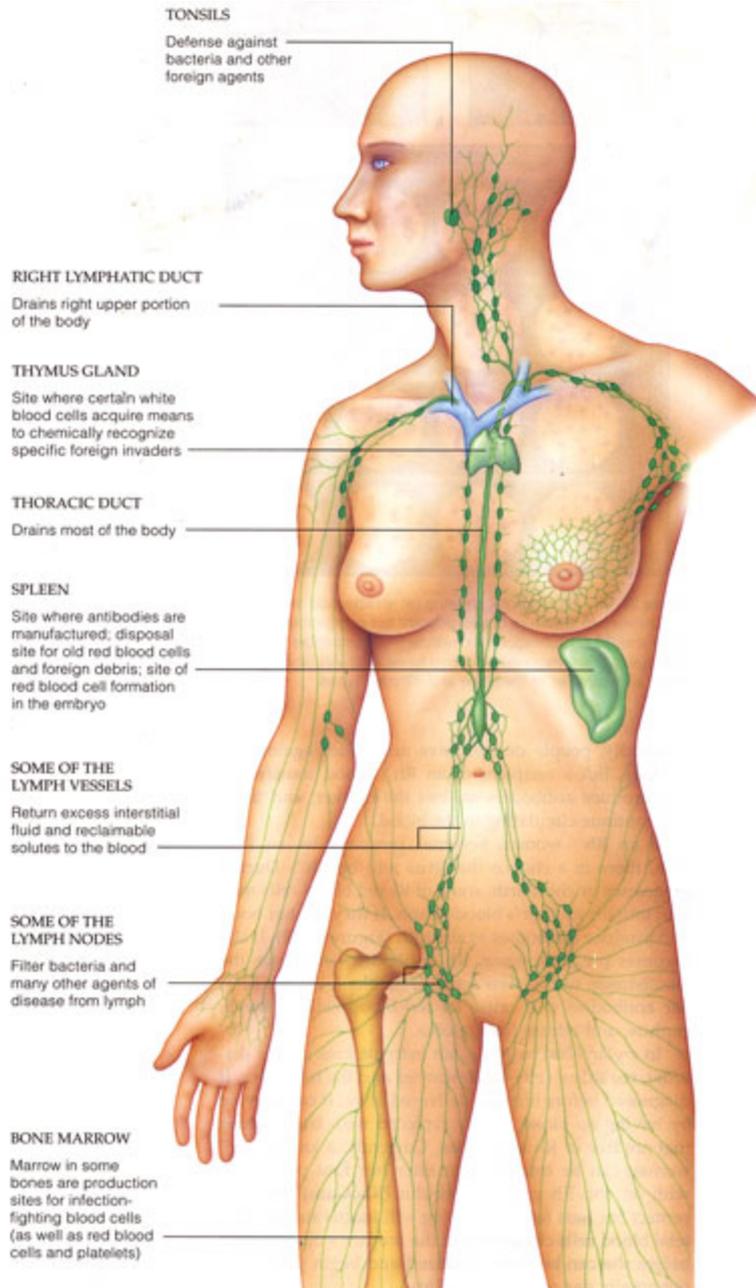
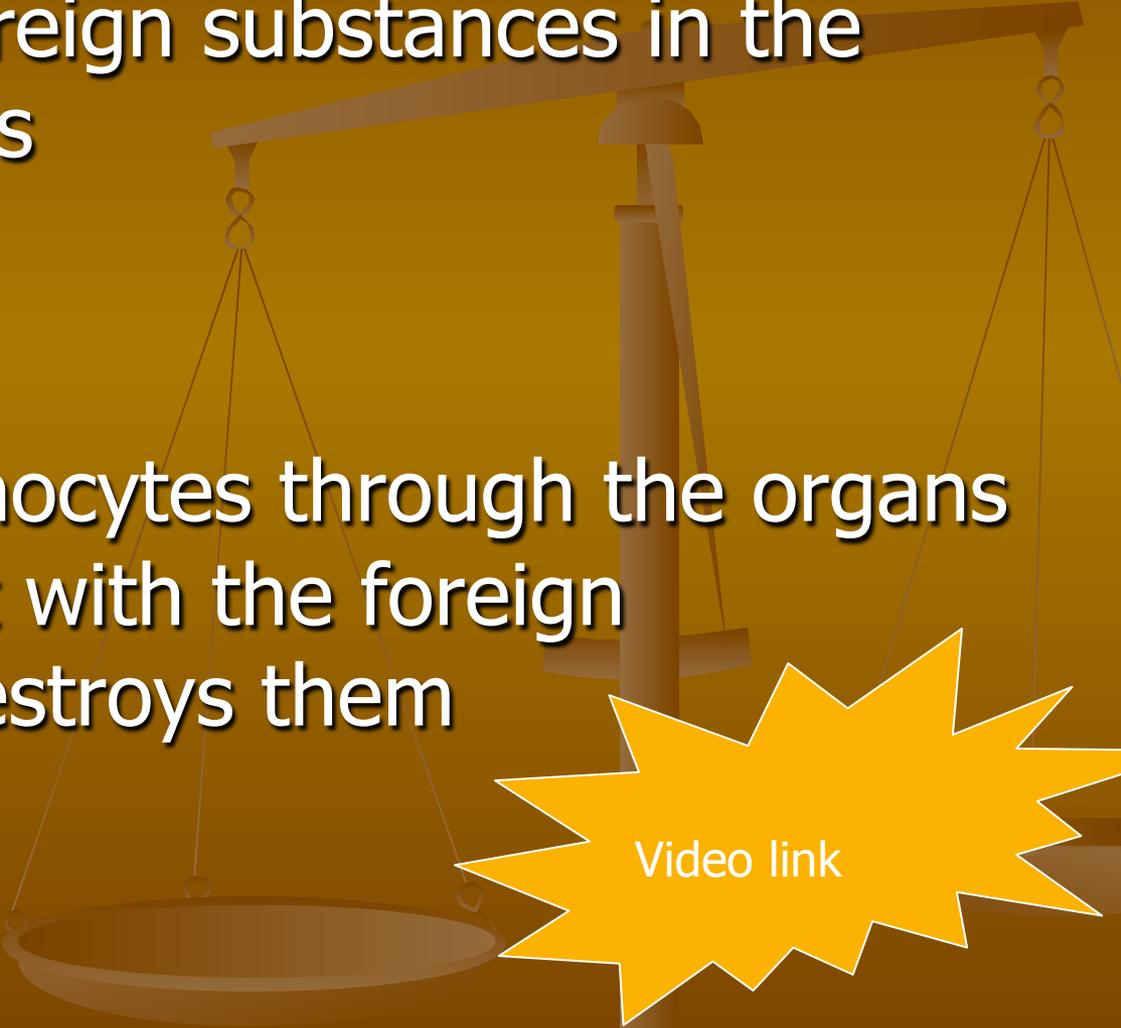


