Biology 30 Unit 1 Human Organism Regulating Change/Homeostasis

2. Chemical/Endocrine Controls (endocrine glands)

Reference: Galbraith pp. 389 and Nelson pp. 332

Introduction

The endocrine system (the ductless glands) secrete their hormones directly into the blood. …

A. Glands

1. Label the accompanying diagram with the following glands and their specific hormones (in this booklet): *hypothalamus, pituitary, thyroid, adrenal, pancreas, ovaries and testes*.
2. Explain the physical connection and "neuroendocrine" role of the hypothalamus.

B. Hormones

1. Explain the difference between protein and steroid hormones.

2. Explain the specificity of protein hormones, using the receptor "fit" concept.

3. Design a chart to show the origins, target organs and the normal and abnormal effects of one these hormones: TSH and Thyroxin, ADH, and Calcitonin and Parathormone.

C. Blood Sugar/Glucose Homeostasis

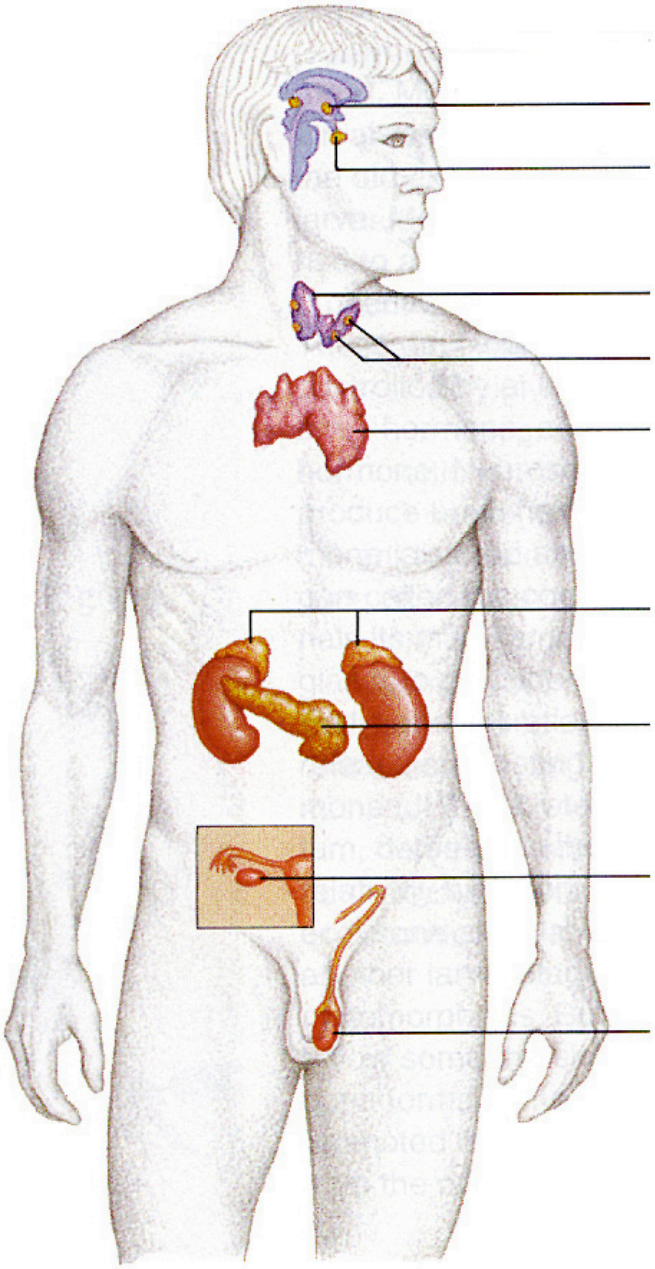
1. Islets of Langerhans (Pancreas). Draw and label a feedback loop involving the pancreas and the hormones insulin, glucagons, and epinephrine. Explain briefly.

2. Briefly Explain "Diabetes Mellitus"

D. STS Connections

1. Explain how we collect Insulin
2. Where is Islet cell Transplantation, being pioneered (Nelson p. 344)
3. How do Insulin Pumps work?

