

# INTRODUCTION FOR PHYSIOLOGY



# What is homeostasis?

**Hemeo: same**

**Stasis: standing**

Process that occurs in all living things  
All organ systems work together to achieve homeostasis

Ability of an organism to maintain its internal environment, despite changes to its internal or external environment

Homeostasis is related with balances

Homeostasis :  
This mechanism is to restores balances to the body in case of any changes in the body as a result of external environmental changes or internal organic changes



## 1) Feedback pathways :

-A cellular relay race

-Specific organs and structures must communicate with each other in response to changes in the body

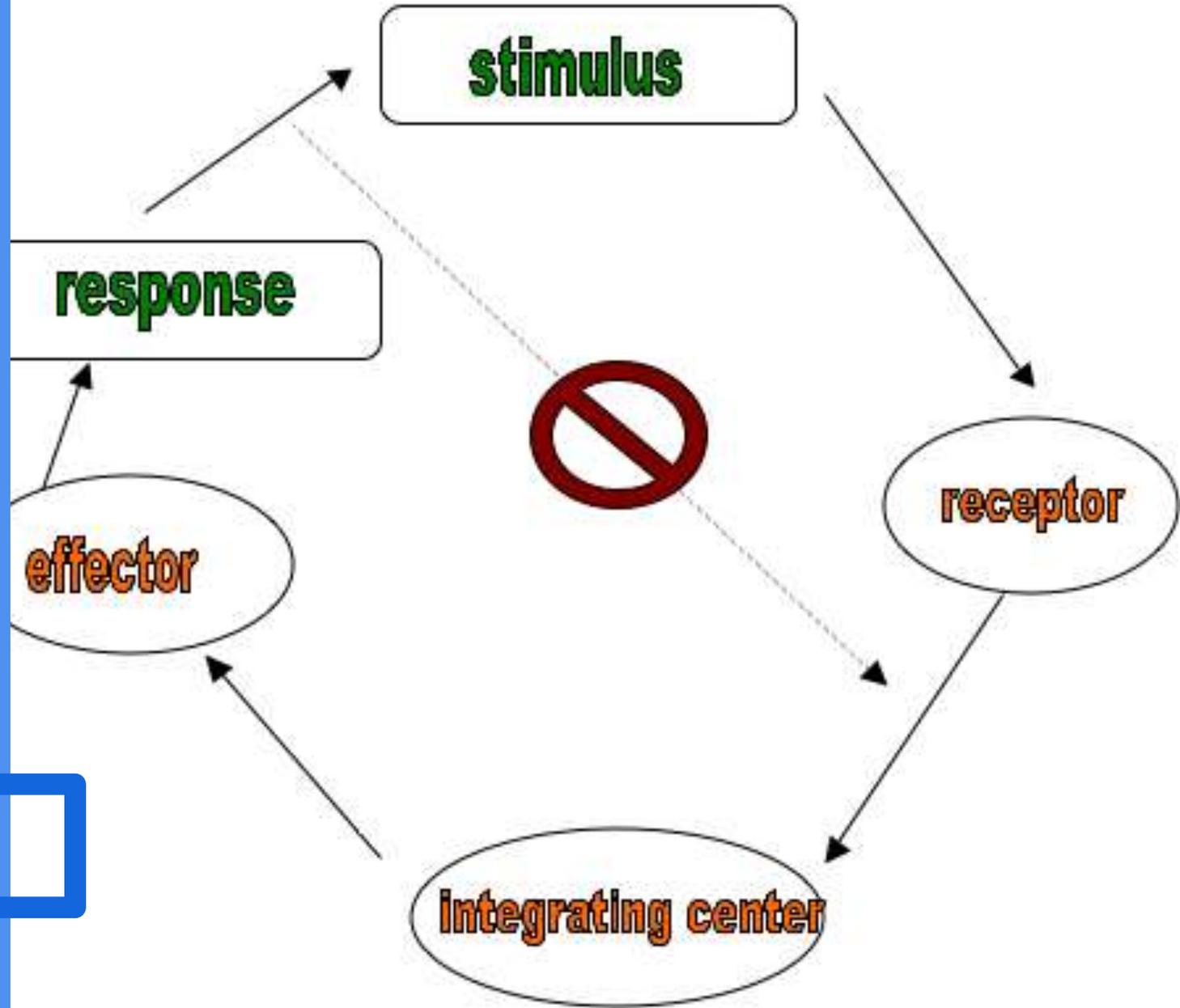
Feedback : is an impression of particular thing

