

Homeostasis, Stress and Adaptation



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ILOs:

- At the end of this lecture students will be able to:
 - 1- identify major concepts such as stress, adaptation, stressors, coping mechanisms
 - 2- Differentiate between positive and negative feedback
 - 3- Discuss the physiological changes that occur in response to stress



Definitions

■ Homeostasis

- **A** state of balance in the body or equilibrium among the physiologic, psychological, socio-cultural, intellectual, and spiritual needs of the body.

■ Stress

- **A** disruptive condition that occurs in response to any demand made on the body, such demands are called ***stressors***.
- an assault on the homeostasis
- Two types of stress:
 - 1. Eustress** is stress that presents the opportunity for growth and satisfaction
 - 2. Distress** is negative stress that can result in debilitating strain





Definitions (Cont.)

- **Stressor:**

- **A**ny physical, social, or psychological event or condition that causes a disruption in homeostasis and causes the stress response

- **Stress response:**

- **A** state of **physiological and behavioral** responses to a stressor that help to restore homeostasis

- **Adaptation**

- **R**estoration of homeostasis (the adjusting behavior to certain situations that enable the person to cope with these situations)

- **Coping:**

- **I**s the cognitive and behavioral strategies used to manage the stressor





Common Stressors

- **Physiological:**

- aging, injury, infection, pain, noise, pollution.

- **Psychological:**

- fear, insecurity, failing in task, loss of family member.

- **Social:**

- isolation, poverty, threat to safety.

- **Spiritual:**

- guilt, doubt, hopelessness.





Factors affecting an individual response to stress

- **Internal:**

- Age
- Gender
- Health status
- Nutritional status
- Previous experiences

- **External:**

- Social support
- Cultural
- Religious
- Number, time and duration of stressors.





Psychological response to stress

- **Individual's perception of the event:**
 - Appraisal of the stressful event
 - The way you interpreted the event is how you respond to the event.
 - **Primary appraisal –**
 - Identification, assessment of the situation
 - **Secondary appraisal –**
 - evaluation and action
- **Coping with the stressful event**
 - **Cognitive** (develop emotions) or
 - **Behavioral** efforts (changes in the environment)





Physiological responses to stress

1. **L**ocal adaptation syndrome:
 2. **G**eneral adaptation syndrome:
-
- **Local adaptation syndrome:**
 - Responses that occur at the local site of injury such as redness and swelling





General Adaptation Syndrome (GAS):

- **Has three stages;**
 - **Stage 1: Alarm**
 - Crisis/alarm (paleness, shivering, sweating of palms, etc)
 - Sympathetic stimulation
 - **Stage 2: Resistance**
 - Adaptation
 - Begins almost immediately after beginning of alarm phase
 - Body adjusts in order to return to homeostasis
 - Parasympathetic nervous system helps keep energy levels under control