Lymphatic System

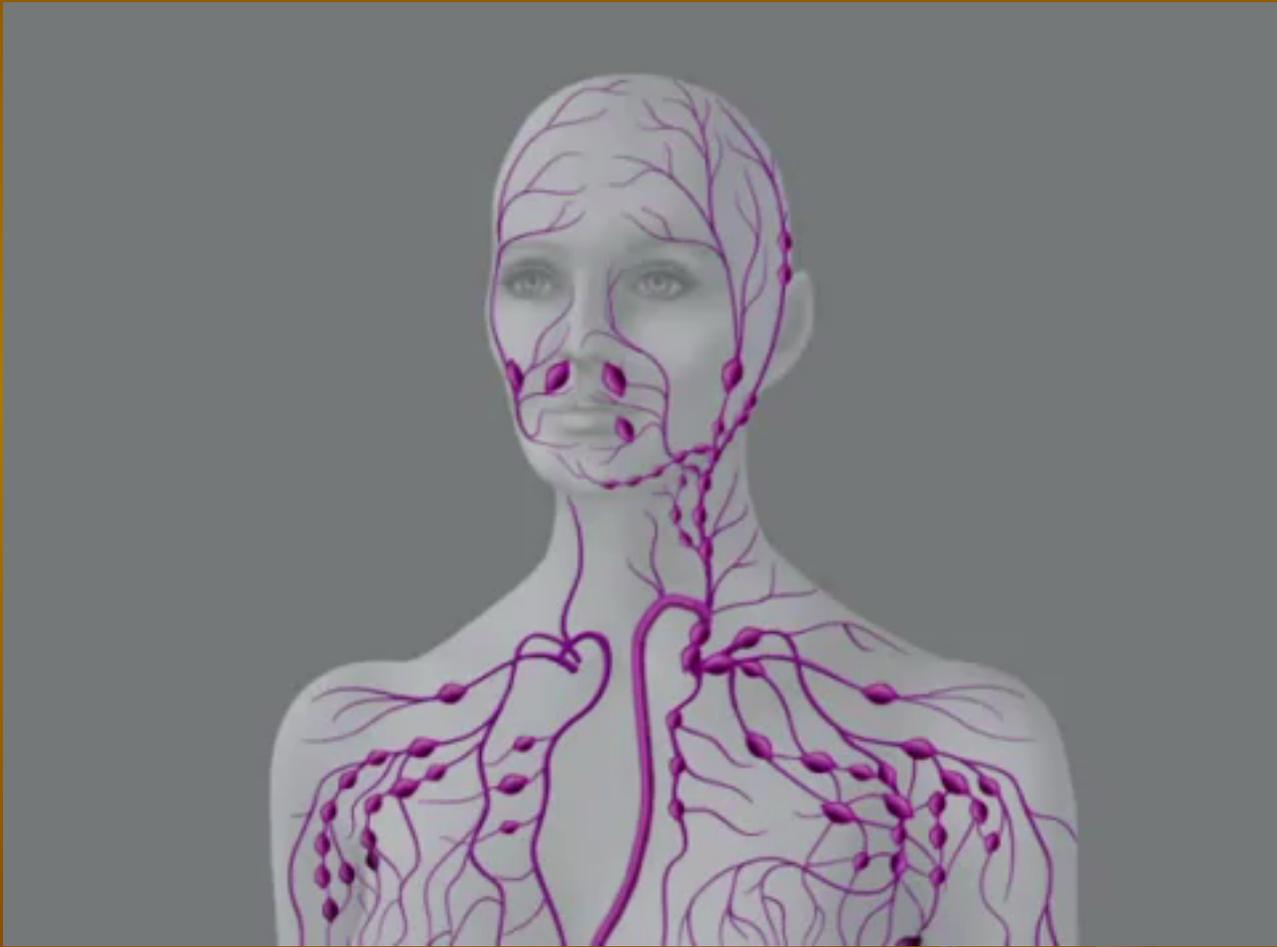


- Collects & returns interstitial fluid & plasma proteins to blood
- Defends body from disease by producing lymphocytes
- Absorbs lipids from intestine & transports them to blood

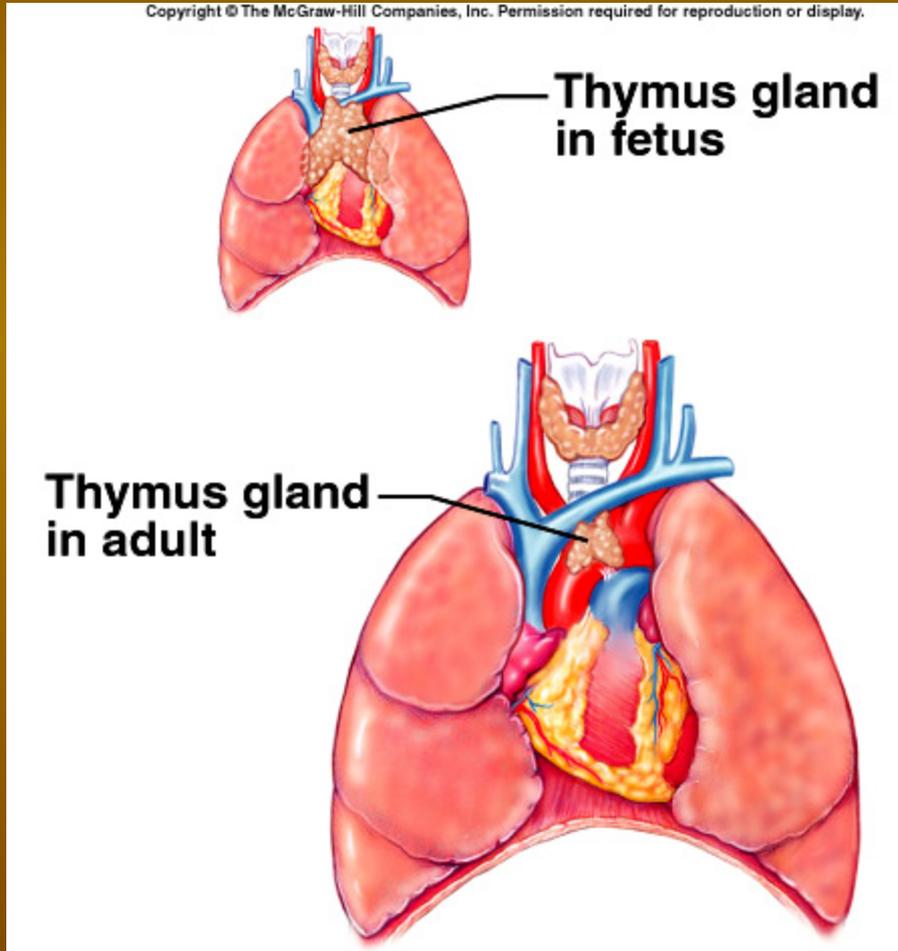
- Concentrates foreign substances in the lymphatic organs
- Circulates lymphocytes through the organs to make contact with the foreign substances & destroys them



