Stress and Emergency Reaction

Stress stimuli

A stress stimulus is any stimulus, internal or external, that can excite the hypothalamus to release Corticotropin-Releasing Hormone (CRH) at rates greater than would occur at that time of day in the absence of the stimulus; this is called an emergency reaction and it prepares the body for “fight or flight”. Increased CRH in the body increases cortisol, which in turn increases catecholamines.

Activators of stress reaction:

Stress can be due to: (life-threatening factors)

1. Perception/anticipation of danger or harm
2. Trauma/pain
3. Fluid loss
4. Hypotension
5. Anoxia
6. Extremes in temperature
7. Hypoglycemia
8. Severe exercise

Stress causes activation of the sympathetic system which prepares the body for vigorous muscle activity, including the following actions:

1. Increases blood pressure
2. Increases blood flow to active muscles
3. Decreases blood flow to organs not needed for rapid motor activities (e.g. GIT, kidneys)
4. Increases glucose blood concentration
5. Increases glycolysis in liver & muscle
6. Increases mental activity
7. Increases rate of blood coagulation

Note that both mental and physical stress can excite the sympathetic system!

General Adaptation Syndrome

This is defined by the following series of reactions:

- 1st stage: This is the alarm or emergency reaction and occurs when the threat/stressor is identified or realized. During this stage, adrenaline will be produced and the fight-or-flight response will occur. There is also some production of cortisol through the activation of the HPA axis..
- 2nd stage: Resistance: If the threat/stressor persists, then the body tries to cope with the stress. However, the body cannot keep this up indefinitely, so its resources are gradually depleted.
- 3rd stage: This is the exhaustion of the adaptive response. Here, all of the body's resources are eventually depleted and the body becomes unable to maintain normal function. At this point the initial autonomic

nervous system symptoms may reappear (sweating, raised heart rate etc.). If this stage is extended, it may result in long term damage as the capacity of glands (particularly the adrenal gland), and the immune system is exhausted and function is impaired resulting in decompensation.