

PURPOSE

To expand students' existing knowledge of the development and changes that happen to males in puberty and their relation to hormones and the brain.

LEARNING OBJECTIVES

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

1. Recognize the power of our choices in shaping brain development.
2. Understand the impact of hormones on physical and emotional changes.
3. Understand that basic hygiene practices are important for health.

MATERIALS & RESOURCES

- **Lesson 5 teenMEN** powerpoint
- **Activity: Brain Connections** (material needed: ball of yarn)
- **Worksheet: Rapid Fire Five + Answer Key**

VOCABULARY

- **Hormones:** Chemical messengers that travel in the bloodstream, directing the activity of every system in the body.
- **Hormonal feedback:** When hormone levels in the body have an effect on the brain to either increase or decrease output of the same or other hormones.
- **Hormonal axis:** The system of communication in a man between the brain and the testes which regulates the male hormones that affect the reproductive system and overall health.
- **Puberty:** An important and normal time of growth and development. It occurs for boys through the ages of 10-17.
- **Testosterone:** The main male hormone. It causes the changes of puberty.

PREPARATION

- ☐ A ball of yarn is needed for the **Brain Connections Activity**.
- ☐ You may print the **Rapid Fire Five + Answer Key** or use the slides and answers provided in the slide notes.

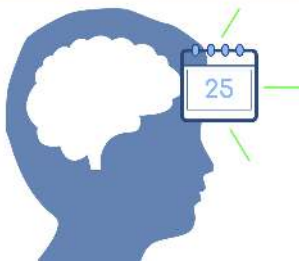
PROCEDURE

Step 1 (5 minutes): Puberty and the brain

Today, we're going to learn more about the changes of puberty and your brain. Let's watch a short video about the development of the brain. [Play this short video on the development of the brain.](#)

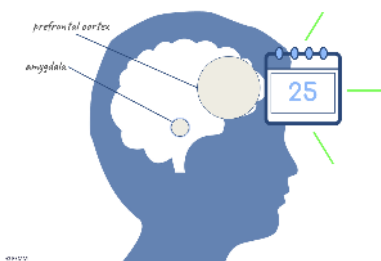
Your brain is amazing! At just 5 weeks old a human fetus is the size of an apple seed but the brain has already begun to grow. That's pretty incredible. The "pruning" that the video describes is actually what's happening now, during puberty, and will continue after puberty.

Did you know?



Did you know: the human brain isn't fully mature and developed until around age 25? During puberty your brain is undergoing its own massive growth spurt and remodel. The last parts of the brain to fully mature are the prefrontal cortex, where judgment and long-term decision making takes place, and the amygdala, which is the emotional center.

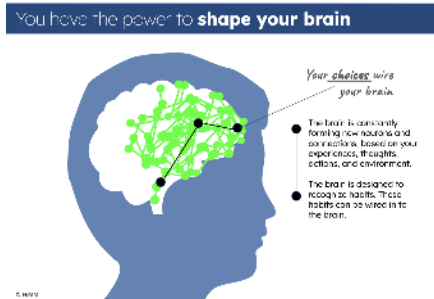
Did you know?



Click on the slide to show where the prefrontal cortex and the amygdala are located in the brain.

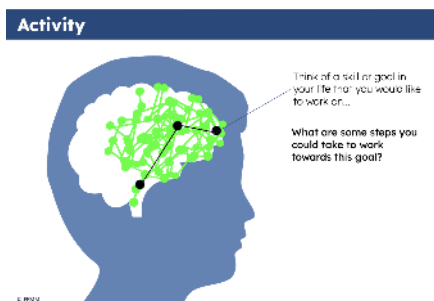
These parts of the brain are particularly critical for emotional awareness and

self-control. As a result, the teen brain is highly sensitive. For example, studies show that adolescents become addicted to nicotine faster and at lower doses than adults. Most addictions begin in adolescence. So, now is the most important time to say no to things that are unhealthy for you and practice making excellent choices.



