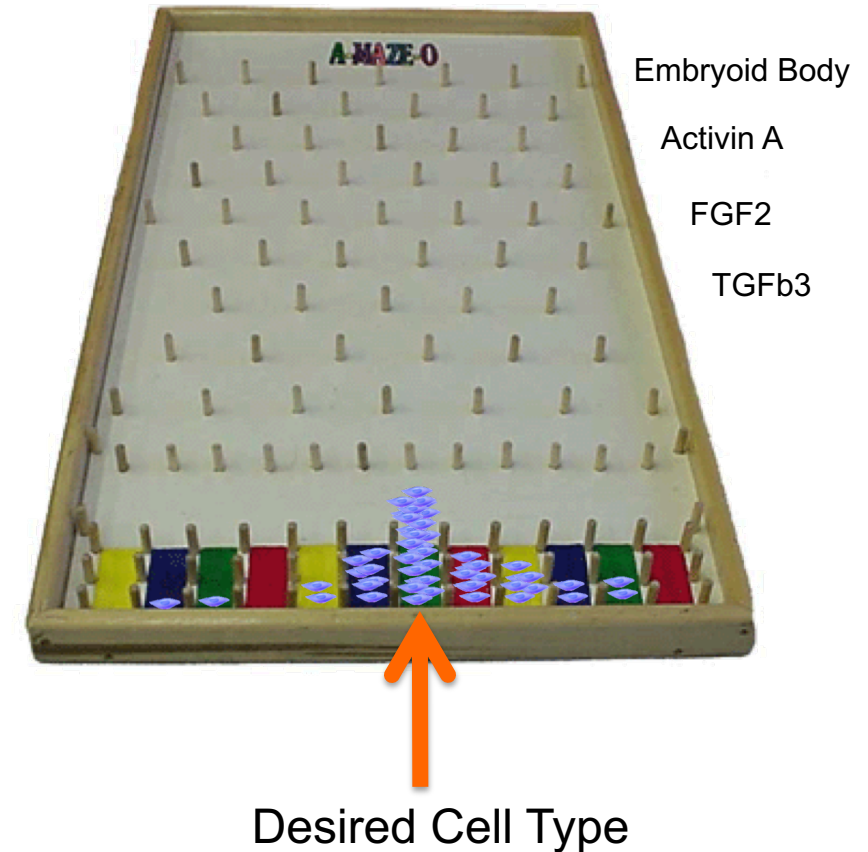
Numerous Products Performing Well in Trials

- Retinal Pigment Epithelial cells (OpRegen) – Age-related macular degeneration (BioTime Phase II)
- Oligodendrocyte Progenitor Cells (OPC1) – Spinal cord injury (Asterias Phase II)
- Dendritic cells (VAC2) – Cancer immunotherapy (Asterias/CRUK Phase I)

Pluripotency – The Competitive Edge

The >1000-fold complexity of cell types derived from hPS cells leads to unique challenges:

- How manufacture with cGMP?
- How produce allogeneic product?
- Identity - Lot-to-lot variability in composition
- Purity – Contamination with unknown cell types





The Generation of Six Clinical-Grade Human Embryonic Stem Cell Lines

Jeremy Micah Crook,^{1,3,*} Teija Tuulikki Peura,² Lucy Kravets,¹ Alexis Gina Bosman,² Jeremy James Buzzard,¹ Rachel Horne,¹ Hannes Hentze,¹ Norris Ray Dunn,^{1,3} Robert Zweigerdt,^{1,3} Florence Chua,¹ Alan Upshall,¹ and Alan Colman^{1,3}

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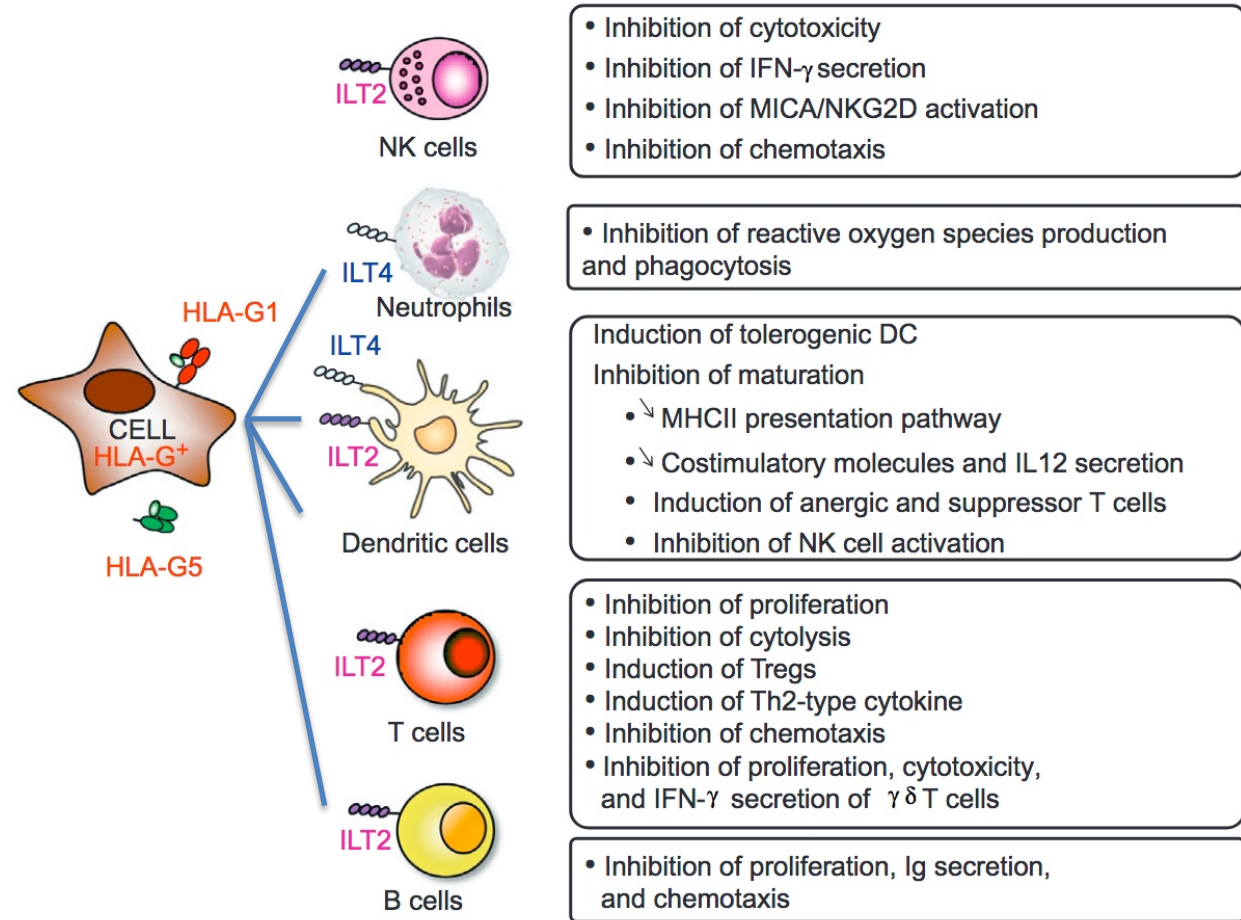
DOI 10.1016/j.stem.2007.10.004

First publication describing the derivation of clinical-grade GMP hES cell lines

- Comprehensive, multiple stage donor consent
- FDA approved, GMP human fibroblast feeder cell line
- Six karyotypically normal hES cell lines successfully derived
- Screened for panel of adventitious agents
- NIH Registered

UniverCyte™: HLA-G for Allogeneic Immunotolerance

- It appears that the primary role of HLA-G is to suppress maternal immune response to pregnancies.
- Appears to disarm multiple arms of immune system



