

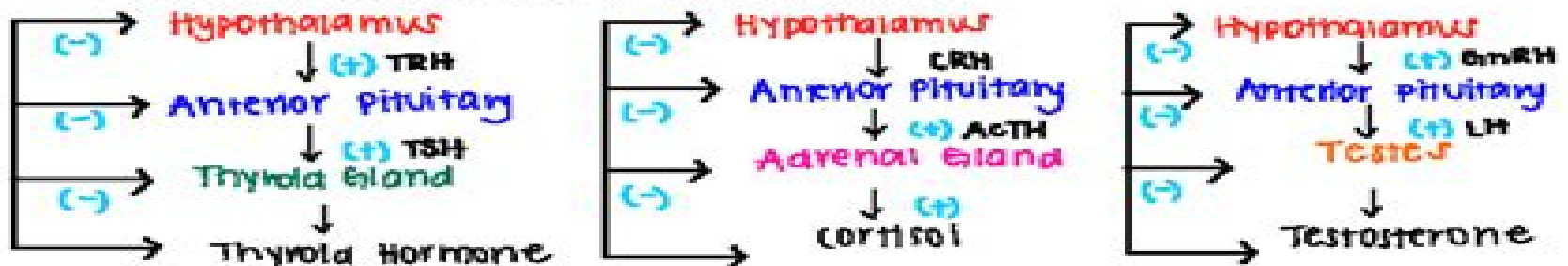
## Virtual Rat Endocrine Activity

Based on USING "VIRTUAL RATS" FOR UNDERSTANDING ENDOCRINE PHYSIOLOGY by Sandra V. Varney, Edyta Sipe, J. P. Laythock, & Stephen E. DeVesta, Dept. of Physiology, Northeastern Ohio University College of Medicine.

### INTRODUCTION AND BACKGROUND:

The purpose of this exercise is for you to understand basic principles and important concepts regarding the endocrine system. In this exercise, you will observe the effects of unknown hormones on "virtual rats" and use your knowledge of the endocrine system in determining the hormone used. Control "virtual rats" are provided as normals to which all other values should be compared. Upon careful comparison of the hormone-treated "virtual rats" with the control "virtual rats", you will be able to determine the unknown hormone. This activity is based on the negative feedback control pathways for testosterone, cortisol and thyroid hormones.

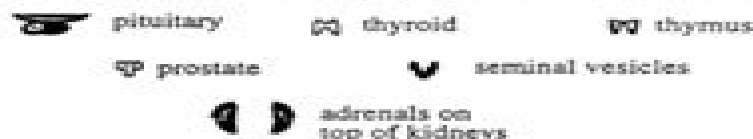
Write in the negative feedback control pathways for these hormones below:



### PROCEDURE:

In this exercise, you will determine the identity of an unknown hormone by observing the effect it has on the organs of the male rat.

The data for this lab were compiled from seven pairs of male rats; one pair was the control group and the remaining six pairs were experimental groups. In each set, there was an "intact" rat and a "castrate rat." Castration was removal of the testes to eliminate testosterone production. The two rats (normal and castrate) of each group were treated alike in all other ways (food, water, etc). All rats, except for those in the control group were injected with a hormone (ACTH, cortisol, LH, TRH, testosterone or TSH) on a daily basis for two weeks, sacrificed humanely and autopsied. Organ weights were measured at autopsy. Using your predictions of hormone effects and the autopsy data, match the rat groups with the hormone they were injected with. The following figure represents the rat organs weighed. The organs below appear on each rat. The pituitary is not drawn to scale; it is drawn larger than actual size. The seminal vesicles and prostate are targets of testosterone.



### Negative Feedback : output inhibits the input of a pathway

TRH that's secreted by the hypothalamus neurons stimulates anterior pituitary cells to release TSH. TSH attaches to receptors in the thyroid gland, promoting thyroid hormone production and secretion. Thyroid hormone secretion in the hypothalamus is blocked and stops secreting when blood's levels of hormones rise above a threshold.

# Virtual Rat Endocrine Activity Answers

**Katrin Zwirgmaier**



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