

SI A&P - Full Discipline Demo - Biodigital

The Endocrine System - BioDigital

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI A&P - Full Discipline Demo - Biodigital
Course	SI A&P - Full Discipline Demo - Biodigital
Instructor	Sales SI Demo

Test Your Knowledge

Match each term with the best description.

Endocrine glands	Testosterone-producing cells of the testes	1	
Target cells	Cells of posterior pituitary gland that store oxytocin and ADH	2	
Feedback loops	Mechanisms that utilize the level of a product to control the product's production	3	
Pituicytes	Possess receptors, within the cell membrane or nucleus, which bind with hormones	4	
Leydig cells	Ductless organs that secrete hormones directly into the bloodstream	5	

Correct answers:

- 1 Leydig cells 2 Pituicytes 3 Feedback loops 4 Target cells
5 Endocrine glands

Categorize each statement as true or false.

⚡ Hormones produced by the hypothalamus target the pituitary gland.	
⚡ The pineal gland produces cortisol.	
⚡ The pancreas produces insulin and glucagon.	
⚡ Hormones from the thymus gland target the digestive system.	
True	False
1	2

Correct answers:

- 1 Hormones produced by the hypothalamus target the pituitary gland.
The pancreas produces insulin and glucagon.
- 2 The pineal gland produces cortisol.
Hormones from the thymus gland target the digestive system.

Exploration

Hormones are organic compounds that act upon specific tissues in the body to produce a physiological response.

☒ True	✓
☐ False	

_____ feedback loops are the more common of the two feedback types in the human body.

- ☐ Positive
- ☒ Negative ✓
- ☐ Inverse
- ☐ Qualitative

Hormones produced by the thyroid target the _____.

- ☐ heart
- ☐ bones
- ☐ muscles
- ☒ All of the above ✓

Adrenal glands are composed of an inner medulla and an outer cortex.

- ☒ True ✓
- ☐ False

Exercise 1

Which cells of the labeled pancreas produce hormone and which hormones do they produce? Do these cells make up the majority or the minority of the pancreatic tissue?

The labeled cells of the islets produce the hormones insulin and glucagon. Islets only make up the minority of the pancreatic tissue with the acinar cells (exocrine cells) composing the majority of pancreatic tissue.

What hormones are released by the anterior pituitary gland? Which type of cell observed in this exercise releases each of the hormones?

The anterior pituitary releases GH and PRL from the acidophil cells and TSH, ACTH, FSH, and LH from the basophils.

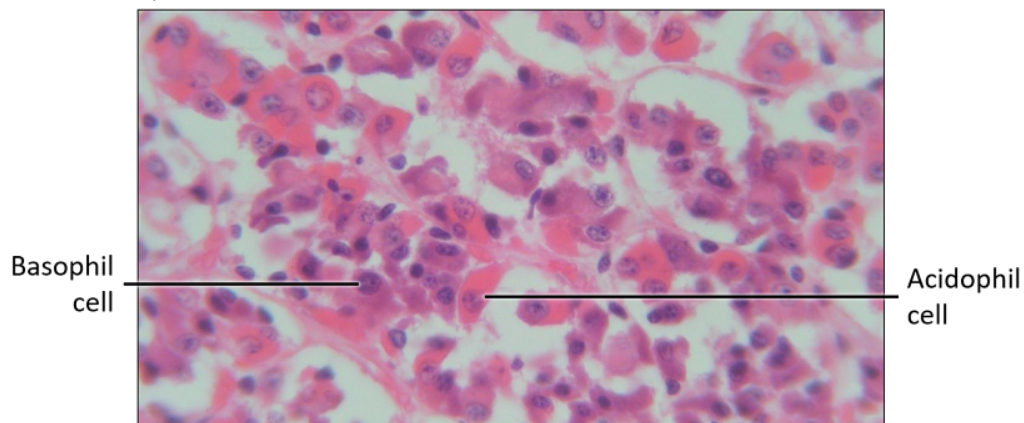
What are Leydig cells and how are they distinguished?

The Leydig cells produce testosterone in the testes. They are cells that are located on the outer edge of the seminiferous tubules.