Adv. Immunol. (2015) 127:33-144

Value of the UniverCyte Pluripotent Platform

Classical biologics off-the-shelf business model

Traditional
Biologics



*Centralized
Production
Facility*



*Distributed
Frozen
Inventory*



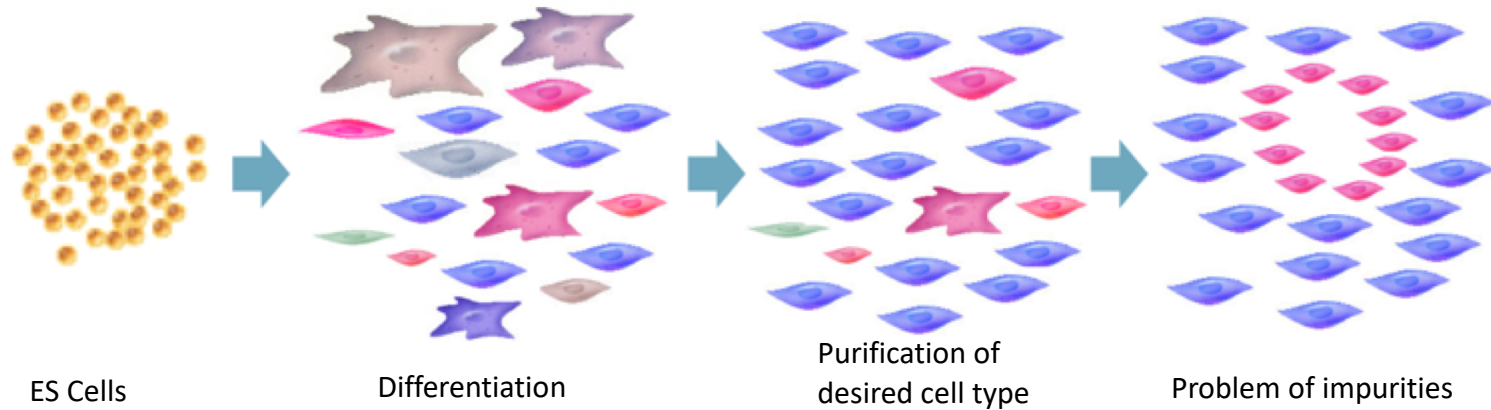
Point Of Care

UniverCyte-
Derived
Cell Therapy
Products

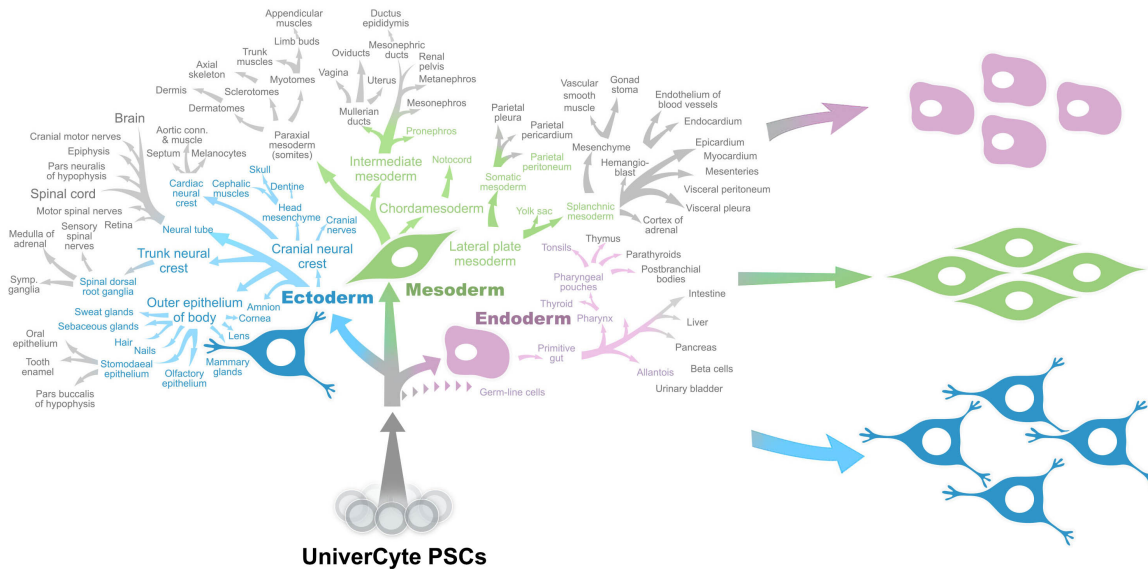


Universal *PureStem*TM Technology

Traditional Manufacture

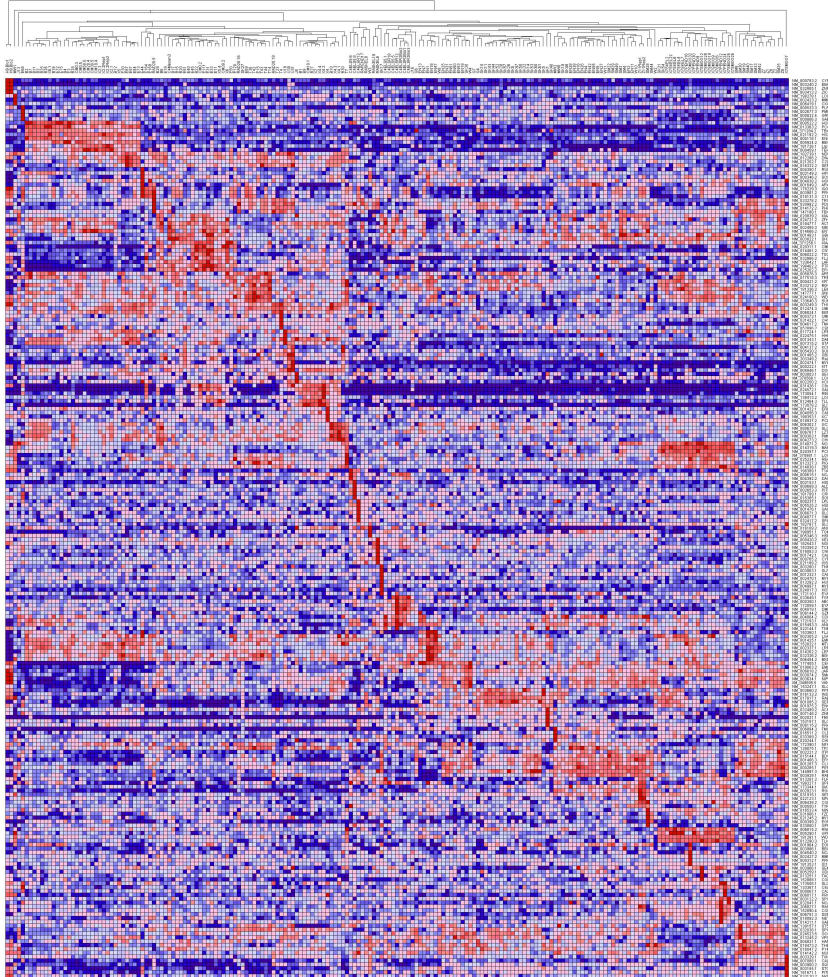


PureStem Technology



- >200-fold diversity
- Scalable, monoclonally-purified regenerative progenitor cell lines
- Off-the-shelf use

PureStem-Based Manufacture



- > 200 diverse human embryonic progenitor cell types isolated in a clonally pure and scalable format.

Example of PureStem Line Scalability

Estimated Cell Number If Scaled Cells Presently in Inventory to Passage 30

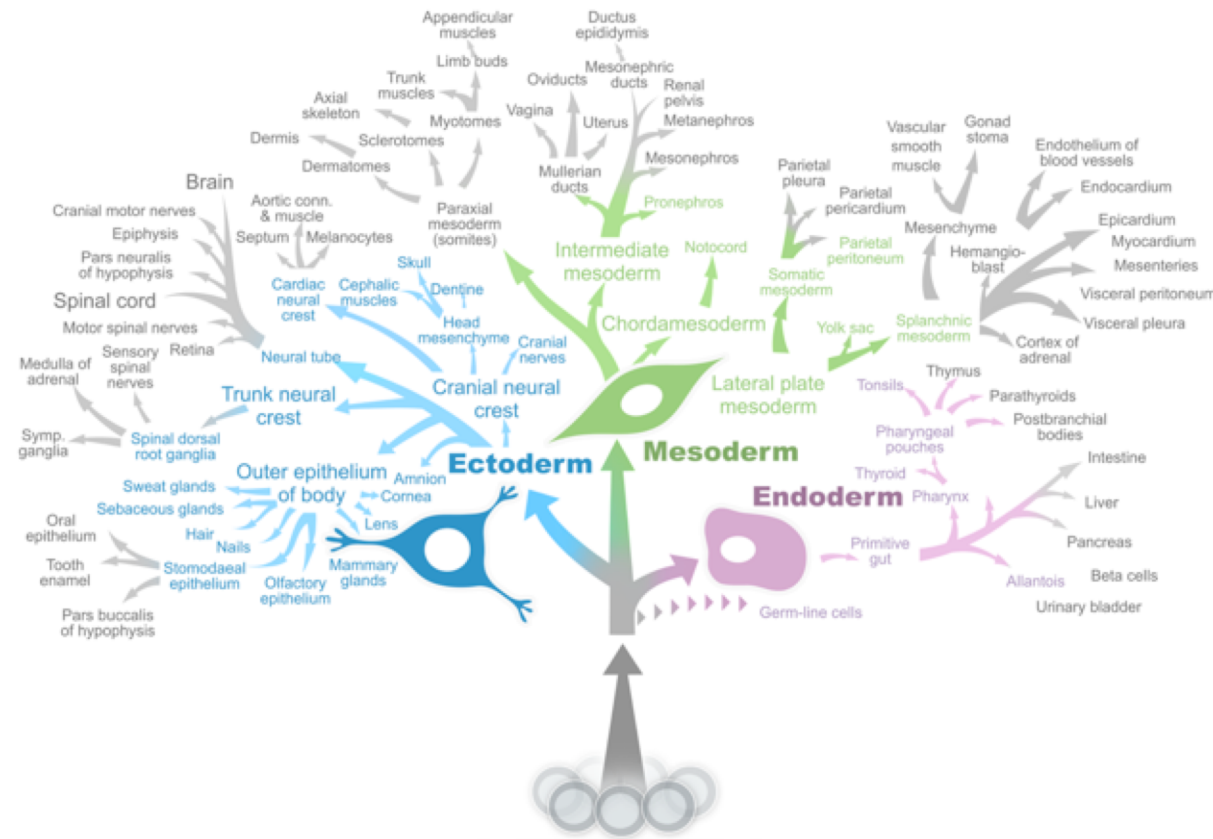
CELL LINE

4D20.8 Example	Cell Number in Millions	Passage Number	Approximate treatments if require 100 million cells per treatment
	100	P9	1
	300	P10	3
	900	P11	9
	2700	P12	27
	8100	P13	81
	24300	P14	243
	72900	P15	729
	218700	P16	2187
	656100	P17	6561
	1968300	P18	19683
	5904900	P19	59049
	17714700	P20	177147
	53144100	P21	531441
	159432300	P22	1594323
	478296900	P23	4782969
	1434890700	P24	14348907
	4304672100	P25	43046721
	12914016300	P26	129140163
	38742048900	P27	387420489
	1.16226E+11	P28	1162261467
	3.48678E+11	P29	3486784401
	1.04604E+12	P30	10460353203