Endocrine System (Diagram 1)



Name of Gland	Hormone(s) Produced
1. _____	
2. _____	List all 8 hormones below
3. _____	_____
4. _____	_____
5. _____	
6. _____	_____ (cortex) _____ (cortex) _____ (medulla)
7. _____	_____ _____
8. _____	_____ _____
9. _____	_____

Hormones of the Anterior Pituitary

1) _____
2) _____
3) _____
4) _____
5) _____
6) _____

Posterior Pituitary

1) _____
2) _____

What is the key difference between posterior and anterior hormones?

Hormones and Their Target Organs (both Normal and Abnormal) N p. 338, W, p

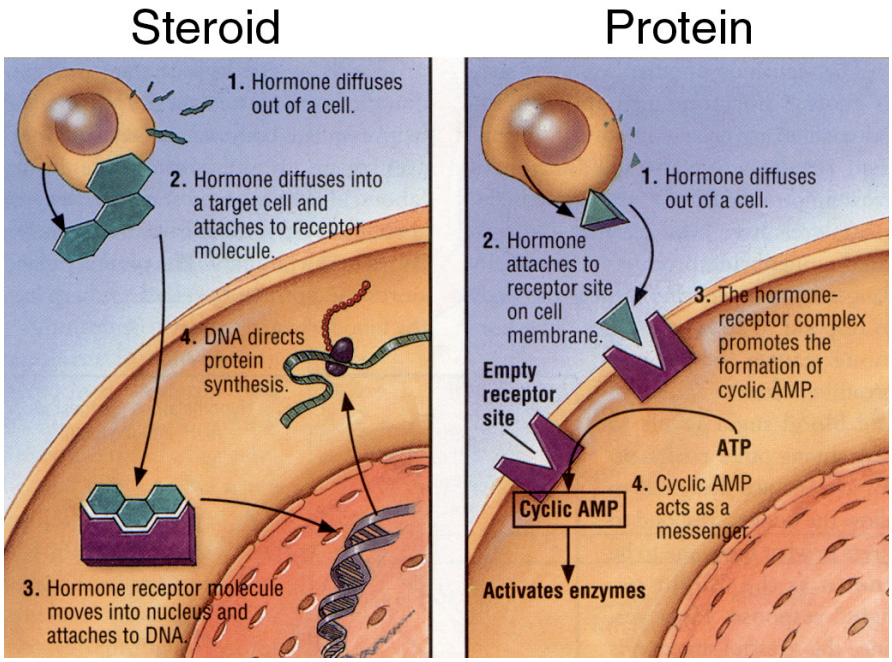
Hormone	Gland	Normal Effect / Target organ	Abnormal – Hyposecretion	Abnormal – Hypersecretion
HGH or somatotropin			Child -	Child – Adult –
Thyroxin (T4)		* Needs what mineral?	Child – Adult –	
Calcitonin				
Parathormone				
Cortisol				
ADH				
Aldosterone				
Insulin				

Steroid vs. Protein

Biology 30

Name: _____

There are two major types of hormone messengers in our bodies, steroid and protein. Use the diagram below, and p. 335 in Nelson to answer the following questions.



1) Describe the composition of steroid hormones, and their solubility.

2) Give an example of a common steroid.

3) Where do these hormones finally match up with a receptor?

4) During the Olympics, many athletes give in to pressure and take drugs to boost their performance. What is the effect of adding more testosterone to the body? What happens if you take too much testosterone?

5) Describe the composition of protein hormones. What are they soluble in?

6) Where do these hormones meet their receptor sites?

7) For Protein hormones, what chemical finally acts as a messenger inside the cell to trigger the required response?

8) Do all cells in our bodies have the same receptors? Why or why not?

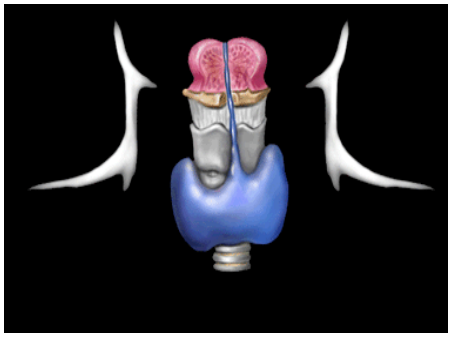
9) What makes a gland part of the endocrine system, and not just a gland (like our Sylvia glands)?

