# MEAT

## TECHSPEC REVIEW

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**20.020**
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# Impact

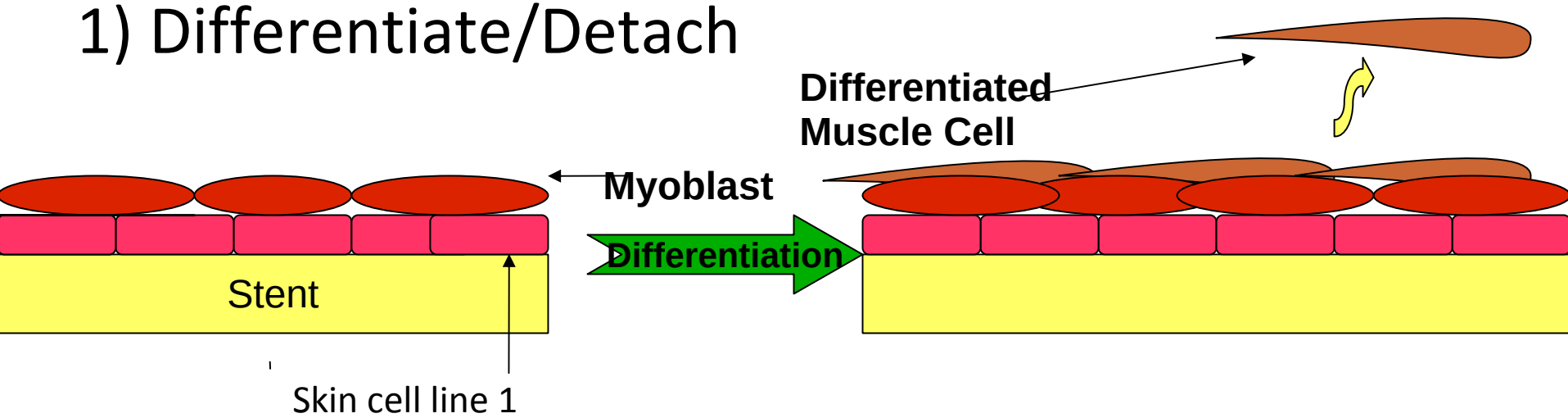
- Use of cattle as source of meat is highly resource demanding
- Methane gas emitted from cattle contributes to global warming
- Ethical issues with treatment of animals
- Presence of high levels of synthetic hormones and antibiotics in present-day meat
- Risk of contamination during development or slaughter

# Purpose

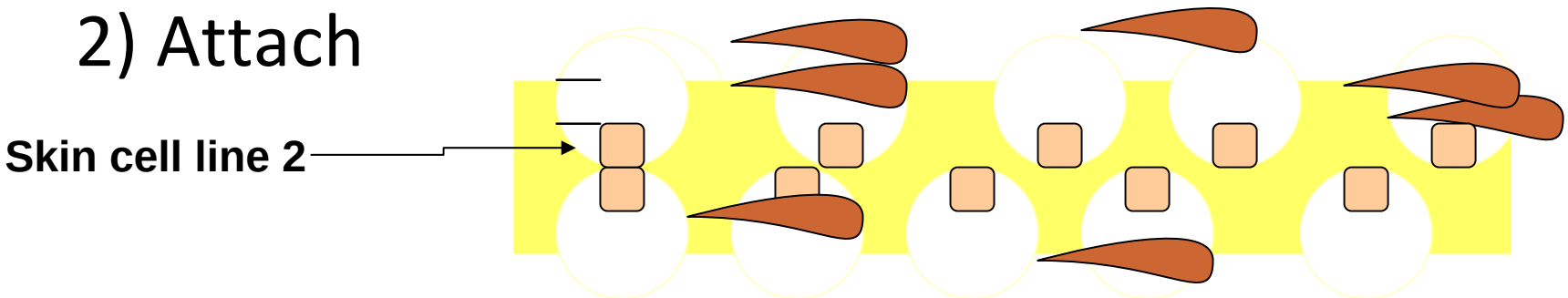
- Develop a procedure with tools from tissue engineering that allow for the construction of edible tissue that closely resembles the present-day meat product and addresses nutritional and safety concerns