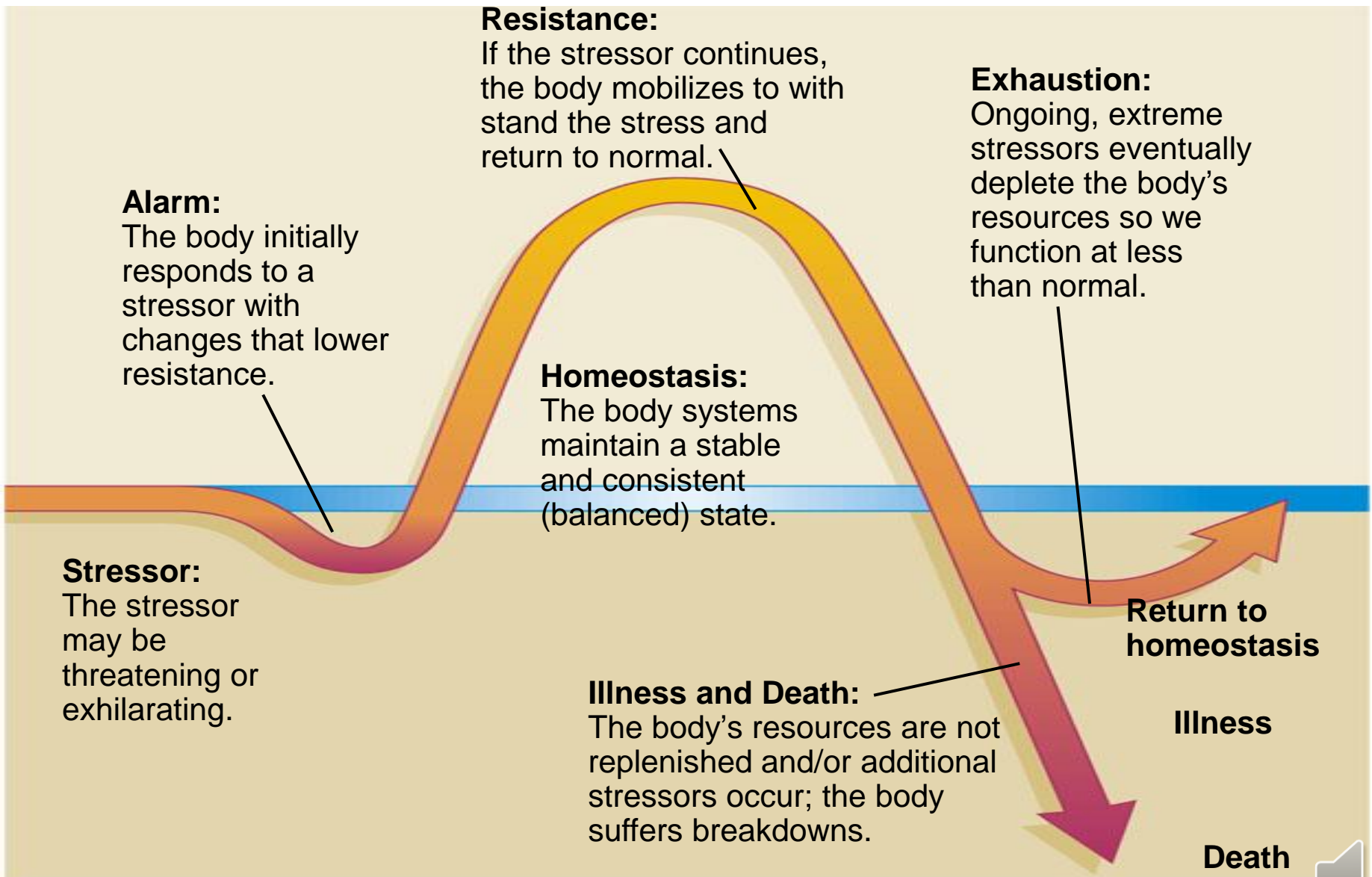


General Adaptation Syndrome (GAS): (Cont.)