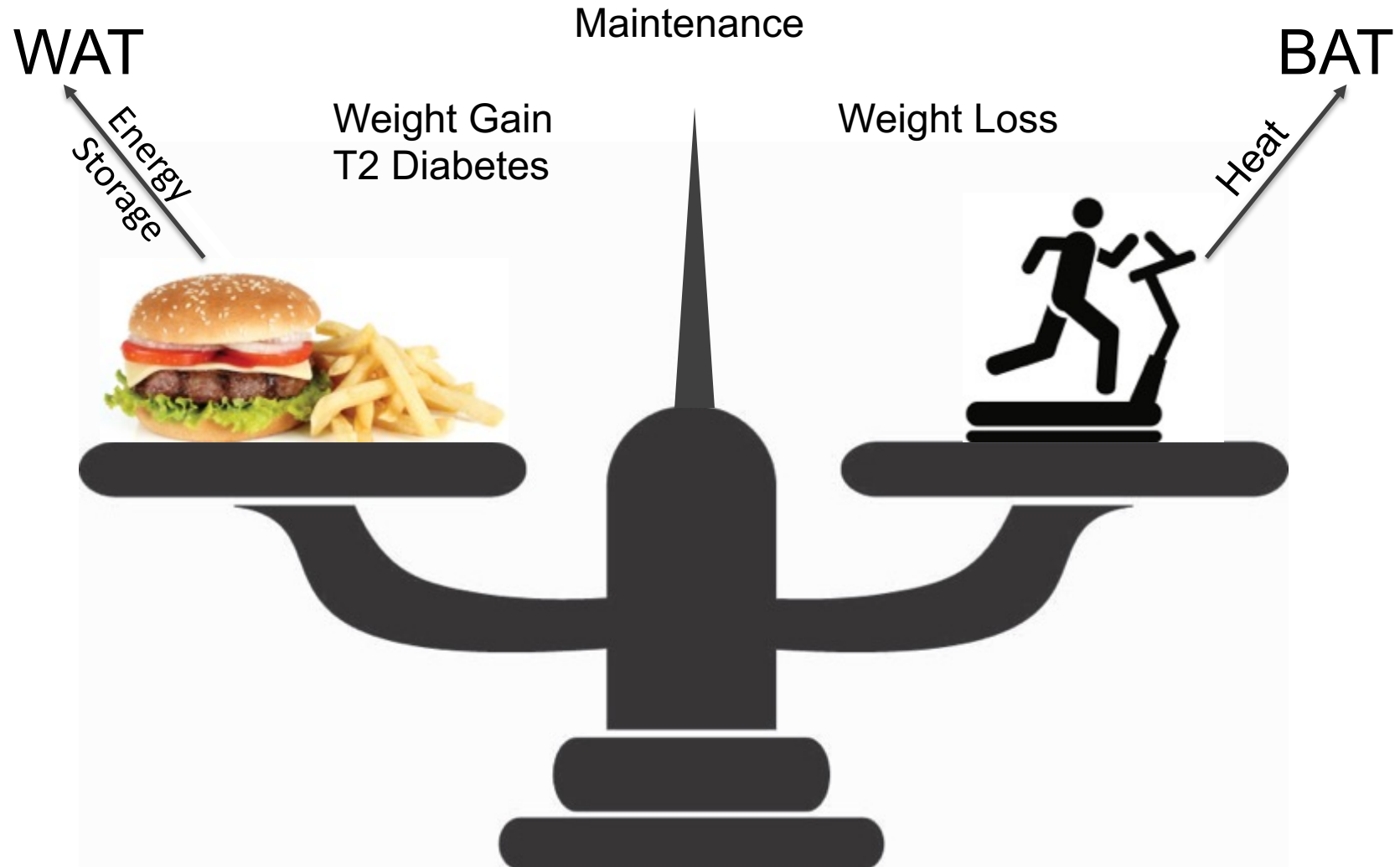


Identification of Low-Hanging Fruit

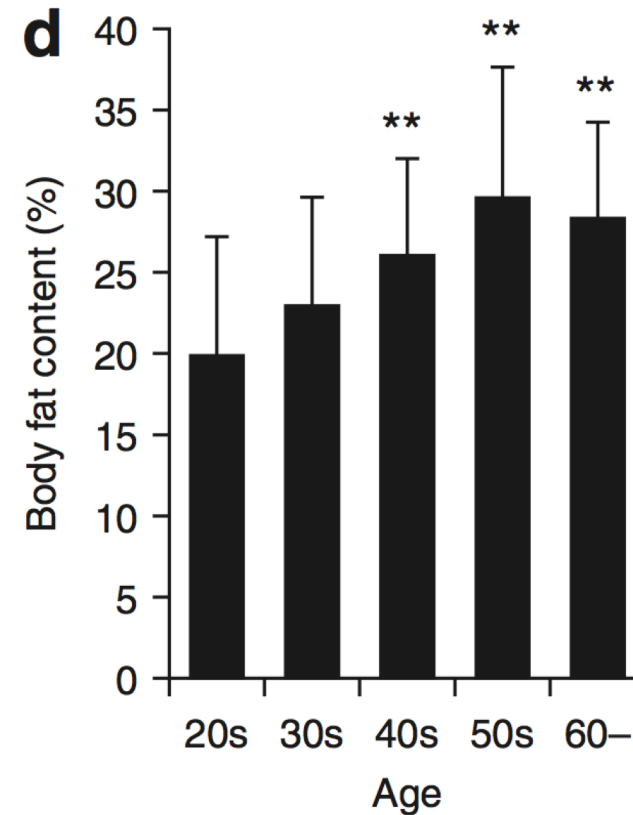
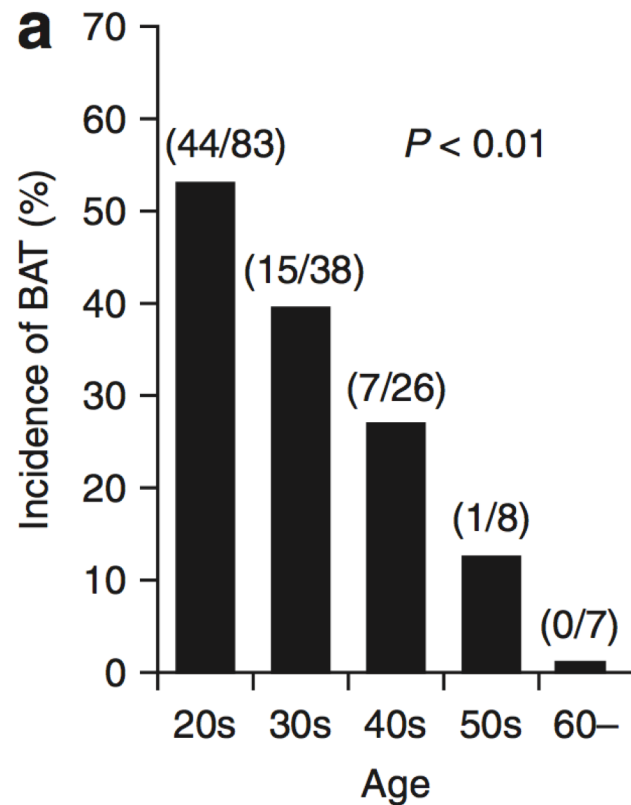
- Key applications in age-related degenerative disease
- Disease characterized by loss of cells
- Not addressable with current modalities