# 3 Step Process

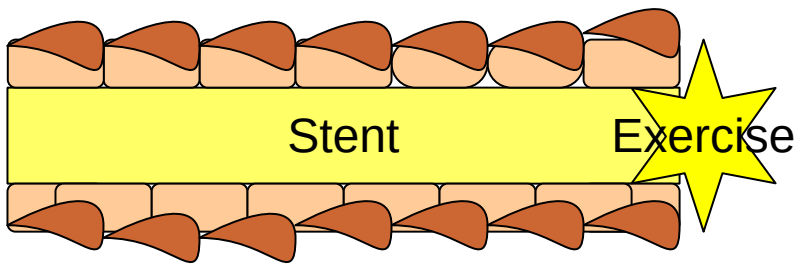
## 1) Differentiate/Detach



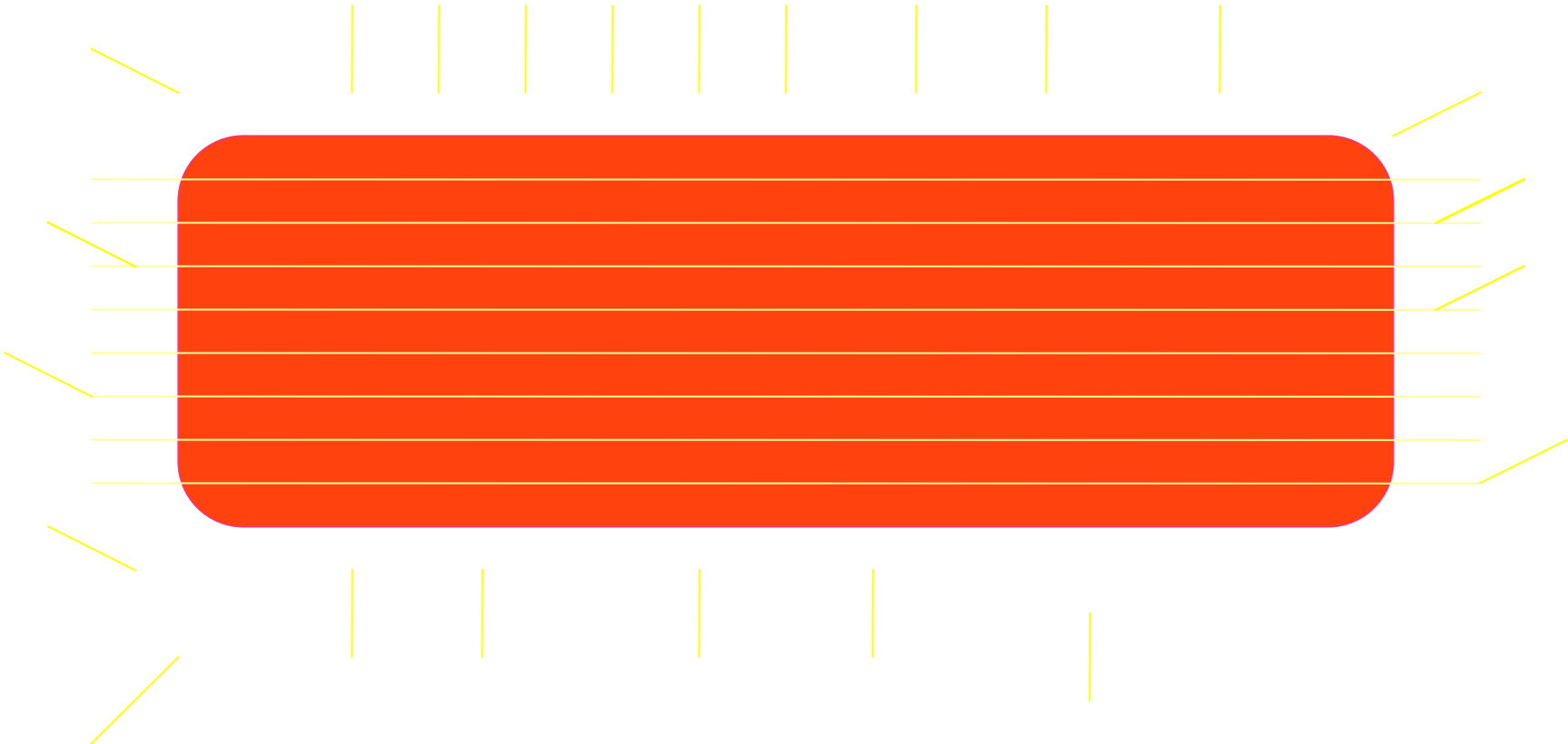

## 2) Attach




## 3)Exercise

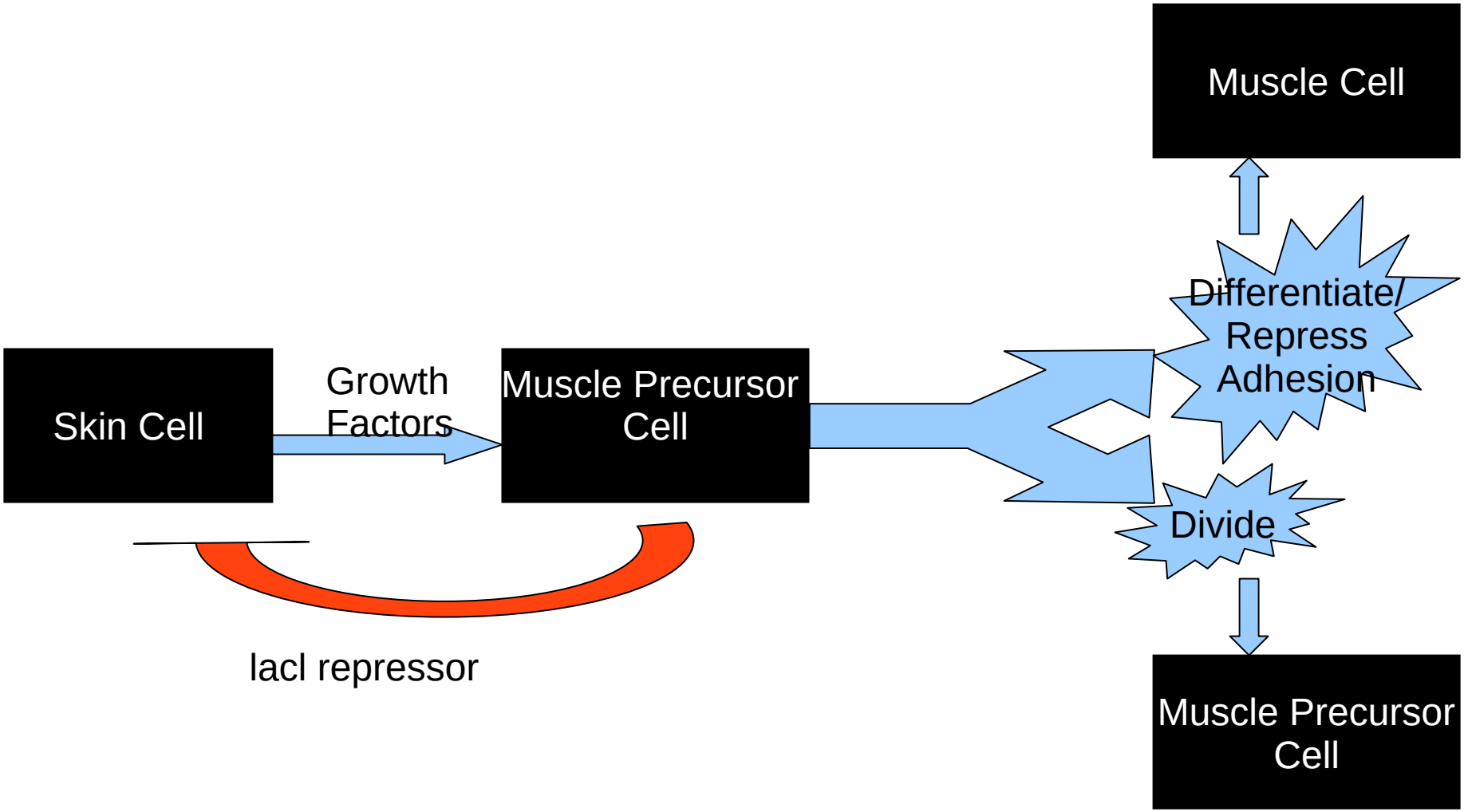