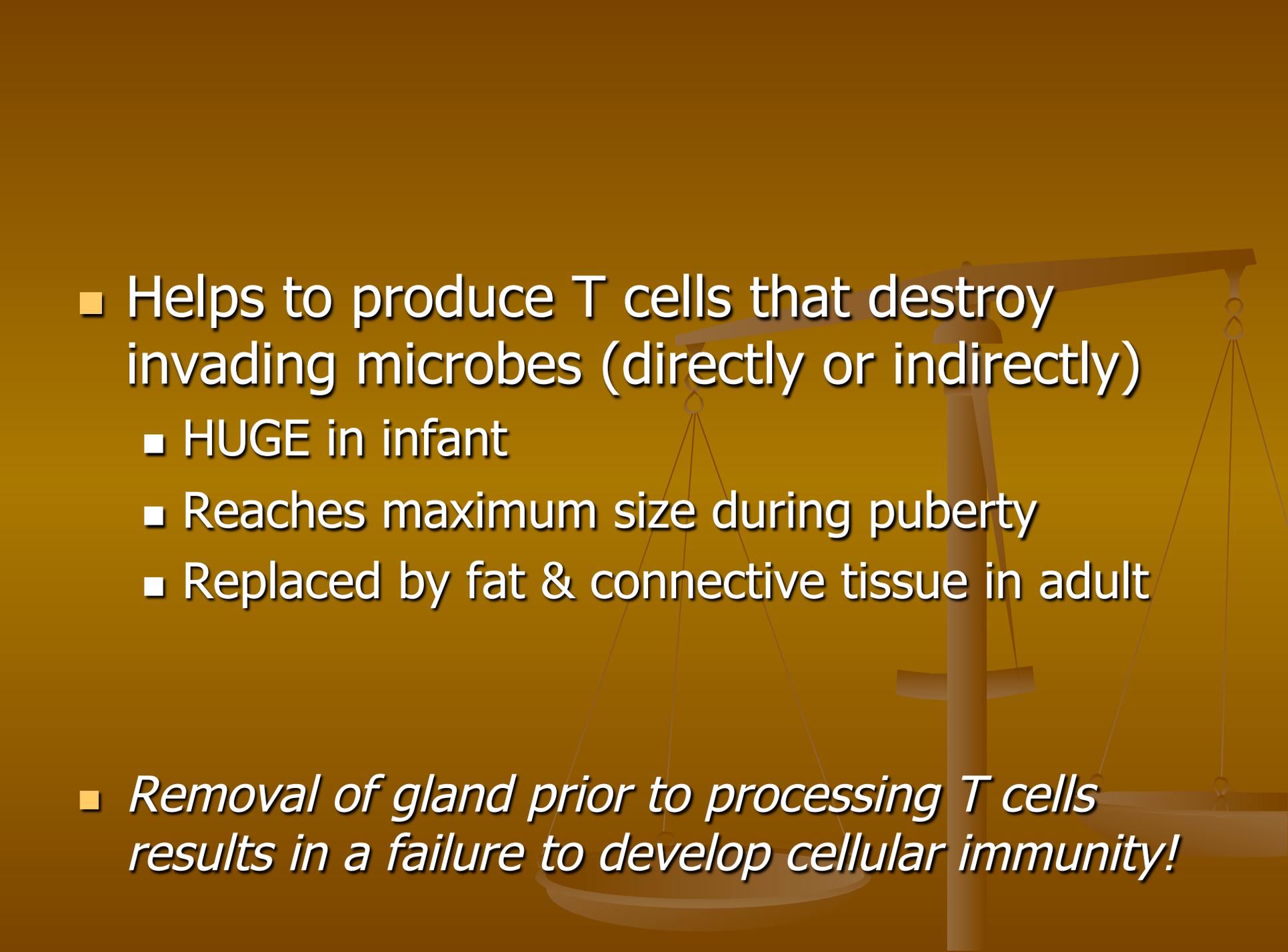
Video link



Thymus gland

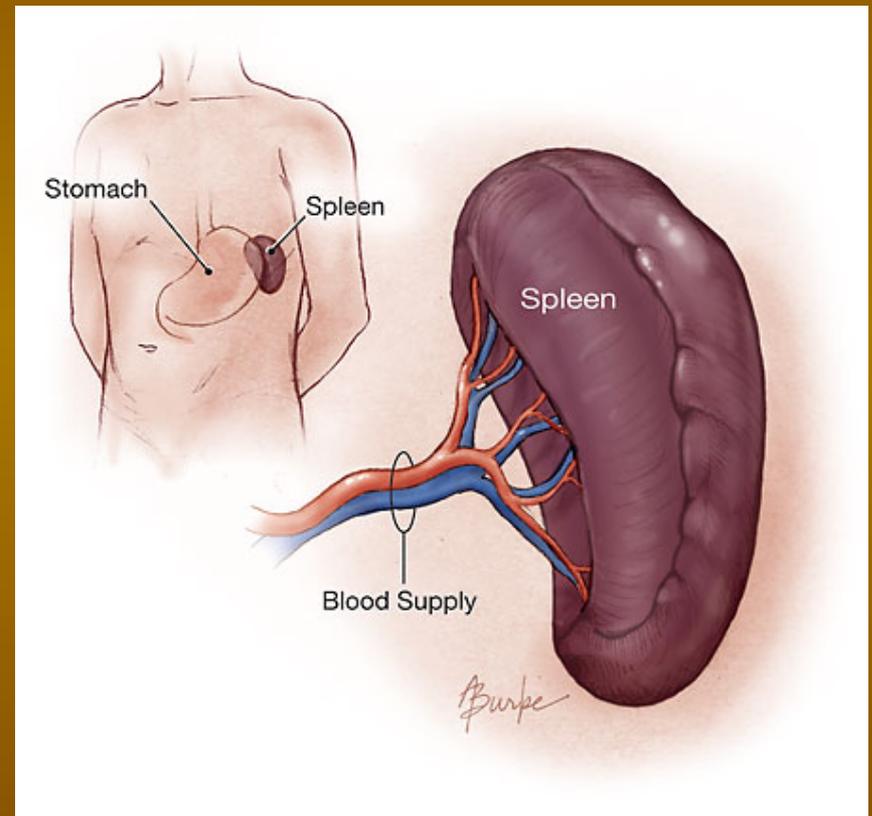


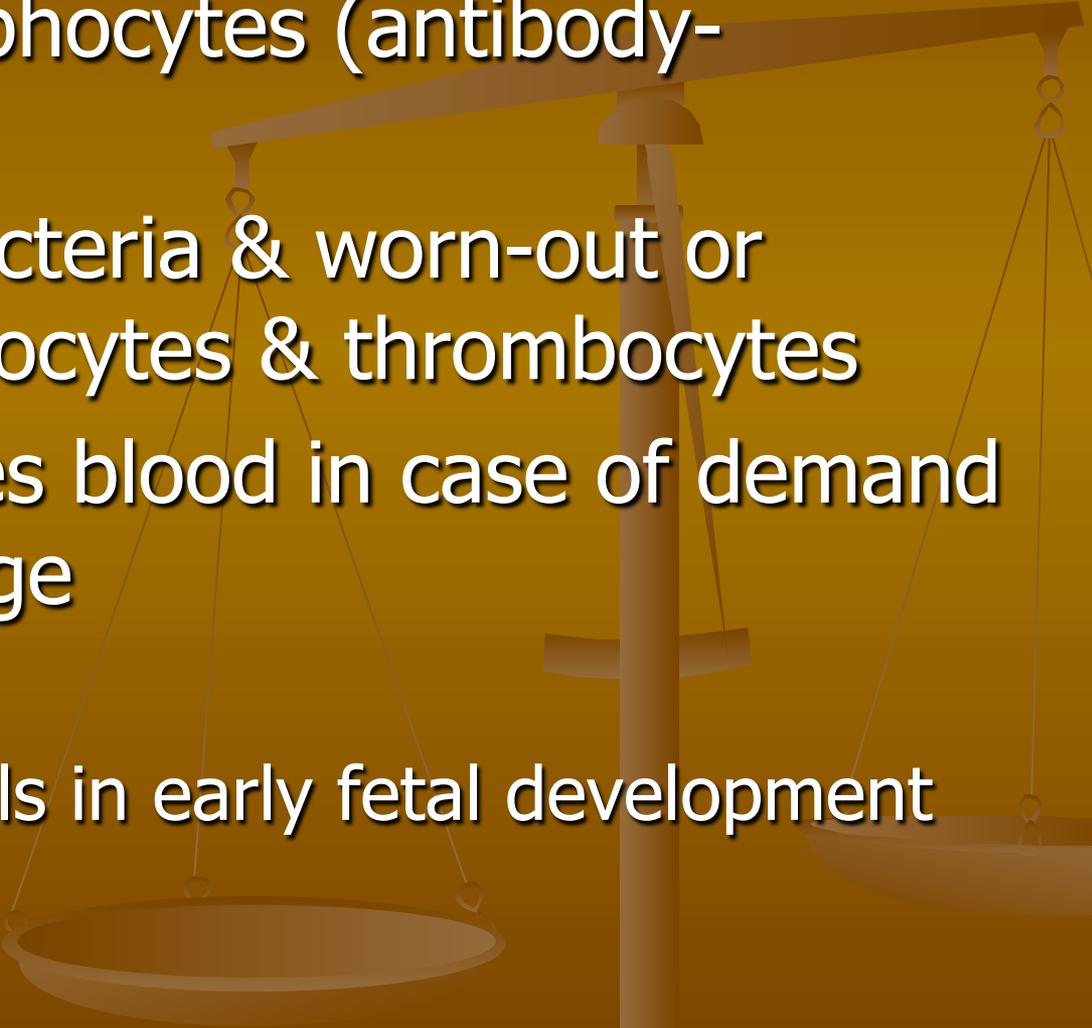
- Contains lymphocytes (white blood cells)
- T- lymphocytes (T cells) leave gland & provide cell-mediated immunity
 - *Helper T cells*
 - *Cytotoxic/ killer T cells*
 - *Supressor T cells*

- 
- Helps to produce T cells that destroy invading microbes (directly or indirectly)
 - HUGE in infant
 - Reaches maximum size during puberty
 - Replaced by fat & connective tissue in adult
 - *Removal of gland prior to processing T cells results in a failure to develop cellular immunity!*