Brown Adipose Cells Regulate Metabolism



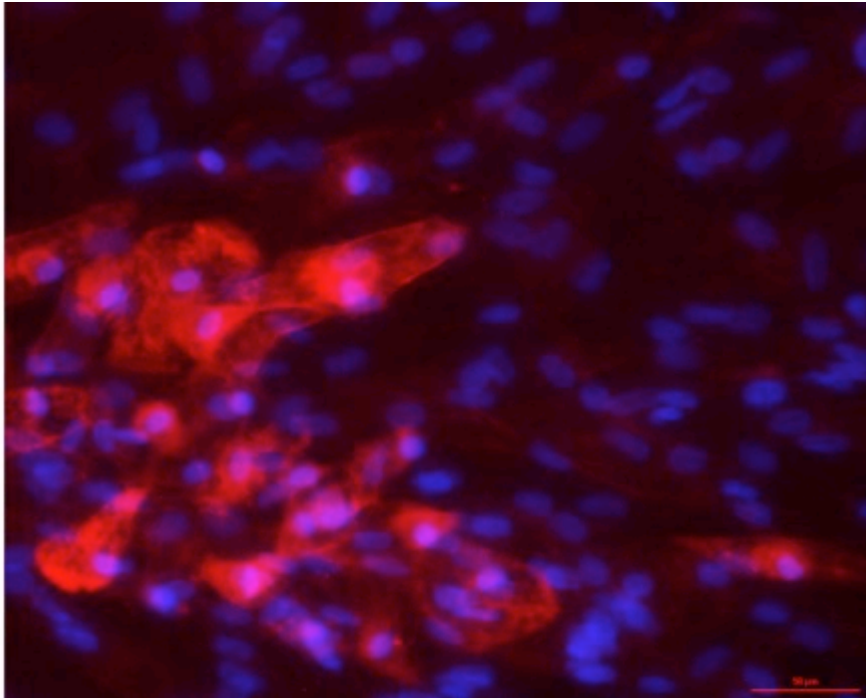
Brown Adipose Cells Regulate Metabolism



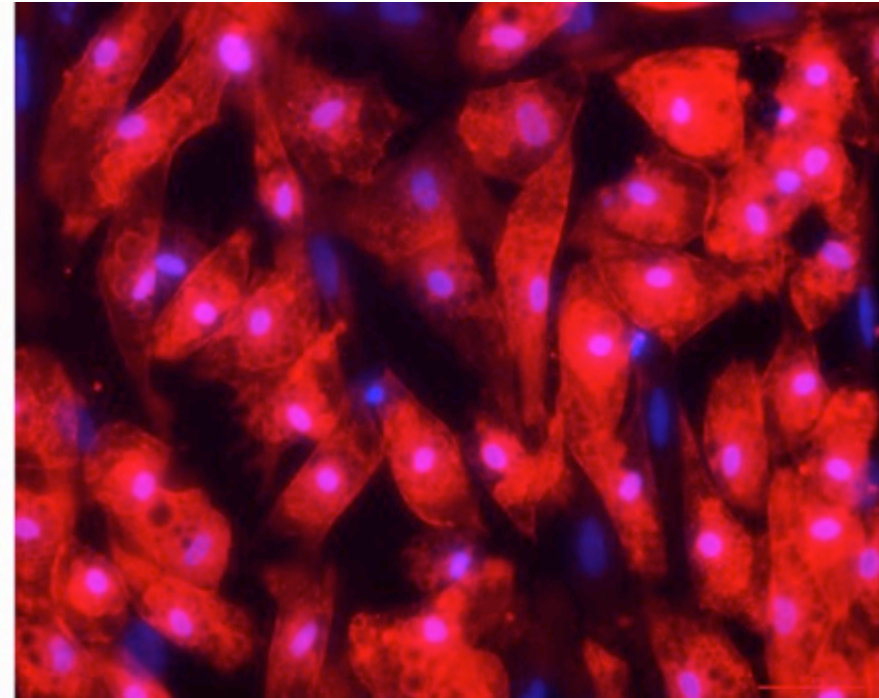
Obesity (2011) **19**, 1755–1760. doi:10.1038/oby.2011.125

AgeX-BAT1 Properties

*Stained for Brown Adipocyte Marker **UCP1***



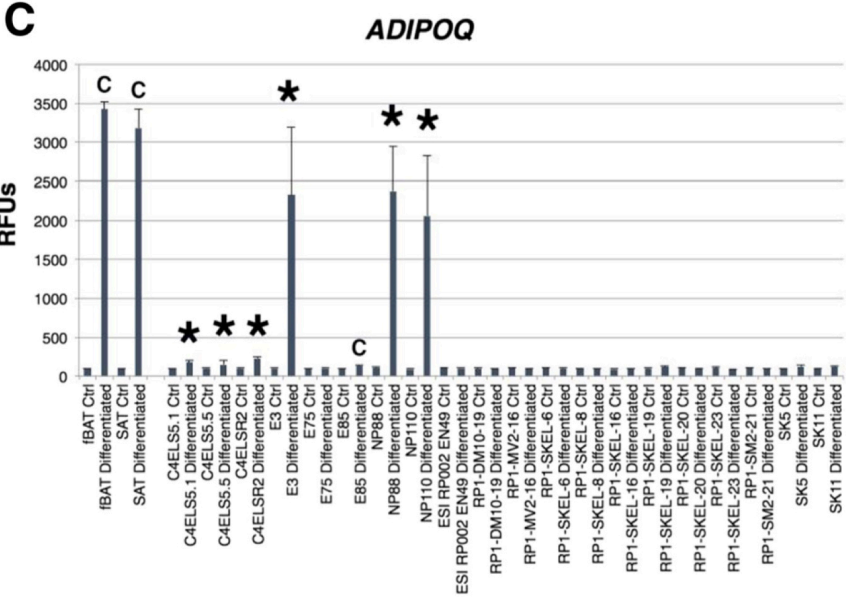
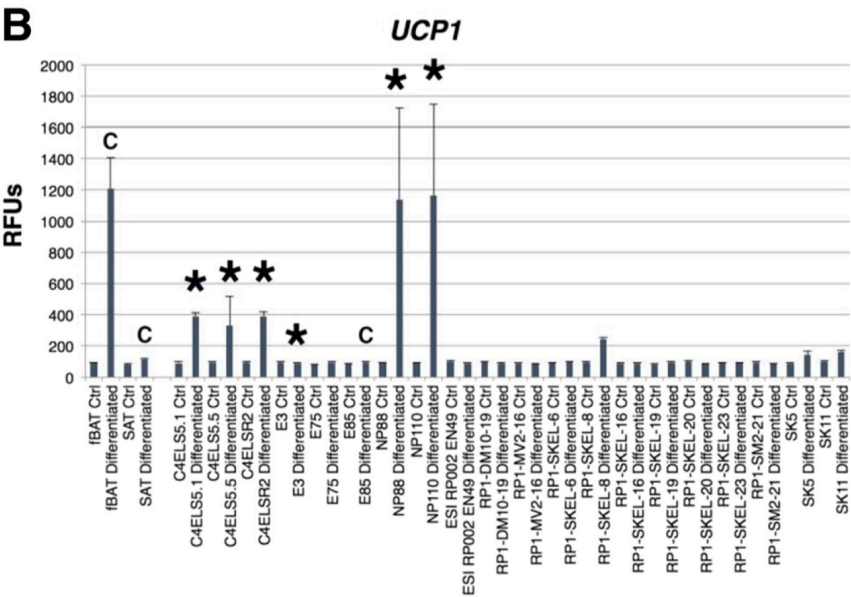
Tissue-Sourced Brown Adipocytes



PureStem Brown Adipocytes

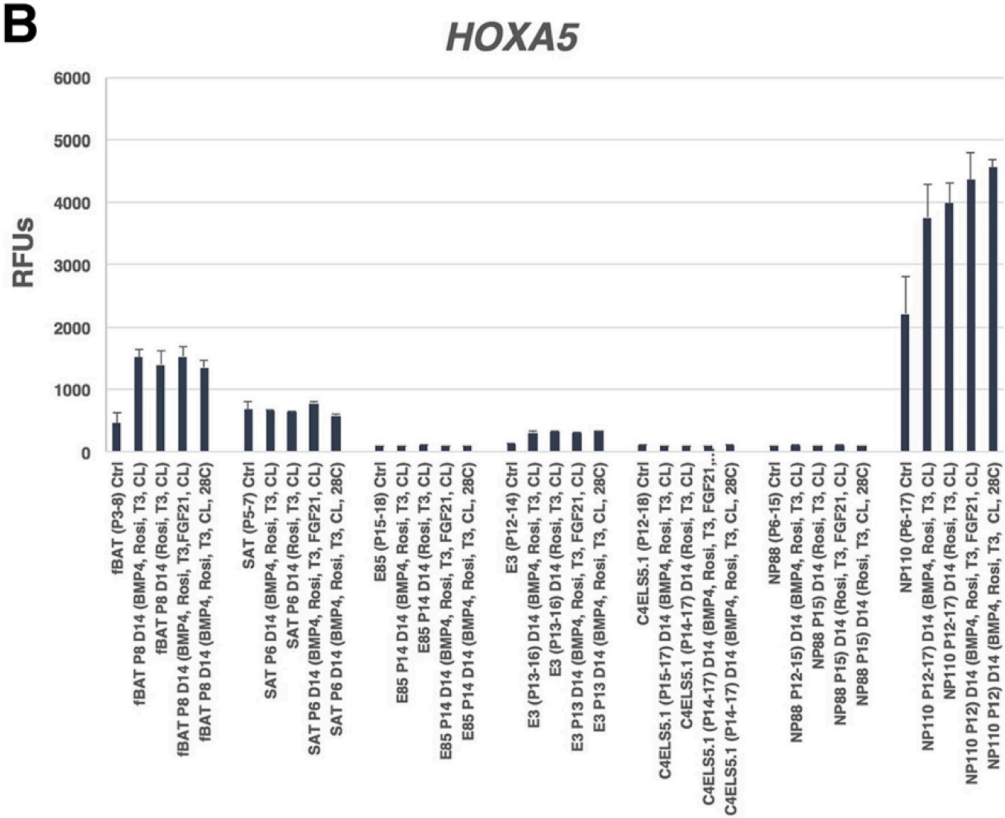
West et al. *Stem Cell Research & Therapy* (2019) 10:7