# FINAL PRODUCT

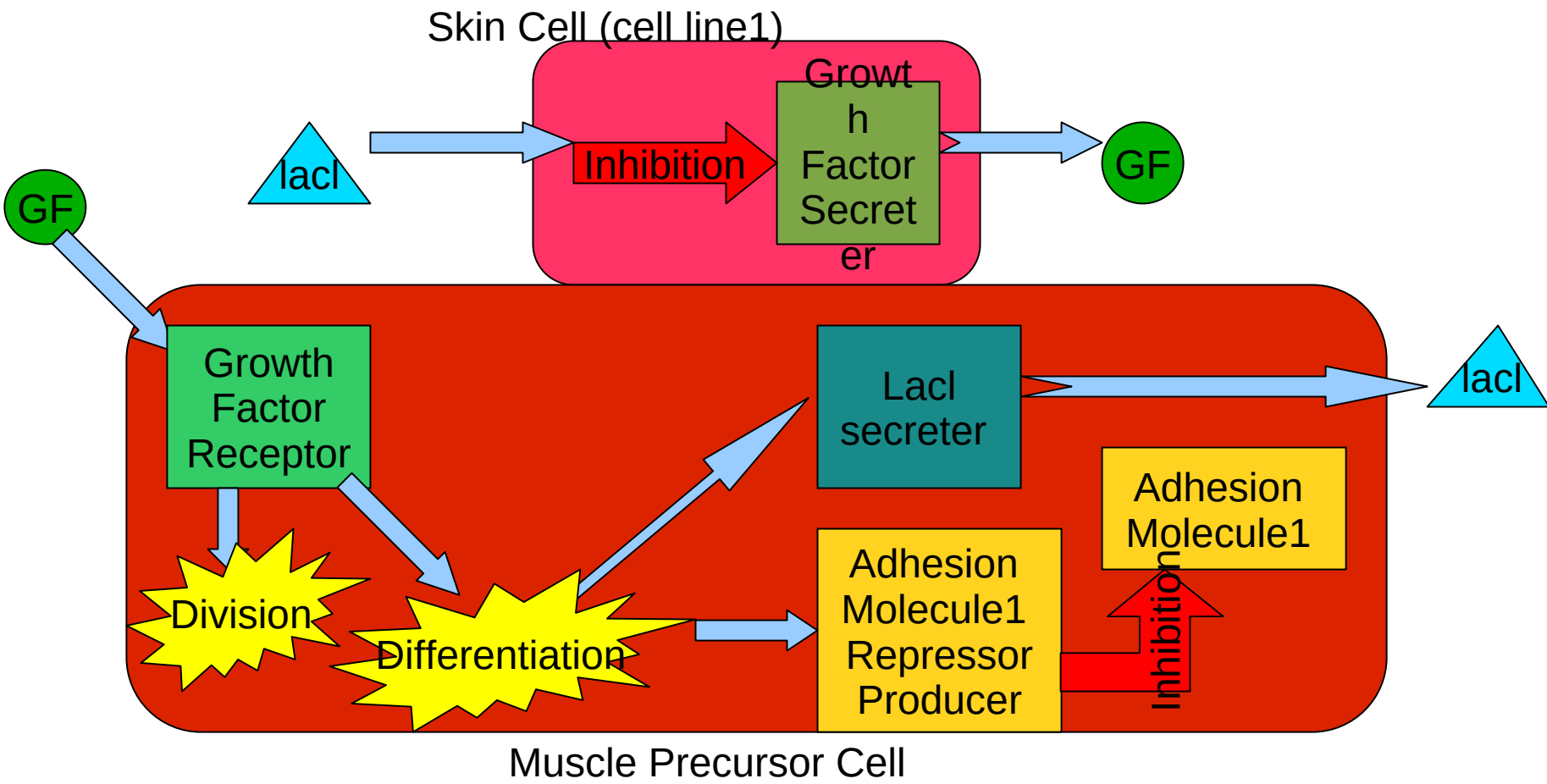


# System and Device Overview

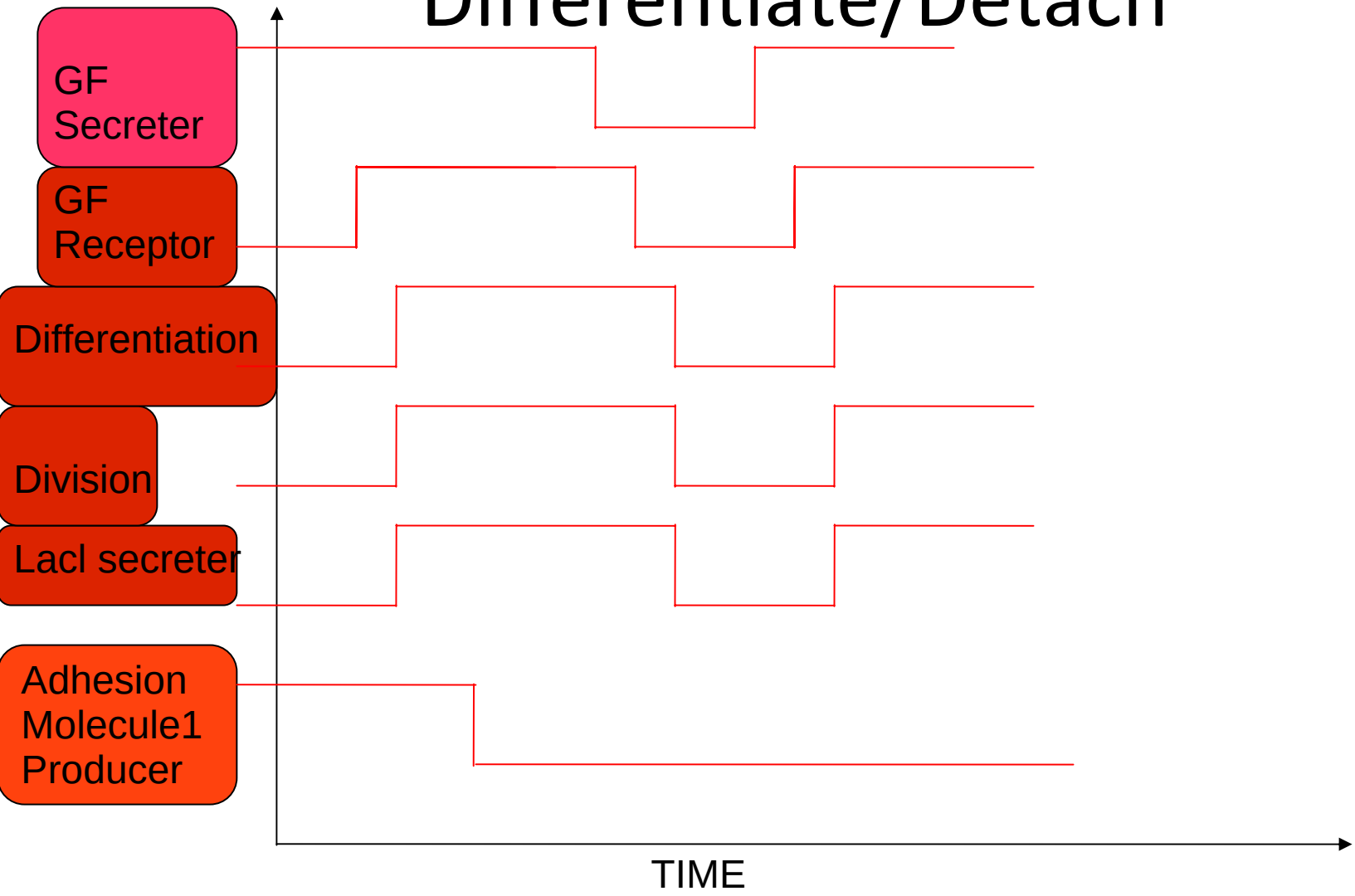
# Differentiate/Detach



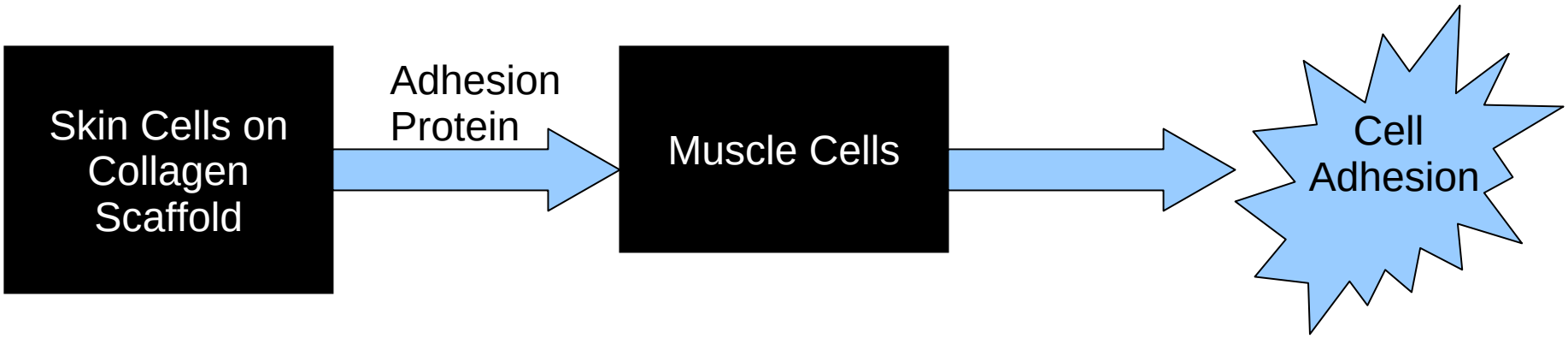