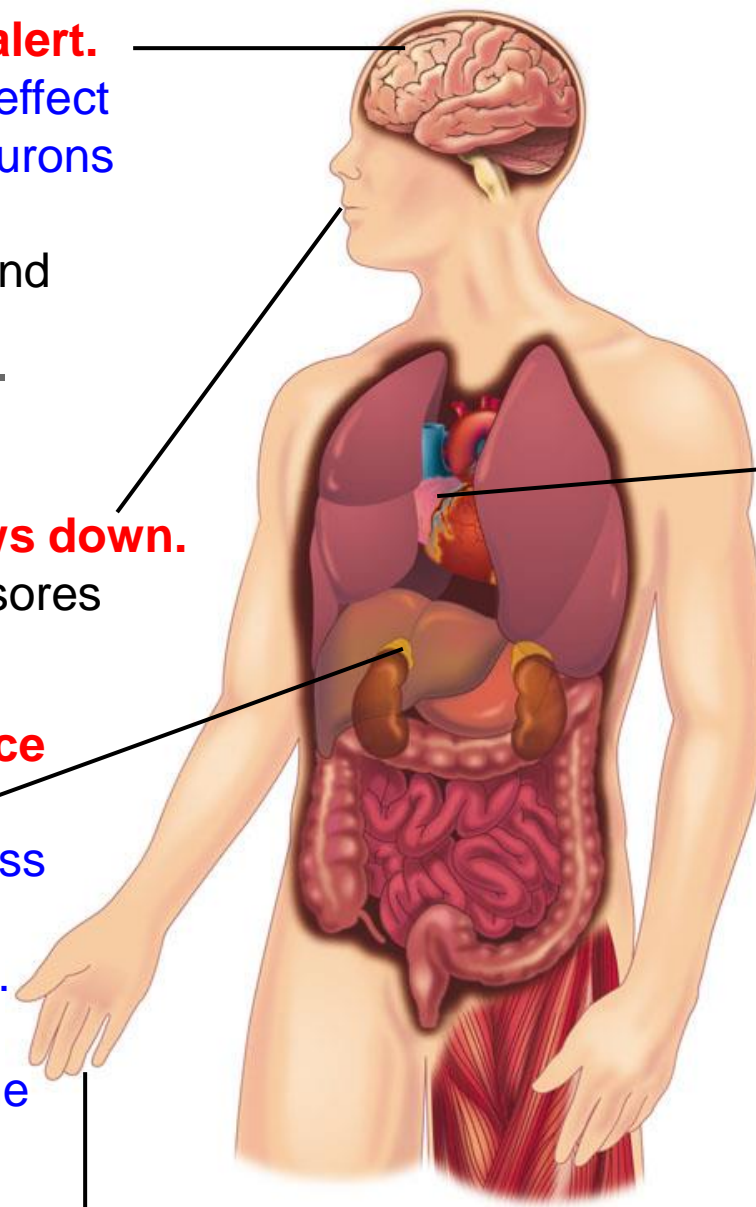
■ Stage 3: Exhaustion

- **I**f adaptive energy is inadequate to deal with prolonged or overwhelming stress
- **O**ccurs after continuous alarm and resistance reactions
- **P**hysical and emotional energy to battle stress have been depleted

General Adaptation Syndrome (GAS) (Cont.)



The Effects of Stress on the Body



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Brain becomes more alert.

- Stress hormones can effect memory and cause neurons to atrophy and die.
- Headaches, anxiety, and depression
- Disrupted sleep

Digestive system slows down.

- Mouth ulcers or cold sores

Adrenal glands produce stress hormones.

- Cortisol and other stress hormones can increase central or abdominal fat.
- Cortisol increases glucose production in the liver, causing renal hypertension.

Skin problems such as eczema and psoriasis

Heart rate increases and blood pressure rises.

- Persistently elevated blood pressure and heart rate can increase potential for blood clotting and risk of stroke or heart attack.
- Weakening of the heart muscles and symptoms that mimic a heart attack

- = Immediate response to stress
- = Effects of chronic or prolonged stress
- = Other possible effects of chronic stress



The Effects of Stress on the Body

Breathing quickens.

- Increased susceptibility to colds and respiratory infections

Immune system is depressed.

- Increased susceptibility to infection
- Slower healing

Digestive system slows down.

- Upset stomach

Muscles tense.