AgeX-BAT1 Properties



West et al. *Stem Cell Research & Therapy* (2019) 10:7

AgeX-BAT1 Properties

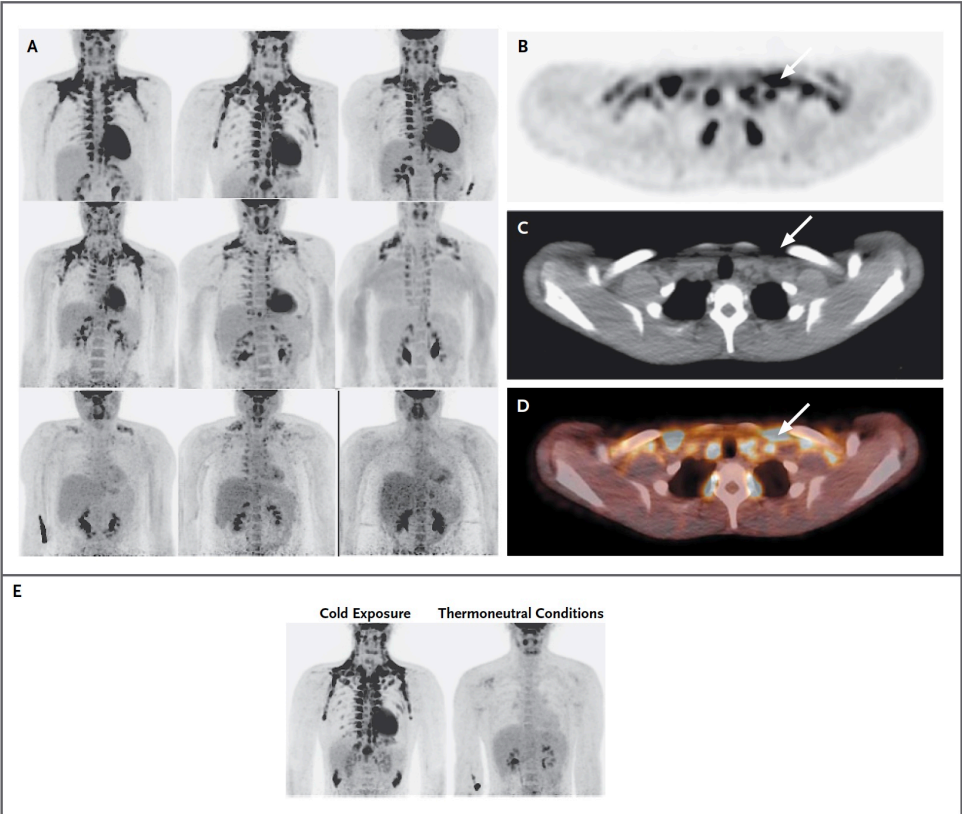


West et al. *Stem Cell Research & Therapy* (2019) 10:7

Lean
High BAT
Activity

Lean
Low BAT
Activity

Obese
Lowest
BAT
Activity



N Engl J Med 2009;360:1500-8

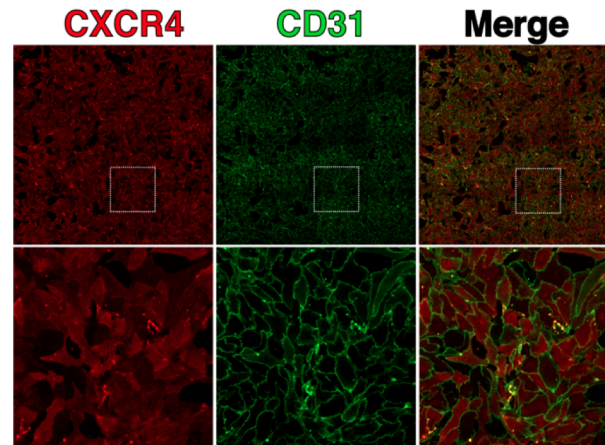
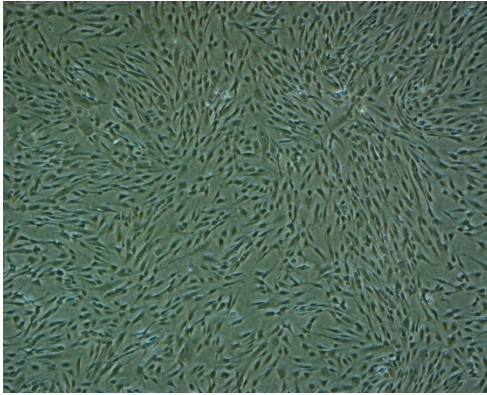
Obesity/T2D Market/Competition

- 30M Americans have diabetes¹ 1:3 Americans will have diabetes by 2050
- The global market for diabetes mellitus and obesity is set to rise from \$70.8 billion in 2015 to \$163.2 billion by 2022, at a strong compound annual growth rate of 12.7%, according to business intelligence firm GBI Research.
- Competing products commonly target insulin secretion, glucose excretion, incretins such as GLP-1, or attempt to activate existing BAT or cause browning of white fat.

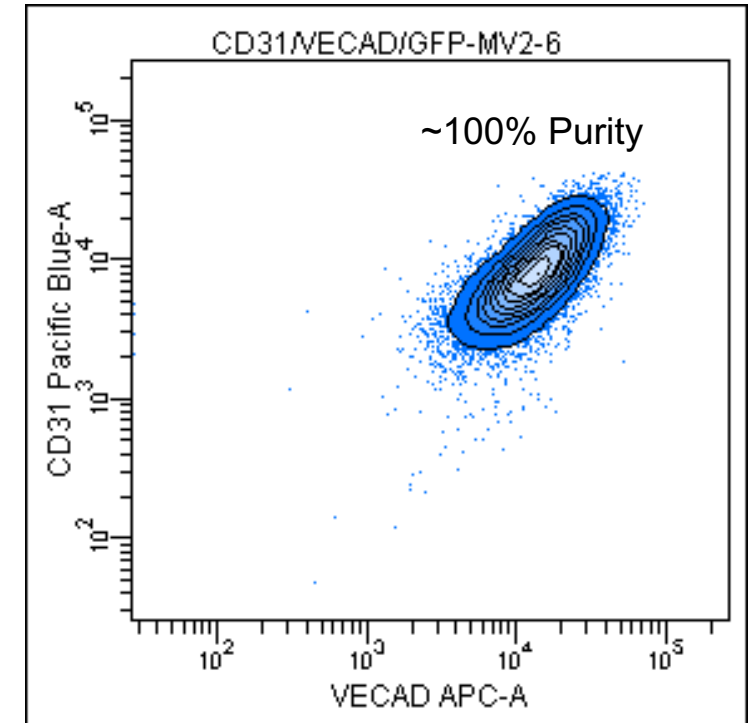
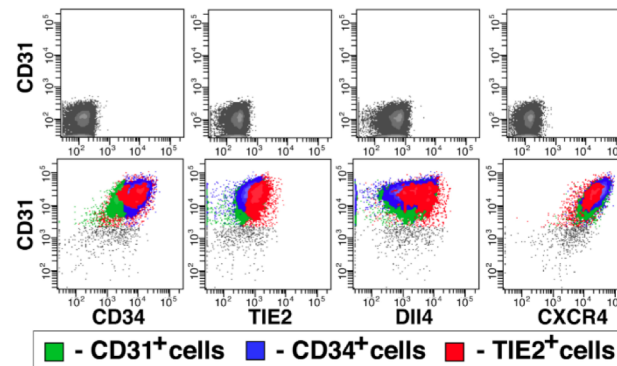
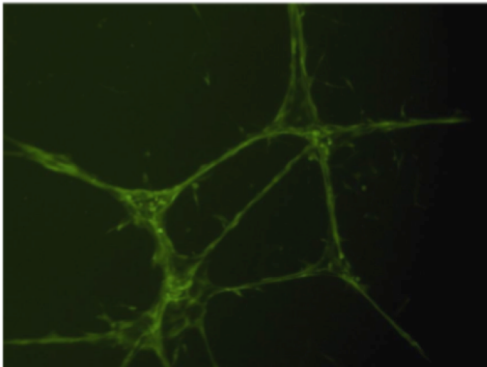
1) Centers for Disease Control and Prevention. National Diabetes Statistics Report: Estimates of Diabetes and Its Burden in the United States. US Department of Health and Human Services; Atlanta, GA: 2014.

AgeX-VASC1 Purity

Monoclonal Endothelium



GFP Endothelium (168 hrs)



Cardiovascular Market

> *\$Trillion Market Worldwide*



	Current	2035
Medical costs up 135 percent	\$318 billion	\$749 billion
Indirect costs up 55 percent (Lost productivity)	\$237 billion	\$368 billion
TOTAL COSTS	\$555 billion	\$1.1 trillion