## 2) Keeps levels of certain processes within a normal range

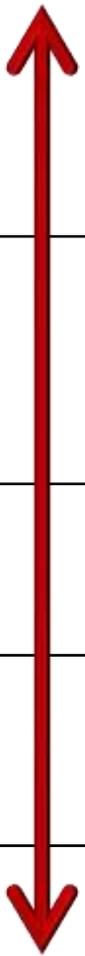
In case the body does not respond normally and does not achieve balance, it needs a medical attention

# How to maintain homeostasis ?

# Cellular relay race



	<b>Definition</b>	<b>Types</b>	<b>Function</b>	<b>Example</b>
<b>stimulus</b>	The thing that affects the body positively or negatively by increasing or decreasing	From external environment From internal the body	Affects the body and causes changes in homeostasis	Weather changes (temperature )
<b>Receptor</b>	Sensory receptor (ascending neurons) Receive the stimulus	Specific for each stimulus	Sensory neurons take the information from the body up to the central nervous system	Thermoreceptor for temperature
<b>Integrating center</b>	Central nervous system	Brain and spinal cord	Process the information	Determine if high or low temperature of the body
<b>effector</b>	Motor neurons (descending)	<b>Not mentioned .....</b>	Take the commands from the CNS to the organs	Transmits orders for body temperature for sweat glands and other organs
<b>response</b>	The body's reaction to a stimulus	According to the stimulus but always the opposite	achieve homeostasis	Either loss the heat by sweating or maintain heat by shivering



**Reverses the stimulus : if it increase the response will decrease the stimulus and vice versa : in this example according to the temperature if high the body will lose and vice versa**

# What things in your body need to be kept within a range?

- **Body Temperature**
- **Blood pressure: if increase results in perfusion problem and decrease causes decrease in blood circulation**
- **Blood pH :effected by acid and base balance**
- **O<sub>2</sub> and CO<sub>2</sub> concentration : increase CO<sub>2</sub> increase acidosis**
- **Osmoregulation-Water balance : concentration of water to salts**
- **Blood glucose : increase because of problem in insulin**

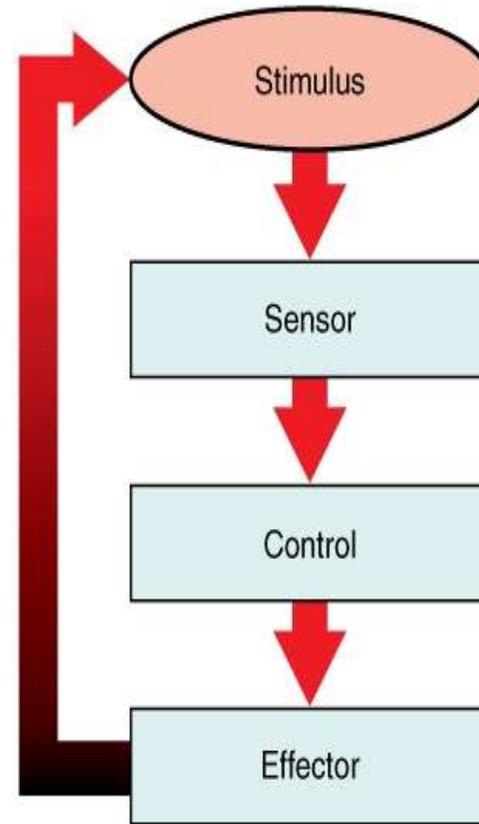
Every thing in the body should be within normal range