- Muscular twitches or nervous tics

Reproductive system

- Menstrual disorders in women
- Impotence and premature ejaculation in men

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■ = Immediate response to stress
■ = Effects of chronic or prolonged stress
■ = Other possible effects of chronic stress



Some Physiological Responses to Stress

- Releases norepinephrine and epinephrine.
- Pupils dilate.
- Secretion is increased from lacrimal glands.
- Bronchioles dilate.
- Respiration rate is increased.
- Increased force of cardiac contraction
- Increased cardiac output
- Increased heart rate
- Increased blood pressure
- Decreased gastric and intestinal motility
- Decreased secretions
- Sphincters contract
- Increased glycogenolysis and gluconeogenesis
- Decreased glycogen synthesis
- Increased ureter motility
- Bladder muscle contracts
- Bladder sphincter relaxes
- Increased secretion
- Lipolysis



Parasympathetic Nervous System

- Relaxation
- Body repair and restoration
- Lower heart rate
- Lower blood pressure
- Lower glucose and insulin
- Blood directed to digestion
- Decrease in oxygen consumption CO₂ elimination.



Effects of Chronic Stress

- Increase Gluconeogenesis
- Decrease Immune
- Decrease inflammatory response
- Retention of sodium and water
- Decrease in libido, frigidity and impotence
- Increase in blood pressure