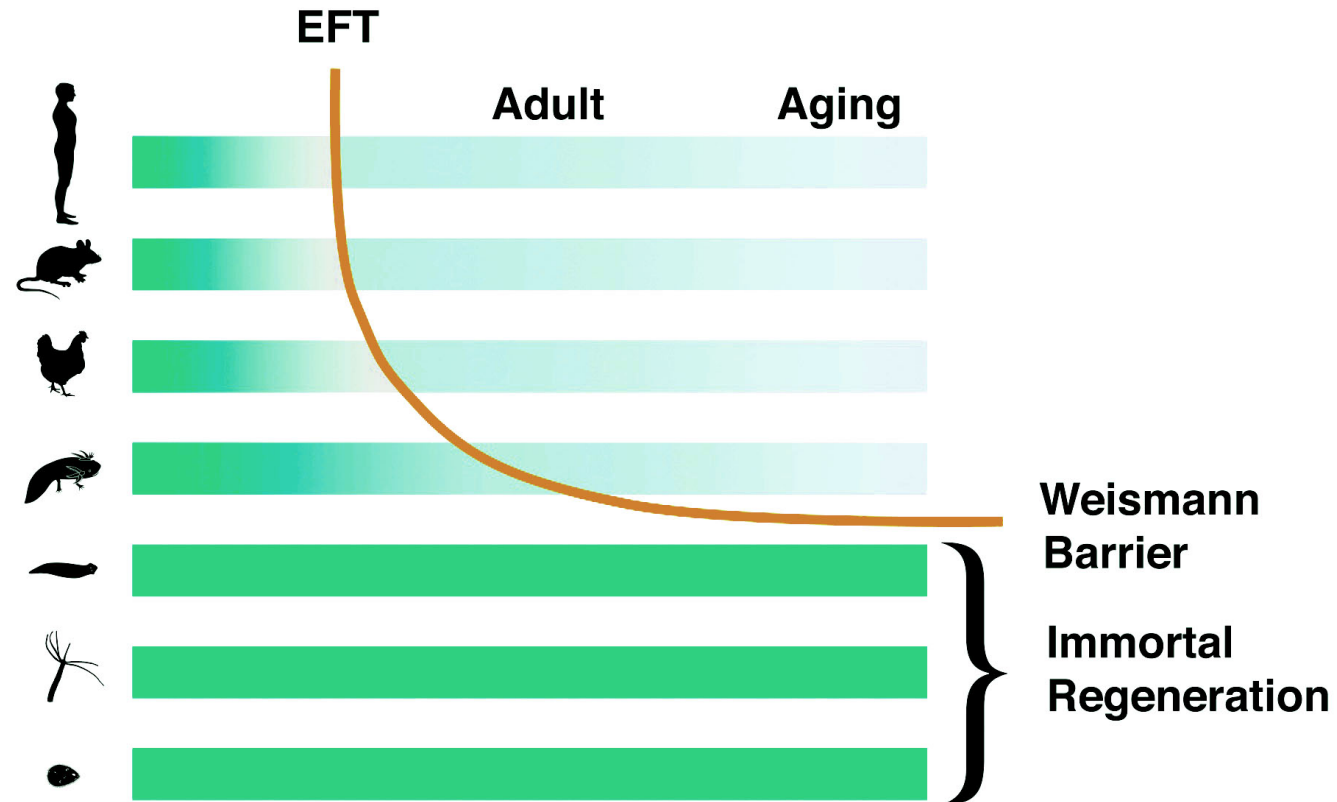
The Cost Generators: Aging Baby Boomers

As Baby Boomers age, costs for CVD will shift from middle-aged Americans to individuals ages 65 and over. By 2035, Boomers who are 80 and older will be the source of the largest cost increases for CVD.

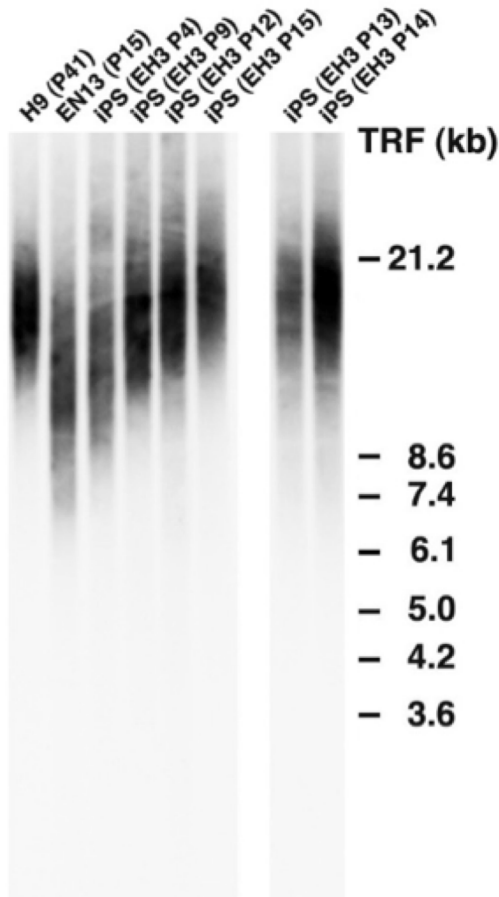
http://www.heart.org/idc/groups/heart-public/@wcm/@adv/documents/downloadable/ucm_491543.pdf

Induced Tissue Regeneration (iTR)

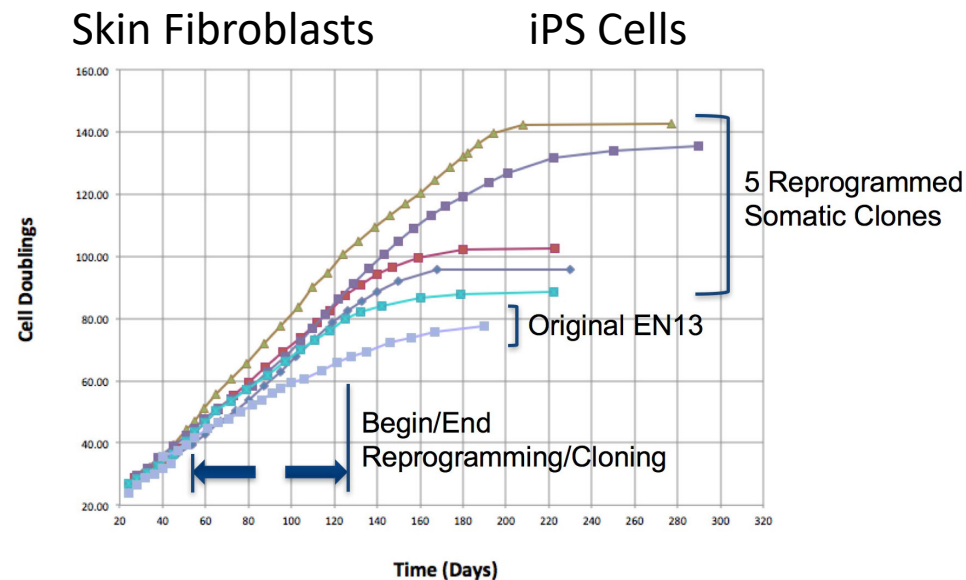
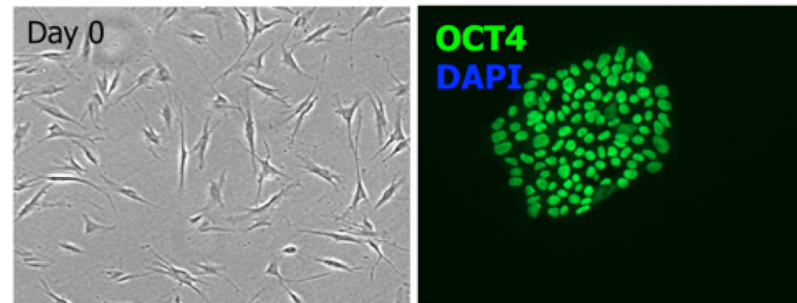
Innate regeneration in humans restricted to early development