Your brain is constantly forming new neurons (nerve cells, the fundamental units of the brain) and connections. The brain is designed to recognize habits. These habits become hard-wired into the brain. Every time you make an excellent choice for yourself and your health, like choosing to play a new sport or do your homework after school, these choices shape your brain, hard-wiring it for success, for life.

Step 2 (10 minutes): *Brain Connections Activity*



Have students stand up and form a circle. Ask the class to think of and name an example of a skill or a goal in their life that they'd like to work on. For example: "I want to get better at soccer." Then, brainstorm suggestions with the class about what choices to make to improve in this area: "...I could attend every practice, go for a run on the days that I don't have practice, etc."

Show the ball of yarn and explain that the ball of yarn represents the brain and the string represents neural pathways (the connections that develop in the brain).

1. *To start, hold on to the beginning/end of the string and then toss the ball to a student in the circle.*
2. *As the student receives the ball of yarn, they are to give one suggestion for how to improve at the skill/goal agreed upon by the class. i.e. “I won’t talk when the coach is talking” and then, hanging on to their corner of the yarn, toss the ball to the next student.*
3. *After many examples, note how thick the connections and brain pathways are getting! Every choice you are making is strengthening the neural connections, forming habits in your brain to achieve your goals.*
4. *Then, have each student give an excuse for not going to soccer practice. For example: “friends came over and I lost track of the time”, “I didn’t feel like it,” “I didn’t ask for a ride,” etc. With each excuse given, have the students toss the ball of yarn back to the person who threw it to them, **undoing or taking away** the line of yarn and the neural pathway created (leaving only a few connections between neurons in the end). Note how thin and weak the neural connections are now.*

Your choices are shaping your brain now and for your future. Whether it’s learning a new skill at soccer practice or learning to say no to something that’s unhealthy for you, you are wiring your brain. Puberty is a hugely important time for your brain’s growth and development. Your choices begin as a single action, but if repeated long enough, these patterns become hardwired, neural pathways carved deep into the brain.

Did you know: the human brain is considered to be one of the most powerful computers. Your brain has 100,000 miles worth of blood vessels - that’s enough “circuitry” to go around the earth approximately 4 times! So if you ever think you don’t have what it takes, you’re not good enough or you can’t break a bad habit, just remember that you have a powerful brain that can change and adapt, one choice and

one step at a time.

Step 3 (5 minutes): Testosterone and Puberty

As we know, hormones are controlled by the brain and hormones are powerful!

Your brain and testosterone

Hormones are POWERFUL.

The smallest changes in hormone levels cause big changes in your brain and body.

Have you ever heard about Olympic athletes who were caught using substances to make them go faster or jump higher or run longer? The substances they take are often a kind of testosterone. Even things found in muscle-building supplements can be very unhealthy for your body, especially as you are still growing and your hormonal axis is maturing. Supplements and drugs to increase muscle and testosterone cause damage to the heart, increase the risk of cancer and they actually decrease or even stop your body's own production of testosterone.

In puberty, testosterone will help your body to develop and mature. It will help you grow taller and build strong bones and muscles. It will also cause your voice to change, eventually deepening. You will also notice that your body will start to produce more odor and sweat and become more hairy. All of these things will happen when your body is ready. You do not want to interfere with your brain and body development.

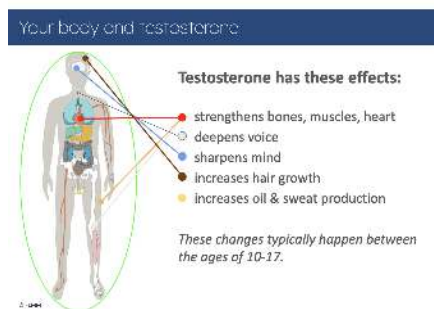
What's so great about hormones?



testosterone	
brain cells	increases ability to learn
bones	strengthens bone structure & density
muscles	increases muscle mass
hair	promotes growth
fat metabolism	promotes fat burning
blood sugar	keeps at a healthy level
overall well-being	positive levels promote confidence and motivation

Testosterone increases muscle mass and bone density, affecting the muscular and skeletal systems. Testosterone also increases oxygen in the blood, which increases energy and endurance. This impacts the cardiovascular and respiratory systems. This chart shows how testosterone impacts your whole body.