# Differentiate/Detach



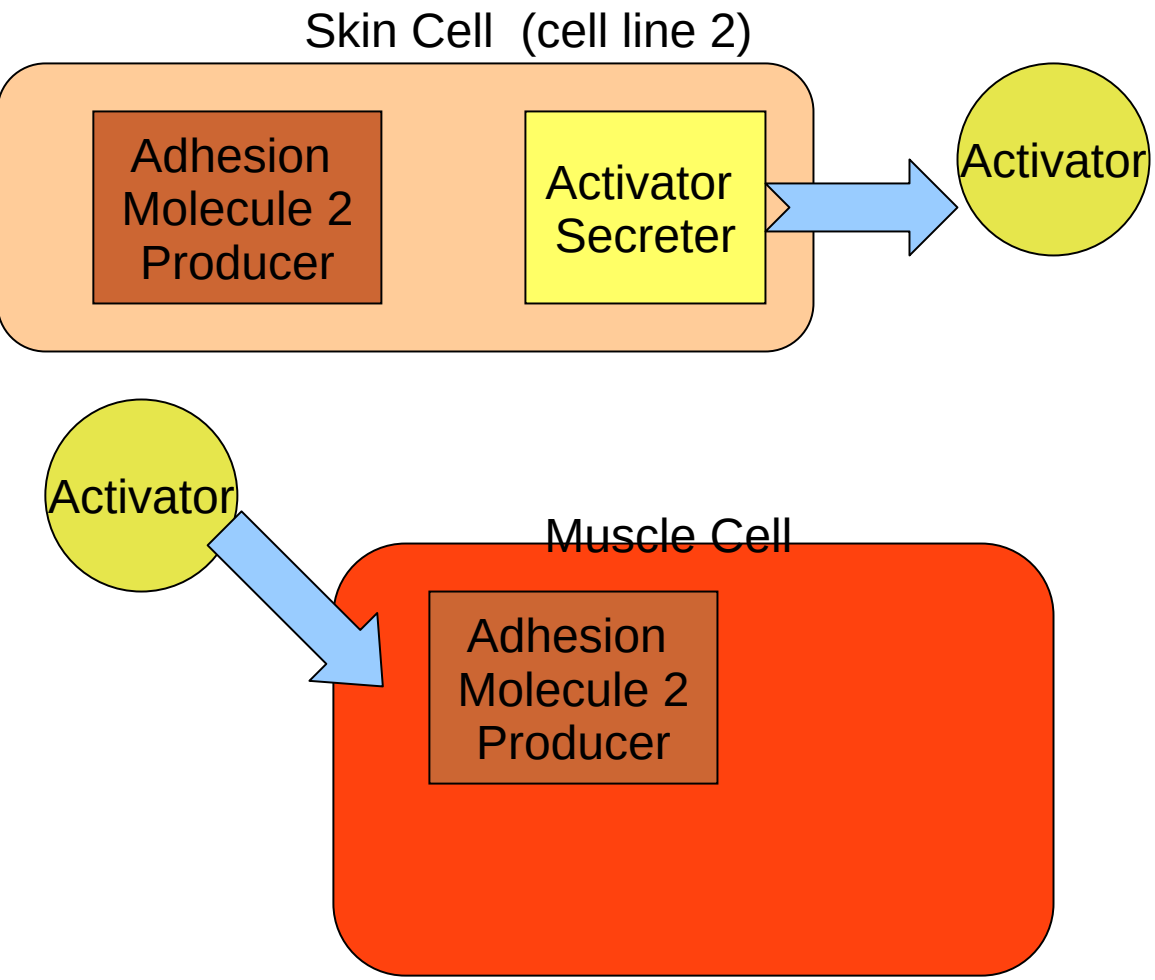
# Differentiate/Detach



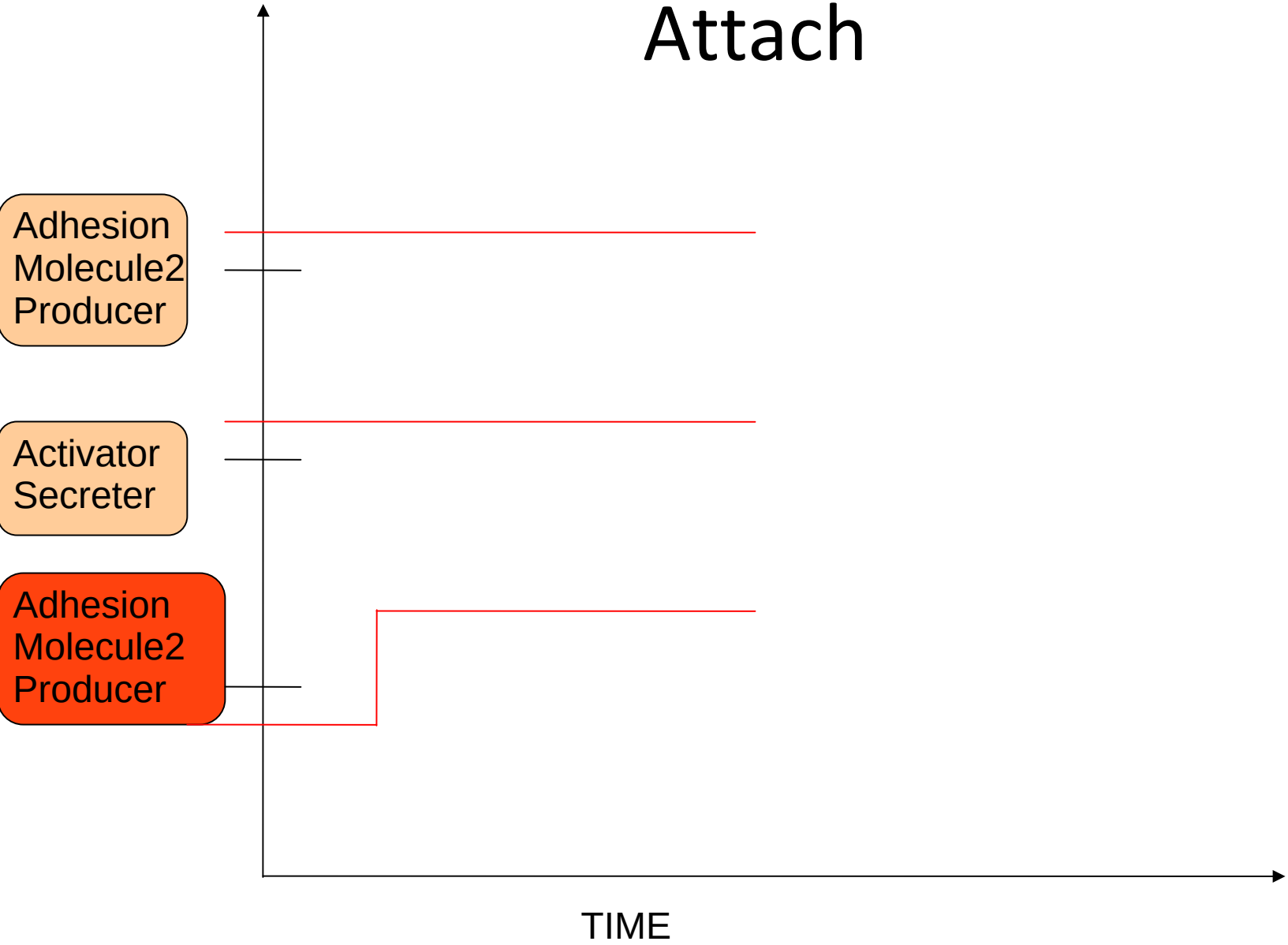
# Attach


Skin Cells on Collagen Scaffold
Adhesion Protein
Muscle Cells