Reversing the Aging of Human Cells Back to Pluripotency

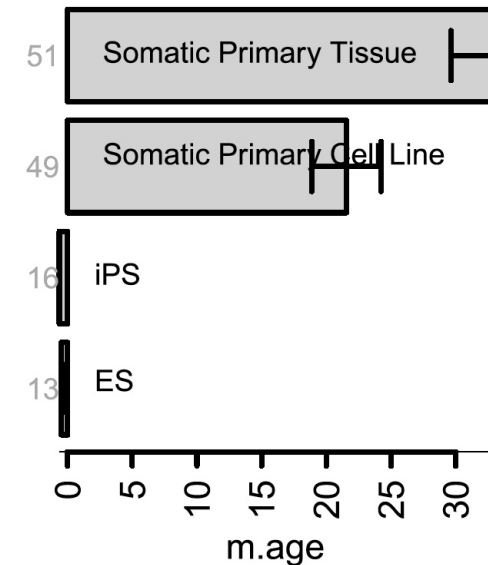


Regen Med 2010 May;5(3):345-63



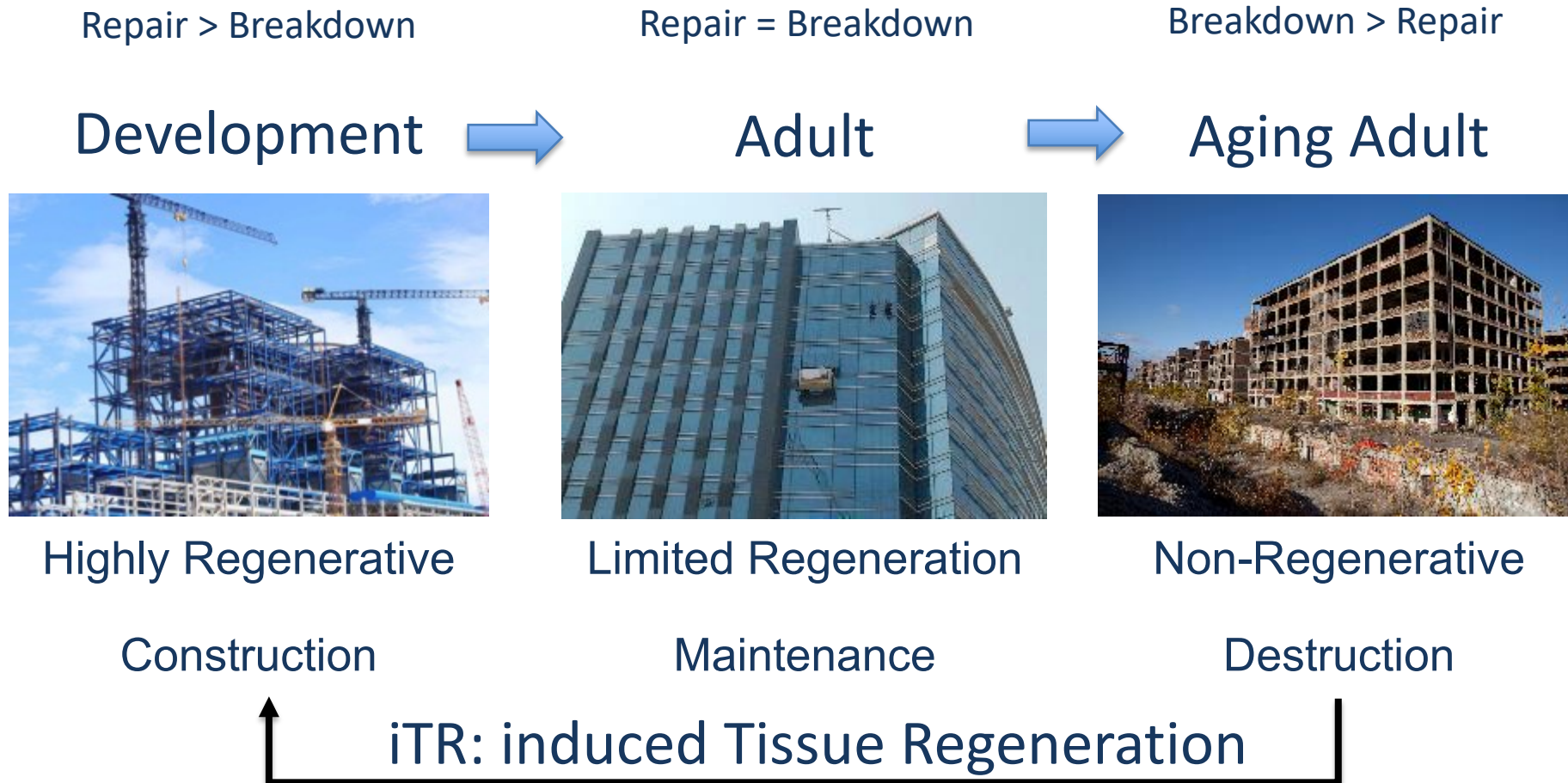
Reprogramming Methylation Age

A Data 77 $p = 1e-14$

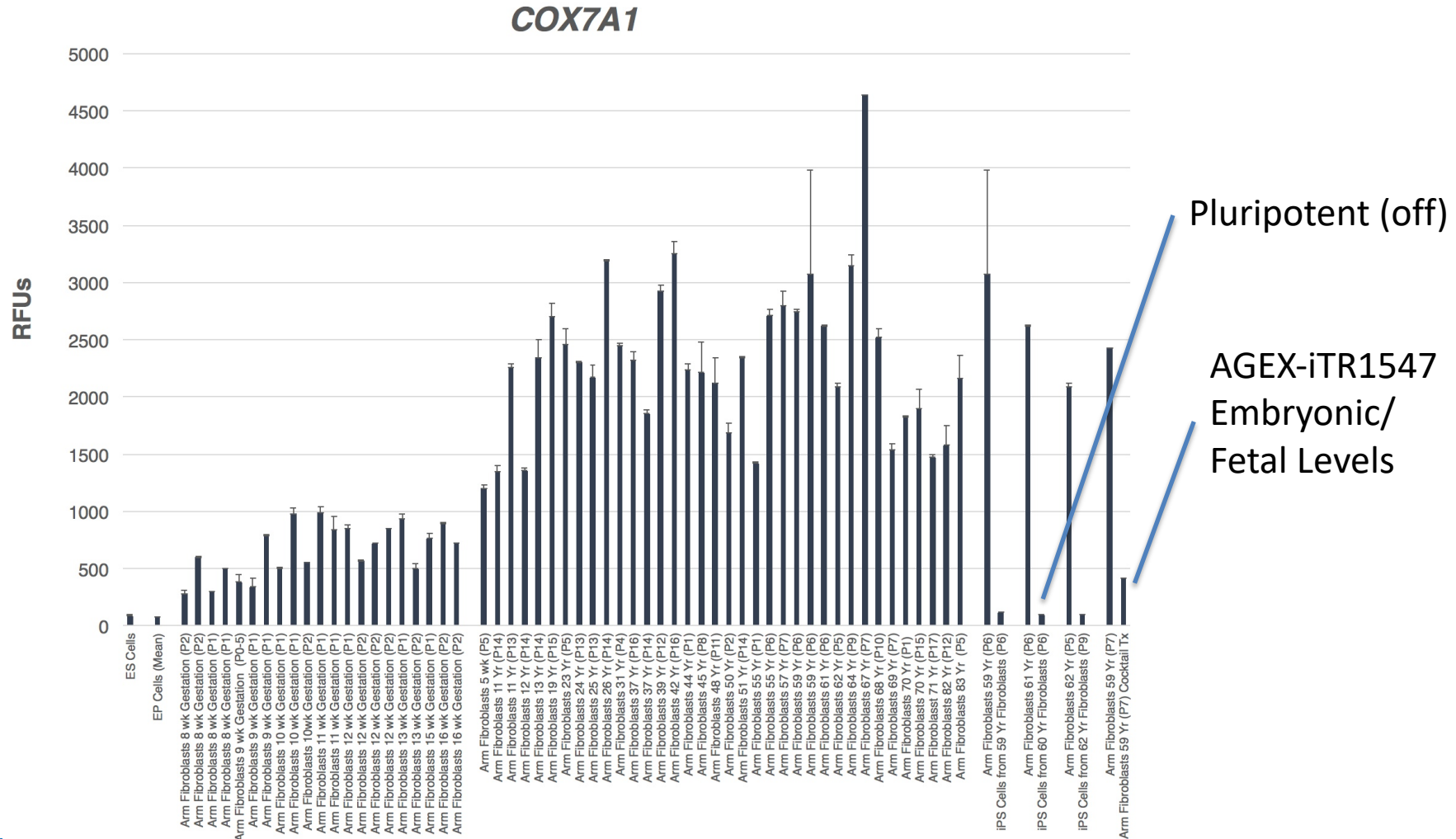


Genome Biol. 2013;14(10):R115

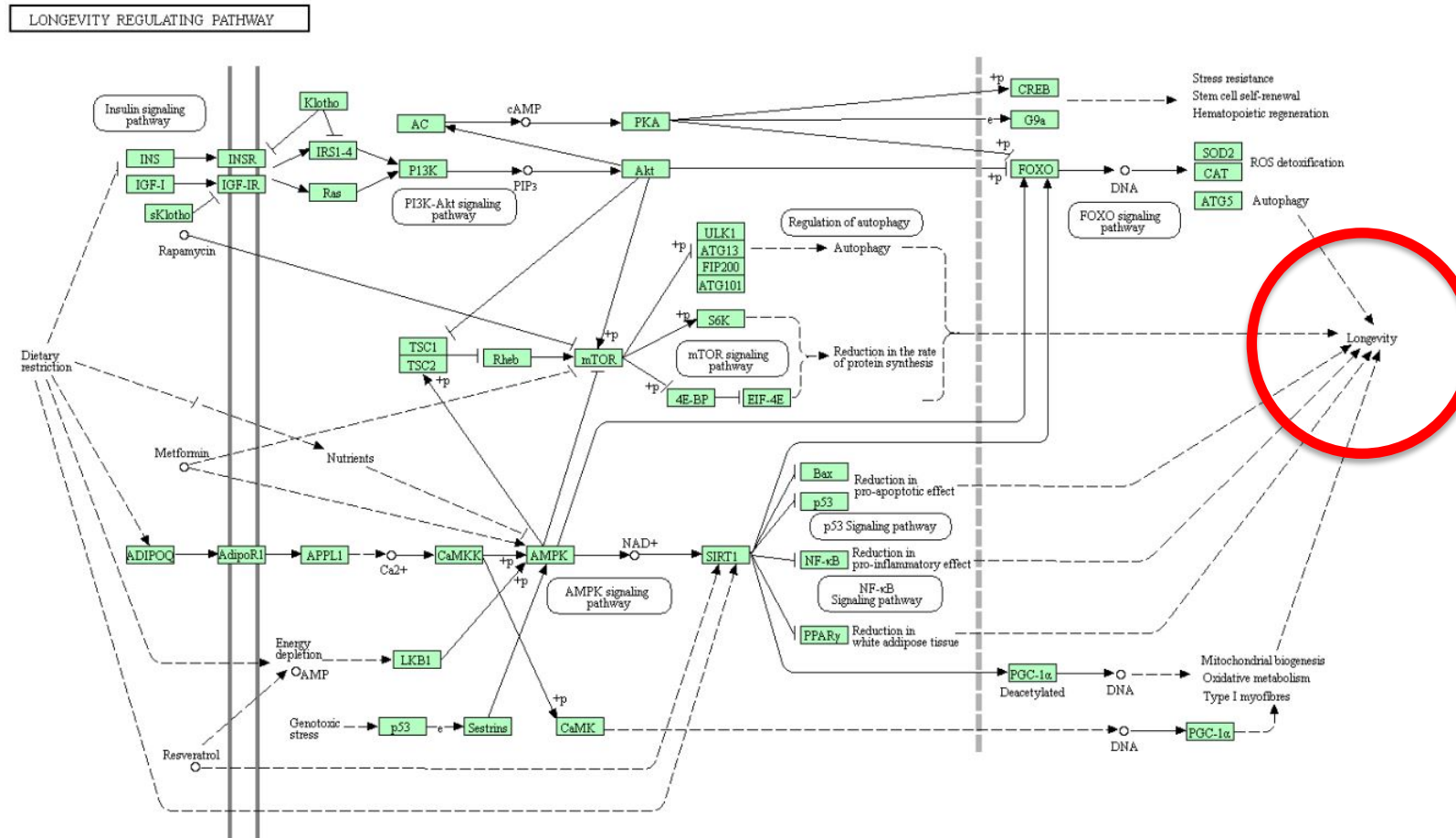
Reversing the Aging of Human Cells Back to Regeneration



An Example of an iTR Gene



Toward a Unified Theory of Aging



A growing consensus that modulating these metabolic pathways effect aging, but how?