# Why is feedback important in living things?

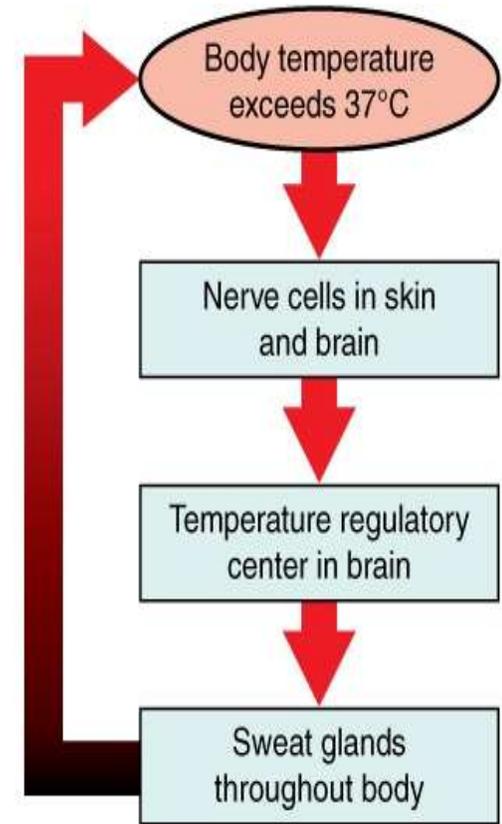


**Allows baseline to be regained**

- Cellular Materials
- Energy (ATP)



(a) Negative feedback loop



(b) Body temperature regulation

# Negative feedback pathways



Way in which most homeostatic mechanisms work



The product of the pathway inhibits, or shuts down, the original signal

# POSITIVE FEEDBACK LOOPS

VERSUS

# NEGATIVE FEEDBACK LOOPS

## POSITIVE FEEDBACK LOOPS

A feedback mechanism resulting in the amplification or growth of the output signal

Breakdown the homeostasis of the system

Less common but, occur in specific situations

Ex: childbirth, blood clotting, and fruit ripening

## NEGATIVE FEEDBACK LOOPS

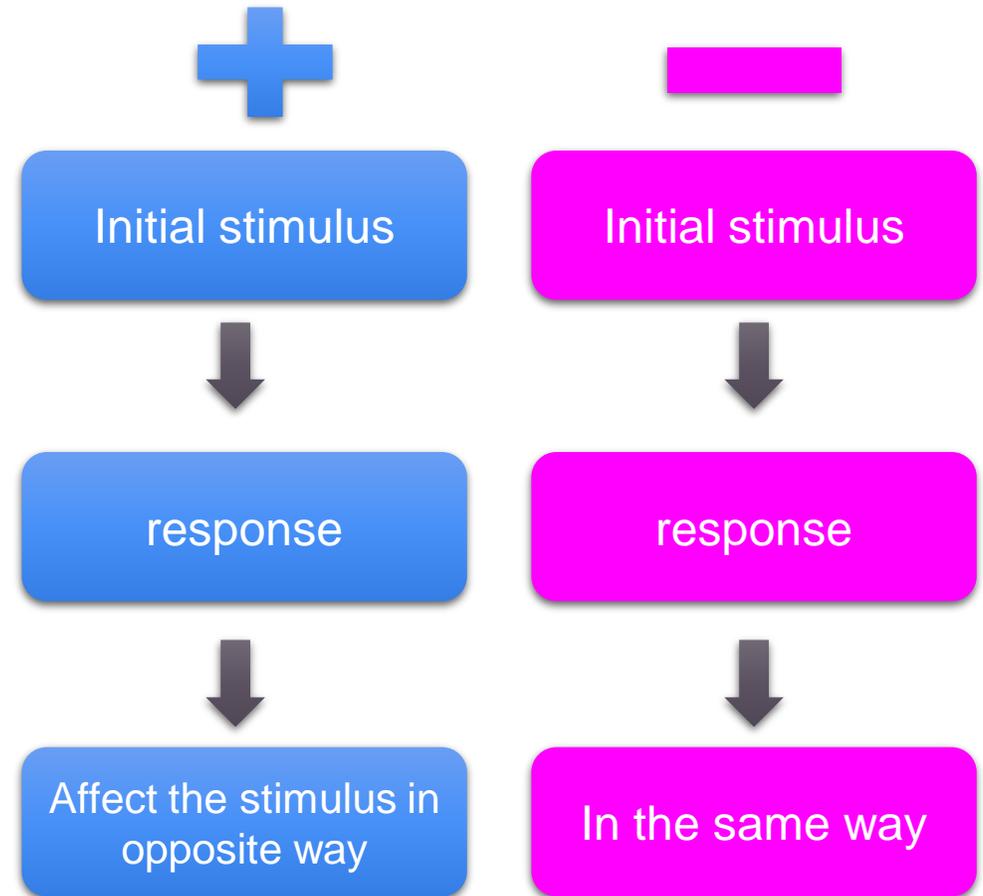
A feedback mechanism resulting in the inhibition or the slowing down of a process

