HARNESSING THE POWER OF HUMAN STEM CELLS

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Bachelors
Biochemical Engineering



Pharmaceutical Industry
Bioprocess Design



Doctorate
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Stem Cell Research





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STANFORD
UNIVERSITY

Ignite Program
Stanford University
Graduate School of Business

STANFORD GRADUATE SCHOOL OF
BUSINESS

Chief Scientific Officer
FACTORFIVE

FACTORFIVE



01: INTRODUCTION

02: STEM CELL OVERVIEW

03: THE PRODUCT

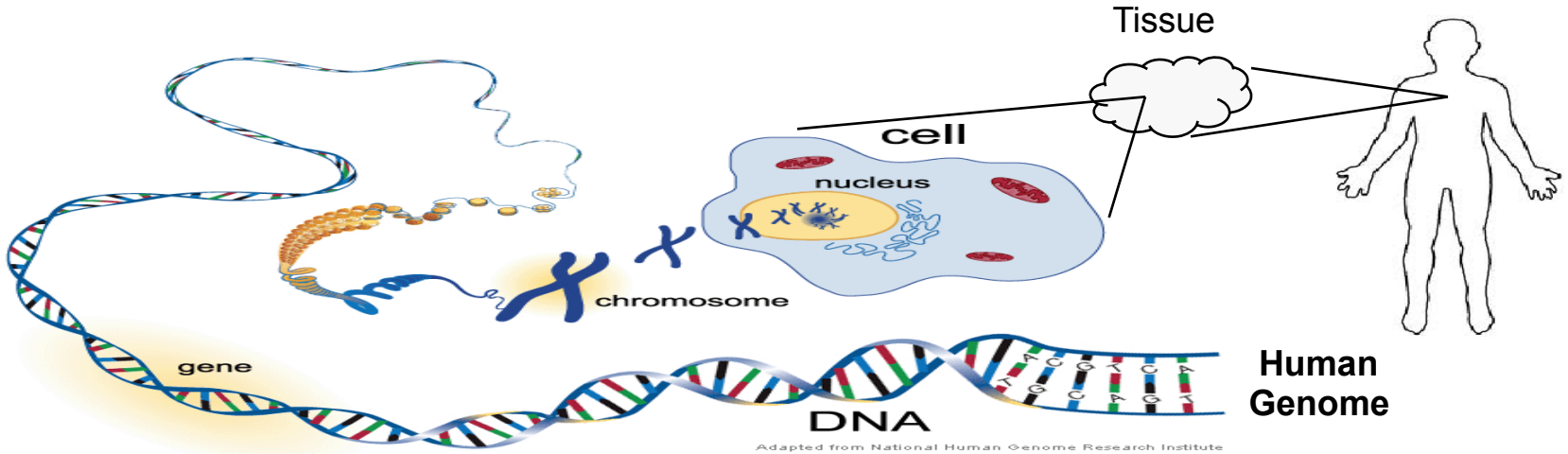
04: BACKED BY SCIENCE

05: THE RESULTS

INTRODUCTION

01

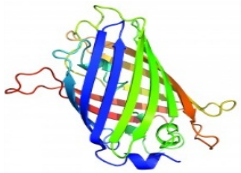
BIOLOGY BREAKDOWN



Transcription

AAAA → **mRNA**

Translation



Protein

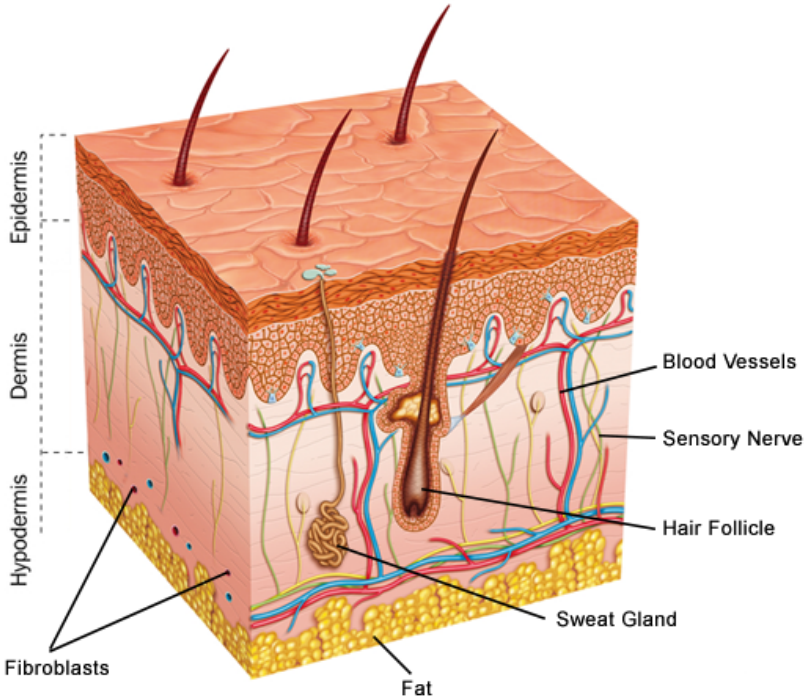
A protein is simply a chain of amino acids, including:

- Growth Factors
- Cytokines
- Enzymes
- Co-factors
- Paracrine Factors

STEM CELL OVERVIEW

STEM CELL OVERVIEW

CROSS-SECTION OF HEALTHY SKIN:



Epidermis: Protective layer of mainly dead skin cells (stratum corneum) and underlying keratinocytes and fibroblasts that renew the barrier that protects us.

Dermis: A mixture of cell types in a matrix of specific proteins that help organize and support the skin.

Hypodermis: A layer of subcutaneous fat that includes adipose derived stem cells (ADSCs) which support the upper layers of the skin and help repair and regenerate damaged skin cells.

STEM CELL OVERVIEW

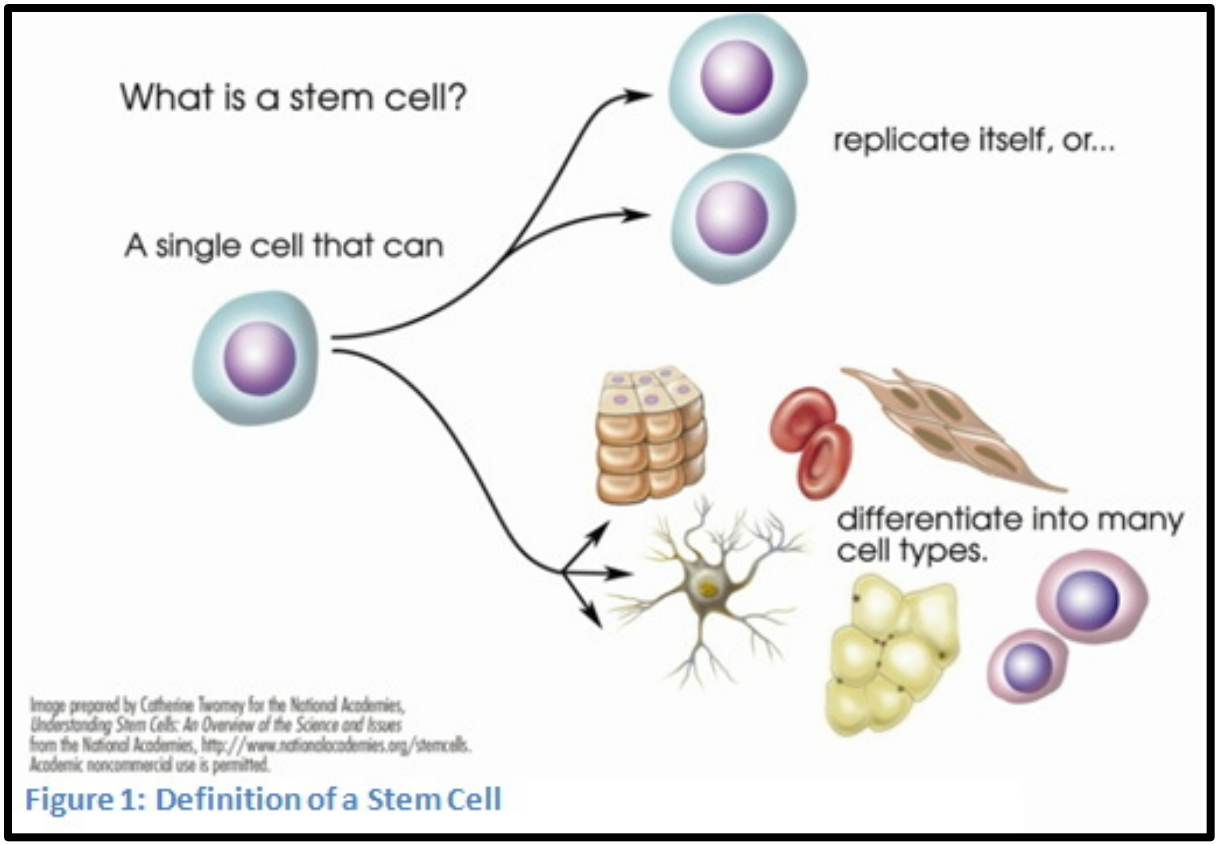
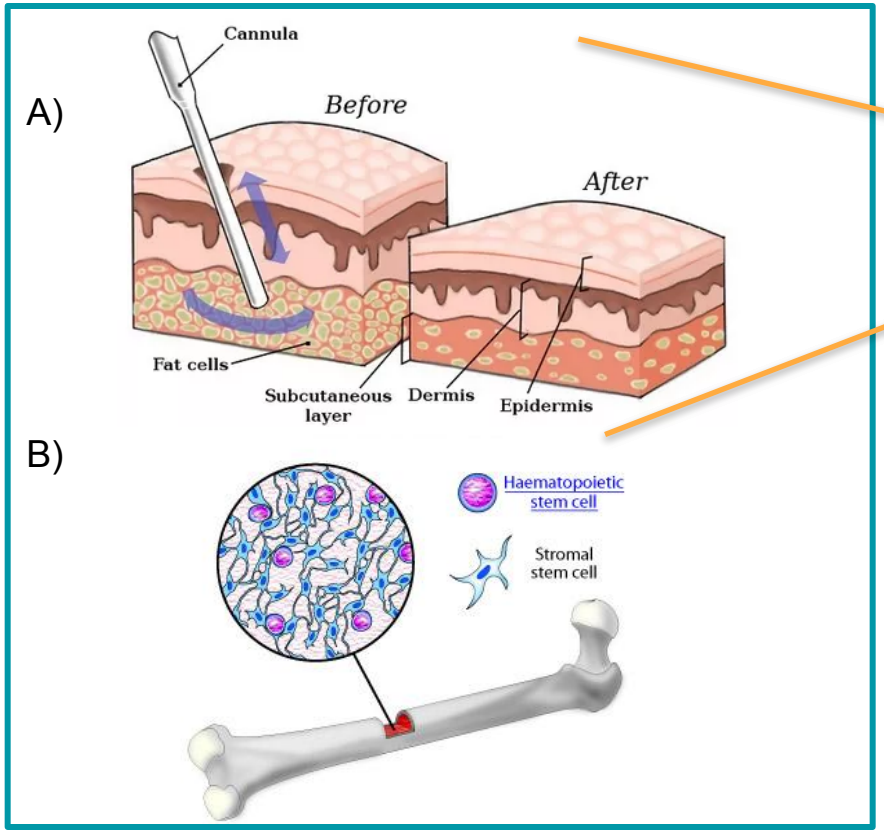
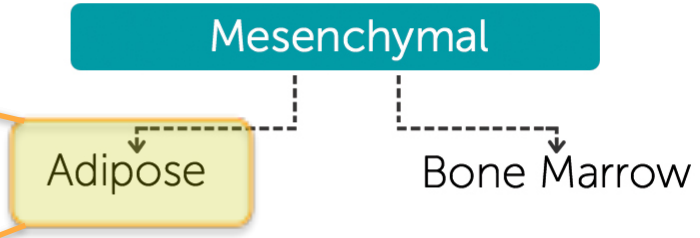