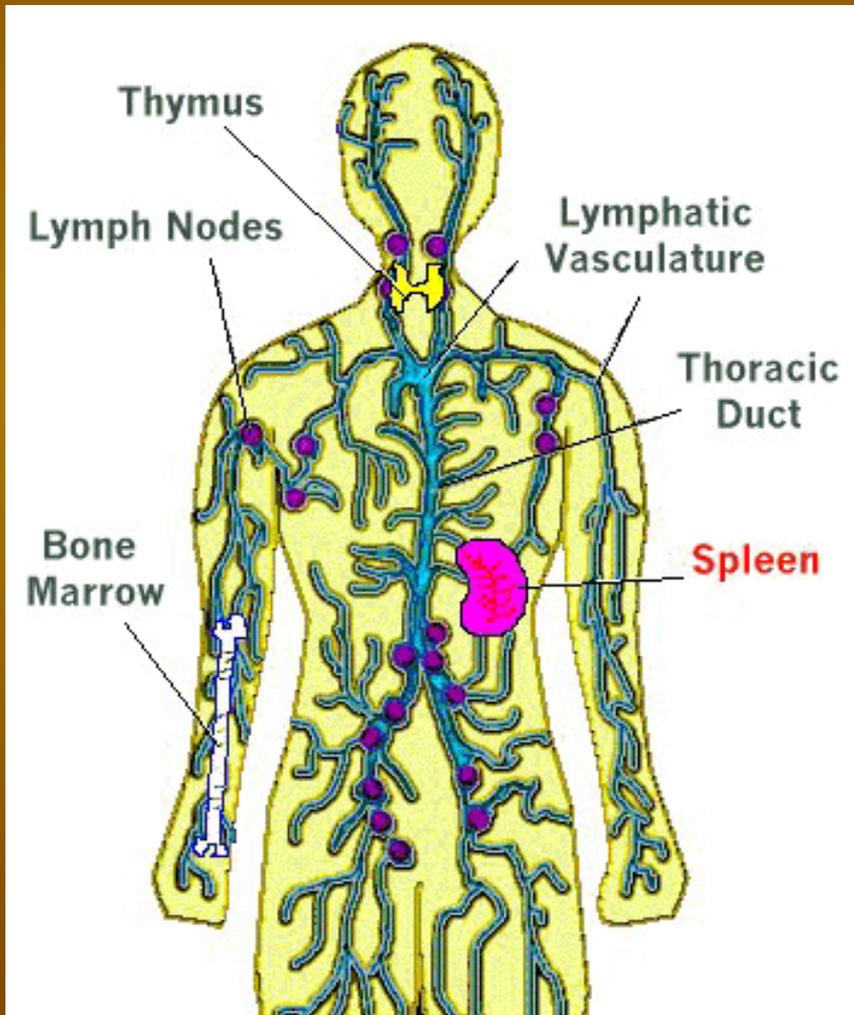
Spleen

- Contains lymphocytes (macrophages) that remove unwanted materials from blood
- Filters blood much like lymph nodes filter lymph

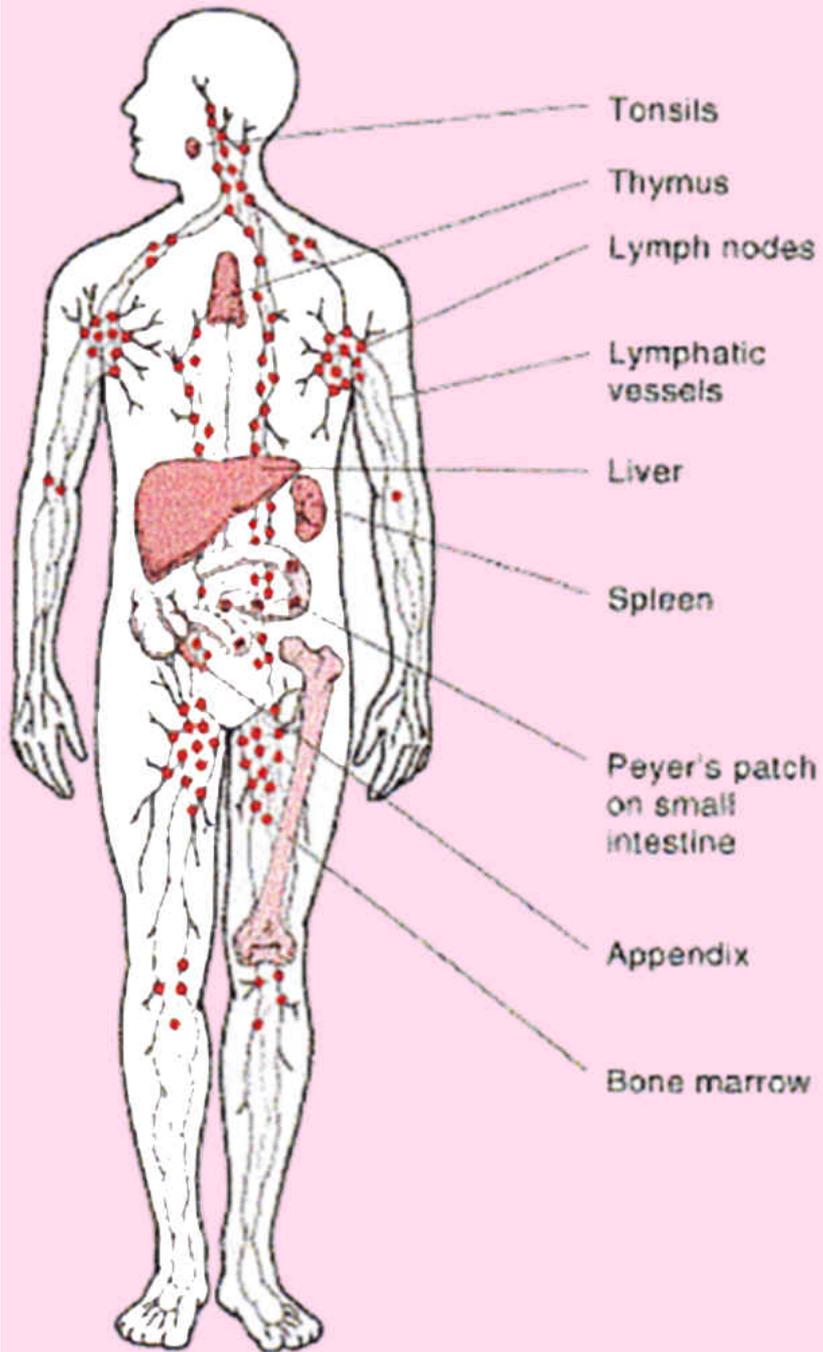


- 
- Produces B lymphocytes (antibody-producing cells)
 - Phagocytizes bacteria & worn-out or damaged erythrocytes & thrombocytes
 - Stores & releases blood in case of demand like a hemorrhage
 - Forms blood cells in early fetal development