What is the function of the follicular epithelium of the thyroid and how is it distinguished?

The follicular epithelium of the thyroid secretes thyroid hormones. These cells are arranged as simple cuboidal epithelial tissue and are found surrounding the colloid areas (areas with secretions of hormones) of the thyroid.

Photo 1: Anterior Pituitary
(SAMPLE ANSWER BELOW)

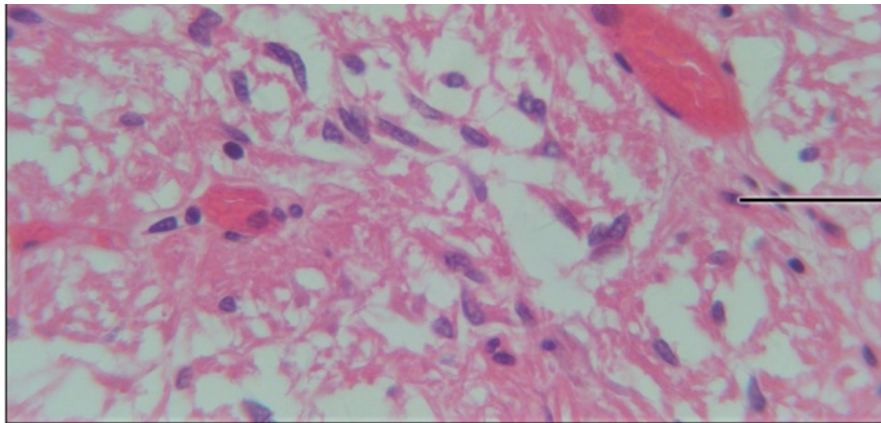


Data Table 1: Microscopic Examination of the Endocrine System
(SAMPLE ANSWER BELOW)

Structure	Magnification	Comments
Anterior Pituitary	600X	Students will only comment if they cannot locate a structure
Posterior Pituitary	600X	Students will only comment if they cannot locate a structure
Thyroid Gland	600X	Students will only comment if they cannot locate a structure
Adrenal Gland	60X	Students will only comment if they cannot locate a structure
Pancreas	600X	Students will only comment if they cannot locate a structure
Ovary	150X	Students will only comment if they cannot locate a structure
Testis	600X	Students will only comment if they cannot locate a structure

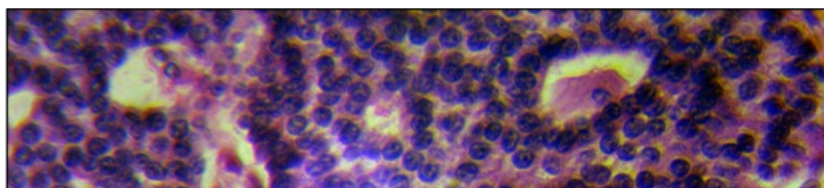
Photo 2: Posterior Pituitary
(SAMPLE ANSWER BELOW)





Pituicyte

Photo 3: Thyroid Gland
(SAMPLE ANSWER BELOW)



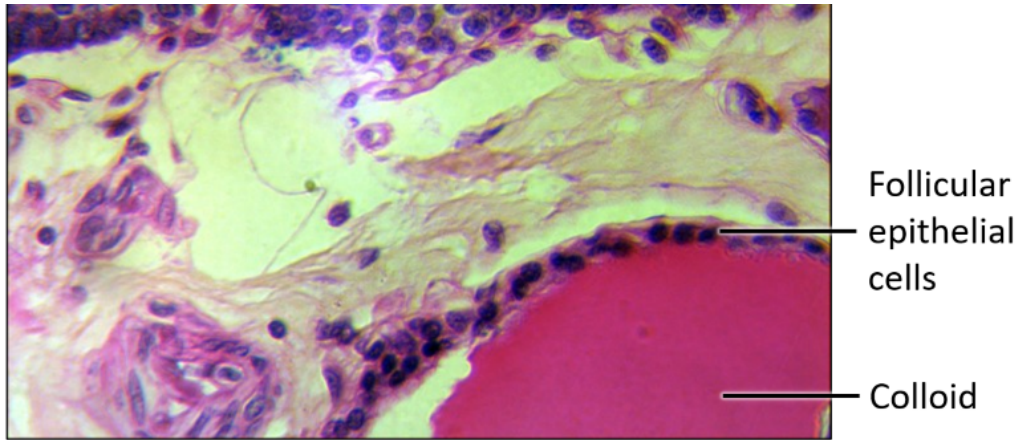


Photo 4: Adrenal Gland
(SAMPLE ANSWER BELOW)