Figure 1: Definition of a Stem Cell

STEM CELL OVERVIEW

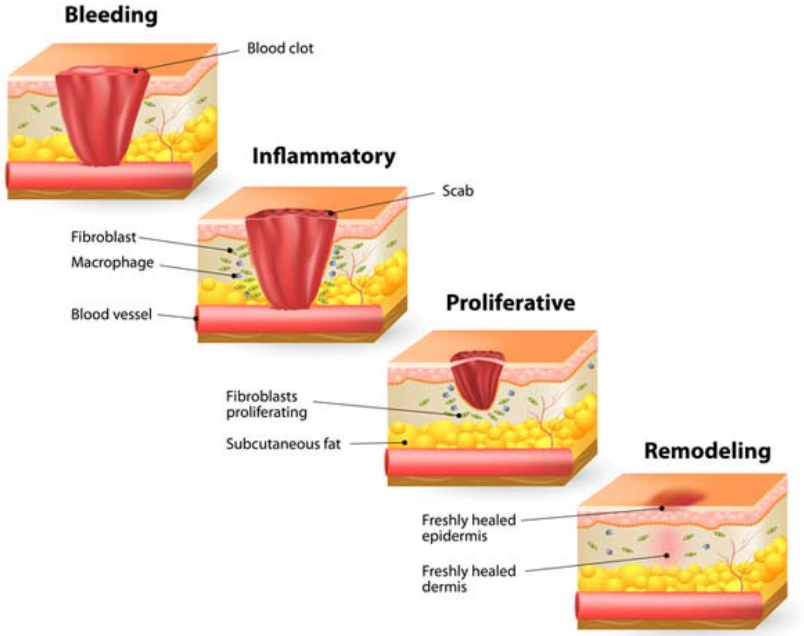




- ✓ Found in adult tissues. Most abundant in fat (adipose).
- ✓ Involved in natural healing.
- ✓ More stable than pluripotent cells.
- ✓ Can form: skin, muscle, bone, blood, heart, etc.

STEM CELL OVERVIEW

NATURAL HEALING:

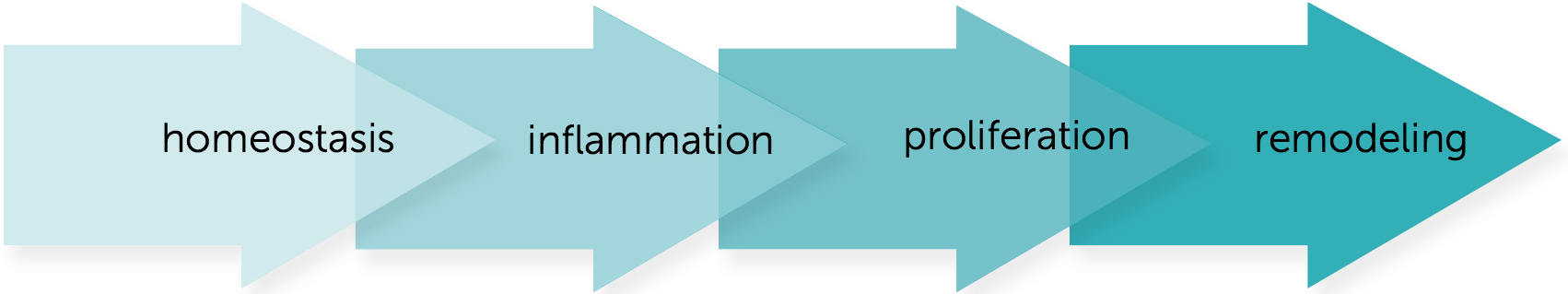


- Multistage process.
- Inflammation is a natural part of healing.
- Multiple cell types involved.
- Collagen and Extracellular matrix (ECM) proteins are a precursor to new cells populating the wound bed.
- Remodeling is a secondary process, initially, the skin just wants to close the wound as quickly as possible. Lack of ECM and inadequate supportive factors leads to scarring or suboptimal healing.

Source: Gosain A, DiPietro LA. (2004). Aging and wound healing. World J Surg 28:321-326

STEM CELL OVERVIEW

WOUND HEALING



CELLULAR & BIO-PHYSIOLOGIC EVENTS:

1. Vascular constriction
2. Platelet aggregation, degranulation, and fibrin formation (thrombus)

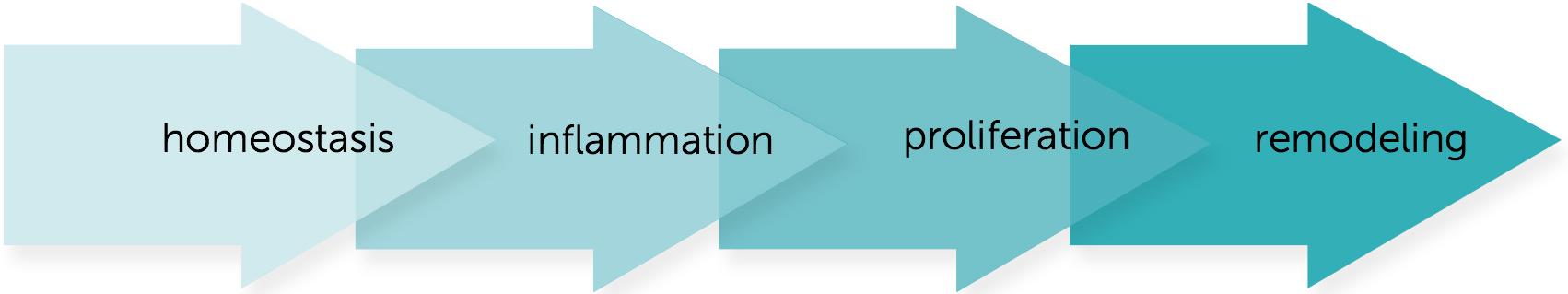
1. Neutrophil infiltration
2. Monocyte infiltration and differentiation to macrophage
3. Lymphocyte infiltration

1. Re-epithelialization
2. Angiogenesis
3. Collagen synthesis
4. ECM formation

1. Collagen remodeling
2. Vascular maturation and
3. Regression

STEM CELL OVERVIEW

WOUND HEALING



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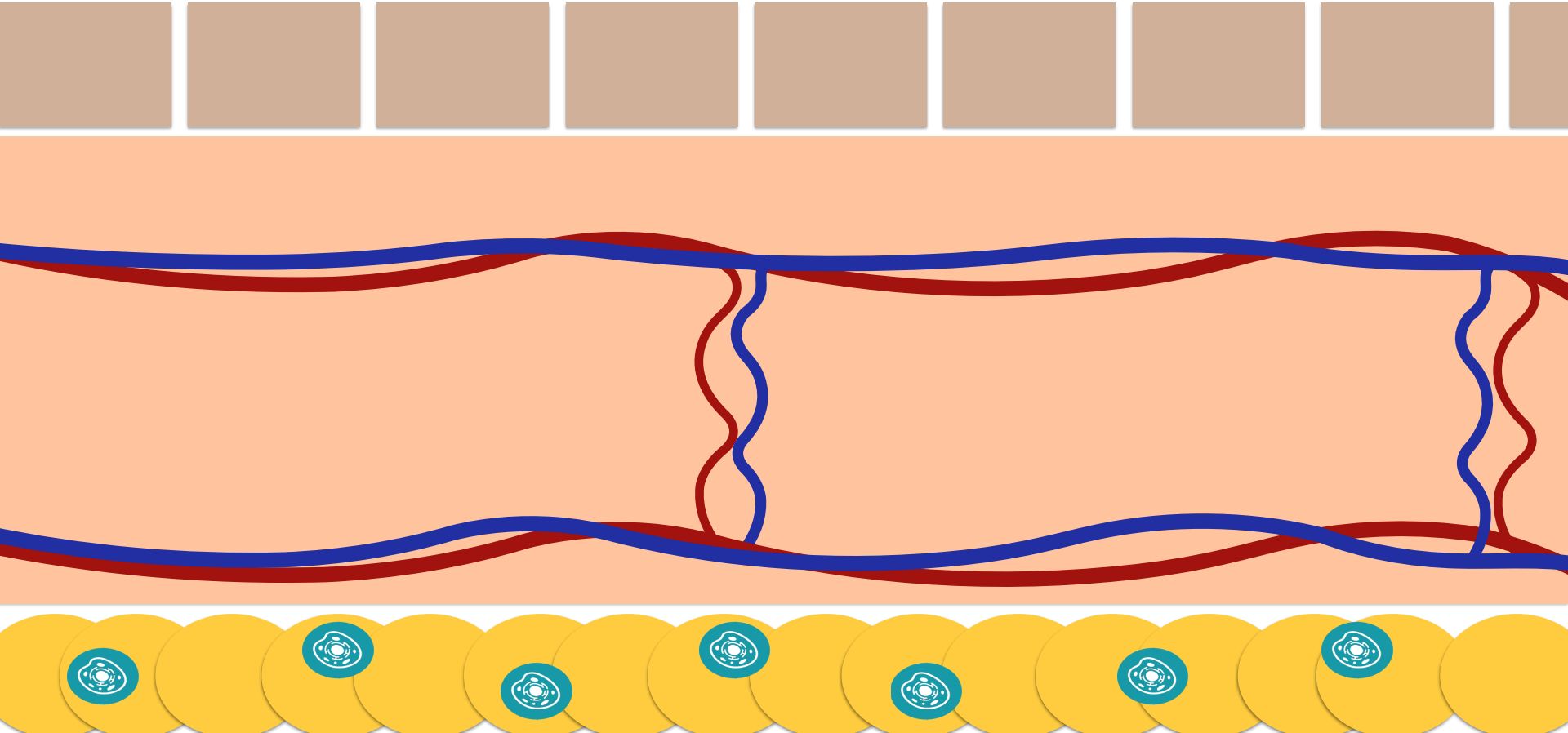
HEALING / REMODEL PROCESS



