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Early horse embryos produce estrogen sex hormones, which may encourage development

What is this research about?

Hormones are chemical messengers that regulate the behaviour of cells in the body. Estrogens are a group of sex hormones which are most abundant in females (although they are found in both sexes). One of their main roles is to direct the female reproductive cycle, but they also play an important role in establishing and maintaining pregnancy. Estrogens are produced by an enzyme called aromatase, which converts the male sex hormones (testosterone and androstenedione) into the estrogens (estradiol and estrone). Both the mother and the embryo can make estrogens, although the embryo generally does so only during very early stages of development. For example, pig embryos make estrogen for a few days during the second week of pregnancy. In contrast, the duration of estrogen production in horse embryos has not been established but is much longer. When horse embryos are four weeks old, they contain several active substances that are made from estrogens, but it is not known whether these estrogens were originally made by the embryo itself. The purpose of this study is to see if four-week-old horse embryos are capable of producing estrogens.

What did the researchers do?

Twenty-three horse embryos were removed from pregnant mares (female horses) in the fourth week of pregnancy (20-28 days old). Each embryo was separated from its outside membranes and cut into small pieces. Androstenedione was added to see if the embryonic tissue was capable of making estrogens. To identify newly produced estrogens, the androstenedione was radioactively marked, so that if radioactivity was detected in the final chemical products (estrone and estradiol) it would mean that they had been formed by the embryonic tissue during the experiment. The researchers also measured the activity of the enzyme aromatase, which makes estrone and estradiol, using a second method for confirmation.

What you need to know:

Four-week-old horse embryos produce their own estrogen sex hormones, which may play an important role in their normal development including the formation of blood vessels and blood cells.

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What did the researchers find?

The researchers found that horse embryos could produce their own estrogens at this stage of development. Estrone and estradiol were both formed by the embryo, although the relative amounts varied between embryos. Some products formed from estrone were detected, and these hormone-like molecules may also play a role in embryo development. Development of male or female characteristics does not occur until much later in the pregnancy, so the embryo-produced estrogens may be involved in other aspects of development such as in the formation of blood vessels and blood cells, as this is occurring rapidly at the four-week stage.

About the University of Guelph Researchers:

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Keywords:

Horse, equine, pregnancy, embryo, estrogen, estrogen production, embryo development, hormone

How can you use this research?

Developmental biologists can use this research to study the production of estrogens and their role in embryo development in other species, including humans.

Veterinarians can use this research to better understand the role of embryo-created estrogens in the normal development of the embryo and in early failure of pregnancy.

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