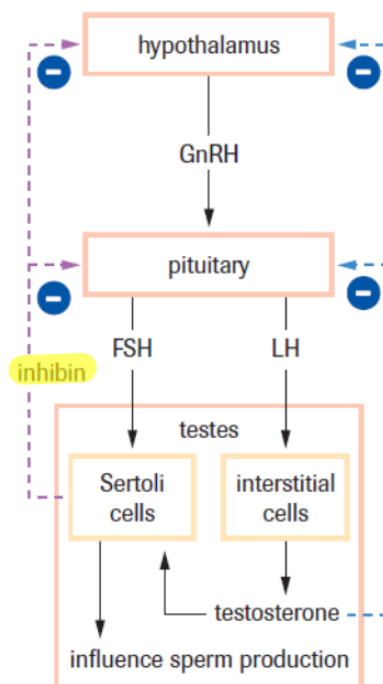


Outcome 1

Class 2 – Hormonal Control of the Male Reproductive System

Notes

- The main male sex hormone is **testosterone**
- Produced by the **interstitial** cells in the seminiferous tubules
- Testosterone is responsible for **secondary** male sex characteristics
 - traits that distinguish the two sexes of a species, but that are not directly part of the reproductive system
 - Male Secondary Sex Characteristics
 - Testicular size, function, and fertility
 - Penis Size
 - Pubic hair
 - Body and facial hair
 - Voice change
 - Height growth
 - Male musculature and body shape
- At puberty the hypothalamus starts releasing **GnRH** (gonadotropin-releasing hormone) when **testosterone** levels are low
 - GnRH activates the **pituitary** causing the release of **FSH** and **LH**
 - FSH stimulates sperm production in the cells of the seminiferous tubules
 - LH stimulates the **interstitial cells** to make **testosterone**
 - Testosterone stimulates sperm production
 - Once high levels of testosterone is detected by the hypothalamus, a negative feedback system is activated



Outcome 1
Class 2 – Hormonal Control of the Male Reproductive System
Review Assignment

Understanding the Regulation of Male Sex Hormones

An experiment was performed in which the circulatory systems of two male mice (A and B) with compatible blood types were joined (Figure 7). The data analysis from the experiment is shown in Table 4. (Note that + indicates “found,” - indicates “not found.”)

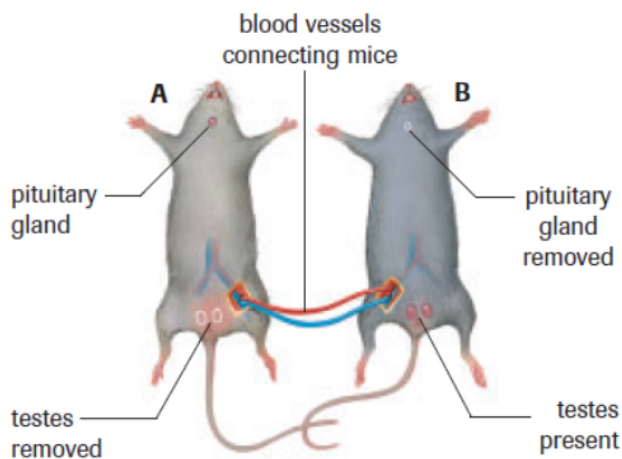


Table 4 Presence of Hormones and Sperm in Joined Mice

Animal	Testosterone	LH	FSH	Sperm in urethra
A	+	+	+	-
B	+	+	+	+

Figure 7
 Circulatory systems of two mice are joined.

1. State the purpose of the experiment
2. Why were the circulatory systems joined?
3. If LH and FSH are produced in the pituitary gland, explain how it is possible to find these hormones in mouse B.
4. Explain why testosterone is found in both mice.
5. Why is sperm found in the urethra of mouse B but not in the urethra of mouse A?
6. In another experiment, the circulatory systems of the two mice were not joined and the data in Table 5 were collected. Predict which glands and organs are present or absent from each animal. Give reasons for your prediction.

Table 5 Presence of Hormones and Sperm in Two Mice

Animal	Testosterone	LH	FSH	Sperm in urethra
A	-	+	+	-
B	-	-	-	-

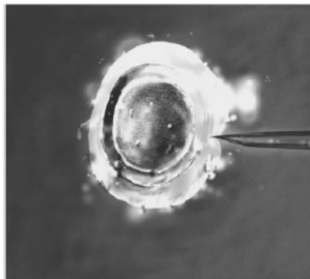
Use the following information to answer the next question.

A male is having fertility problems. His sperm are not making their way to the oocyte in time to fertilize it. Analysis of his seminal fluid determines two insufficiencies.