Always maintain the conditions of homeostasis

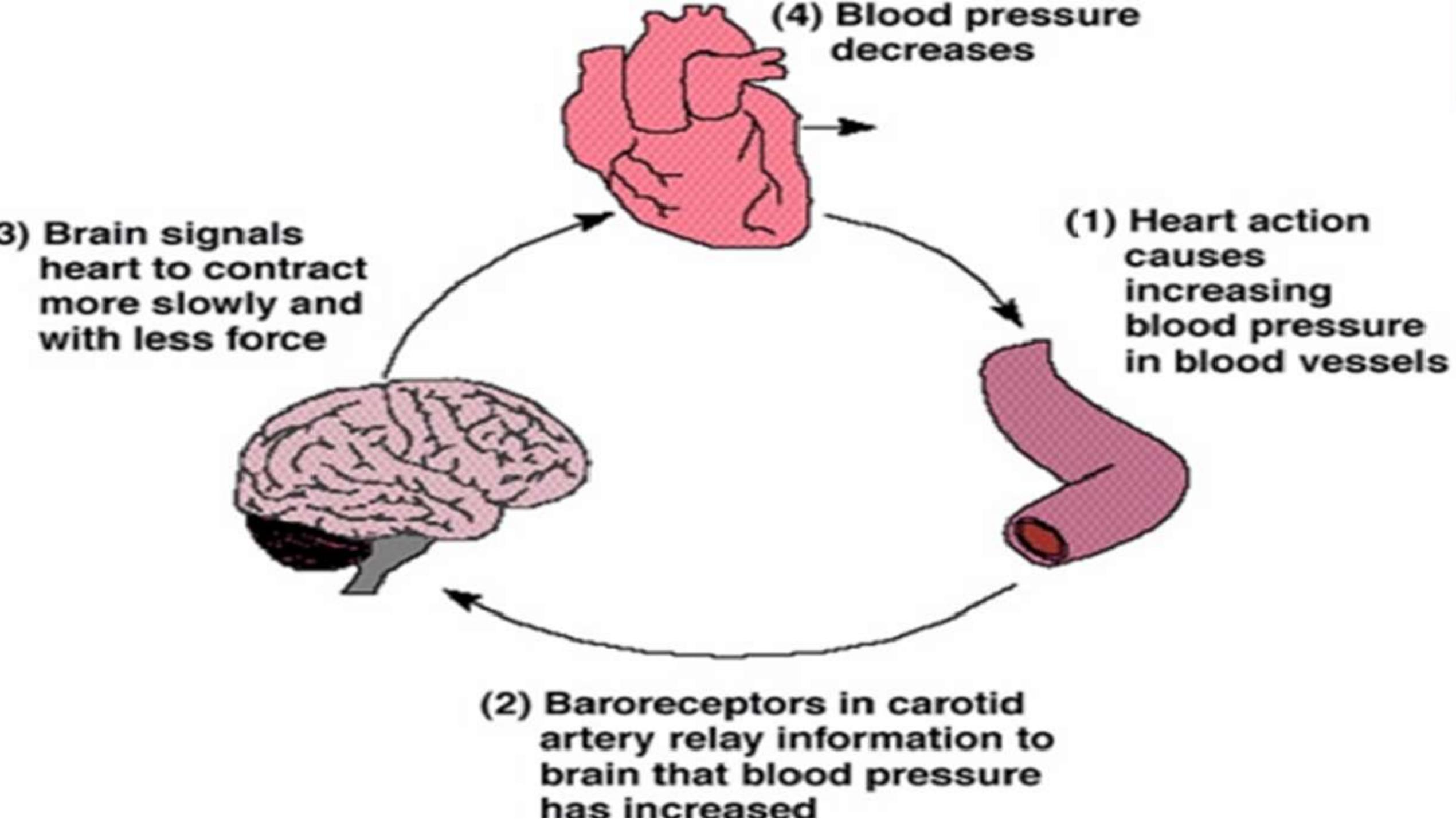
Occur more often in the body, helping in maintaining various conditions of the body