Thyroid and Parathyroid

Biology 30

Name: _____

Fill-in-the-blanks



1. The thyroid gland is found bridging the _____ _____. The two major hormones produce are _____ and _____. T4 or _____ promotes _____ metabolism, _____, and development of the _____ system. Secretion of this hormone is governed by a feedback mechanism between _____, produced in the pituitary, and the thyroid gland.

   The other main hormone _____, causes _____ to leave the blood and be stored in the _____.

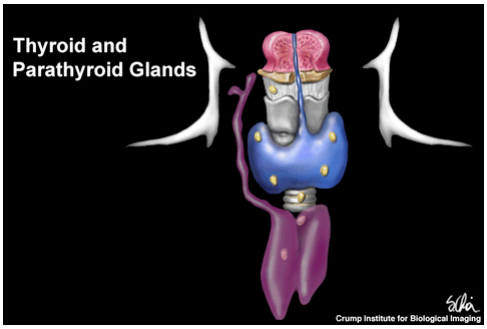
2. Parathyroid glands are located in the _____ glands and they are usually _____ in number. Their chief secretion is _____, which causes _____ to be re-absorbed by the kidneys, or released from the _____ and enter the _____.

True or False

Indicate whether the following statements are True or False by circulating the correct letter (T) or (F).

T	F	1.	Lack of thyroxin in adults results in cretinism.
T	F	2.	Myxedema is the result of excessive secretion of thyroxin.
T	F	3.	In positive feedback, the receptor keeps giving the same response.
T	F	4.	Goiter is the result of too little iodine in the diet.
T	F	5.	TSH stimulates the enlargement of the thyroid in goiter as a result of an attempt to make more thyroxin.

Parathyroid Information:



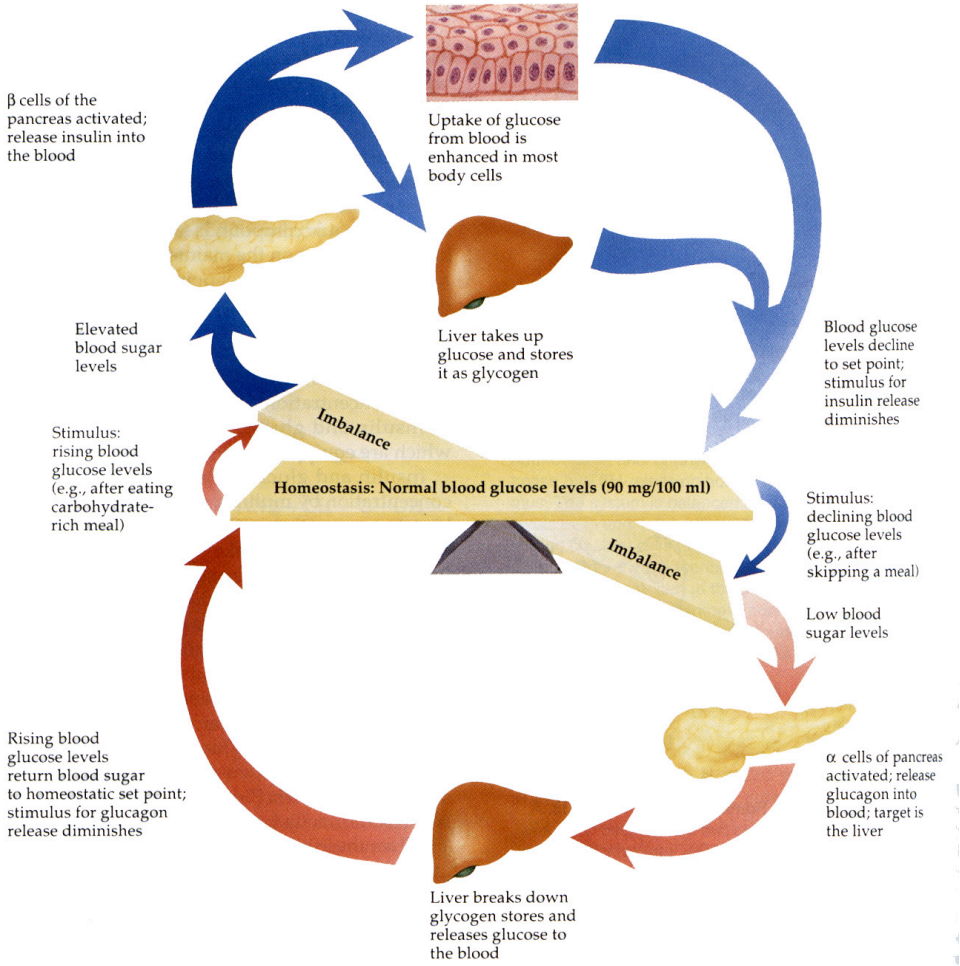
A deficiency of parathormone production (hypoparathyroidism) may lead to irregular witches and spasms of muscle cell (tetany) and excessive irritability of the nervous system causing convulsions. An Excess of parathormone (hyparathyroidism) may lead to brittle bones or deposits of calcium in soft tissues.