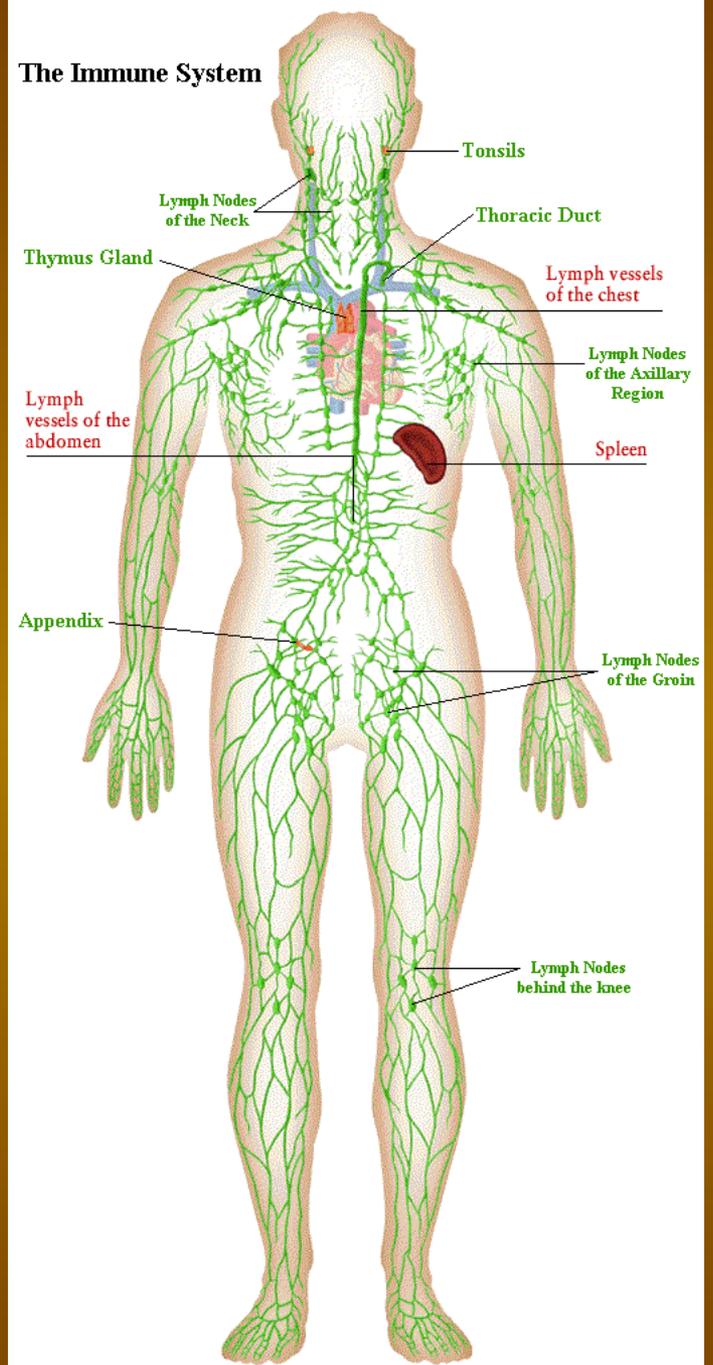
Lymph nodes



- Contain large number of lymphocytes & macrophages
- Destroy foreign substances (bacteria), damaged cells & cellular debris