Ex: regulation of body temperature, blood pressure, and fluid content

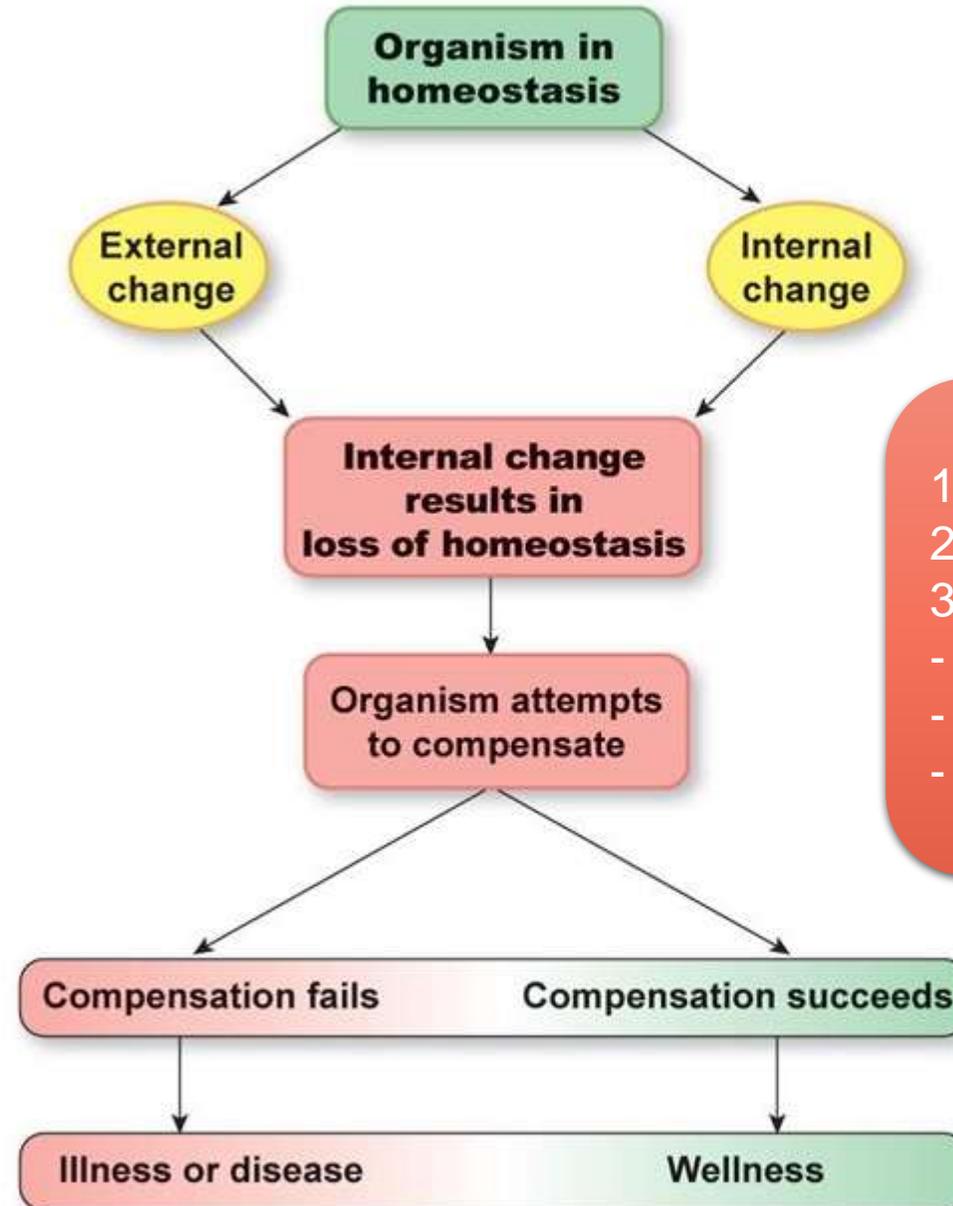
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# Homeostasis Summary



- 1) Successful compensation
- 2) Homeostasis reestablished
- 3) Unable to compensate :
  - Pathophysiology
  - Sickness
  - Death

# Positive feedback pathways :

## Response enhances the stimulus

**Birth** : - normal uterus  
constriction for birth process  
..... secretion of an  
important hormone (oxytocin  
) will increase as a result of  
stimulus .....