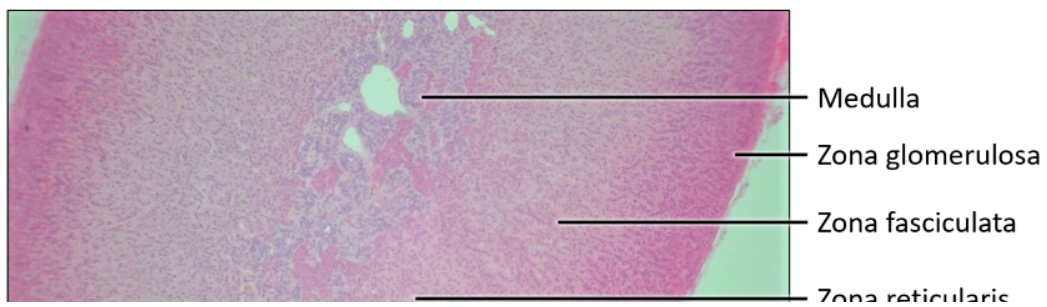
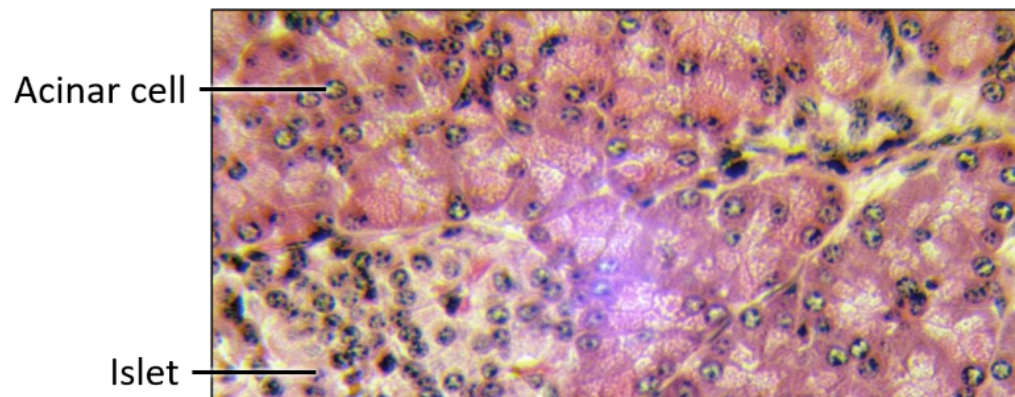




Photo 5: Pancreas
(SAMPLE ANSWER BELOW)