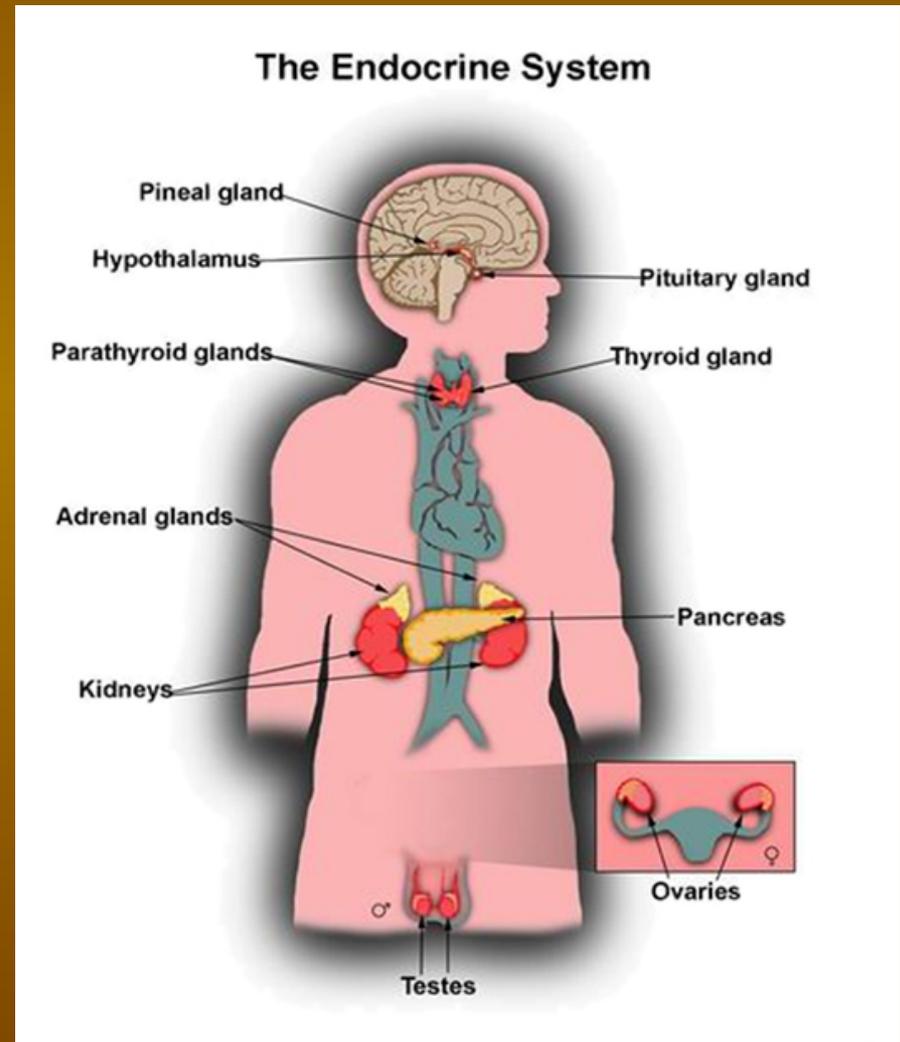


The Immune System

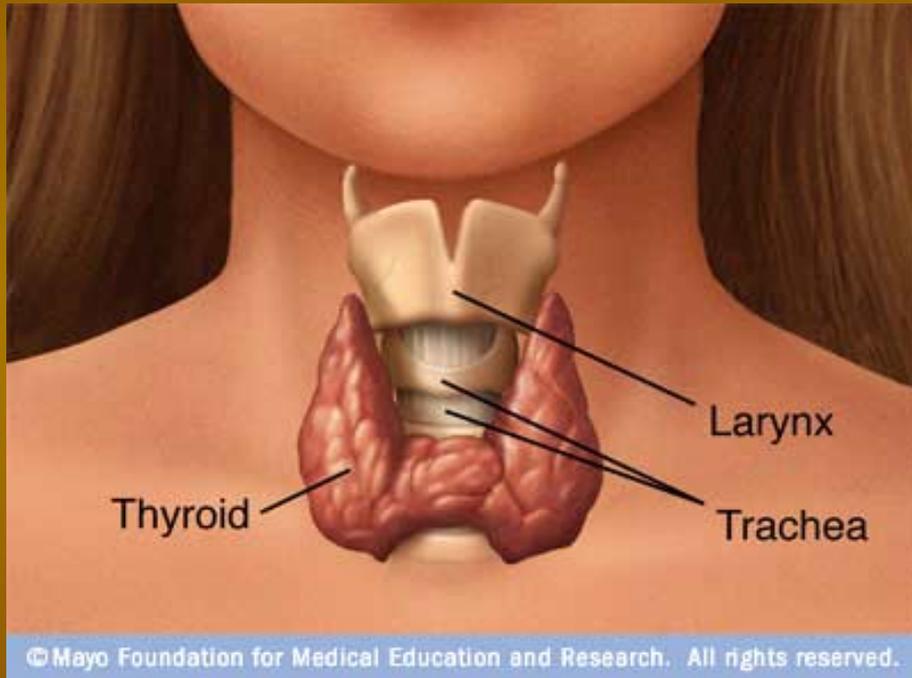


Endocrine System

- HOMEOSTASIS!
- Regulation of metabolic processes
- Controls rates of chemical reactions
- Aids in regulating water & electrolyte balance
- Role in reproduction & development
- (*hypothalamus is the link btw nerv & endo*)



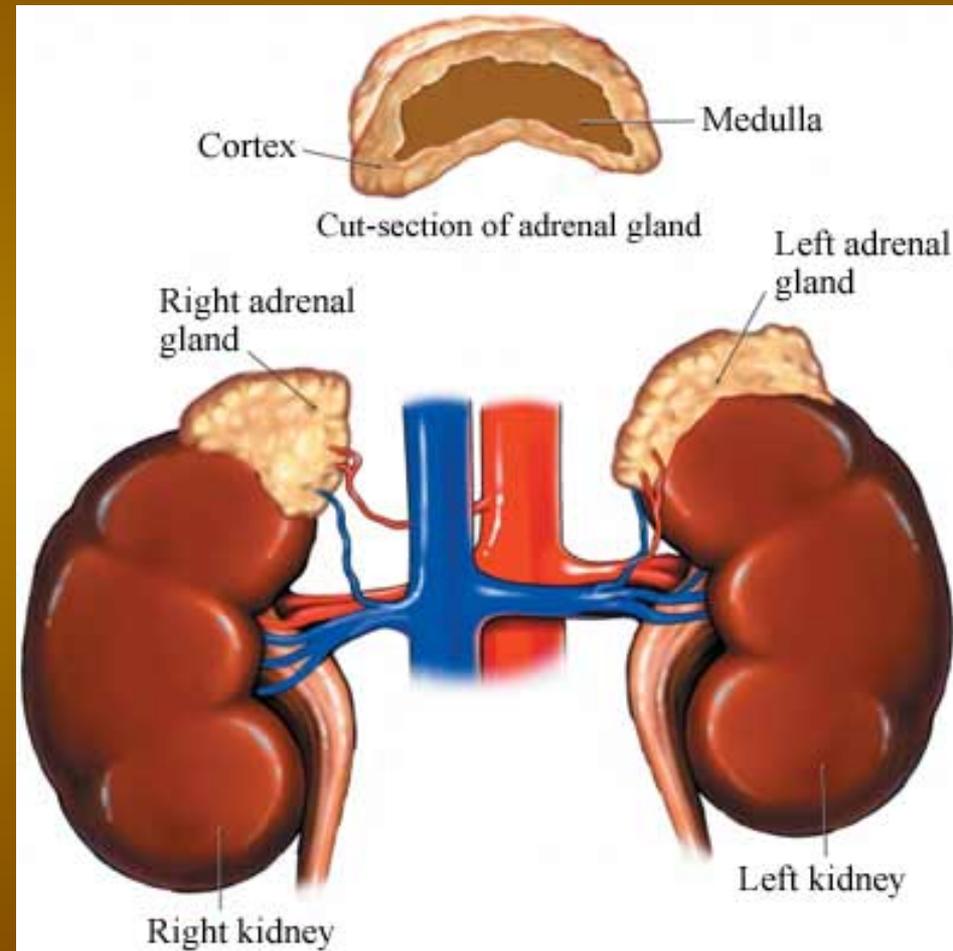
Thyroid Gland