Cell Adhesion

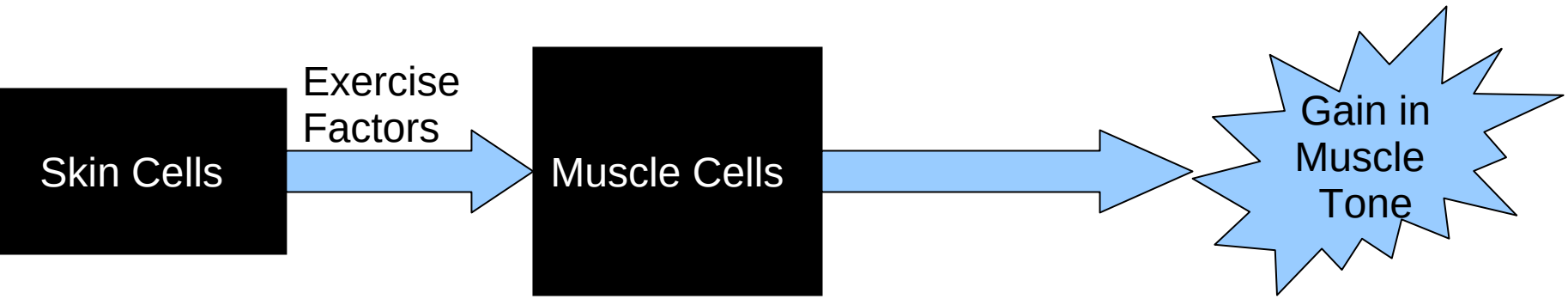
# Attach


Skin Cell (cell line 2)
Adhesion Molecule 2 Producer
Activator Secreter
Activator
Activator
Muscle Cell
Adhesion Molecule 2 Producer