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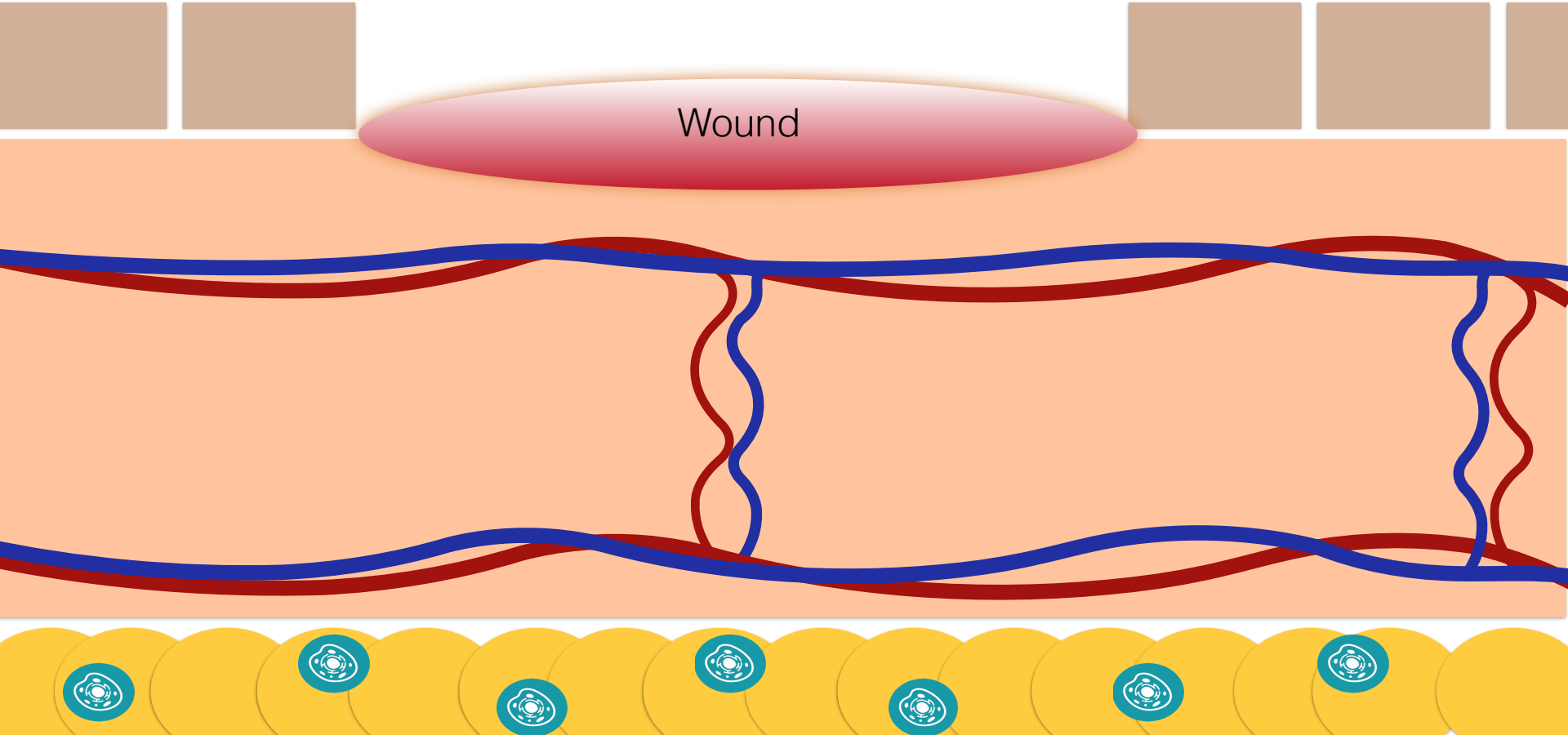

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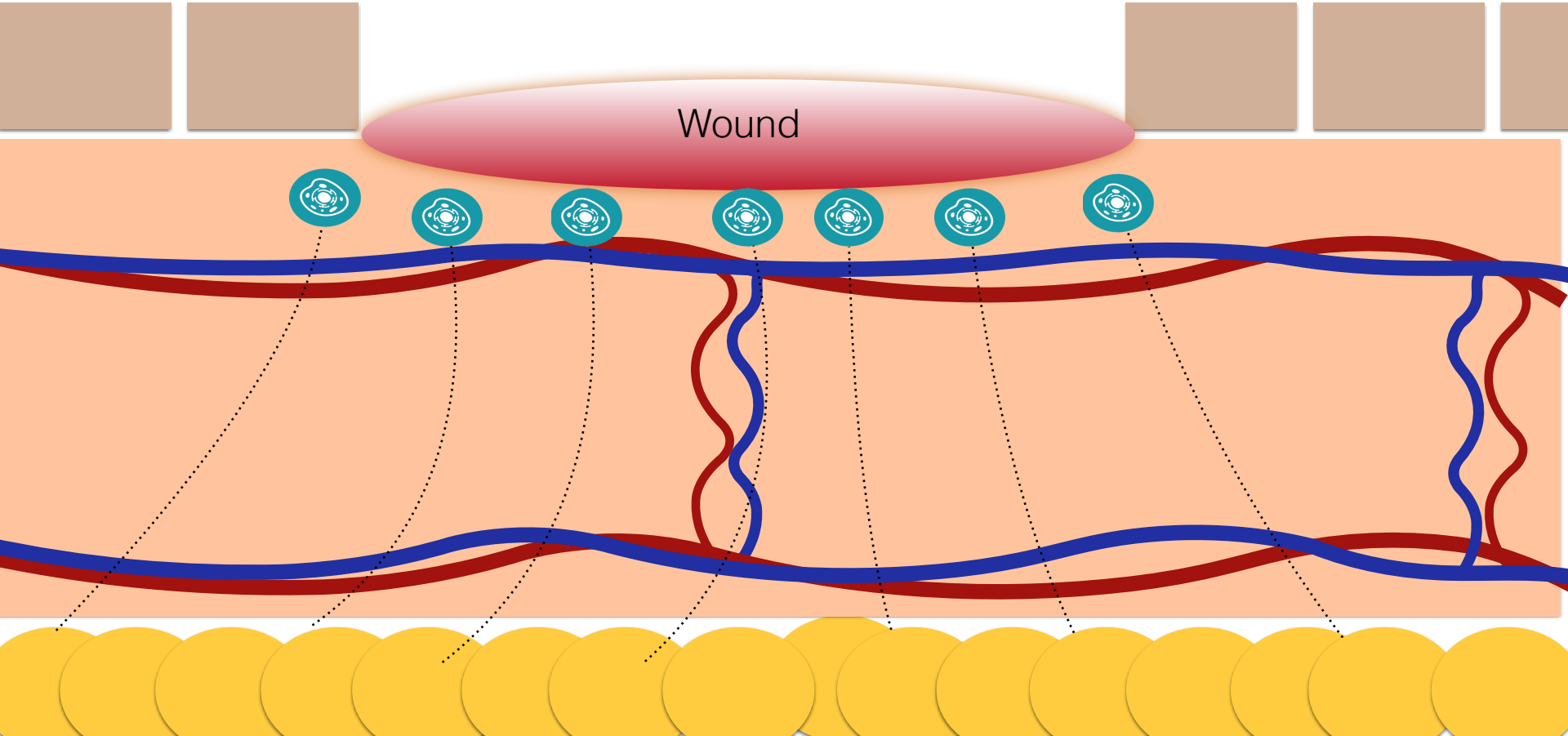