Remember, for some guys, puberty starts early and for other guys, puberty starts a little later, because every guy's body is unique.



Your body's production of testosterone will:

- Help you grow taller
- Strengthen bones, muscles and heart
- Cause your voice to change and become deeper
- Sharpen your mind
- Make you more hairy
- Cause your body to produce more odor and sweat

Step 4 (10 minutes): Questions about Puberty and Hygiene

Let's talk about some of the changes you might be seeing or questions you might have.

Go through slides with frequently asked questions from teenage boys.

teenMEN Frequently Asked Questions

"How tall will I be?"

Tamir, age 14

How tall will I be? There's no way to know how tall you'll get exactly (until you stop growing!). Many boys your age are shorter than the girls. This is normal, because girls get a head start on puberty (typically ages 9-14 for a girl, and guys go through puberty a little later). Boys often are still growing after the girls have stopped, so you'll likely catch up and be taller than some of the girls eventually. Some boys stop growing when they're 16, but some boys keep growing until they're 18!

teenMEN Frequently Asked Questions

"What does testosterone
do to my brain?"

Will, age 13

What does testosterone do to my brain?

Testosterone changes how your brain is organized. It can make certain structures of your brain bigger. Also, testosterone influences how your brain gets activated when it responds to a situation or environment. Testosterone has been shown to have a good impact on mood, lessening both anxiety and depression. Testosterone also improves your spatial memory abilities. Testosterone could help you stand up to a bully. It can also give you the brain power to focus on what you're doing! The main thing to know is that testosterone is good for your brain; you just have to make sure you are developing the right habits!

teenMEN Frequently Asked Questions

"How can I get bigger muscles?"

Marc, age 14

How can I get bigger muscles?

Guys can expect their shoulders to broaden and muscles to grow, but remember - all guys grow differently and at different paces. Testosterone acts directly on your muscles and also helps keep your bones strong. The best thing you can do to support your muscular system is to play sports and exercise each day. We'll discuss this health habit more next lesson.

teenMEN Frequently Asked Questions

"Why am I getting more hair?"

Nick, age 14

Why am I getting more hair on my body?

Testosterone travels to the hair cells, leading to darker and thicker hair, and hair growth on the underarms or face. Boys can begin to see hair growing on the chin and upper lip, chest, armpits, and in the pubic area (around the reproductive organs). In puberty, the hair all over your body begins to thicken.

teenMEN Frequently Asked Questions

"Do I need deodorant now?"

Chris, age 13

Do I need deodorant now?

Sweat is not smelly... until it comes into contact with your skin. Sweat and bacteria are what make you smell. Using deodorants can cover up the smell, but... Sweat pushes out dirt and grime in the skin. So, letting your sweat dry allows it to settle *back* into your pores, complete with whatever toxins it was trying to push out in the first place. This is why it's important to shower after exercise.

teenMEN Frequently Asked Questions

"I'm washing my face, but
I'm still getting pimples!"

Cole, age 13

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Acne

Testosterone and other hormones are working hard in your body and sometimes they work a little too hard and produce oil that clogs your pores and you end up with pimples. This is normal, but you can ask a parent to help you select a product that could help clear your skin.

teenMEN Frequently Asked Questions

"Why does a guy's voice change
during puberty?"

Daniel, age 13

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Voice

Testosterone is responsible for the voice deepening during puberty. Testosterone causes the vocal cords to thicken and the larynx or voice box to grow larger in men during puberty. The voice may "crack" or "break" as the body adjusts to the changes in the larynx. Most guy's voices don't fully mature until their twenties.