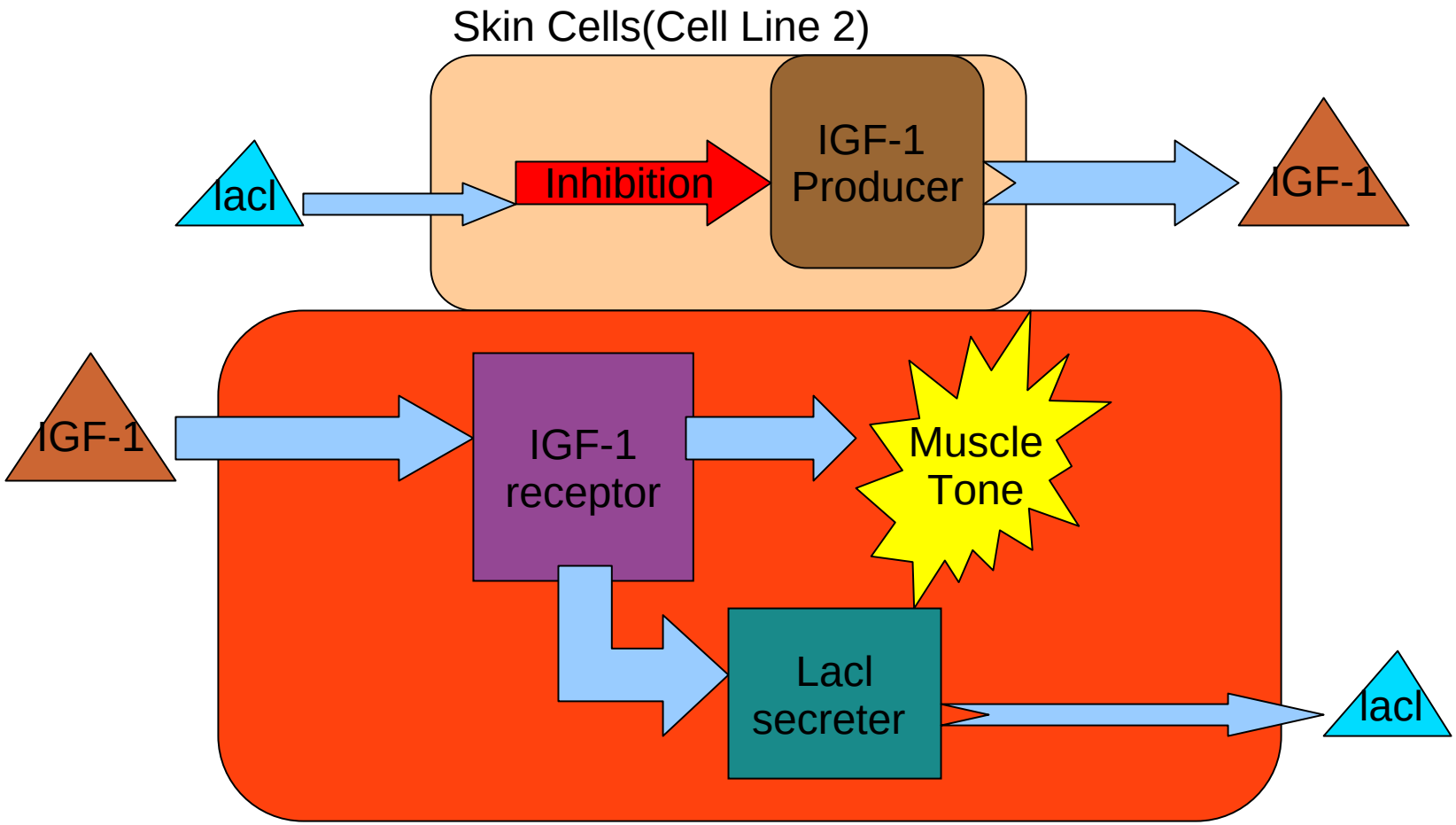
# Attach


Adhesion Molecule2 Producer
Activator Secreter
Adhesion Molecule2 Producer
TIME

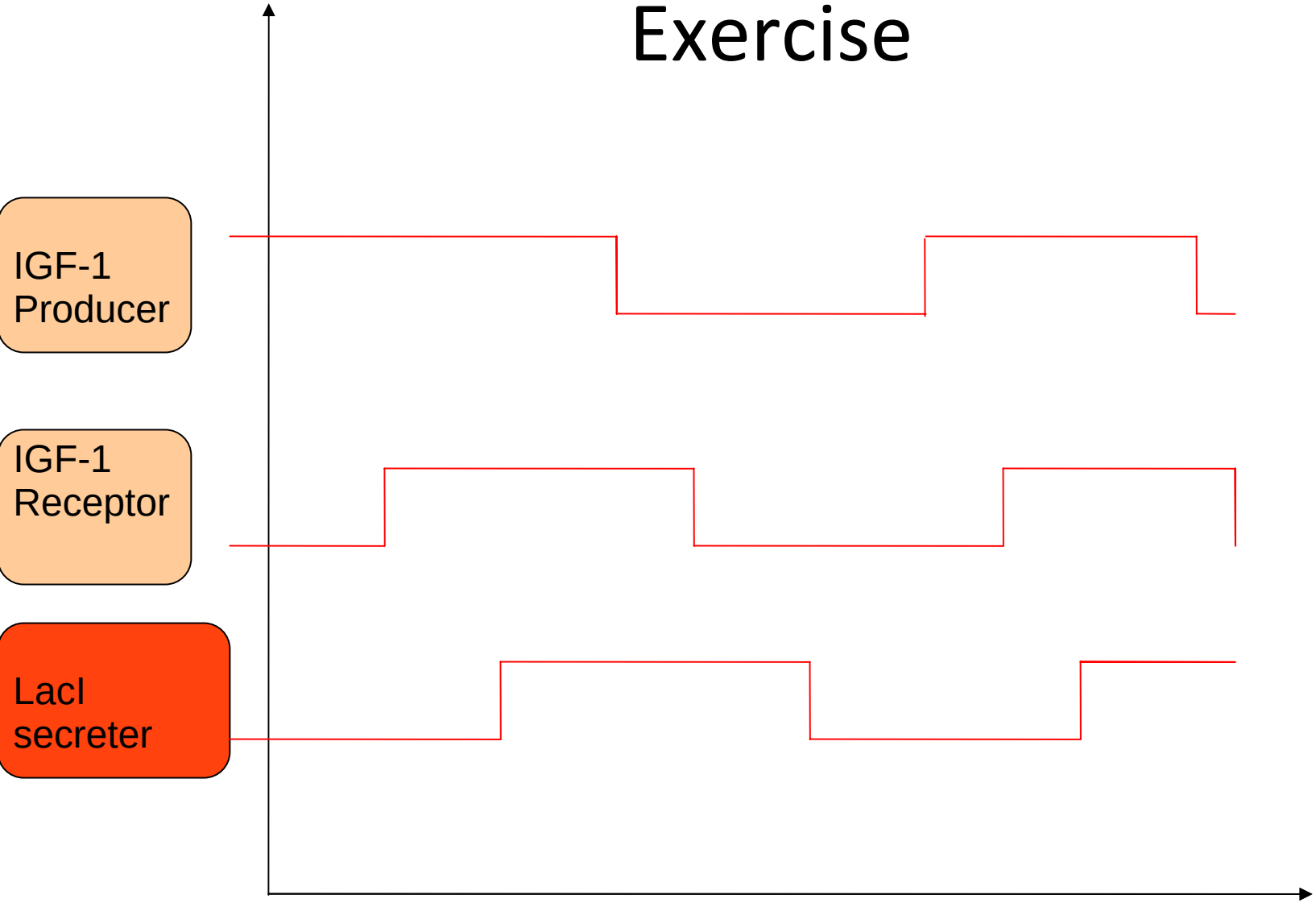
# Exercise


Skin Cells
Exercise Factors
