Hormone Replacement Therapy in Adolescent Girls

Hormone Replacement Therapy is often needed for the treatment of hypogonadism in girls. Hypogonadism occurs when your body is not making enough sex hormones. This can happen if the pituitary gland, hypothalamus, or ovary doesn’t work, or is missing. This booklet is designed to help you and your family learn more about hypogonadism and its treatment. Feel free to ask your doctor or nurse any questions you may have after reading this booklet.

What organs make puberty happen?

The **ovaries** are organs that make eggs and the sex hormones estrogen and progesterone. Estrogen helps with breast development during puberty. Along with progesterone, it also helps to start and maintain monthly periods. Estrogen also helps girls to grow.

The **hypothalamus** and **pituitary gland** are parts of your brain. The hypothalamus releases GnRH (gonadotropin releasing hormone), which tells the pituitary gland to send LH (luteinizing hormone) and FSH (follicle stimulating hormone) to the ovaries. The ovaries then make estrogen and progesterone.

The **adrenal glands** are also involved in puberty. These glands release androgens, which are hormones needed for pubic and armpit hair growth and body odor. As a result, if your adrenal glands are working you may have hair growth and body odor even if you have low estrogen and progesterone levels (hypogonadism).
What are the causes of hypogonadism?

- **Primary Hypogonadism**: Doctors use this term when the ovaries are not working. This happens with conditions like Turner Syndrome, gonadal dysgenesis, and galactosemia. This can also happen if the ovaries are damaged by treatments for cancers (e.g., radiation treatment), or by abnormal function of the immune system.

- **Secondary Hypogonadism**: Doctors use this term when there is a problem with the hypothalamus or pituitary gland. This can happen if these parts of the brain did not form as they should have before you were born. This can also happen if the brain is damaged by treatment for cancers (i.e. removal of a tumor or radiation treatment). And sometimes the hypothalamus and the pituitary gland are present but they don’t make the hormones.

How will your doctor decide if puberty is happening as it should?

Doctors look for the normal signs of puberty to decide if your ovaries are working as they should. Puberty is the process that occurs to make a girl into a woman. The normal age for the start of puberty in girls is between 8 and 14 years old. The signs caused by estrogen include:

- Breast changes
- Increase in growth rate
- Advances in bone age

If these events do not occur as expected, your doctor may then wonder if you have hypogonadism.

**Bone Age**

Your bone age is obtained through a simple X-ray of your hand and wrist. By looking at this X-ray, your doctor can tell how mature your bones are and decide how quickly your body is changing. Your bone age is a better sign of when your body is ready to go into puberty than your real age. If your bone age is around 10 or 11 years, and you have not started puberty yet, your doctor may begin to think about hypogonadism.

**Blood Tests**

Your doctor will use blood tests to see how your ovaries, hypothalamus and pituitary gland are working. The main things your doctor will want to check are:

1. Estrogen
2. FSH
3. LH

Often the first test your doctor will do will be a single blood draw to check the levels of these hormones in your blood. If the levels of FSH and LH are very high while the estrogen level is low, this tells your doctor that your ovaries are not making estrogen as well as they should. But to check for secondary causes, your doctor may want to do a second longer test. For the longer
test, you will first get a small injection of LHRH (luteinizing hormone releasing hormone) followed by blood tests afterward and perhaps even the next day. A small needle or catheter may be left in the vein to collect these blood samples. If in that time you don’t start making FSH and LH, this will tell your doctor that your pituitary gland or hypothalamus is not working.

Sometimes, the cause of hypogonadism is genetic. Your doctor may look for genetic causes by drawing some blood to look at the chromosomes. Your chromosomes have all the important messages to tell the cells in your body how to develop. Chromosomes contain instructions that make your eyes a certain color, make all the organs (including the ovaries) develop, and control many other things about how you developed before you were born.

Other Tests

If problems are found in your hypothalamus or pituitary gland, the doctor may ask you to have an MRI or a CT scan done. Both of these tests take a picture of your brain to better look at the sites where LH and FSH are made.

Why does hypogonadism need to be treated?

The purpose of treatment is to replace the hormones that your body is not making enough of. This helps your body to:

- Start and maintain puberty
- Finish growing
- Have strong bones (prevent osteoporosis)
- Prevent uterine cancer and heart disease
- Have sexual function (sexual thoughts, feelings, and responses)

How is hypogonadism treated?

This is treated by replacing the hormones. You will be taking hormones to try to copy what happens in normal puberty. As you get older, you will take hormones to copy the way adult ovaries work.

You will likely start treatment when your bone age is 10 to 12 years old. Once you and your doctor decide that you should begin treatment, you will receive a very small amount of estrogen daily either by a pill or a patch on the skin. You will likely stay on this dose for the first 6-12 months. This dose is so low that often little or no signs of puberty are seen.

Your doctor will watch for signs of changes in your body and your bone age to decide when to increase your dose. You may see breast changes and an increase in the rate of your growth. Some girls may also see pubic hair, armpit hair, and acne. This varies a lot between each person. You should ask your doctor if you have any concerns.
After about 1-2 years of estrogen treatment, progesterone will be added. This helps to start monthly periods and keep them cycling.

There are two ways to take these hormones. The first is by daily pills. These are made as 2 separate pills, or as a combined pill, which is really the same type of pill called a “birth control pill”.

The second way is a patch which is worn on the hip or buttock, and releases estrogen and progesterone through your skin. Skin patches are a good option for girls with galactosemia because the patches do not contain lactose.

**You need to take your medicine as prescribed. This is important.** To help you remember, you may want to use a calendar or a day of the week pillbox. If you are having trouble, ask your nurse or doctor for help.

**How long will I need treatment?**

Even after you complete puberty, there is a need to take hormones to maintain strong bones, prevent uterine cancer, and reduce the risk of heart disease. Treatment tries to mimic the hormone patterns of the normal menstrual cycle.

**Are there any side effects?**

As with any drugs, there are side effects to taking hormones. Some nausea, breast soreness, and unexpected bleeding can occur. For girls with Turner Syndrome, the hands and feet may be more swollen. Hormone replacement in girls with hypogonadism is not the same as that in postmenopausal women. The treatment for hypogonadism provides hormones at a time when they should be present in the body. As a result, there are fewer and less serious side effects. However, you should stop taking your hormones and call your doctor if you have problems breathing or severe pain in one leg.

**Are there other concerns I should know about?**

**Height**

Estrogen does two things with growth. First, it gives a boost to your growth rate, making you grow faster. It also helps to close the growth plates in your bones, thereby shortening the time you have to grow. Higher dose estrogen treatment may be delayed in order to give you more time to grow before your growth plates close. Talk with your doctor or nurse about the best time to begin treatment. Your feelings are important in this decision.
**Fertility**
There are many different causes of hypogonadism. Each of these has different effects on fertility. You may need to discuss this with your doctors as you become older. They will be able to talk with you about your options, as they vary for each person.

**Sexual Function**
With treatment, you should be able to have normal sexual function. If you decide to become sexually active, be sure to discuss the use of condoms with your doctor or nurse to protect yourself against pregnancy and sexually transmitted diseases.

**Breast Growth**
The breast size you develop depends much more on your genetics than on the dose of estrogen you take. Your doctor will decide on the dose of estrogen that is best for you. Changing this dose will not change the amount of final breast growth you get.

**Conclusion**
While there is no cure for hypogonadism, taking hormones can help you to grow and develop. Be sure to talk with your doctors or nurses to get your questions answered and find out the best treatment options for you.

References