

PURPOSE

To expand students' knowledge of the male reproductive process, including the production of sperm and the hormone testosterone. To reinforce the concept that this process is a sign of health.

LEARNING OBJECTIVES

By the end of the lesson students will be able to:

1. Understand where testosterone is produced and how hormones govern this process.
2. Understand that the healthy function of the male reproductive system begins at puberty and happens continuously through life.

MATERIALS & RESOURCES

- **Lesson 3 teenMEN** powerpoint
- **Who wants to be a Trillionaire: teenMEN edition (slides in PPT)**
+ Teacher's Answer Key
- **Exit Activity: True or False?**

VOCABULARY

- **Hormones:** Chemical signals that travel in the bloodstream, directing the activity of every system. The body has many different hormones, produced in different parts of the body.
- **Testosterone:** The main male hormone, produced in the testes.

Step 1 (10 minutes): Who wants to be a Trillionaire: teenMEN edition

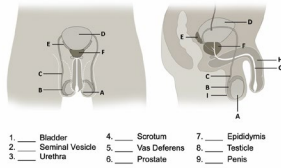
1. Divide students into two teams. Each time will select one person to be the group leader. The leader will represent the team in giving the answers.
2. On each slide is a question and a multiple choice answer. Once the slide with the question is shown, the first team leader to raise their hand gets to answer. However, they must have their final answer ready - they cannot consult their group after their hand is raised. So, make sure you discuss the question with your group first, once the slide is shown, and then raise your hand to give the group's final answer.
3. If a team gets the answer wrong, then the other team has a chance to guess. Each team will receive one trillion points per correct answer. In the end, the team with the most points wins.

The Teacher's Answer Key is provided in the materials. For the Powerpoint, clicking on the slide will reveal the answer.

Step 2 (5 minutes): Review Male Reproductive Anatomy

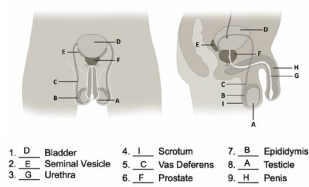
Review male reproductive anatomy, using the Powerpoint slide. Ask students to identify the labeled anatomy.

Review | Male Reproductive Anatomy



Then, show the following slide with the answers.

Answers | Male Reproductive Anatomy



Step 3 (10 minutes): The brain and sperm production

Let's talk about the power of hormones. **Hormones manage the activity of every system in the body.**

What are hormones?

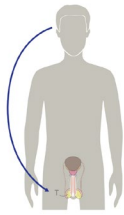
Hormones manage the activity of **every system in the body**.
Hormones are chemical signals that travel in the bloodstream to tissues and organs, directing:

Growth & development!
Mood!
Reproduction!

That's a lot to direct!

Hormones are chemical messengers that travel in the bloodstream. Different hormones give different signals to direct growth and development, mood, and reproduction. But it's important to remember: hormones and puberty aren't random. Despite what you may have heard about puberty or becoming a man, **all of the activity of the male reproductive system is controlled by the brain.**

The Brain & Hormones



The brain sends **hormonal signals** to your reproductive organs to help them mature and function.

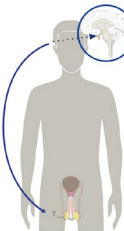
The **testicles** receive these hormonal signals.

Sperm and **testosterone** are both produced in the testicles.

The brain sends signals to your reproductive system to mature in their function. During puberty the pituitary gland begins to function like that of an adult.

The pituitary gland is located in the brain. It's a small but powerful part!

The Brain & the Powerful Pituitary Gland



This little kidney bean-shaped pituitary gland is the "master gland" for your body.

The pituitary gland signals the cells in your testes to produce sperm.

This is an important sign of health! It means that your body and your hormones are working properly.

Did you know: the health of your hormones now, during puberty, changes your brain and your body for the rest of your life!

The pituitary gland is often called the "master gland" because it controls the release of most of the hormones in the body.

Fun fact: a normal pituitary gland weighs less than 1 gram, which is the weight of a raisin or a paper clip and is **about the size and shape of a kidney bean!**

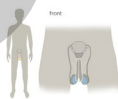
In the male body, this tiny gland releases the hormones that tell the testicles to produce sperm and testosterone. (Powerful, for something the size of a kidney bean!) Sperm is the male cell of reproduction, and testosterone, the main male hormone.

Sperm

Sperm are the male cell of reproduction. Each sperm carries your DNA!

They are made in the testicles.

You will make about **525 billion** sperm in your entire lifetime.

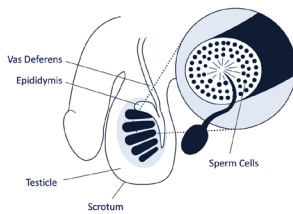


The testes actually make millions of sperm. In fact, by the time your body is done making sperm when you are much older, you will have made about 525 billion sperm.

To make new sperm, it takes your body about 75 days, but this is a process that is happening every day in your body, so sperm is constantly being generated. All of the other parts of your reproductive system help to move the sperm through the body to the outside. But all of this happens in the testes because of your brain.