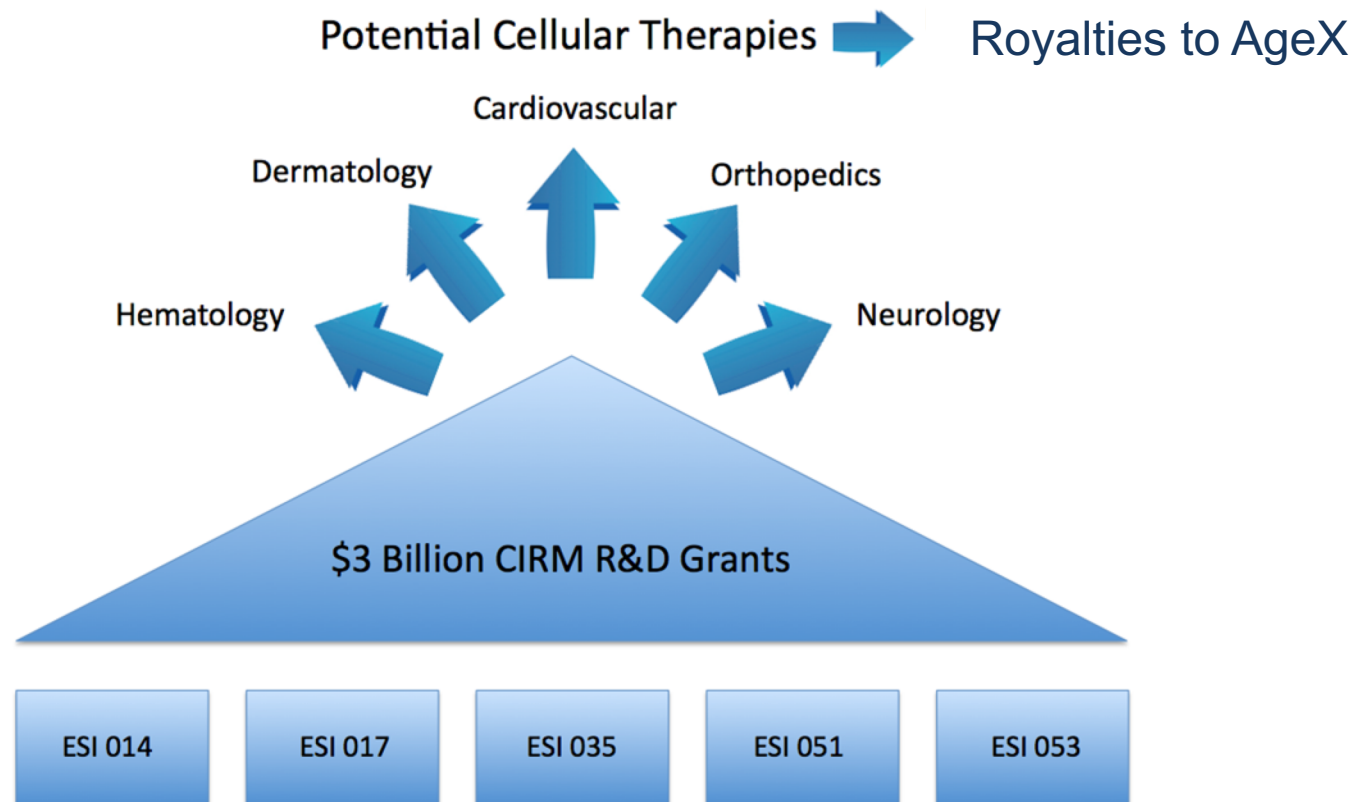
A complex analysis by AgeX scientists suggests that insights from regenerative biology will lead to a unified theory of aging.

Product Pipeline

	Pre-Clinical	Phase I	Phase II	Phase III/Pivotal
THERAPEUTICS				
AGEX-BAT1 (Brown Adipocytes)	T2D			
AGEX-VASC1 (Vascular Progenitors)	MI			
AGEX-iTR1547 (NCE in HyStem)	CHF			
Renelon™ (Repurposed Drug)	510(k)	510(k) Clearance		
RESEARCH PRODUCTS				
Universal cGMP ES Cells, Cytiva		Marketed Research Products		
DATABASE PRODUCTS				
GeneCards/LM Discovery		Marketed NGS Interpretation		
CANCER DIAGNOSTICS & THERAPY				
Cancer Stem Cell EFT Dx & Tx		To be Partnered for Cancer Dx		

Licensing of GMP Stem Cell Master Cell Bank

- Ownership of bank remains with AgeX
- Narrowly-defined products owned/sold by partner
- Running royalty not limited by patent expiration



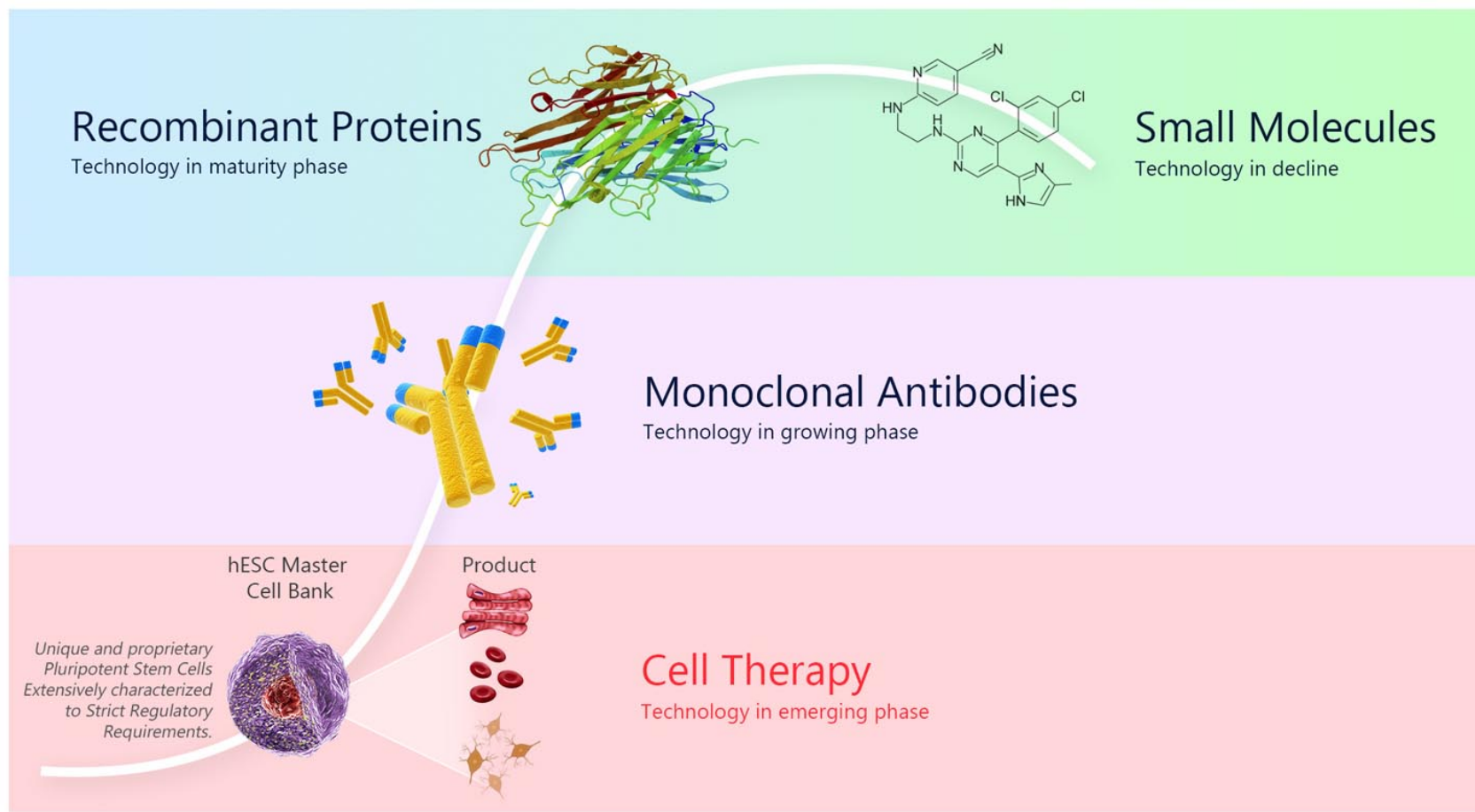
ESI BIO Research Product Division

- Markets cells for drug screening
- Manufacture and Marketing of *Cytiva* for GE Healthcare



Asset Life of Pluripotent Platform

Potentially long lifespan due to lack of regulatory pathway for generics or biosimilars



Summary

- Aging: The demographic trend of our time
- Largest challenge is chronic degenerative diseases of aging
- Straightforward therapeutic strategy: Young cells for aged tissues
- Proprietary manufacturing technology yielding highly scalable, purified, identified, and regenerative cells for applications in age-related degenerative disease
- A proprietary path to off-the-shelf allogeneic application
- A proprietary injectable matrix