HEALING / REMODEL PROCESS

Wound

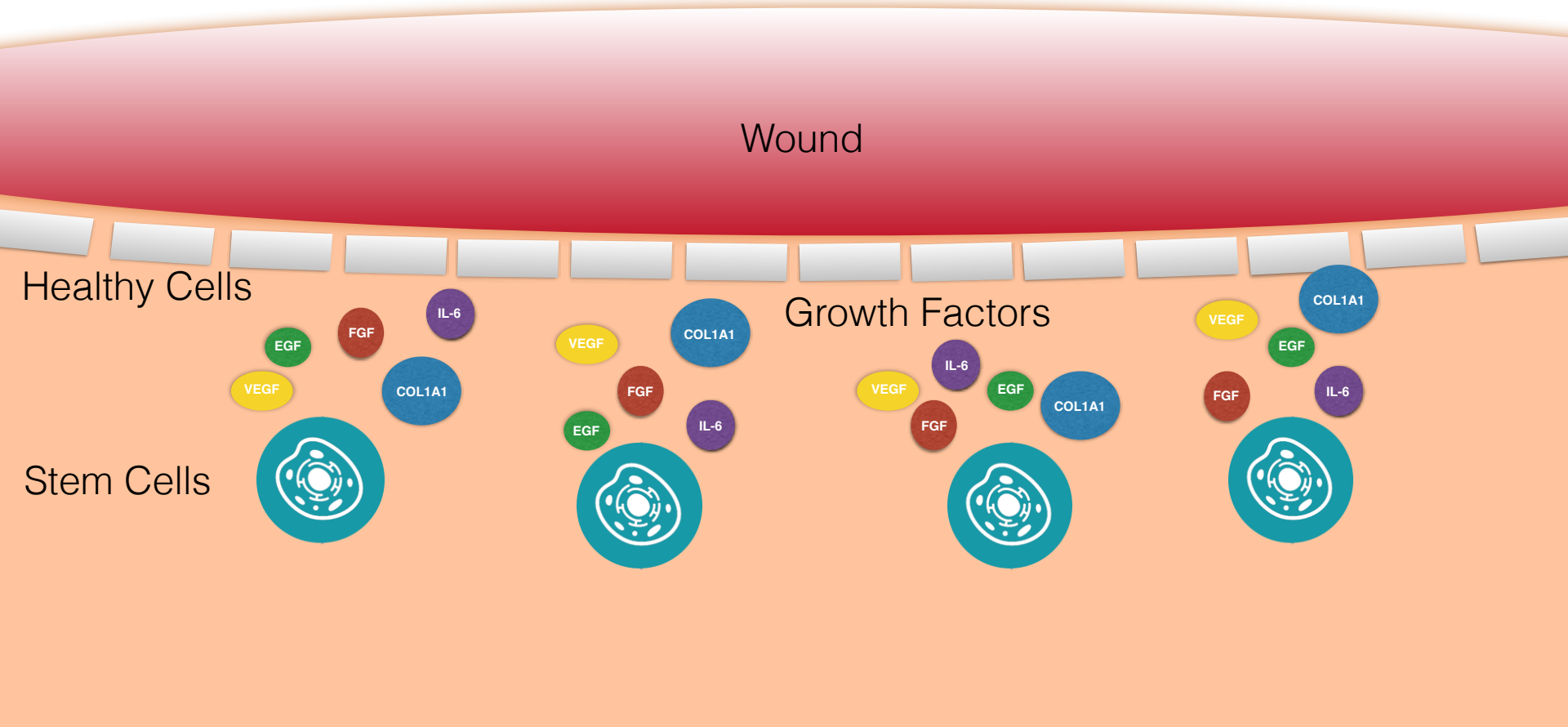
Healthy Cells

Stem Cells

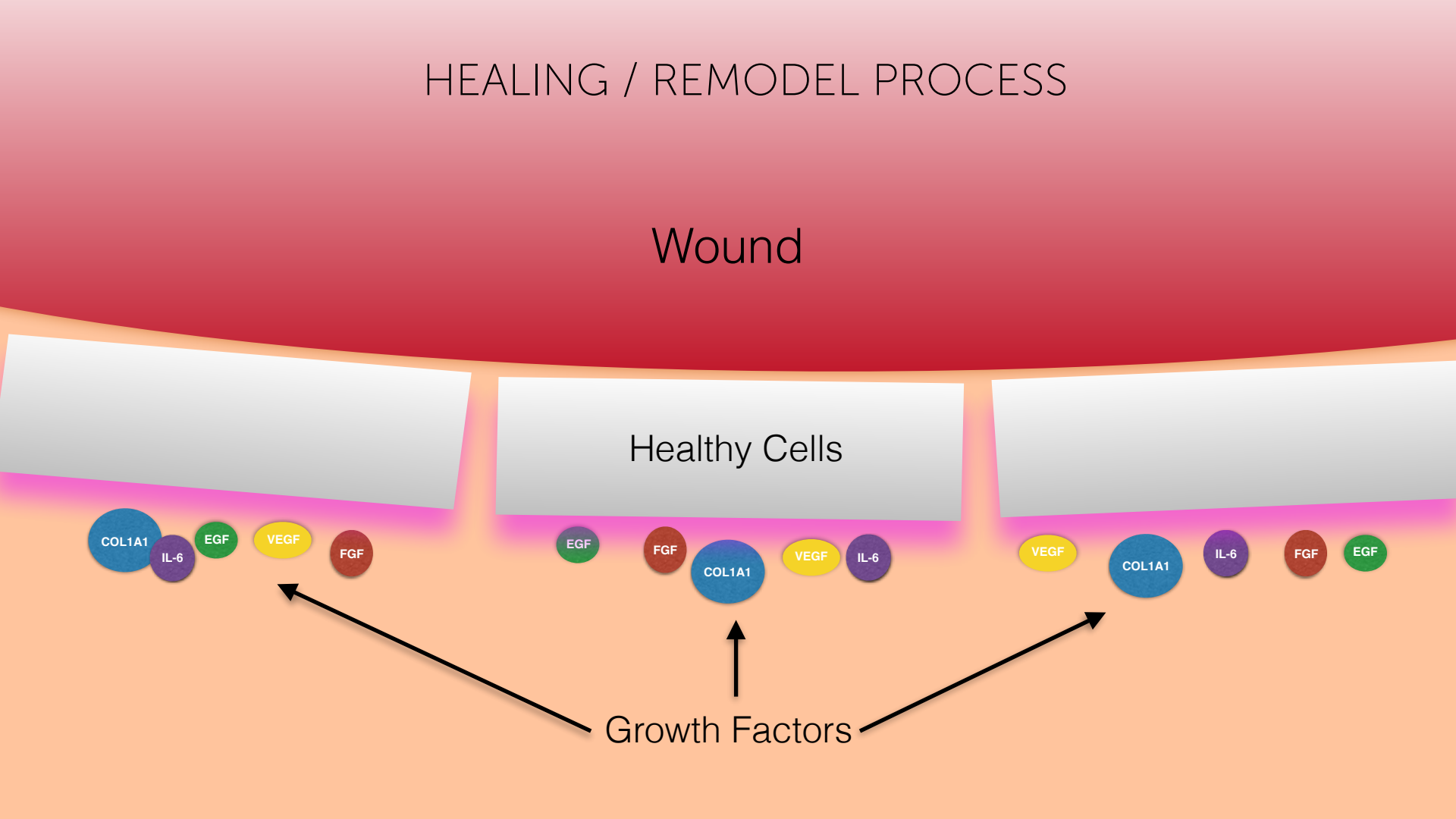





HEALING / REMODEL PROCESS



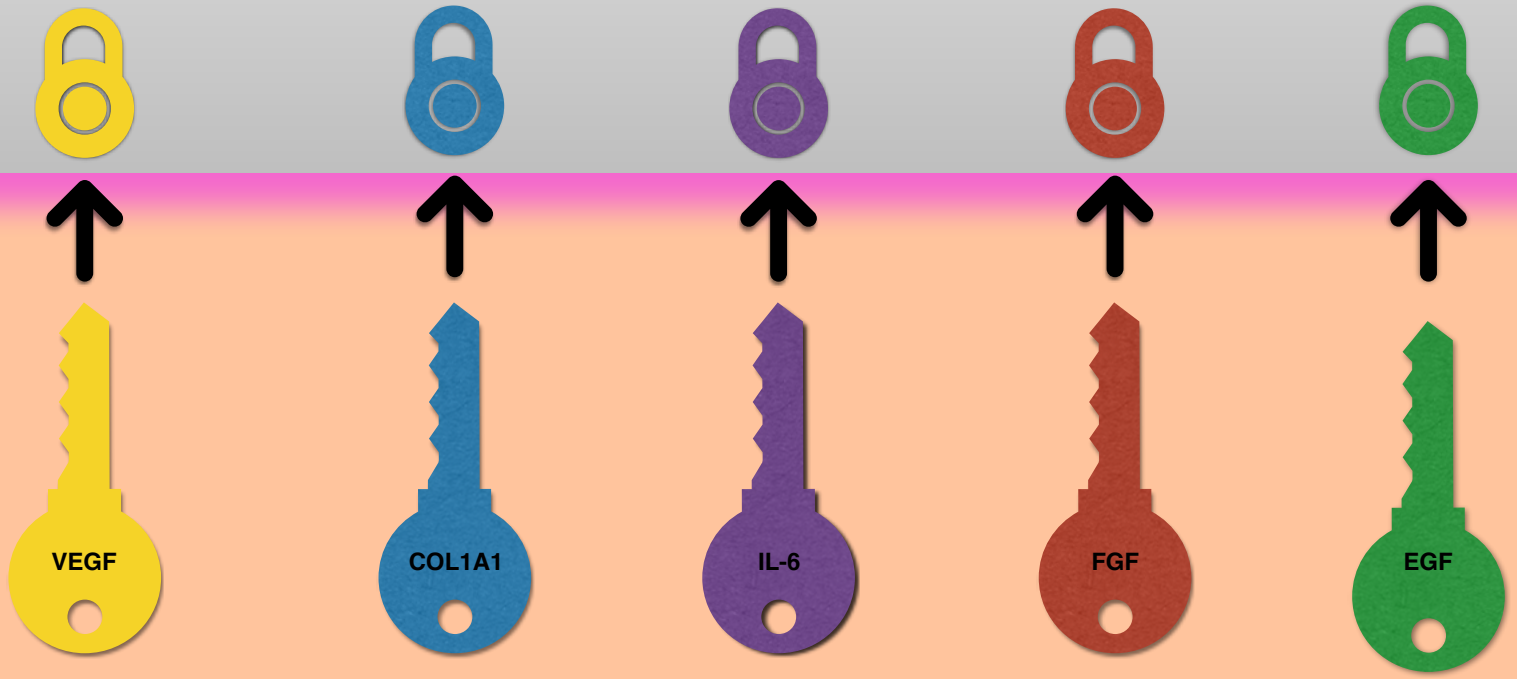
HEALING / REMODEL PROCESS



HEALING / REMODEL PROCESS

Healthy Cell

Receptor Sites



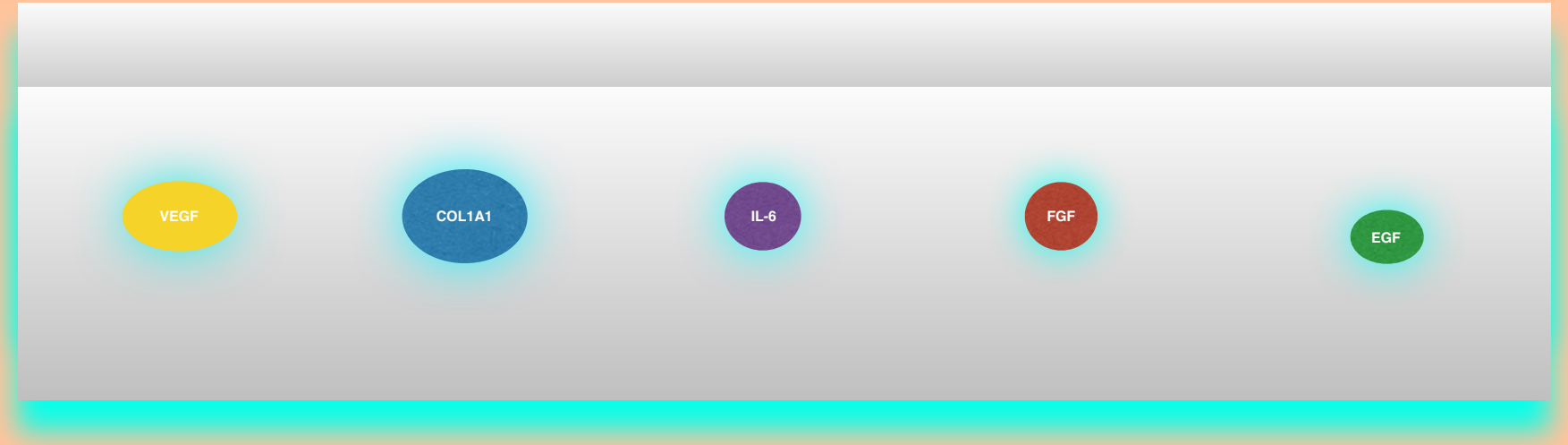
Growth Factors

HEALING / REMODEL PROCESS

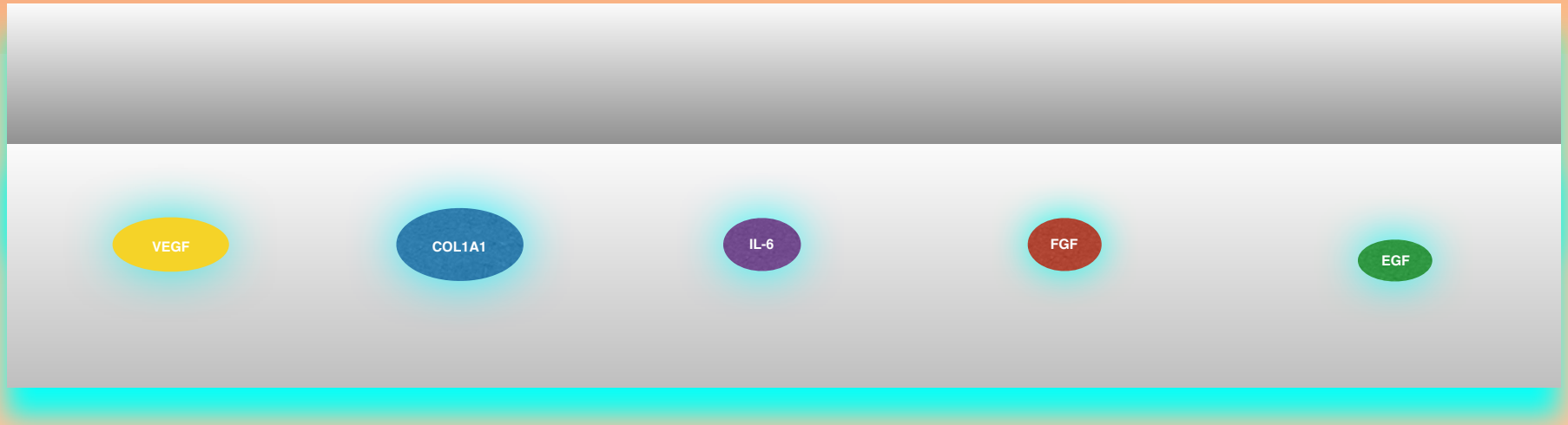


HEALING / REMODEL PROCESS

Gene & protein expression is influenced, leading to cell division and movement (aka cellular remodeling), and modulation of the immune/inflammation response.