The sperm cell is approximately **55 micrometers long**, which is roughly the same size as a pollen grain. In contrast to the egg cell, the female cell of reproduction, the sperm cell is one of the smallest cells of the human body!

Sperm production



Sperm is produced inside of little tubes that are inside the testicles. When you were a baby, these tubes had cells inside of them, but they were not sperm cells. Now that you are entering puberty, your testicles will be able to make sperm cells. After the cells are formed, they move into the **vas deferens**, another part of your reproductive system which is a duct (like a long tunnel). Two other parts of your reproductive system make seminal fluid, which is whitish in color and mixes with the sperm cells. This is what makes up semen.

A boy begins to produce sperm in puberty and continues to produce sperm every day throughout his life.

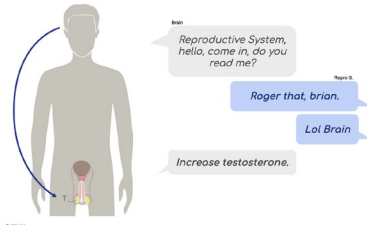
Step 4 (10 minutes): The brain and testosterone production

Something else happens in the testes... **The testes also make the main male hormone testosterone.**

When the pituitary gland sends those hormonal signals to the **testicles**, special cells in the testes called *Leydig* cells produce the hormone testosterone. You can think of the

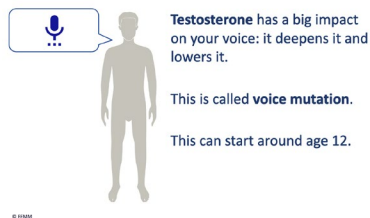
hormonal messages between the brain and the testes like a series of text messages, back and forth. It's a constant feedback loop between the brain and the reproductive system.

Testosterone: messages from the brain



On average, a man produces about 5mg of testosterone a day. This is less than a drop of water on a teaspoon. But hormones have a big impact! Testosterone in the testes helps with sperm production. And the testosterone that is released into the bloodstream communicates with the other parts of the body to impact growth and health. In puberty, all growth is impacted by the body's production of the hormone testosterone.

Hormones & your voice



For example, when your voice starts to get deeper, this is because testosterone has an effect on your larynx and vocal cords. This is actually called *voice mutation*. (But you are not a mutant!) Girls' voices also change during puberty, but not even close to the same way that boys' voices change.

Hormones & your hair



Testosterone acts on different parts of your body, like your armpits, chest, pubic area, mustache/beard area, to make the hair there grow in more thickly and, usually, darker.

But testosterone won't act on all of your hair: your eyelashes are not going to get out of control!

If your body didn't eventually start going through puberty, this could have health effects for you. Going through puberty is a sign of health. The changes that you observe in puberty are signs that your brain and your hormones are working in order to make you into the mature man that you are supposed to be.

CONCLUSION

Next lesson, we will learn more about what happens to your body when testosterone is acting on different parts of your body during puberty,

Exit Activity - True or False?

Read each statement aloud to the class and then choose one student to answer. Each student in the class must get one correct answer before the class is dismissed.

1. Testosterone is only produced after the age of 25 (F).
2. During puberty, your eyelashes will start to grow very thickly and you'll have to trim them (F).
3. Hair will start to grow in your armpits (T).
4. Semen is the male cell of reproduction (F).
5. Sperm is the male cell of reproduction (T).
6. Your body will produce approximately 525 billion sperm in your lifetime (T).
7. You can see an individual sperm without a microscope (F).
8. Testosterone is produced in the testicles (T).
9. The brain must signal the testicles in order to produce sperm (T).
10. If your body doesn't go through puberty by the time you're 18, it's no big deal (F).
11. Getting bigger muscles in puberty is a sign of health (T).
12. Testosterone is the main male hormone (T).
13. Testosterone acts on your larynx to make your voice deeper (T).
14. Every guy's voice has to be the same tone or it means he hasn't gone through puberty (F).
15. The change your voice undergoes during puberty is called voice mutation (T).

16. Both men and women have hormones (T).
17. Hormones are chemical messengers in the bloodstream of all humans (T).
18. Hormones act like text messages in the body, sending messages from one part to another (T).
19. It is normal to be born with two testicles (T).
20. Men produce sperm only one day per year (F).
21. Men produce sperm only at night (F).
22. Sperm and fluids together are what make up semen (T).
23. Estrogen is the main male hormone (F).
24. Hormones manage the activity of every system in the body (T).
25. Men produce sperm only once every three months (F).

References

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- Zamponi, V., Mazzilli, R., Mazzilli, F., & Fantini, M. (2021). Effect of sex hormones on human voice physiology: from childhood to senescence. *Hormones*, 20(4), 691-696, <https://doi.org/10.1007/s42000-021-00298-y>
- Nassar, G.N. & Leslie, S.W. (2023). *Physiology, Testosterone*. StatPearls Publishing <https://www.ncbi.nlm.nih.gov/books/NBK526128/>
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