Note: The teacher can decide on whether or not the following notes are appropriate for the individual class being taught:

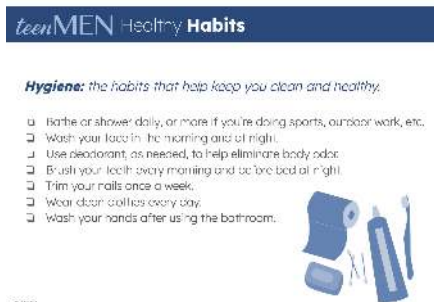
Involuntary ejaculations

Last lesson, we talked about where sperm is produced in your body. Because your body is starting to produce more testosterone, sometimes this sperm will come out of your body while you are sleeping (usually when you are dreaming). This is a normal and healthy sign that your body is working well. This kind of ejaculation will happen less and less as you get older.

Skin

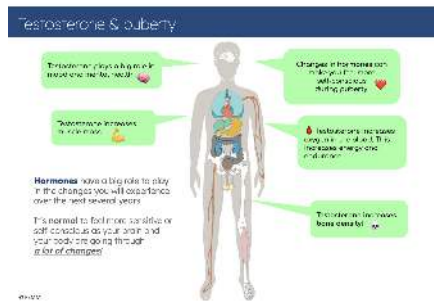
Another thing to note is that your scrotum will actually become darker and the skin will look like it thins out a bit. This is a normal change as the body matures.

Because of all the changes in your body, it's important that you take care of your body. Your hygiene habits are important for your health. Here are some of the hygiene habits you should be practicing:



- **Bathe or shower daily.** This is really important for the health of your skin and for getting rid of body odor as well as to clear away sweat, dirt and bacteria.
 - Use deodorant, as needed, to help eliminate body odor.
- **Wash your face** in the morning and at night to help keep your skin clear.
- **Trim your nails once a week.** Keeping your nails short helps to protect against bacteria getting under our nails and ingrown toenails which are painful.

- **Brush your teeth** every morning and at night. Don't forget to brush your tongue and to floss to get rid of plaque in between teeth.
- **Some boys will need to start shaving soon.** You might not be in this category yet, but eventually you will need to start shaving. It can be fun to pick out shaving cream and a razor at the store. Ask a parent if you need help or advice.

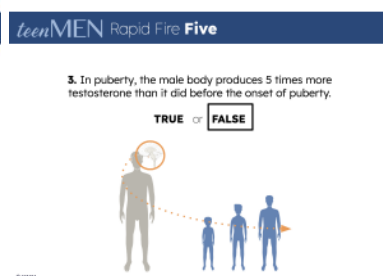
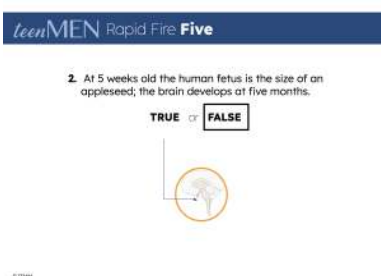
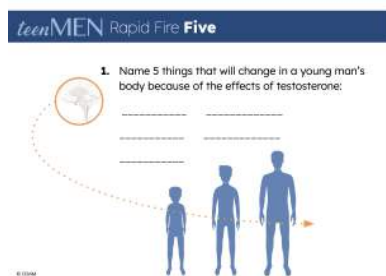


The growth that you see and experience during the next several years should give you confidence that you are developing as you should. Changes in testosterone can impact your mood, making you feel more sensitive or self-conscious at times. This is normal as the brain is growing, developing and changing. It's important to remember that emotions will come and go, but we always have the power to choose how we respond.

Step 5 (5 minutes): Rapid Fire Five

Go through the Rapid Fire Five slides, selecting students to answer the questions.

Clicking on the slide will reveal the answers.



teenMEN Rapid Fire **Five**

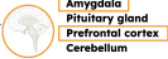
4. The brain isn't fully mature until what age?



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teenMEN Rapid Fire **Five**

5. Of these five parts of the brain, which two are the last to mature:



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CONCLUSION

Today we learned more about how our brain and body develop in puberty. Next lesson we'll learn about the three main pillars of health and the excellent choices we can make to function at our best.

REFERENCES

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