Muscle Cells
Gain in Muscle Tone

# Exercise

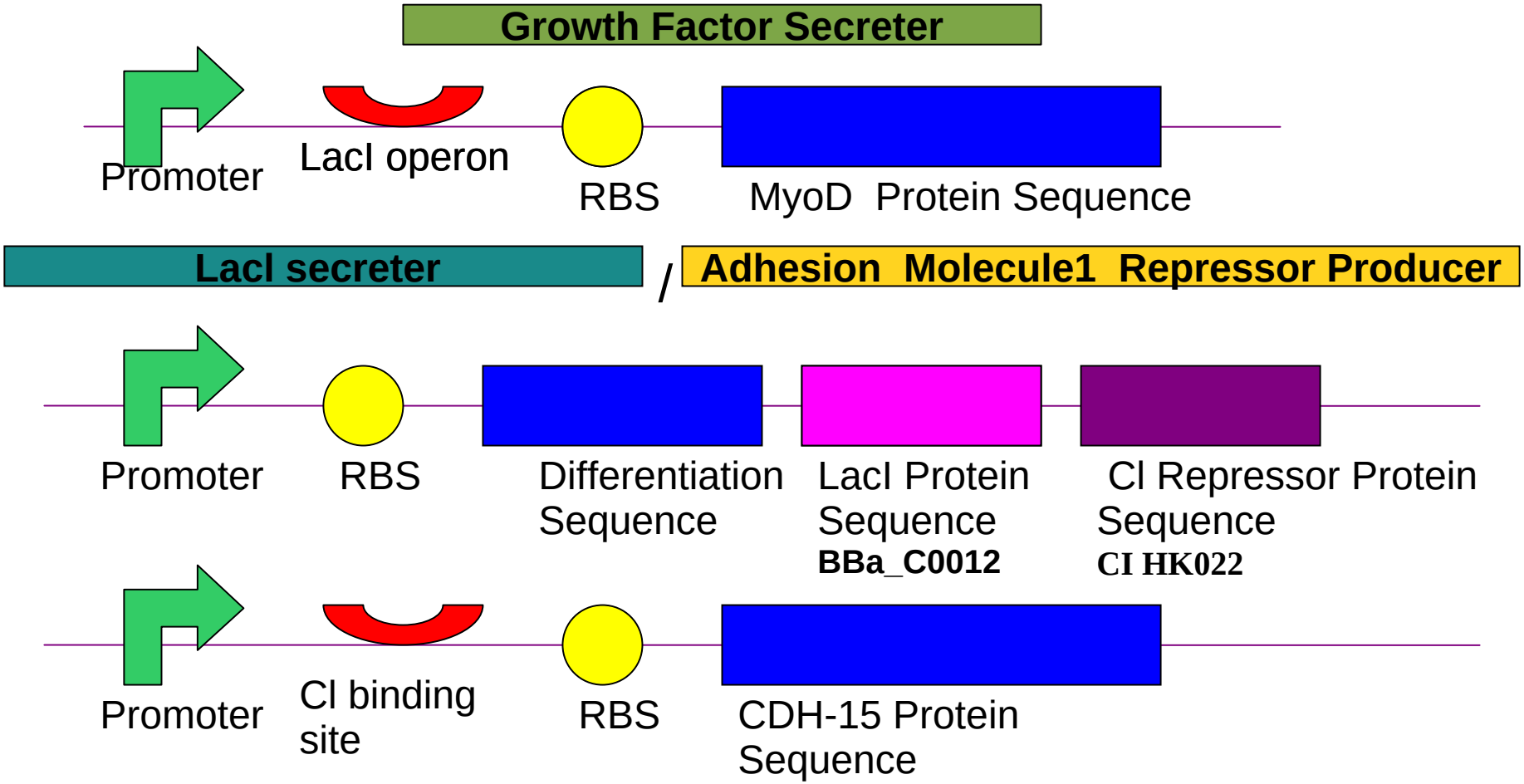

Skin Cells(Cell Line 2)
IGF-1 Producer
Inhibition
lacl
IGF-1
IGF-1
IGF-1 receptor
Muscle Tone
Lacl secreter
lacl