- Helps to regulate metabolism (carbs, protein & fats) which effects growth & development
 - *Energy release from carbohydrates*
 - *Protein synthesis*
 - *Lipid breakdown*
- Regulates blood calcium concentration

Adrenal Gland

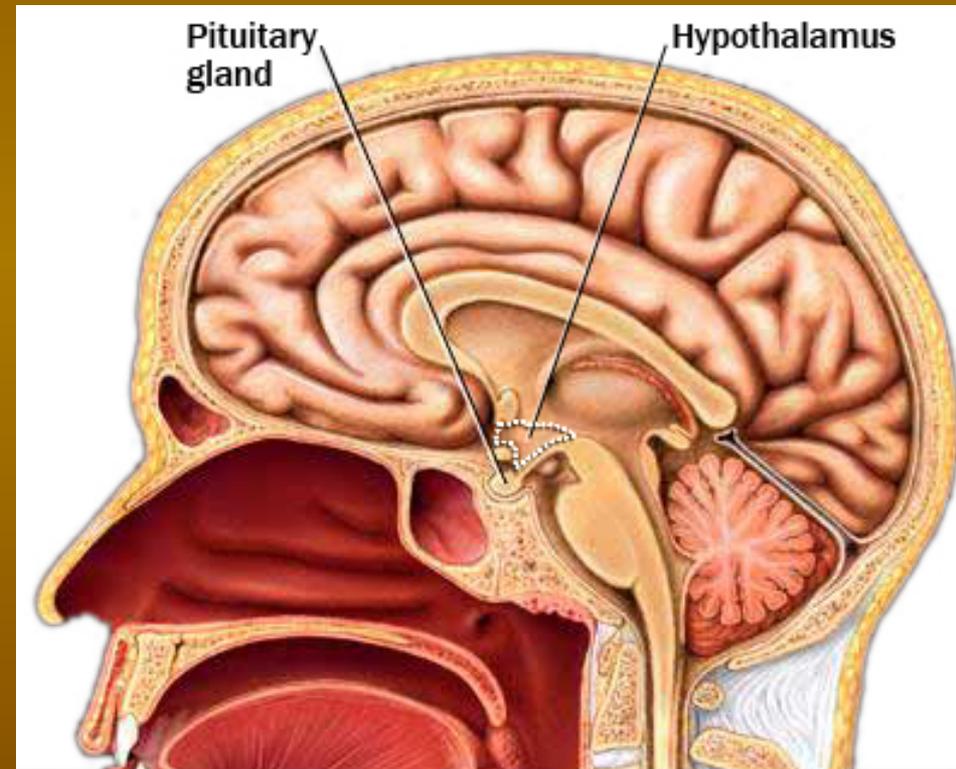
- Medulla- Hormones associated with “fight-or-flight” response
- Cortex- Over 30 different hormones
- Regulation of electrolytes, nutrient metabolism, & early development of reproductive organs