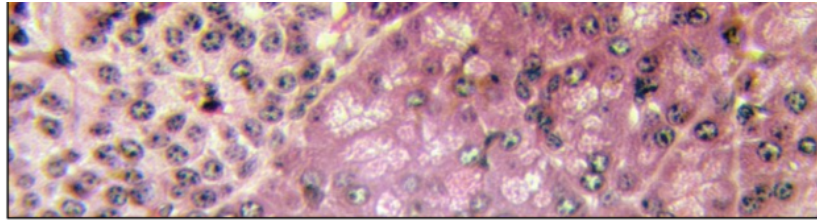
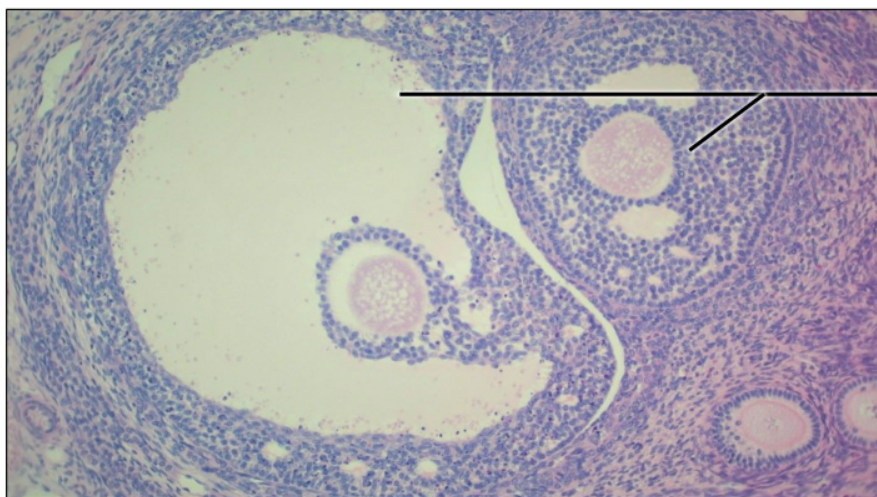
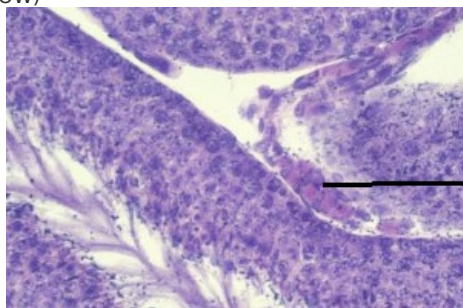


Photo 6: Ovary
(SAMPLE ANSWER BELOW)



Follicles

Photo 7: Testis
(SAMPLE ANSWER BELOW)



Leydig Cells

Exercise 2

What effects did cold water submersion and wall sits have on heart rate and blood pressure in this exercise? Reference your results in Data Tables 1-2 in your explanation.

Both heart rate and blood pressure increased in response to cold water immersion and wall sits as recorded in Data Tables 1-2.

What glands and hormones are involved in the negative feedback loop that controls the stress response observed in this exercise?

The hypothalamus secretes CRH that targets the pituitary gland resulting in the release of ACTH into the bloodstream. ACTH targets the adrenal glands resulting in the release of cortisol, norepinephrine, and epinephrine. These hormones target the digestive, respiratory, and cardiovascular systems resulting in increased blood flow to muscle tissue, increased heart and breathing rates, and increased glycolysis in the liver. Increased cortisol levels in the bloodstream trigger the hypothalamus to stop producing CRH via a negative feedback loop.

Prediction 1: Testing Temperature

(SAMPLE ANSWER BELOW)

Students should predict that a low temperature will induce the stress response by increasing both heart rate and blood pressure.

Data Table 2: Effect of Temperature on Heart Rate and Blood Pressure

(SAMPLE ANSWER BELOW)

Time	Heart Rate (Beats per minute)	Blood Pressure (mmHg; systolic/diastolic)
Initial - Normal Temperature	Answers will vary by students. Sample Data: 72	113/58
60 Seconds in Ice Water	76	118/58
120 Seconds in Ice Water	78	128/58
Final - Dry	72	115/58

Prediction 2: Body Postion Prediction

(SAMPLE ANSWER BELOW)

Students should predict that a sustained wall sit will induce the stress response by increasing both heart rate and blood pressure.

Data Table 3: Effect of Body Position on Heart Rate and Blood Pressure

(SAMPLE ANSWER BELOW)

Time	Heart Rate (Beats per minute)	Blood Pressure (mmHg; systolic/diastolic)
Initial - Standing	Answers will vary by students. Sample Data: 72	113/58
After Wall Sit	99	129/58
Final - Standing	74	116/58

Exercise 3

What is unique about the glands of the endocrine system?

Endocrine glands have no ducts. They secrete their hormones directly into capillaries.

Explain the function of the thyroid gland and the hormones it secretes. Include how hormone release is regulated and what cells the hormones act on.