Pancreas and Diabetes

Biology 30

Name: _____

This flow diagram shows the balancing effect of insulin and glucagon on blood sugar levels. Study it carefully and answer the related questions. Also use page 341 in Nelson



1) What are the specialized cells that release insulin called?

2) If a person's blood sugar level suddenly drops (like from exercise) what hormone will be released?

3) What does this hormone do to raise the blood sugar levels?

4) What is the scientific name for a genetic disorder that is characterized by a lack of insulin in the body? What does the name literally mean in Latin?

5) What are some symptoms associated with Diabetes?

6) Juvenile diabetes is usually controlled by insulin injections. How is adult diabetes often controlled? Why does this method work for adult, and not juvenile?

7) What are some alternate treatments being explored? (p. 344)

Adrenal Cortex (Endocrine part 2)

Biology 30

Name: _____

Fill-in-the-blanks

The two parts of an adrenal gland are the adrenal _____ and the adrenal _____. The central _____ is stimulated by the _____ system to produce _____ and _____ for "fight or flight" responses. The other _____ produces _____ which are stimulated by ACTH produced in the _____ gland.

True or False

Indicate whether the following statements are True or False by circulating the correct letter (T) or (F).

T F 1. Blood glucose levels increase in the presence of adrenalin.

T F 2. Blood pressure increases in the presence of high levels of aldosterone.

T F 3. The pupil of the eye constricts if we are frightened.

T F 4. The rate of blood coagulation increases during an emergency.

T F 5. If excess salt is lost from the kidneys so is water.

T F 6. Cortisone maintains kidney water balance.

T F 7. Cortisone increases blood sugar levels.

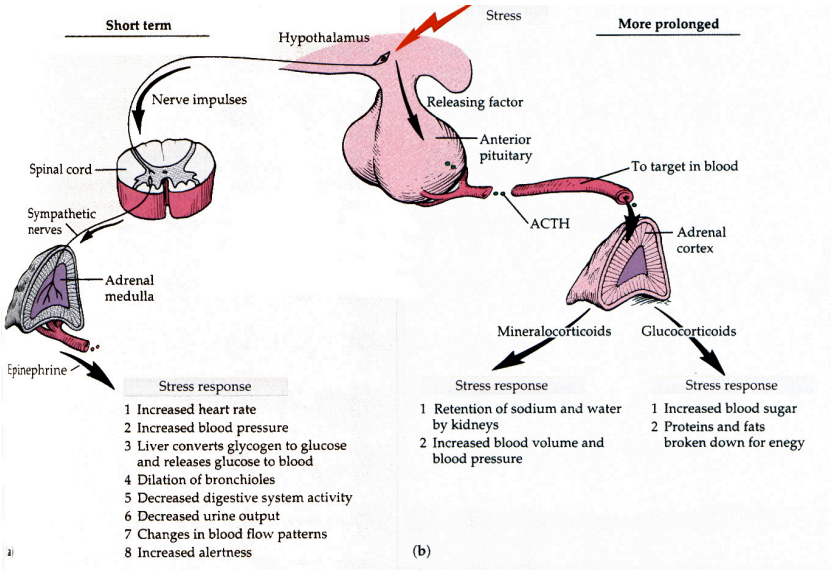
T F 8. Excess cortisone may weaken the body by converting protein to sugar.