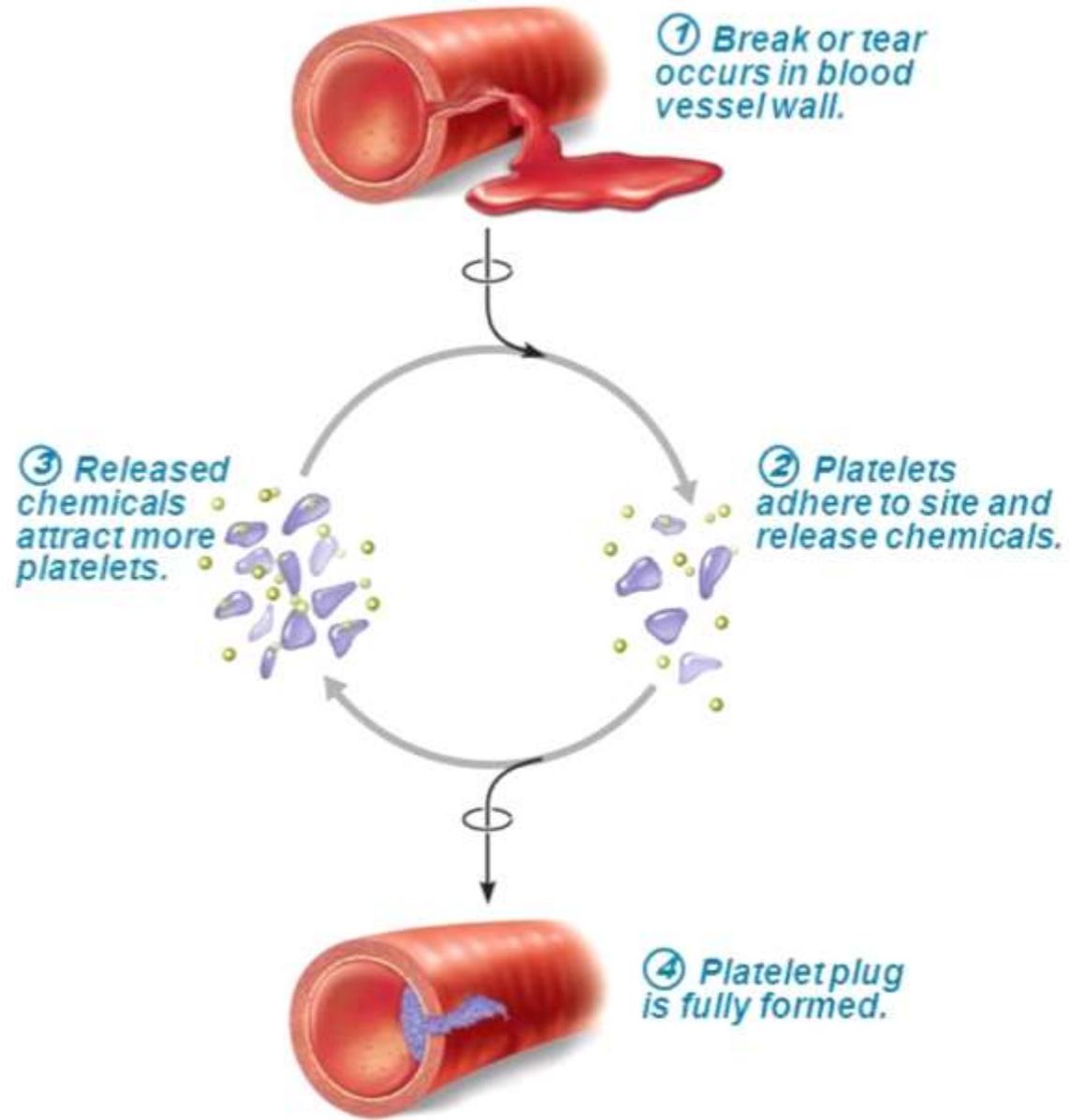
- Increase the constriction of  
uterus .....
- positive feed back

**Note** : oxytocin level won't  
go down until giving birth

**Generation of action potential** :  
This is meant signaling and  
electricity process (polarization  
and depolarization)  
Increase the stimulus .....

increase the generation of action  
potential

**Blood coagulation**





**Feed- back control :**

**Planned output and actual output are compared and subsequent action is taken if necessary**

**Feedforward control :**

**Based on forecast result**

**If the forecast is bad the control is taken well in advance of actual result :for example, learning ... walking**