The thyroid gland secretes thyroxine, a hormone that influences the metabolic rate of the body. If synthesis of thyroxine declines, the anterior pituitary secretes thyroid stimulating hormone, which stimulates the production of thyroid cells and their secretions. Calcitonin is also produced in the thyroid, acting to stimulate new bone formation by osteoblasts, thereby influencing calcium levels.

Photo 8: Thyroid Glands
(SAMPLE ANSWER BELOW)

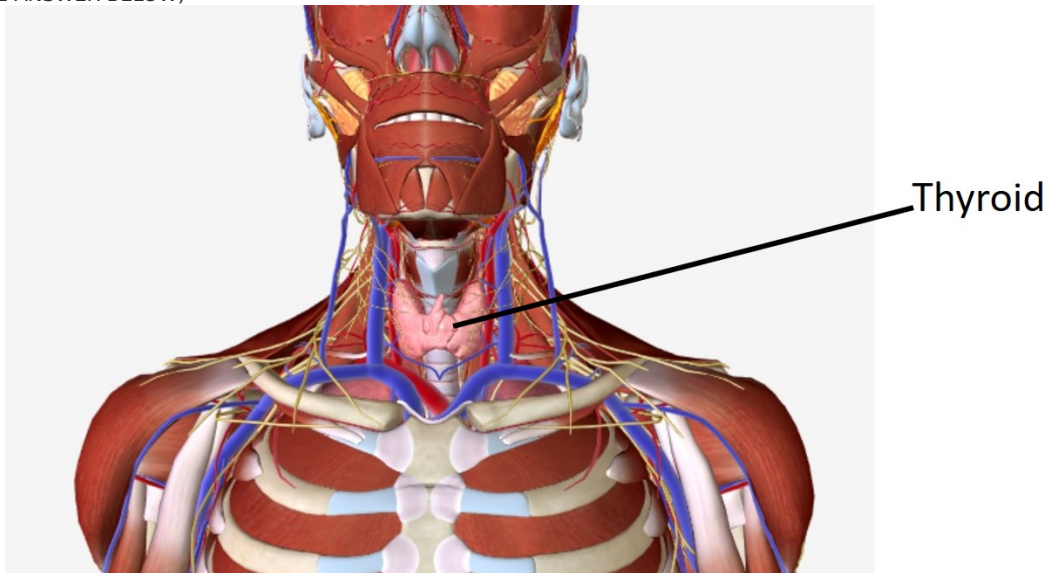
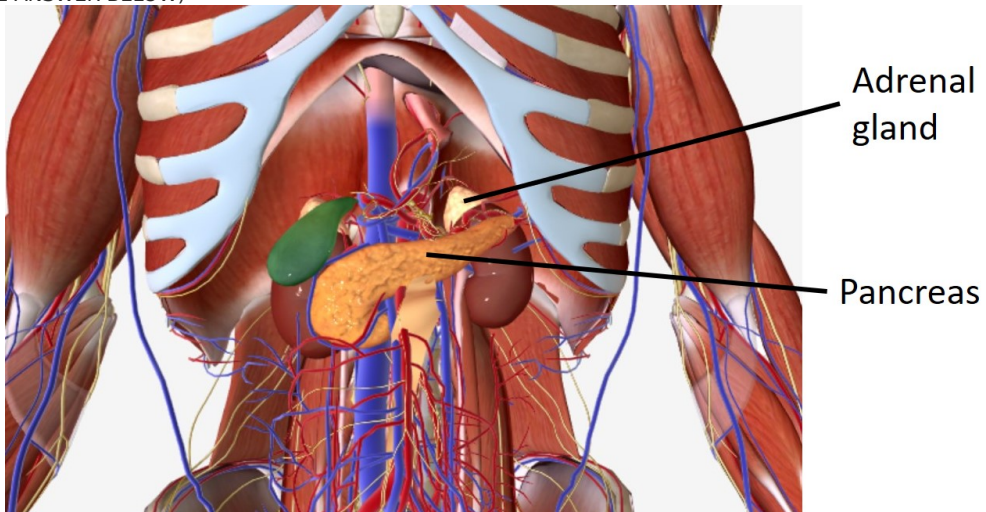


Photo 9: Pancreas and Adrenal Gland
(SAMPLE ANSWER BELOW)



Competency Review

Hormones regulate ____.