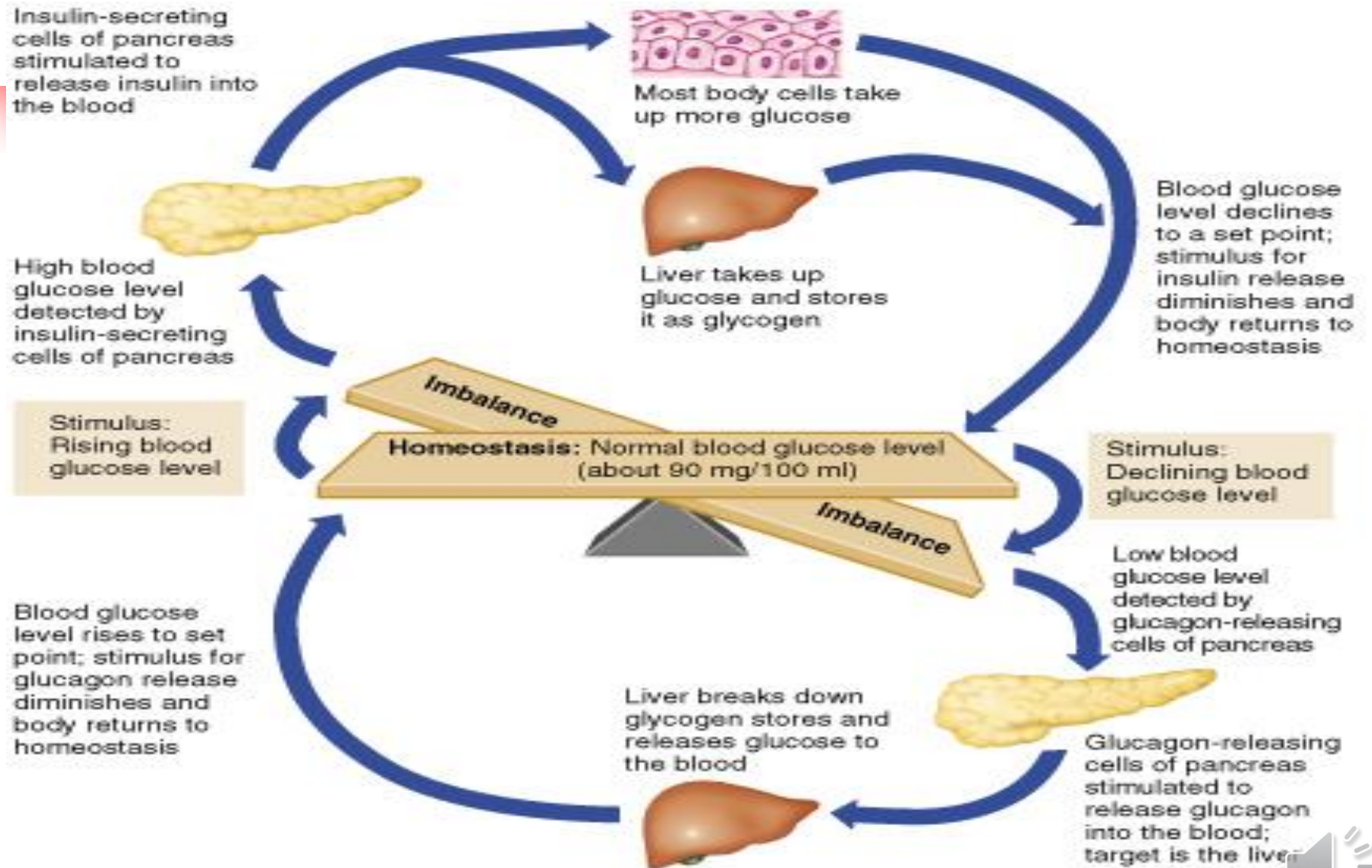


Homeostatic responses control: Negative Feedback Control

- Results in a return to homeostatic equilibrium because the **response reduces stimulus (stress)**
- Examples:
 - Regulation of blood glucose
 - Regulation of body temperature
 - Most Other Physiologic Mechanisms

Homeostatic responses control:

Negative Feedback Control (Cont.)