T F 9. Ovaries and testes are the only organs producing sex hormones.

T F 10. We can live without our adrenal medulla.

Adrenal Information

Cortosal or cortisone is a glucocorticoid which promotes the manufacture of glucose and increases the storage of glycogen in the liver in the form of glycogen. Body protein is broken down and converted into sugar to increase the blood glucose level. This is a valuable response during starvation when body protein must be sacrificed to maintain blood glucose levels for the functioning of the brain It is not clearly understood, however, how this action helps us cope with emotional and other stresses. Excess secretion of this hormone may weaken the body.



Homeostasis Video 0 to 400 on Counter

Fill in the missing information to make a set of notes

1. Life on earth is _____; as many as _____ different species have been named.
2. For every species, life is a _____ against great odds.
3. Humans survive in extremes of temperature ranging from _____ to _____ oC.
4. Homeostasis is about _____; on the inside its all happening: _____, _____ & _____, all under constant control.

5. How dose a mammal (dog/human) respond to:
   a) cold –

   -

   b) heat –

   c) blood sugar/glucose fluctuations –

6. Claude _____ stated that there were two environments; the _____ and the _____; and that all vital mechanisms have only one object to …

7. a) in 1930 who named homeostasis?
   b) how does the word translate? "homeo "stasis"

   c) Use another word or explanation for homeostasis

8. Why is a higher set point desirable in case of infection or fever?

9. What is a normal "set point" or body temperature for:
   a) humans –
   b) birds –

10. What term describes:
    a) an organism whose body temperature varies with that of the environment (ex from)?

    b) organisms like birds and mammals –

11. What can be said of the differentiate between the two?

12. Name two other factors in the body that must be constantly monitored and controlled:
-

-

13. Using the pattern mentioned in carrying out this control, fill in the missing information:

STRESS _____ message _____ message _____

14. Where does the REPONSE originate?
What does it accomplish?

15. Where does FEEDBACK originate?
What does it accomplish?

16. Using the EUGLENA, give an example for each of the steps in the pattern below:

STRESS

RECEPTOR

CONTROL CENTER

MESSAGE

EFFECTOR

RESPONSE

FEEDBACK

17. Which 4 steps from above would be considered the “major” steps?

Endocrine Review Questions (Taken from old Diploma exams) Biology 30

January 1998 Diploma:

Use the following information to answer the next question.

In 1947, E. B. Verney published the results of a series of experiments that he had conducted on a number of dogs. He found that if he injected a concentrated salt solution into the bloodstream, hypothalamus, and ventricles of the brain, hormone "X" was released in large amounts.

13. Hormone "X" was most likely
    A. ADH
    B. ACTH
    C. oxytocin
    D. aldosterone

14. The endocrine function of the pancreas was studied in Canada using dogs as experimental animals. The pancreatic cells with an endocrine function are
    A. islet cells
    B. blood cells
    C. Sertoli cells
    D. interstitial cells

Use the following information to answer the next question.

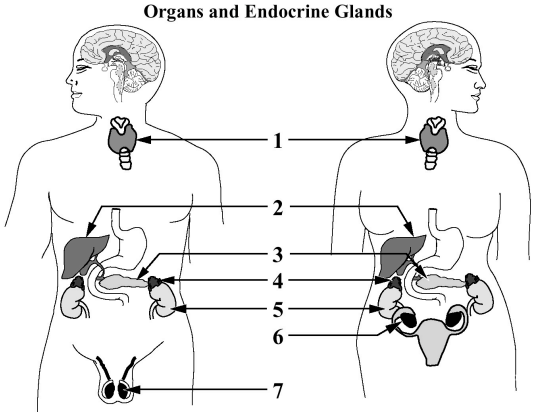
Bovine somatotropin (BST) is a growth hormone that has been produced using biotechnology since 1970. BST increases milk production by 10% to 20% when injected into milk-producing cows. BST increases nutrient absorption from the bloodstream into the cow's mammary gland.

