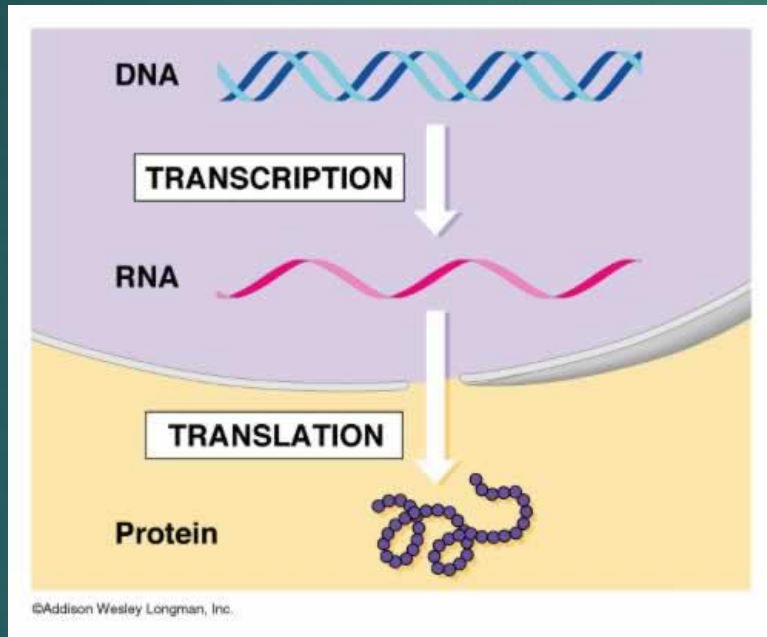


Cell to Cell Communication via Steroids & Hormones

PACKET #27

Hormones & Gene Transcription

Hormones & Gene Transcription

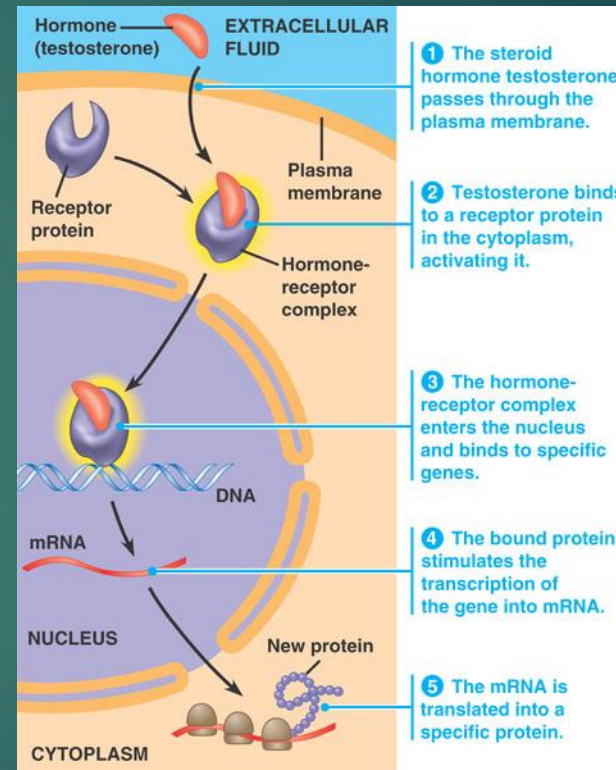


- ◆ Hormones are sometimes used to initiate transcription and translation as a response.
- ◆ Some hormones are small enough, and hydrophobic, to make it through the cell membrane where an intracellular receptor will be used.

Steroid Hormones & Intracellular Processing

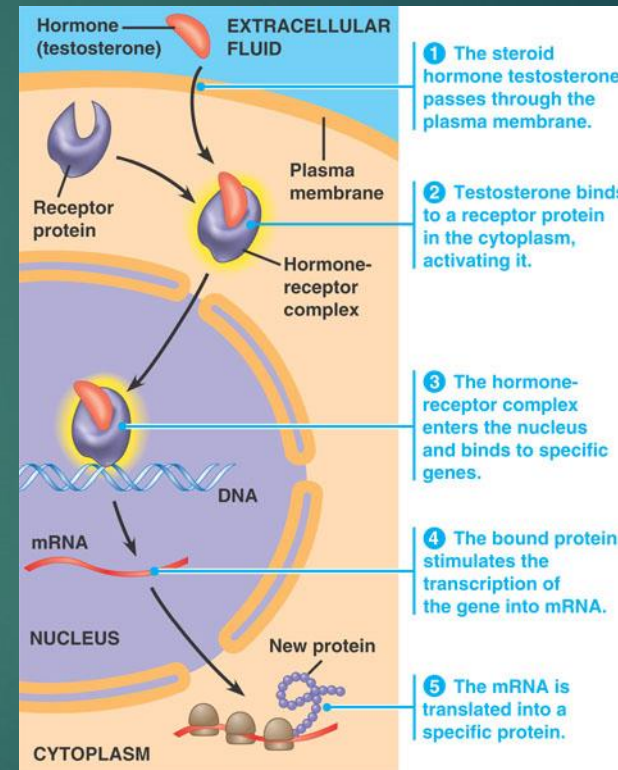
Intracellular Signaling Process I

- ◆ Signal crosses membrane
- ◆ Binds to receptor protein
 - ◆ Forms receptor-agonist complex
- ◆ Complex is transported into the nucleus through the nuclear pores
- ◆ Complex activates the receptor protein
- ◆ Activated receptor protein binds at specific regulatory sequences on the DNA strand