HEALING / REMODEL PROCESS



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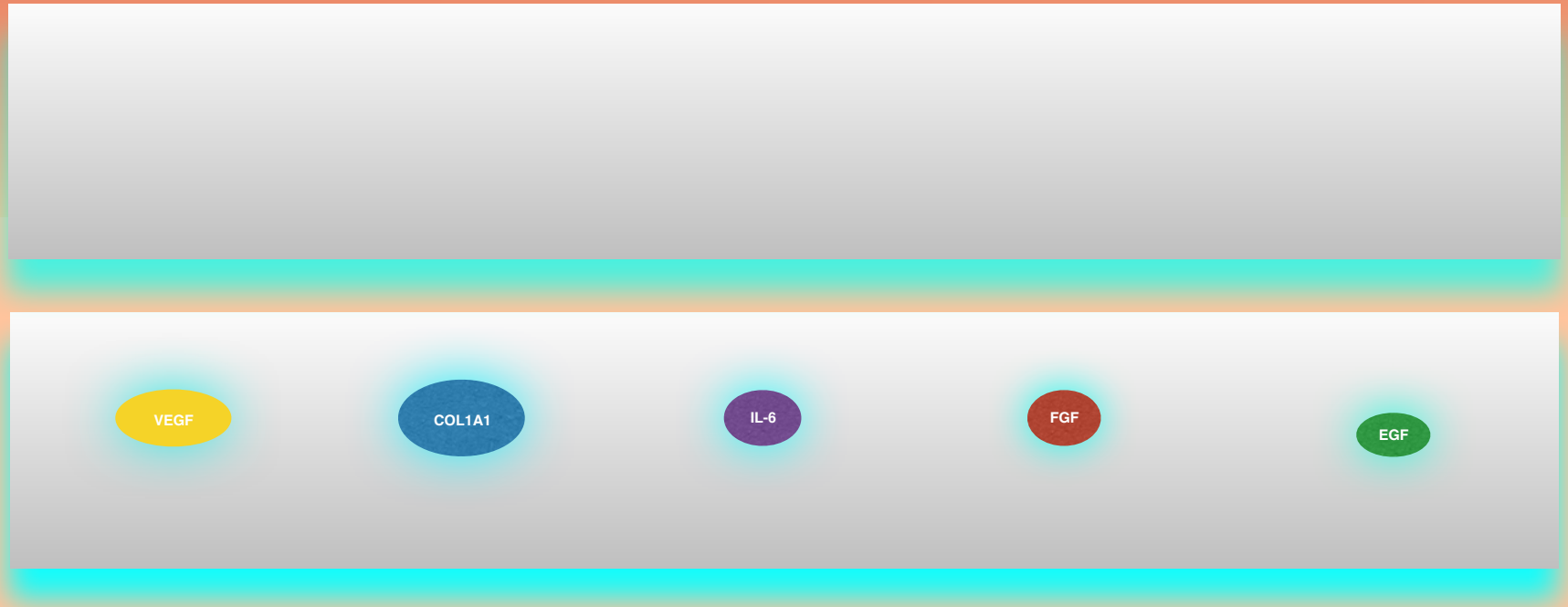

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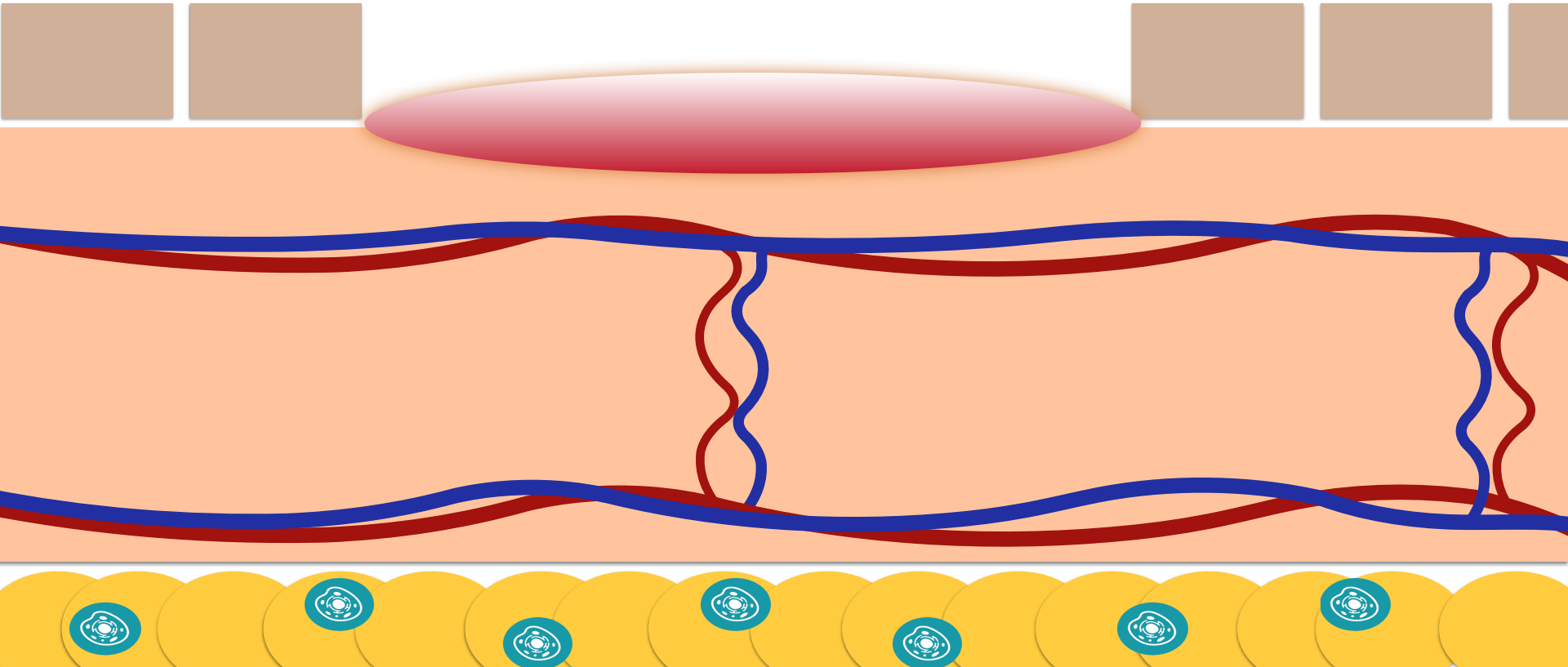

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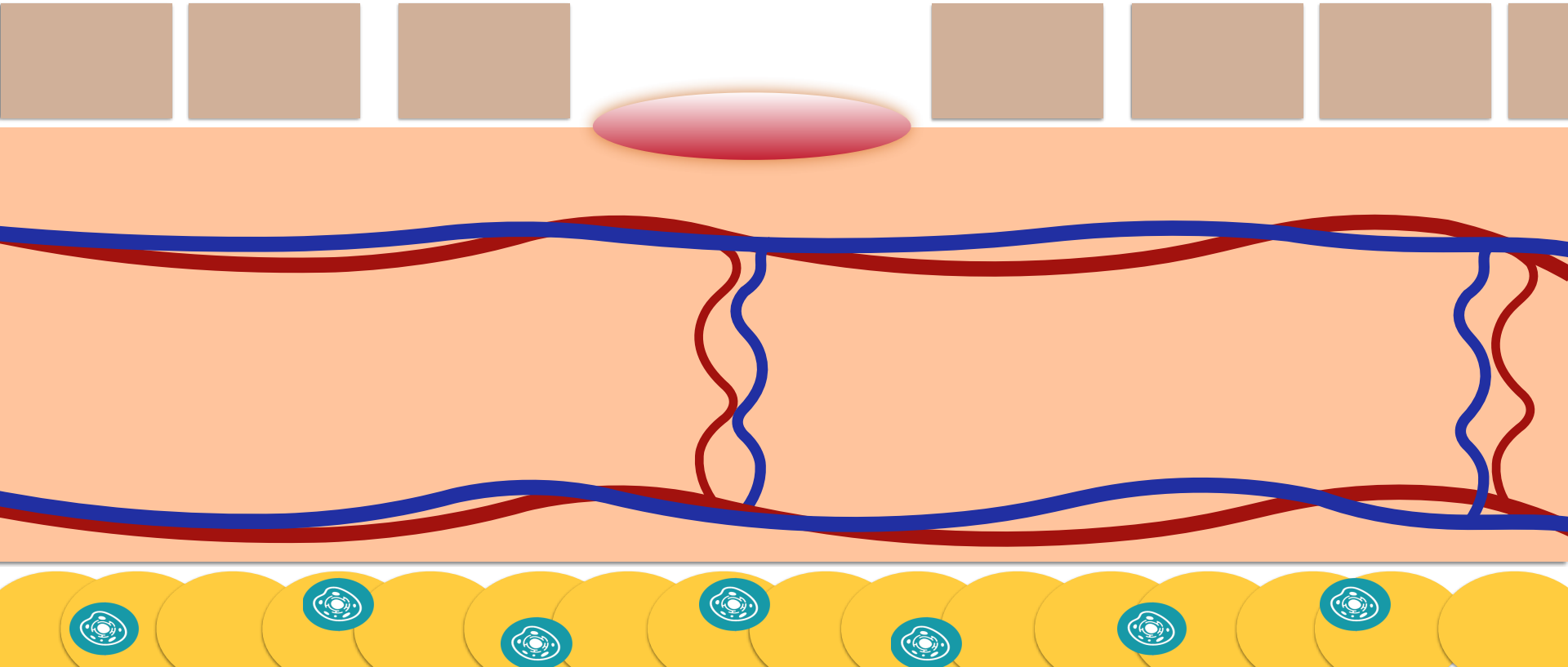

