Effects of Hormones in Relation to the Differentiation of Terminal End Buds in the Rat Mammary Glands

BACKGROUND

During the summer of 2011, four high school students worked in the Breast Cancer Research Laboratory at Fox Chase Cancer Facility. Fox Chase is a cancer research facility that is also a hospital and treats patients who are afflicted with any type of cancer. Two juniors were supported by the Huntington Breast Cancer Action Coalition (HBCAC) and by the Great Neck Breast Cancer Coalition (GNBCC). The student's main objective was to study environmental effects on breast cancer. Basically, three different hormones were tested in female rats. The students had to determine which hormone reduced the amount of Terminal End Buds the most, which then reduced the risk of acquiring breast cancer.

PROCEDURE

- Mammary glands dissected from female Sprague-Dawley rats.
- Pictures of wet mount mammary glands taken by an Olympus SZX10 and saved on computer and disc.
- For each grid box, record each amount of structures that appear.
- Analyze the data that was collected, to determine what hormone worked the best.

RESULTS

Many mammary glands were observed, with most of them differing in amount of structures based on the treatment given to them. Based on the observations, one hormone proved much more effective than the others in minimizing the total TEB's in the mammary glands. hCG greatly reduced the Terminal End Buds in the mammary glands much more significantly than estrogen and progesterone did.

CONCLUSION

Out of the three hormones tested, hCG worked the best to reduce the amount of Terminal End Buds. This proved that a hormone can greatly reduce TEB's in the mammary glands by differentiating them into harmless structures that could not become affected by carcinogens.

The hormones: hCG, estrogen, and progesterone were all were tested in rat mammary glands. The purpose was the somewhat reduce the amount of terminal end buds in the gland. Terminal end buds are the only structure in the mammary gland that could become cancerous if exposure to carcinogens. The procedure included counting various mammary glands and totaling the amount of structures that were observed. After much testing, it was proved that hCG was most effective in the reduction of the TEBs.

TERMINOLOGY

Mammary Gland- Any of the milk-producing glands in female mammals, consisting of lobes containing clusters of alveoli with a system of ducts to convey the milk to an external nipple. These glands typically occur in pairs and begin secreting milk when the offspring are born.

Terminal End Buds (TEB)- structure found in the mammary gland that can differentiate into other structures. If exposed to carcinogens, they can become cancerous and will eventually turn into breast cancer.

hCG (human chorionic gonadotropin)- Released from the embryo after conception. Functions in maintaining the corpus luteum. Induces differentiation of the mammary gland. Studies have shown that hCG is able to protect against DMBA- induced mammary carcinogenesis, preventing tumor growth in the breast

Estrogen- Carcinogenic when given alone. Released in order to mature the uterine lining in case of pregnancy

Progestrone- Released by the corpus luteum. —Released from the ovaries in order to form the placenta

PAGES