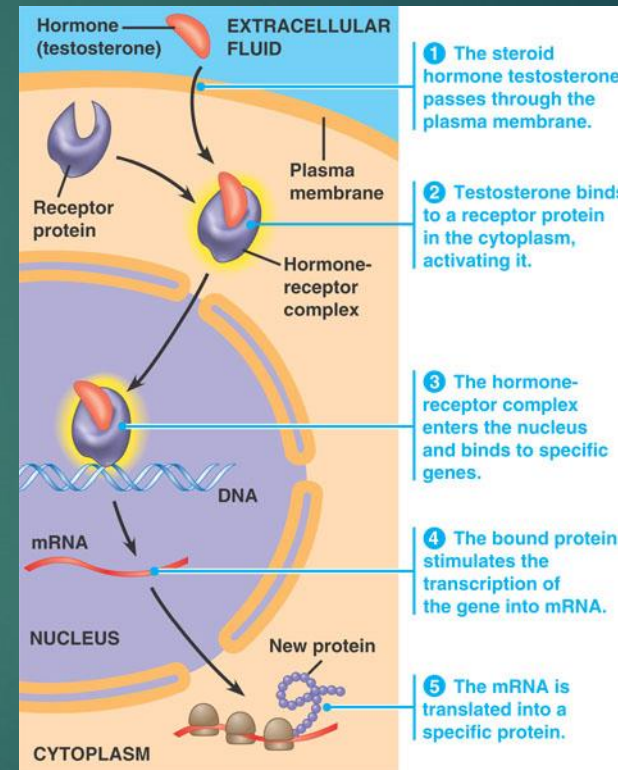
Intracellular Signaling Process II

- ▶ Complex binds to specific region of DNA causing increased expression of specific genes
 - ▶ Transcription is initiated.



Intracellular Signaling Process III

- ▶ Keep in mind that the “response” is not immediate.
 - ▶ Time is required to complete both transcription and translation.
 - ▶ Furthermore, the duration of effects depends on the half-life of mRNA and protein



Testosterone

Testosterone

- ◆ Testosterone, a steroid hormone, is responsible for development of secondary sexual characteristics
 - ◆ Lack of the testosterone receptors, as a result of a mutation, leads to a development of outward female characteristics
 - ◆ More to come on this genetic disorder

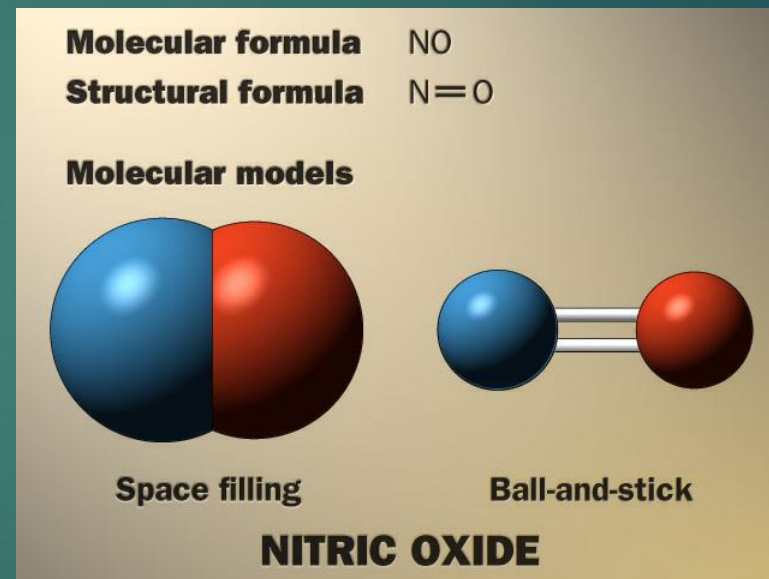
Nitric Oxide & Intracellular Receptors

Nitric Oxide & Intracellular Receptors

11

Monday, April
24, 2017

- ▶ Signal : -Nitric Oxide
 - ▶ Dissolved gas made from arginine
 - ▶ Operates as a local mediator in many tissues
- ▶ Nitric Oxide is used to activate an *intracellular enzyme guananylate cyclase*
 - ▶ Catalyzes the formation of cyclic GMP from GTP
 - ▶ Cyclic GMP activates a short intracellular signaling pathway



Nitric Oxide & Intracellular Receptors II

- ▶ Nitric oxide is released by endothelial cells that line every blood vessel
- ▶ Released in response to stimulation by nerve endings
- ▶ Ultimately causes blood vessel to dilate and relax
 - ▶ Causing blood to flow more freely
- ▶ During sexual stimulation, nitric oxide is released by nerve terminals in the penis of males and clitoris of females.
 - ▶ Results in both organs becoming erect.
- ▶ Nitric oxide works locally and quickly because of a short half-life.
 - ▶ Private message & short distance.



Nitric Oxide & Intracellular Receptors III

- ▶ Drug nitroglycerine is used to treat patients with *angina*
 - ▶ Pain due to inadequate blood flow to the heart muscle
 - ▶ Converted to NO in the body