- ☐ growth
- ☐ metabolism
- ☐ reproduction
- ☒ All of the above ✓

In a negative feedback loop, increases in hormone levels result in decreased production of the hormone.

- ☒ True ✓
- ☐ False

The hypothalamus, pineal gland, and pituitary gland are located ____.

- ☒ inside the brain ✓
 - ☐ attached to the kidneys
 - ☐ adjacent to the airways
 - ☐ inside the abdomen
-

The thymus produces hormones that target the ____.

- ☐ lungs
- ☒ immune system
- ☐ stomach
- ☐ reproductive system

✓

The lumen of thyroid follicular cells is filled with ____.

- ☐ bile
- ☐ estrogen
- ☒ colloid
- ☐ testosterone

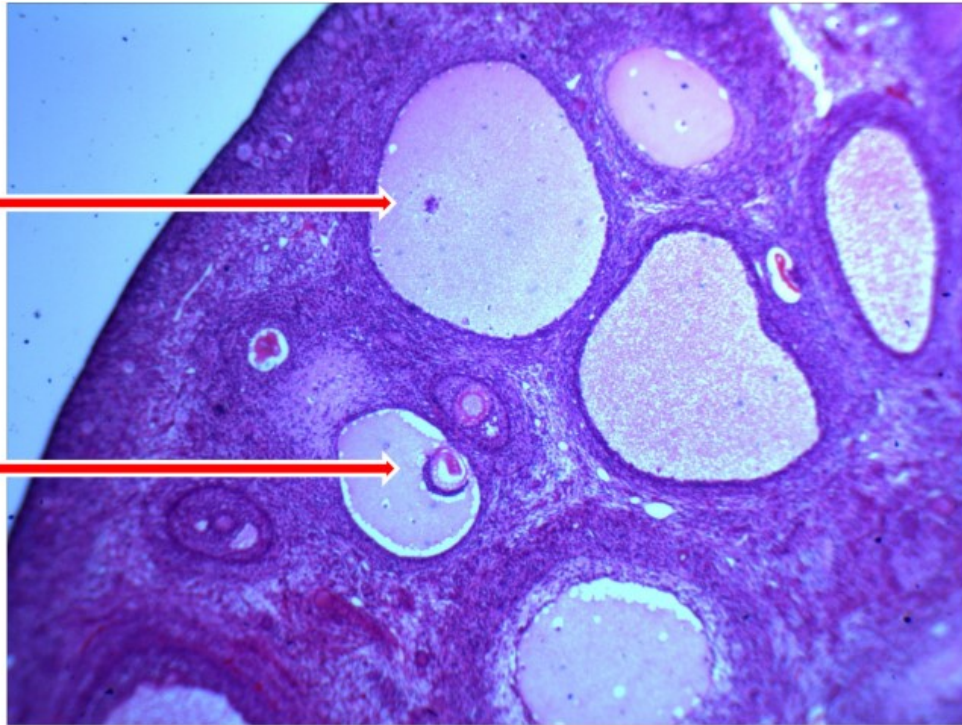
✓

____ cells of the pancreas secrete hormones.

- ☐ Medulla
- ☐ Acinar
- ☒ Islet
- ☐ Follicle

✓

_____ are indicated by the red arrows in the image of endocrine tissue below.



- ☐ Thyroid follicles
- ☒ Ovarian follicles
- ☐ Seminiferous tubules
- ☐ Pituicytes

✓

Blood pressure and heart rate increase in response to performing a wall sit for 30 seconds.

- ☒ True
- ☐ False

✓

Extension Questions

Type I diabetes is a condition in which the body loses the beta cells of the islets of Langerhans in the pancreas. Apply your knowledge of endocrine gland histology and function to explain how the loss of these cells would affect the body. (SAMPLE ANSWER BELOW)

The loss of islet cells in the pancreas would impact the production of important hormones including insulin which would inhibit the uptake of glucose by cells throughout the body.