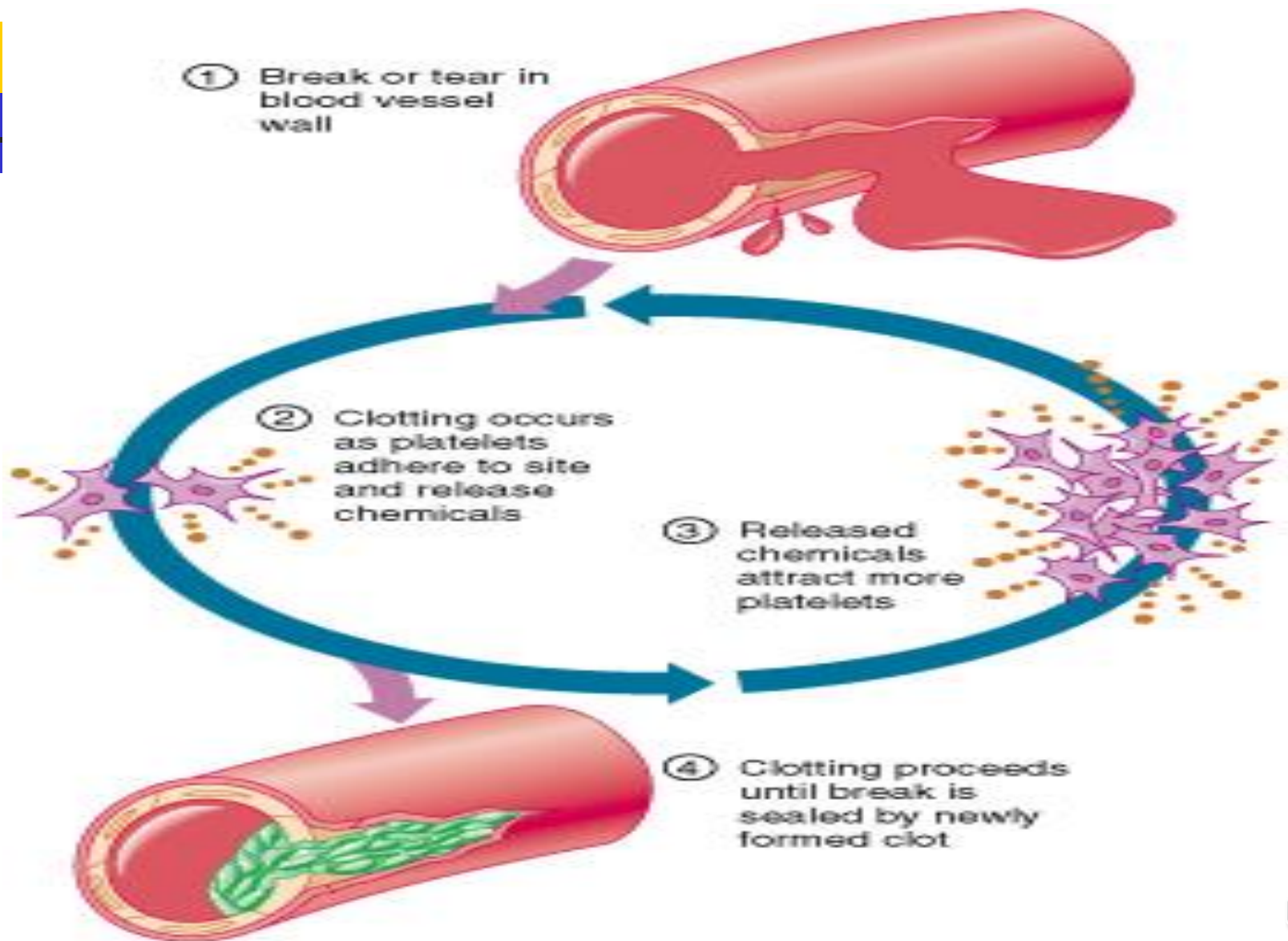




Positive Feedback Control

- Results in a shift to a new homeostatic equilibrium because the **response increases the stimulus level (stress)**.
- Examples:
 - Blood clotting
 - Pregnancy/Childbirth
 - Immune responses
 - A few others
- Most are responses to special conditions resulting in a new, temporary physiologic state

Positive Feedback Control (Cont.)





Mechanism of cellular repair

- **Cellular adaptation may be by structural or functional changes**
 - **Hypertrophy:**
 - increase cell size
 - **Atrophy:**
 - decrease in cell size
 - **Hyperplasia:**
 - increase in number of cells
 - **Dysplasia:**
 - change in the appearance of cells



Unhealthy Coping Strategies

- Smoking
- Drugs
- Alcohol
- Over eating/poor eating habits.
- What other unhealthy coping strategies can you think of ?



Healthy Coping Strategies

- Awareness
- Relaxation
- Meditation
- communication with caring others
- Problem-solving
- Pets
- Exercise
- Your own thoughts
- Laughter
- Aromatherapy
- Massage
- Journaling
- Music
- Hydro-therapy



Nursing Process And Hemostasis

- Objective signs and subjective data
- Symptoms : include heart rate, respiratory rate and temperature.
- Cognitive ability and orientation need to be addressed too.
- Laboratory data such as electrolyte, and urine analysis.
- Diagnostic studies such as computerized tomography and magnetic resonance imaging are useful in identify the change.
- What are the patterns of stressors?
- What are the typical responses to stressful situations?
- What are the cause-and-effect relationships among stressors and thoughts, feelings, and behaviors?
- What is the past history of successful coping mechanisms?



Nursing Diagnoses

- Nursing diagnoses that may occur in response to stressors include:
 - Impaired adjustment
 - Altered role performance
 - Altered thought processes
 - Defensive coping
 - Sleep Pattern Disturbance
 - Post-trauma syndrome
 - Impaired Social Interaction
 - Spiritual Distress
 - Hopelessness
 - Fatigue
 - Fear



Planning/Outcome Identification

- Identify situations that increase stress and anxiety.
- Verbalize a plan to decrease the effect of common stressors.
- Differentiate positive and negative stressors.
- Categorize stressors.
- Demonstrate stress-management exercises.
- Verbalize a plan for stress management, including necessary lifestyle modifications.