–from Harpp and Joseph

15. BST could probably be obtained naturally from which gland in a cow?
    A. Thyroid
    B. Adrenal
    C. Pituitary
    D. Pancreatic

17. In humans, when iodine levels are adequate, abnormally high TSH secretion would likely result in
    A. nervousness and weight gain
    B. nervousness and weight loss
    C. sleepiness and weight gain
    D. sleepiness and weight loss

June 1998 Diploma:



8. The gland that is directly stimulated by the nervous system to secrete hormones is the structure labelled
    A. 2
    B. 3
    C. 4
    D. 5

9. The structure that produces only hormones is labelled
    A. 1
    B. 2
    C. 5
    D. 6

10. A target organ for aldosterone is the structure labelled
    A. 3
    B. 5

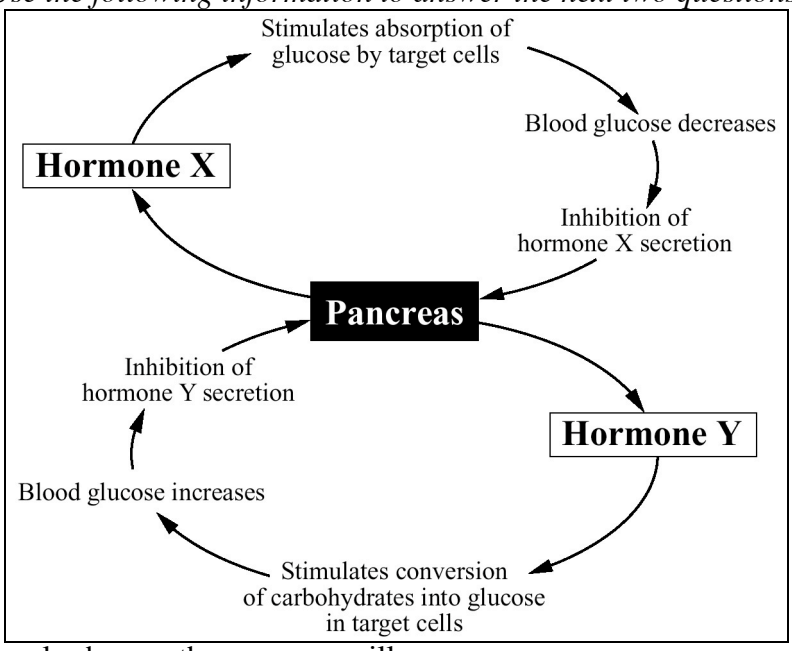
12. When the hypothalamus fails to produce ADH, the physiological effect that is most likely is
    A. muscle spasms
    B. loss of memory
    C. decreased breathing rate
    D. increased urine production

January 1999 Diploma:

12. A condition that results in an enlargement of the thyroid gland may be caused by a diet deficient in
    A. iron
    B. iodine
    C. sodium
    D. potassium

June 1999 Diploma:

Use the following information to answer the next two questions.



15. If blood glucose levels change, the pancreas will
    A. stop hormone secretions because the target cells are not working
    B. produce a more active form of the hormone that stimulates the target cells
    C. cause other endocrine glands to secrete hormones that stimulate the target cells
    D. increase the secretion of the appropriate hormone that stimulates the target cells

16. The names of hormones X and Y are, respectively,
    A. insulin and glucagon
    B. glucagon and insulin
    C. glycogen and insulin
    D. insulin and glycogen

January 2000 Diploma:

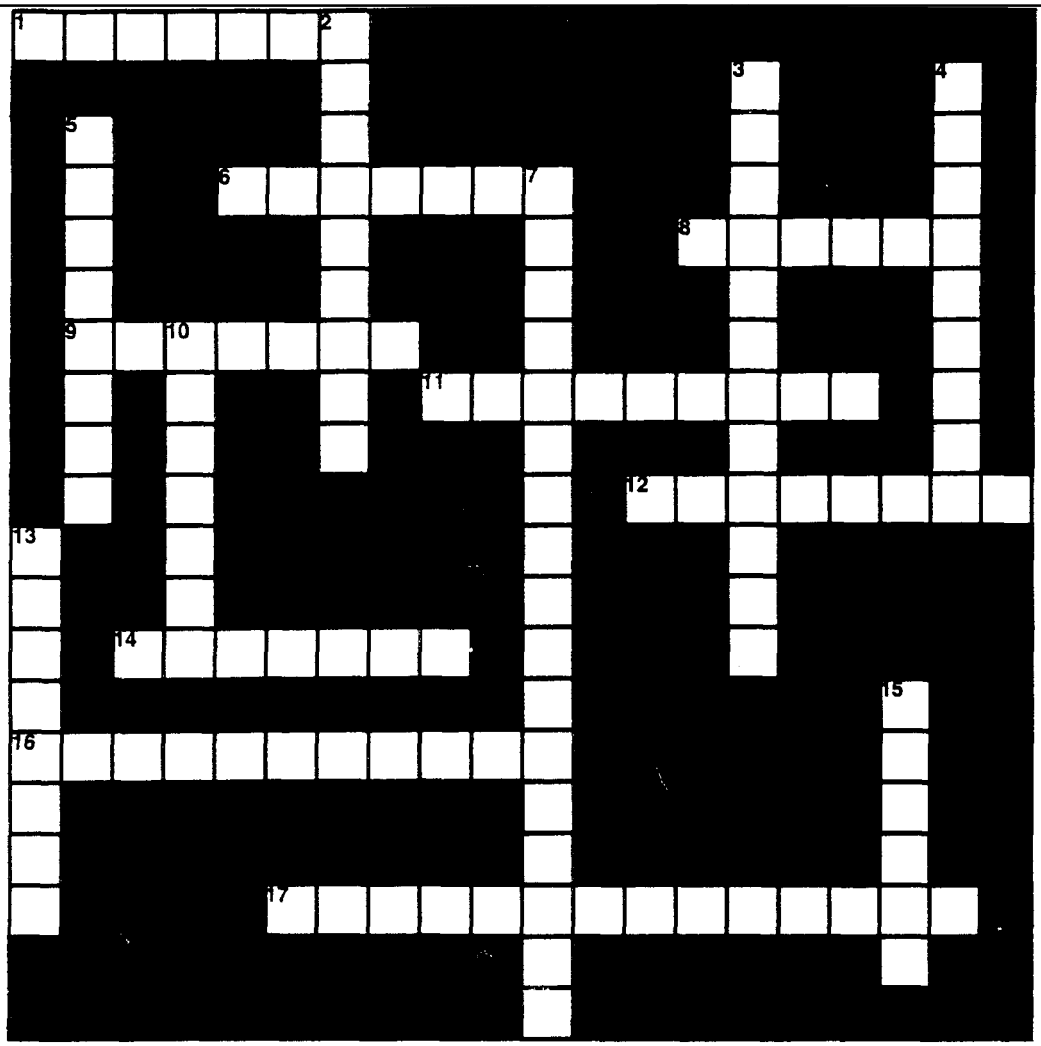
Use the following information to answer the next question.

Responses Stimulated by Hormones	
1 Release of thyroxin	4 Development of follicle and sperm
2 Development of bones and muscles	5 Ovulation and maintenance of the corpus luteum
3 Water reabsorption by kidneys	6 Milk production

Numerical Response

02. Identify the response, as numbered above, that would be stimulated by each of the hormones given below.

Response:	_____	_____	_____	_____
Hormone:	STH(HGH)	LH	TSH	FSH



Across

1 Chemical messenger that affects cells in another part of the body
6 This type of hormone is composed of amino acids
8 An enlargement of the thyroid gland
9 A hormone produced by the beta cells in the pancreas
11 The master gland
12 A disease characterized by hyperglycemia
14 A gland found anterior to the kidney
16 A hormone that regulates water balance in the kidneys
17 Hormones that have a pronounced effect in a localized area

Down

2 Hormones carried by the blood
3 Area of the brain
4 A hormone that helps regulate metabolism
5 A hormone that stimulates the conversion of amino acids to glucose
7 A regulatory mechanism that controls hormone levels
10 A hormone group made from cholesterol
13 A hormone that converts glycogen to glucose
15 Substance needed by thyroid gland