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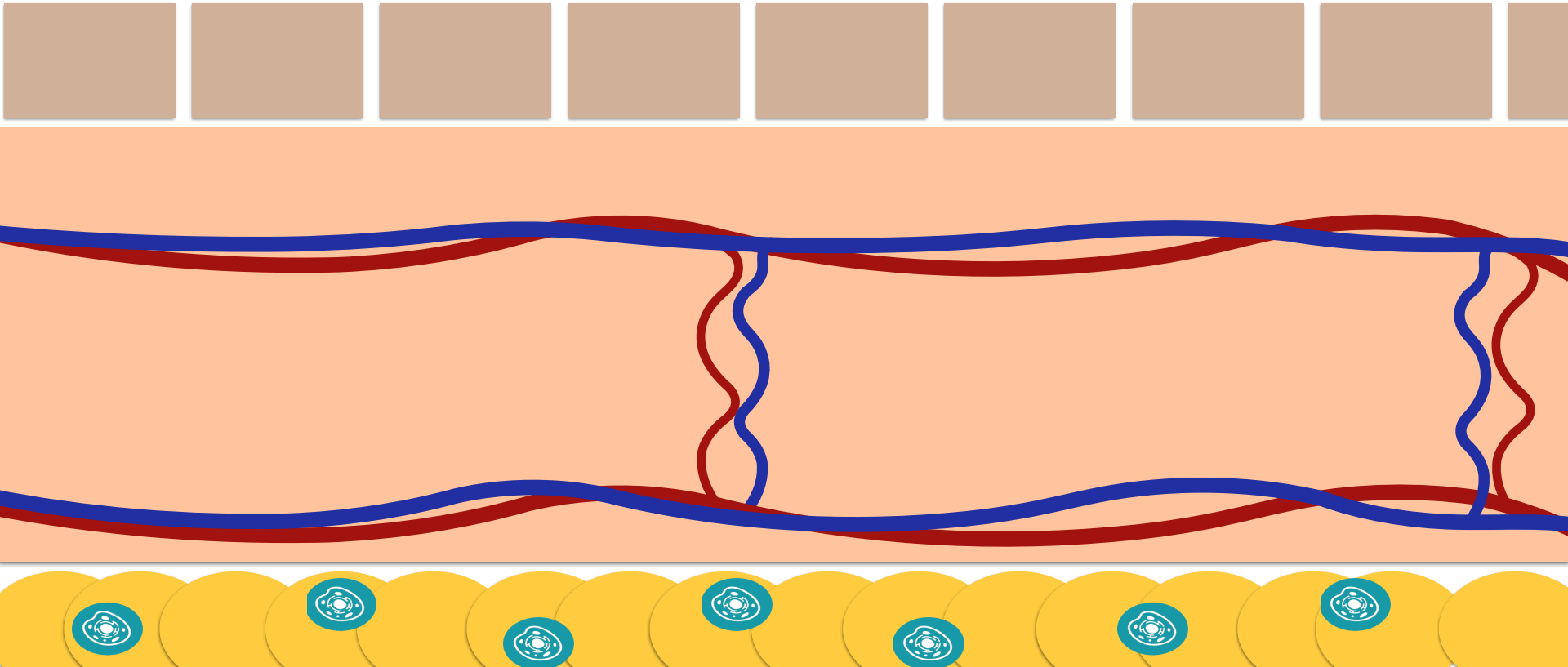
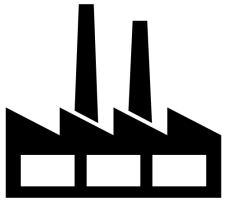


PRODUCT

03

PRODUCT

Human stem cells are biological factories.



They release potent proteins, including human growth factors.



Which we formulate into skin care.



That consumers can topically apply.



To get unparalleled anti-aging results.



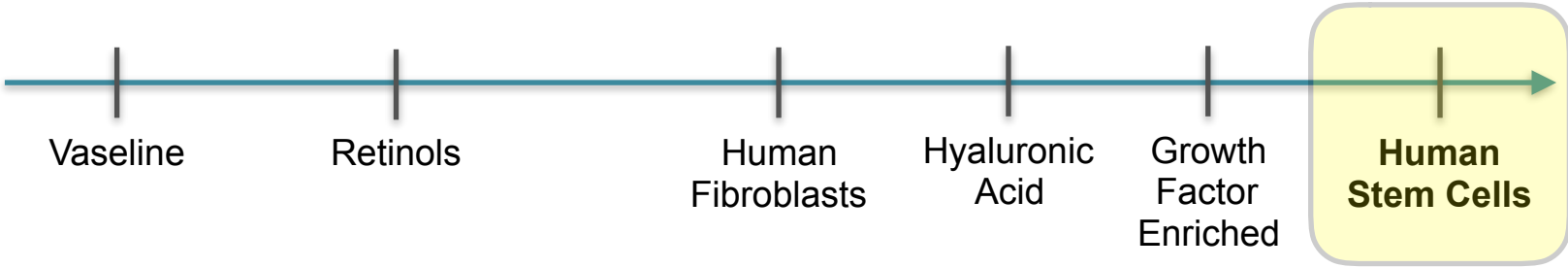
SCIENCE

04

FACTORFIVE

SCIENCE

FACTOR**FIVE** is bringing the forefront of science & biotechnology to skincare.



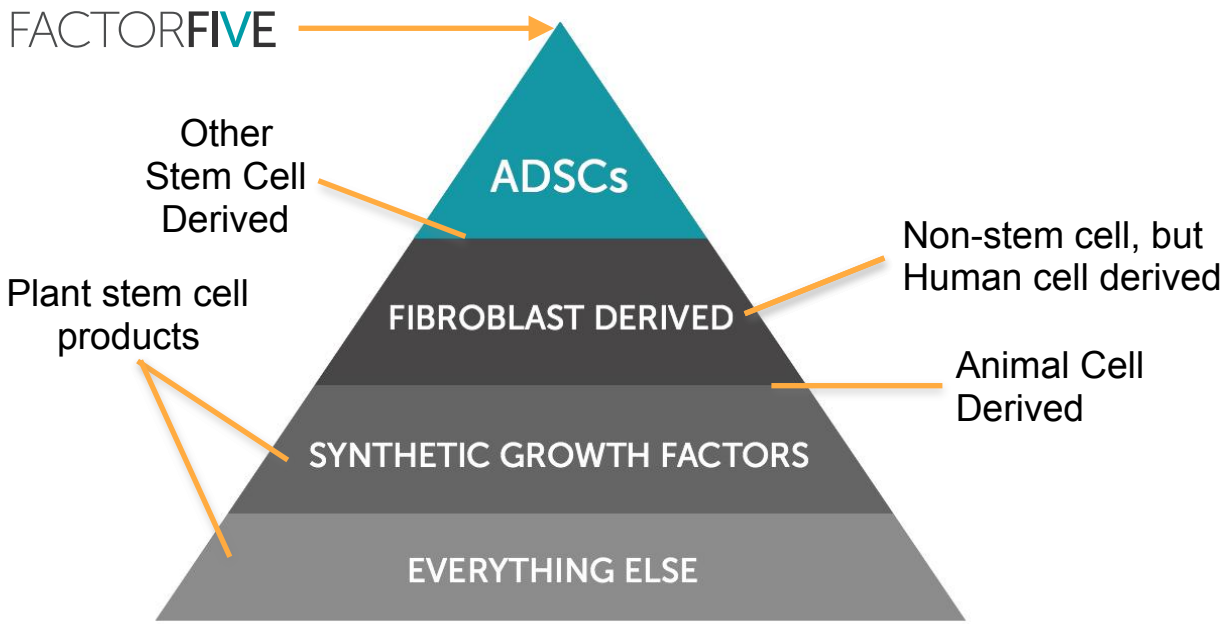
FACTOR**FIVE** uses Mesenchymal Stem Cells derived from healthy consenting adults undergoing liposuction, ***not*** embryos. These stem cells are frequently referred to as Adipose derived Stem Cells (ADSCs).

These stem cells represent the best, most researched cells for skin healing

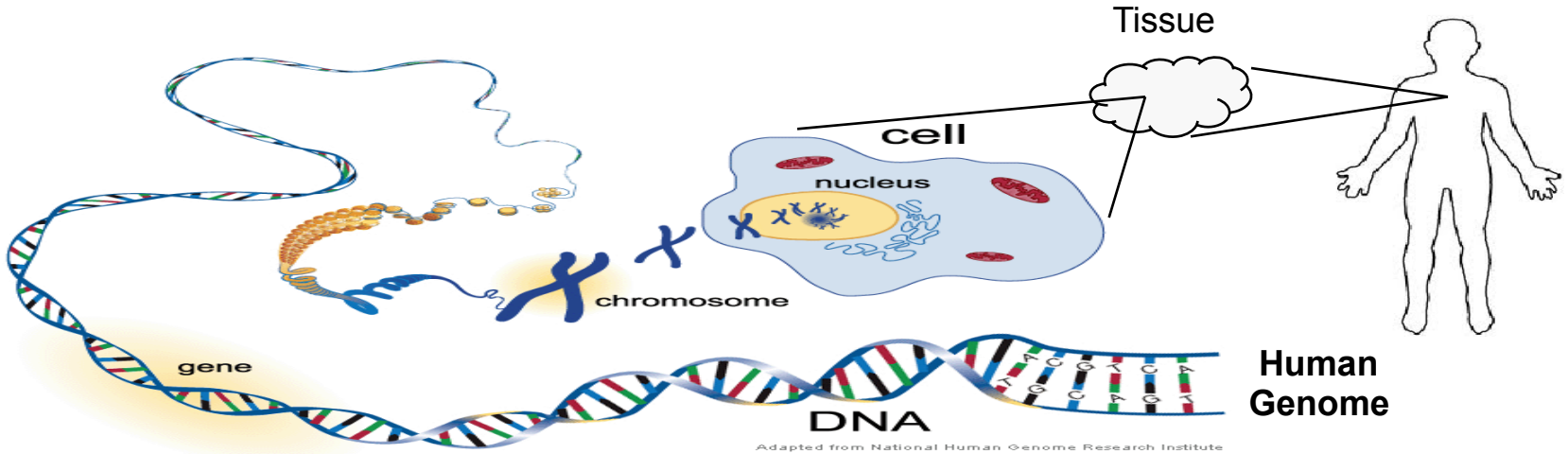
FACTORFIVE

SCIENCE

ADSCs have been shown in over 200 peer reviewed scientific studies to benefit the skin and/or cells supporting the skin.