Nursing Interventions

- Meeting basic needs.
- Minimizing environmental stimuli.
- Verbalizing feelings.
- Involving family and significant others.
- Using Stress-Management techniques.
- Crisis intervention
- Promoting healthy lifestyle
- Enhancing coping strategies
- Teaching relaxation technique
- Educating about stress management
- Enhancing social support



Important Stress-Management Techniques

- Exercise
- Relaxation techniques (e.g. progressive muscle relaxation, guided imagery, meditation, hypnosis)
- Cognitive Reframing or Thought Stopping



Relaxation Techniques

1- **Relaxation Breathing:**

- Concentrate on breathing slowly and deeply with eyes closed (if possible) for several minutes when you need a quick tension reducer or before beginning one of the other methods.
1. Breathe in through your nose and mouth with face relaxed for a count of 1 and 2 and 3 and 4.
 2. Hold your breath for 4 seconds, without straining.
 3. Breathe out through your nose and pursed lips for a count of 6.
 4. Repeat two or three times, breathe naturally for about 30 seconds, then repeat one or more sequences.
 5. If you feel dizzy or tingling in your fingertips, you may be hyperventilating; slow down your breathing and don't take such deep breaths.



Continue....

2- Progressive Muscle Relaxation:

- 1- Assume a comfortable position, either sitting or reclining, and close your eyes.
2. Start with your forehead and tense the muscles so that you feel tightness or strain; hold this position for 5 to 10 seconds.
3. Next, relax your forehead, noting the relief; concentrate on this for 10 to 15 seconds.
4. Progress from head to toe with each muscle group, including your jaw next, then shoulders, arms, hands, abdomen, buttocks, legs, and feet (you can do both sides simultaneously).
5. Note the feeling of total relaxation in your body once you have relieved tension from all your muscles.
6. Complete the exercise by opening your eyes, taking a few deep breaths, stretching, and arising slowly.



Continue....

3- Imagery

- 1-** Assume a comfortable position, breathe deeply, and close your eyes.
2. Count backward from 5 and begin to imagine a pleasant place such as a beach or garden.
3. Put yourself in that place by imagining it with all your senses, for example, hear the sound of waves washing up on the beach, feel the warm sun saturating your skin, or taste a tangy drink of lemonade.
4. Stay in that place for about 5 minutes, imagining different images.
5. Slowly let the images fade, breathe deeply, and count to 5 before opening your eyes.



Continue.....

4- Distraction

- 1- Choose activities that you enjoy—reading, watching television, listening to music, taking a walk, playing an instrument, knitting, doing a craft, or drawing or painting.
2. Adjust the distraction method to your mood—if you are extremely tense do not attempt a complex project or listen to loud, lively music. Rather, listen to quiet, soothing music or sketch a free-form design.
3. Use a variety of methods, some reserved for longer periods of time, and others that can be used on the spot when needed (eg, a portable tape player with headphones and your favourite music or a book of poetry)



Crisis Intervention

- **A** specific technique used to help clients regain equilibrium.
- **The Five Steps of Crisis Intervention**
 - Identification of the Problem
 - Identification of the Alternatives
 - Selection of an Alternative
 - Implementation
 - Evaluation



Enhancing Social Support

- A positive social identity
- Emotional support
- Material aid and tangible services
- Access to information
- Access to new social contact and new social roles



Education About Stress Management

- This can be achieved by providing either
 - Sensory information (child birth lessons)
 - Procedural information (sensation during cardiac cath)
 - Teaching positive stress management techniques (relaxation, problem solving, ...etc.)
 - Education will help perceiving a harmful situation positively and solve problem more effectively.



Teaching relaxation technique

- Relaxation techniques used to relieve stress.
- It produces a response to encounter stress. The physiological stress signs and symptoms are interrupted by reducing the activity of the sympathetic and parasympathetic nervous systems. Further, the psychological stress is reduced.



Promoting Healthy Lifestyle

- A health-promoting lifestyle provides resources for coping include health and energy that buffer the impact of stressors.
- A health risk appraisal can identify lifestyles or habits that contribute to illness



Enhancing Coping Strategies

- Seeking information
- Reprioritizing needs and roles
- Lowering expectations
- Making compromises
- Comparing oneself to others
- Conserve energy
- Taking things one step at a time