- The two insufficiencies in semen that would affect sperm's ability to travel to the oocyte are the lack of
- A. FSH and testosterone
 - B. fructose and testosterone
 - C. FSH and alkaline buffers
 - D. fructose and alkaline buffers

The picture below shows how sperm is injected into an egg. This technology may be used to overcome infertility problems caused by sperm that are unable to penetrate an egg, or by sperm that lack a proper flagellum (tail).

Intracytoplasmic Sperm Injection (ICSI)



- Sperm are normally able to penetrate an egg by
- A. fusing their nuclei with the nucleus of the egg
 - B. releasing hydrolytic enzymes from the acrosome found in the head of the sperm
 - C. dissolving the covering of the egg with alkaline secretions from the prostate gland
 - D. dissolving the covering of the egg using the hydrolytic enzymes secreted from Cowper's gland

Use the following information to answer the next two questions.

New research has led to advances in the development of male contraceptives. One of the most promising contraceptive methods involves injecting androgens (testosterone or other male hormones) into a male's muscles. The androgens produce a negative feedback effect on the hypothalamus and pituitary gland. In trials involving a combination of androgens, sperm counts were reduced to zero in test subjects, but this method was effective for only three weeks.

Events in a Negative Feedback Loop Controlling Sperm Production

- 1 Production of sperm is inhibited
- 2 Hormone levels in the blood return to normal
- 3 Production of FSH and LH is inhibited
- 4 High levels of the injected androgens circulate in the blood

—from Alexander, 1999

Numerical Response

3. The order in which the events listed above would occur following the injection of androgens into a male's muscle is _____, _____, _____, and _____.

(Record all four digits of your answer in the numerical-response section on the answer sheet.)

Use the following additional information to answer the next question.

Researchers developing male contraceptives have found other methods of interfering with various stages of sperm development and sperm release from the body. Some methods of contraception currently being investigated are given below.

- 1 Interfering with the process of meiosis by which sperm are produced
- 2 Blocking the release of hormones that stimulate the release of FSH and LH
- 3 Using removable polyurethane plugs to block the tubes that transport sperm
- 4 Administering a calcium-blocking drug that interferes with the final maturation of sperm

Numerical Response

4. Match each of the methods of contraception described above with the structure given below that is targeted by that method.

Method of
Contraception: _____
Structure: Seminiferous tubules Epididymis Vas deferens Hypothalamus

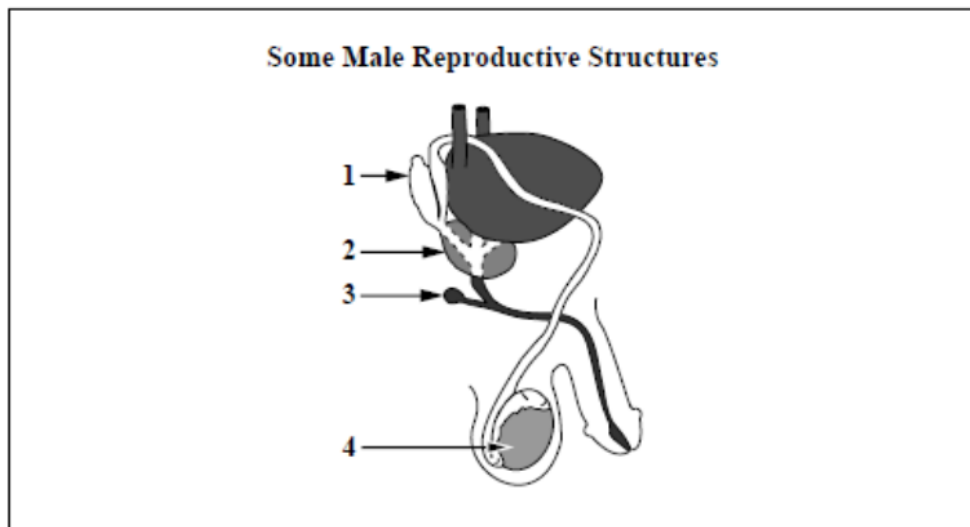
Use the following information to answer the next 2 questions

Benign prostatic hyperplasia (BPH), an enlargement of the prostate gland, causes urination problems such as dribbling and pain. BPH is not a precursor to prostate cancer. Prostate cancer is linked to the absence of a protein coded for by the *p27* gene. The absence of this protein leads to uncontrolled cell growth in prostate tissue.

—from *Seppa, 1998*

8. The movement of which of the following substances could **not** be affected by BPH?
- A. Urine
 - B. Sperm
 - C. Testosterone
 - D. Seminal vesicle secretions

Use the following additional information to answer the next question.



9. In the diagram above, the structure **most affected** by the absence of the protein coded for by the *p27* gene is numbered
- A. 1
 - B. 2
 - C. 3
 - D. 4