BIOLOGY BREAKDOWN



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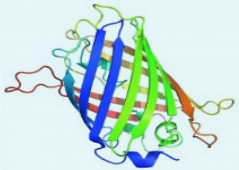

Protein

A protein is simply a chain of amino acids, including:

- Growth Factors
- Cytokines
- Enzymes
- Co-factors
- Paracrine Factors

ADSCs express 500-800 proteins, ~200 are related to or involved in skin health, including:

SERPINE1
CALR
CALU
CFD
CLEC3B
DPT
FSTL1
IGFBP6
LGALS1
LGALS3BP
PTX3
SERPINF1
SERPING1
SPARC
THBS1
TIMP1
CST3
MCP-1
SPAG9

APOE
C1R
C1s
CLU
COL1A1
COL12A1
COL1A2
COL2A1
COL3A1
COL4A1
COL4A2
COL5A1
COL5A2
COL6A1
COL6A2
COL6A3
ELASTIN
FIBRONECTIN
LAMININ

DBI
EFEMP1
FBLN1
FBN1
FN1
MCSF
HSPG2
IGFBP4
IGFBP5
IGFBP7
ISLR
LAMC1
LDHA
LTBP2
LUM
GEL-A
NID1
SOD2

PCOLCE
PPIA
QSOX1
SERPINE2
TAGLN2
CAD-2
THBS2
TIMP2
PDIA3
P4HB
TXNDC5
CTSD
HSP90B1
RBP4
ADIPOQ
PTGDS
SRPX
ICAM-1
HPAI-1

IL-1RA
IL-4
IL-6
IL-7
IL-8
IL-10
IL-12
IFN-a2
IFN-B
ENDOSTATIN
PLGF
PDGF-AA
CTGF
FGF-1
G-CSF
GM-CSF
PAI-1
ANXA2

KGF
EGF
EGF-1
IGF
PEDF
aFGF
FGF2 (bFGF)
HGF
NGF
TGF-B1
TGF-B2
TGF-B3
VEGF
MMP1
MMP2
MMP3
MMP7
MMP13
MMP19

12 forms of Collagen

SERPINE1
CALR
CALU
CFD
CLEC3B
DPT
FSTL1
IGFBP6
LGALS1
LGALS3BP
PTX3
SERPINF1
SERPING1
SPARC
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Extracellular Matrix Proteins (ECM)

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NGF
TGF-B1
TGF-B2
TGF-B3
VEGF
MMP1
MMP2
MMP3
MMP7
MMP13
MMP19

Potent Protective Antioxidant - Superoxidase Dismutase

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CALU
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CLEC3B
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TGF-B1
TGF-B2
TGF-B3
VEGF
MMP1
MMP2
MMP3
MMP7
MMP13
MMP19

Gene identified as making old mice behave/metabolize like young mice

SERPINE1
CALR
CALU
CFD
CLEC3B
DPT
FSTL1
IGFBP6
LGALS1
LGALS3BP
PTX3
SERPINF1
SERPING1
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ICAM-1
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IL-10
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ENDOSTATIN
PLGF
PDGF-AA
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FGF-1
G-CSF
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ANXA2

KGF
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EGF-1
IGF
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aFGF
FGF2 (bFGF)
HGF
NGF
TGF-B1
TGF-B2
TGF-B3
VEGF
MMP1
MMP2
MMP3
MMP7
MMP13
MMP19

SOURCE: https://www.nature.com/news/young-human-blood-makes-old-mice-smarter-1.21848

9+ Proteins involved in regulation of inflammation and immune response

SERPINE1
CALR
CALU
CFD
CLEC3B
DPT
FSTL1
IGFBP6
LGALS1
LGALS3BP
PTX3
SERPINF1
SERPING1
SPARC
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FBLN1
FBN1
FN1
MCSF
HSPG2
IGFBP4
IGFBP5
IGFBP7
ISLR
LAMC1
LDHA
LTBP2
LUM
GEL-A
NID1
SOD2

PCOLCE
PPIA
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SERPINE2
TAGLN2
CAD-2
THBS2
TIMP2
PDIA3
P4HB
TXNDC5
CTSD
HSP90B1
RBP4
ADIPOQ
PTGDS
SRPX
ICAM-1
HPAI-1

IL-1RA
IL-4
IL-6
IL-7
IL-8
IL-10
IL-12
IFN-a2
IFN-B
ENDOSTATIN
PLGF
PDGF-AA
CTGF
FGF-1
G-CSF
GM-CSF
PAI-1
ANXA2

KGF
EGF
EGF-1
IGF
PEDF
aFGF
FGF2 (bFGF)
HGF
NGF
TGF-B1
TGF-B2
TGF-B3
VEGF
MMP1
MMP2
MMP3
MMP7
MMP13
MMP19

Growth Factors, regulating cell turnover, angiogenesis, cell movement/migration, etc.

SERPINE1
CALR
CALU
CFD
CLEC3B
DPT
FSTL1
IGFBP6
LGALS1
LGALS3BP
PTX3
SERPINF1
SERPING1
SPARC
THBS1
TIMP1
CST3
MCP-1
SPAG9

APOE
C1R
C1s
CLU
COL1A1
COL12A1
COL1A2
COL2A1
COL3A1
COL4A1
COL4A2
COL5A1
COL5A2
COL6A1
COL6A2
COL6A3
ELASTIN
FIBRONECTIN
LAMININ

DBI
EFEMP1
FBLN1
FBN1
FN1
MCSF
HSPG2
IGFBP4
IGFBP5
IGFBP7
ISLR
LAMC1
LDHA
LTBP2
LUM
GEL-A
NID1
SOD2

PCOLCE
PPIA
QSOX1
SERPINE2
TAGLN2
CAD-2
THBS2
TIMP2
PDIA3
P4HB
TXNDC5
CTSD
HSP90B1
RBP4
ADIPOQ
PTGDS
SRPX
ICAM-1
HPAI-1

IL-1RA
IL-4
IL-6
IL-7
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PEDF
aFGF
FGF2 (bFGF)
HGF
NGF
TGF-B1
TGF-B2
TGF-B3
VEGF
MMP1
MMP2
MMP3
MMP7
MMP13
MMP19

6+ Matrix Metalloproteases, regulating healing and preventing scar formation

SERPINE1
CALR
CALU
CFD
CLEC3B
DPT
FSTL1
IGFBP6
LGALS1
LGALS3BP
PTX3
SERPINF1
SERPING1
SPARC
THBS1
TIMP1
CST3
MCP-1
SPAG9

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COL4A1
COL4A2
COL5A1
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COL6A2
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FBLN1
FBN1
FN1
MCSF
HSPG2
IGFBP4
IGFBP5
IGFBP7
ISLR
LAMC1
LDHA
LTBP2
LUM
GEL-A
NID1
SOD2

PCOLCE
PPIA
QSOX1
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TAGLN2
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TGF-B1
TGF-B2
TGF-B3
VEGF
MMP1
MMP2
MMP3
MMP7
MMP13
MMP19