Click for fight or flight response

Pituitary Gland

- Helps to control growth, blood pressure, urine production, pregnancy, labor & milk production in females, & controlling secretions from other endocrine glands

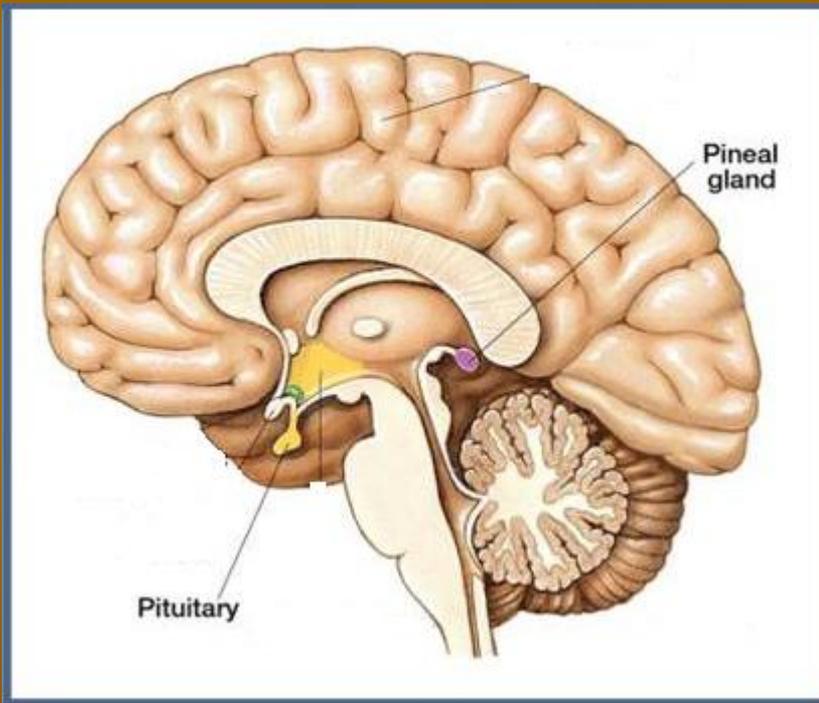


© Mayo Foundation for Medical Education and Research. All rights reserved.

[Click for video summary](#)

Pineal Gland

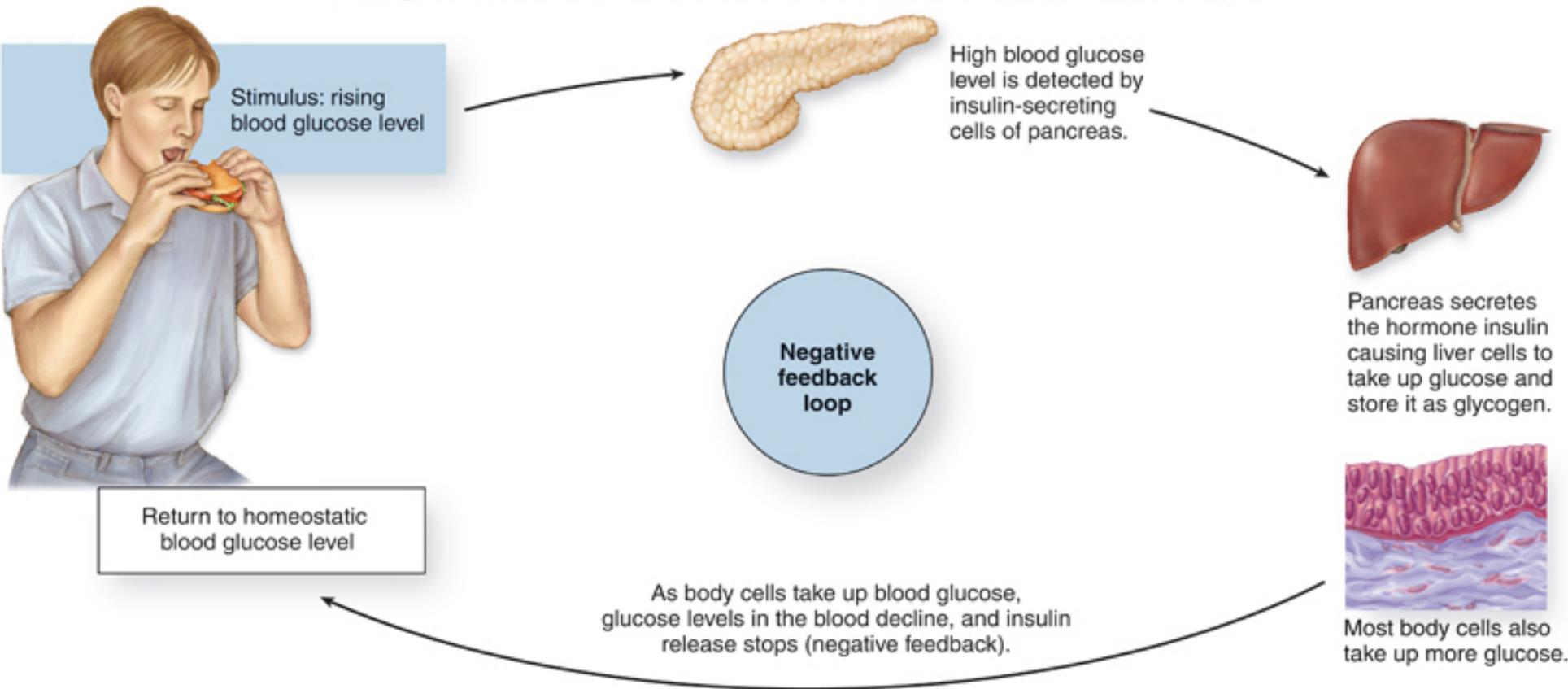
- Regulation of circadian rhythms
- Sleep-wake cycles
- Seasonal cycles in mammals (fertility, etc)



Other organs with endocrine functions

- Pancreas
- Stomach
- Small intestine
- Thymus
- Ovaries
- Placenta (pregnancy)
- Testes

Negative feedback



(a) Negative feedback