# Exercise

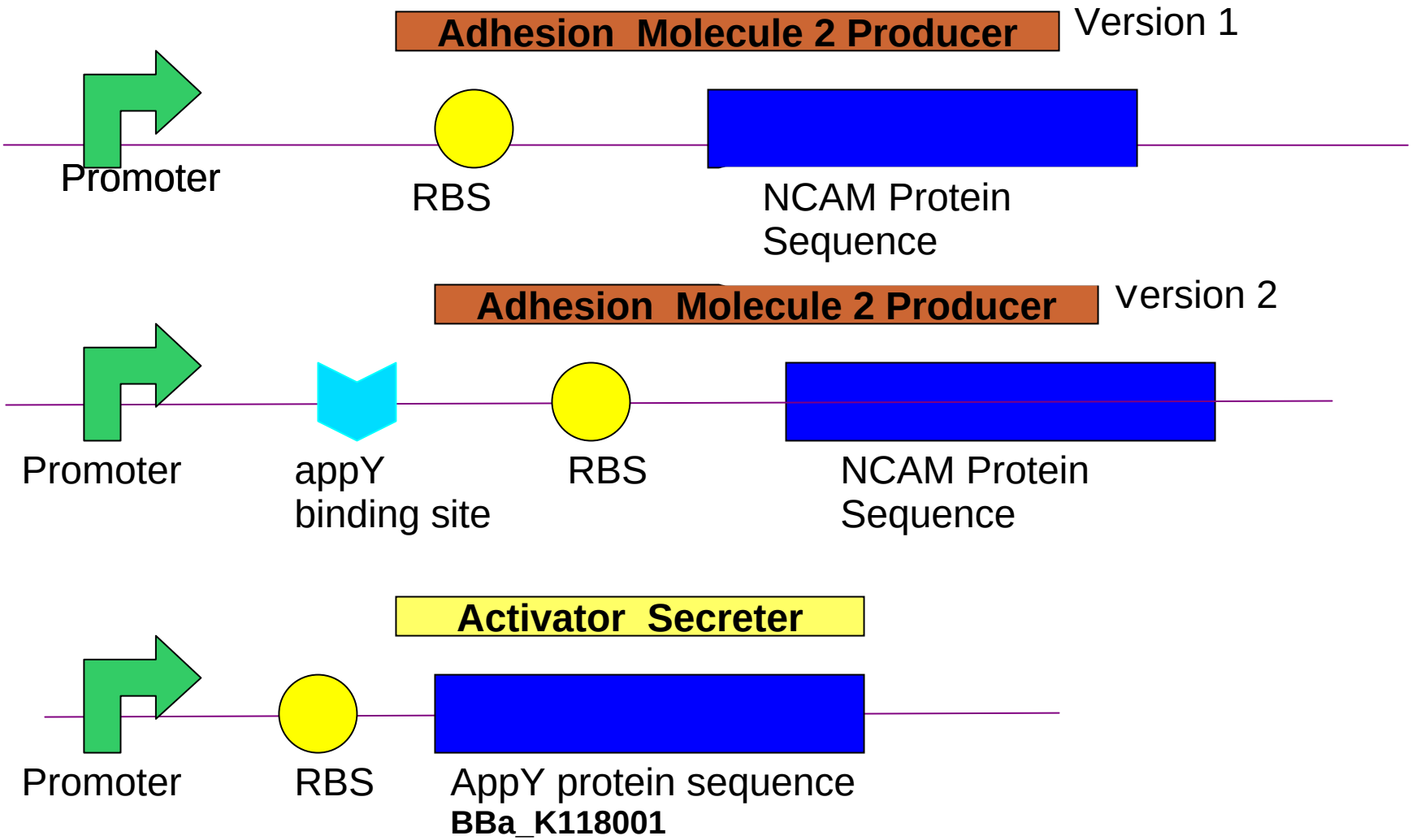


# PARTS

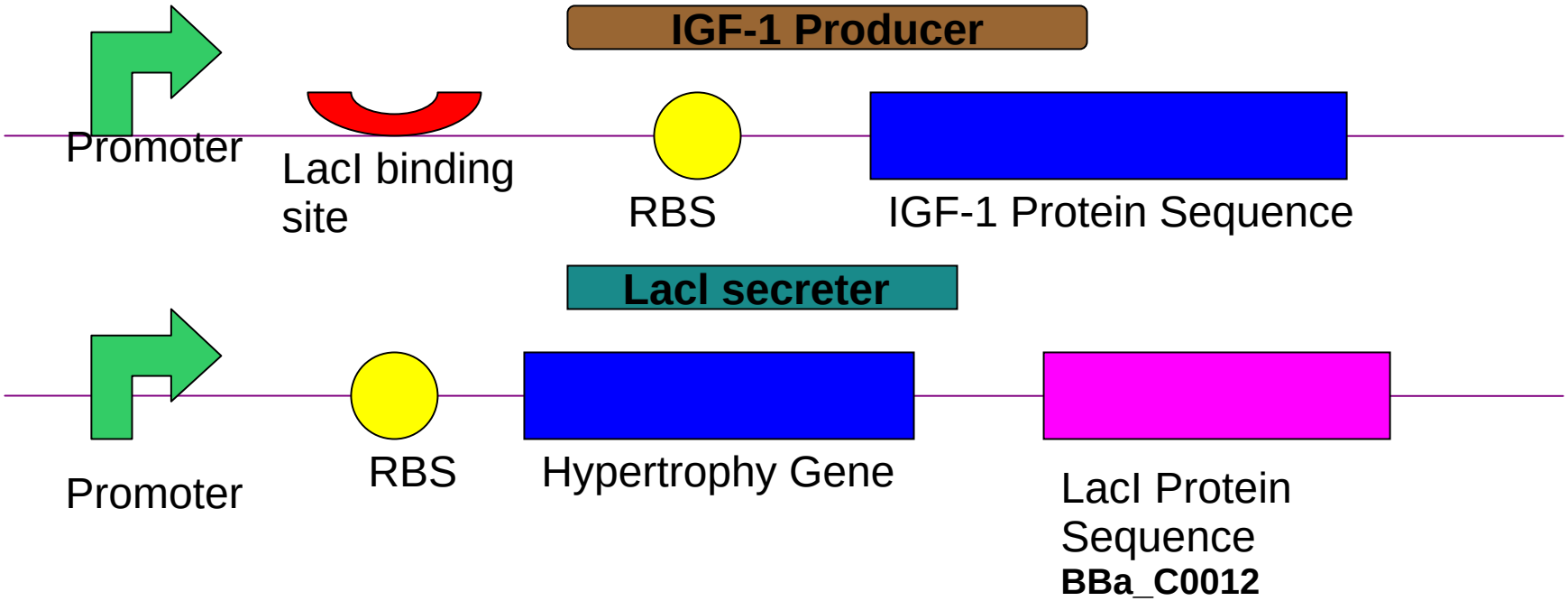
# Differentiate/Detach



# Attach


Adhesion Molecule 2 Producer
Version 1
Promoter
RBS
NCAM Protein Sequence
Adhesion Molecule 2 Producer
version 2
Promoter
appY binding site
RBS
NCAM Protein Sequence
Activator Secreter
Promoter
RBS
AppY protein sequence
BBa_K118001

# Exercise


IGF-1 Producer
Promoter
LacI binding site
RBS
IGF-1 Protein Sequence
LacI secreter
Promoter
RBS
Hypertrophy Gene
LacI Protein Sequence
BBa_C0012

# Testing/Debugging

- Differentiate/Detach: Removal of differentiating system and comparison of before/after muscle cell concentration
- Attach: Attachment of muscle cells to collagen scaffold indicates system working
- Exercise: Compare to non-stimulated muscle cells

# Unknowns and Possible Issues

- Yield of procedure?
- Percentage of floating muscle cells harvested?

# Open Issues

- Bioreactor or not?
- Different pathways?

# Go or No Go?

GO!

20.020 Introduction to Biological Engineering Design
Spring 2009