RESULTS

05

FACTORFIVE

STUDY #1
RESULTS

BEFORE





AFTER

AFTER 4 WEEKS

STUDY #1
RESULTS

BEFORE





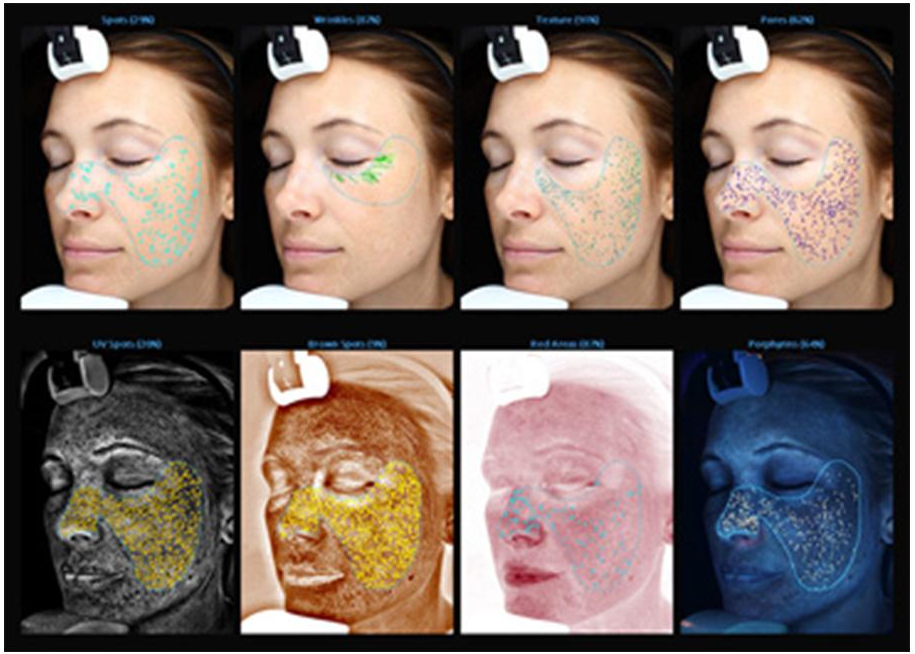
AFTER

AFTER 4 WEEKS

STUDY #1
RESULTS: VISIA SYSTEM

FACIAL SCANNER





HIGH DEFINITION, QUANTIFIABLE MULTIVARIABLE ANALYSIS

STUDY #1: 4 WEEKS - TOPICAL APPLICATION MORNING & EVENING

RESULTS: VISIA SYSTEM

BEFORE





AFTER

REDNESS — 33% reduction

FACTORFIVE

STUDY #1: 4 WEEKS - TOPICAL APPLICATION MORNING & EVENING

RESULTS: VISIA SYSTEM

BEFORE





AFTER

REDNESS — 73% reduction

STUDY #1: 4 WEEKS - TOPICAL APPLICATION MORNING & EVENING

RESULTS: VISIA SYSTEM

BEFORE





AFTER

WRINKLES — 29% minimization

STUDY #1: 4 WEEKS - TOPICAL APPLICATION MORNING & EVENING

RESULTS: VISIA SYSTEM

BEFORE





AFTER

WRINKLES — 17% minimization

FACTORFIVE

STUDY #1: 4 WEEKS - TOPICAL APPLICATION MORNING & EVENING

RESULTS: VISIA SYSTEM

BEFORE





AFTER

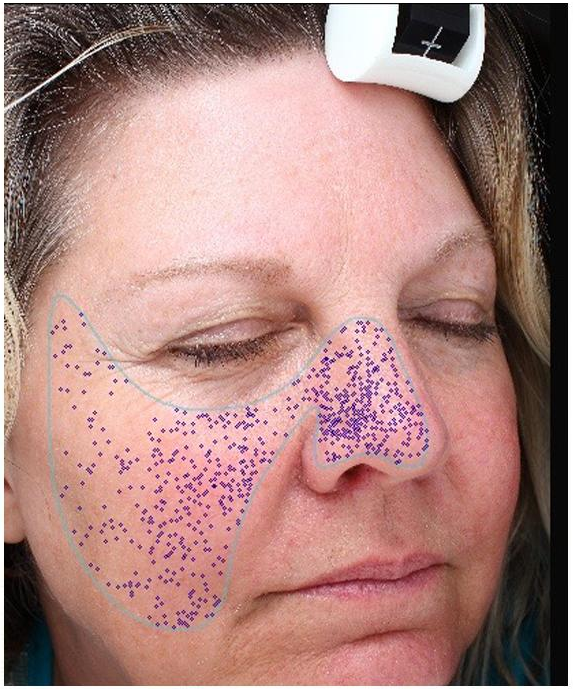
TEXTURE — 73% improvement

FACTORFIVE

STUDY #1: 4 WEEKS - TOPICAL APPLICATION MORNING & EVENING

RESULTS: VISIA SYSTEM

BEFORE





AFTER

PORES — 31% improvement

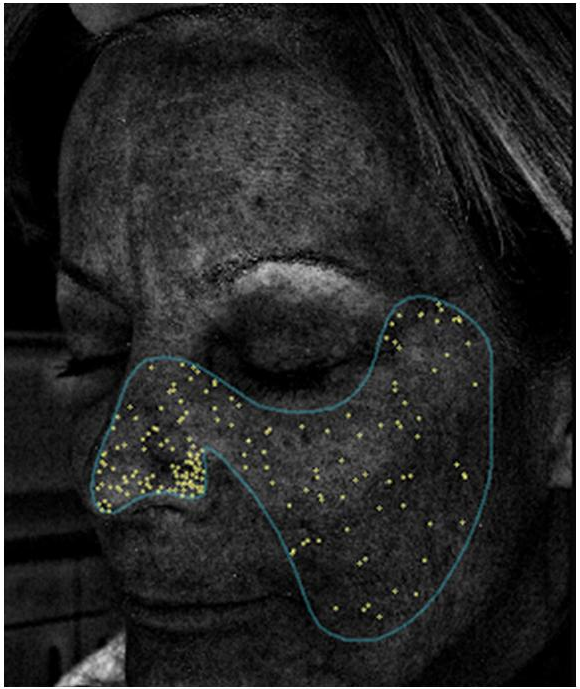
FACTORFIVE

STUDY #1: 4 WEEKS - TOPICAL APPLICATION MORNING & EVENING

RESULTS: VISIA SYSTEM

BEFORE





AFTER

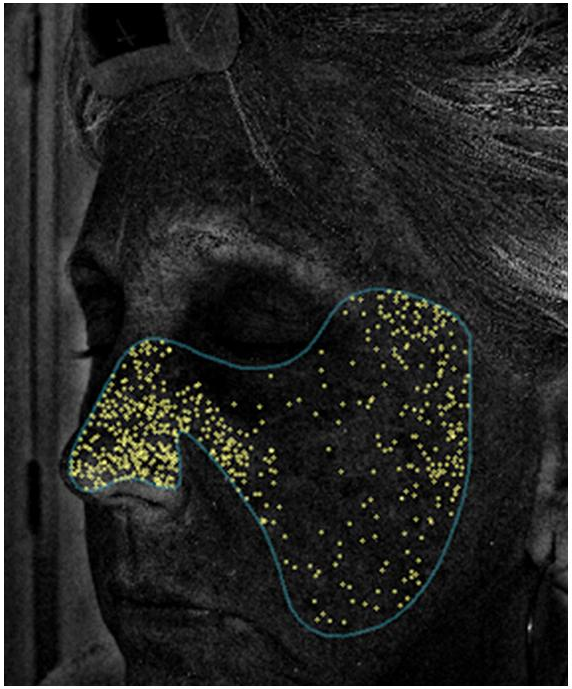
PORPHYRINS — 40% improvement

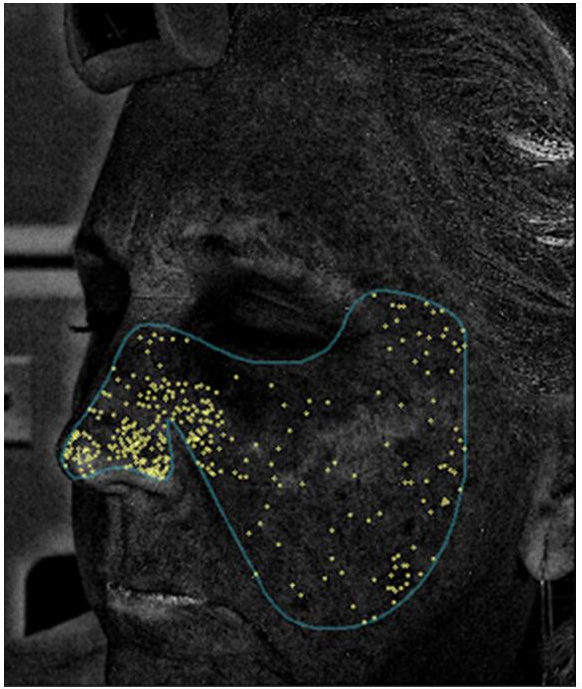
FACTORFIVE

STUDY #1: 4 WEEKS - TOPICAL APPLICATION MORNING & EVENING

RESULTS: VISIA SYSTEM

BEFORE





AFTER

PORPHYRINS — 36% improvement

FACTORFIVE

STUDY #2: 3 WEEK STUDY RESULTS

Control Side



FACTORFIVE

FACTORFIVE

Control Side



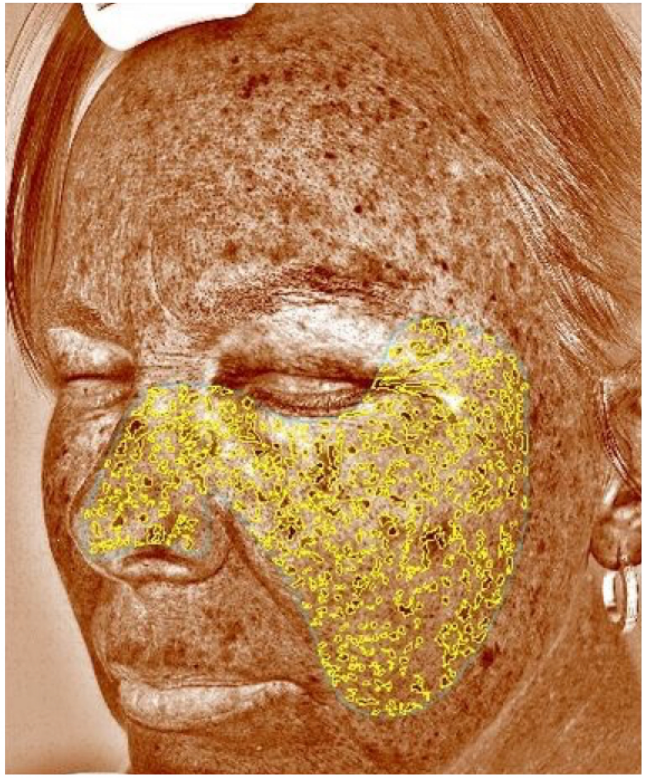
FACTORFIVE

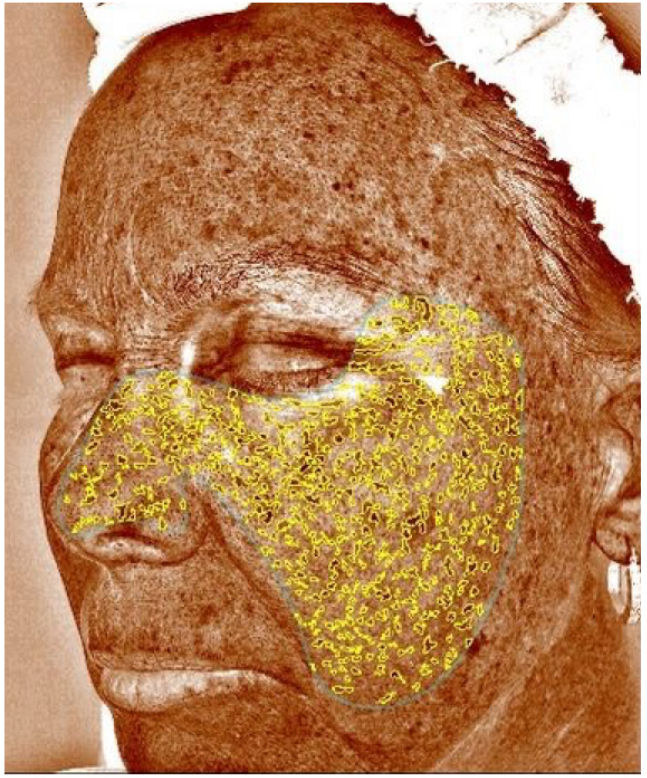
FACTORFIVE

STUDY #2: 3 WEEK STUDY RESULTS

BROWN SPOTS

baseline





3 weeks

19% improvement with FACTOR**FIVE** after 3 weeks

FACTORFIVE

STUDY #2: 3 WEEK STUDY RESULTS

PORES

baseline





3 weeks

27% improvement with FACTOR**FIVE** after 3 weeks

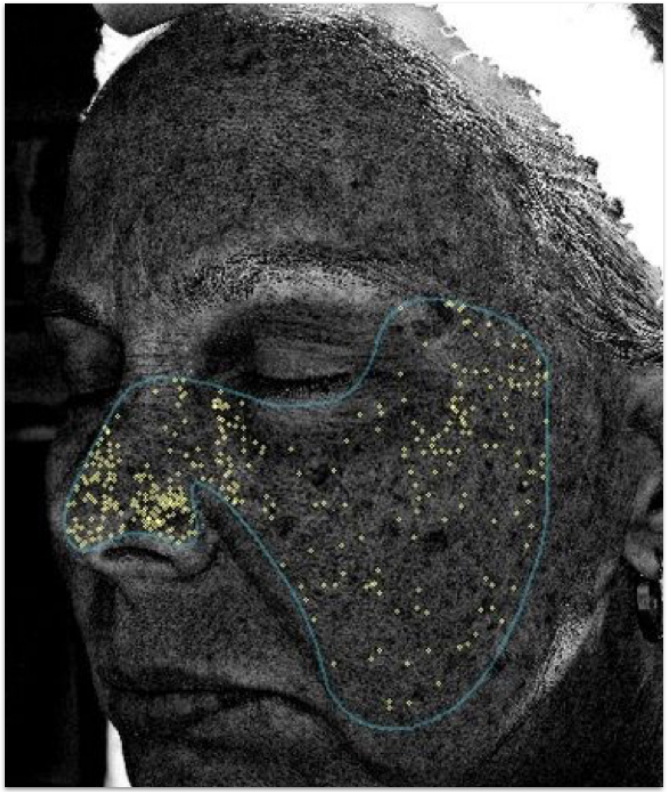
FACTORFIVE

STUDY #2: 3 WEEK STUDY RESULTS

PORPHYRINS

baseline





3 weeks

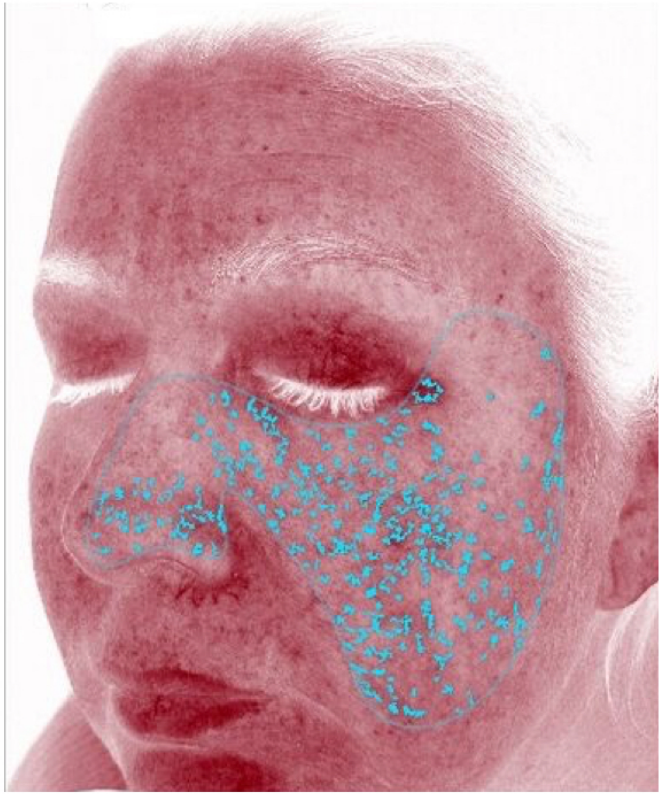
39% improvement with FACTOR**FIVE** after 3 weeks

FACTORFIVE

STUDY #2: 3 WEEK STUDY RESULTS

REDNESS

baseline





3 weeks

21% improvement with FACTOR**FIVE** after 3 weeks

END

Q+A

CONTACT

Questions?

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