MEASUREMENT OF ESTRONE AND PROGESTERONE IN MOUSE SERUM USING ENZYME LINKED IMMUNOASSAYS

Maureen Diggins and Julia Spiry
Department of Biology
Augustana College
Sioux Falls, SD

Nels H. Granholm
Department of Biology and Microbiology
South Dakota State University
Brookings, SD 57007

ABSTRACT

The lethal yellow mouse exhibits a mutation at the agouti locus on the second chromosome. In the homozygous condition (Ay/Ay), the mutation is lethal. However, in the heterozygous condition (Ay/a), the individual lives and exhibits a collection of characteristics known as the lethal yellow syndrome (LYS). The LYS includes a yellow coat color (due to the inability to make eumelanin in the hair), decreased immunocompetence, increasing obesity with age, and reduced fertility.

Our hypothesis is that the decreased fertility (decreased follicle stimulating hormone, decreased rates of ovulation, and decreased mating success) is due to a hormonal imbalance related to the obesity. Specifically, increased body fat results in increased serum levels of estrone. Estrone is a form of estrogen produced by fat cell alteration of an adrenal androgen. The estrone may exert a negative feedback on the hypothalamic/pituitary complex, resulting in decreased production of follicle stimulating hormone and decreased ovulation.

Measurement of estrone in mouse serum was accomplished by adapting a protocol for an enzyme linked immunoassay developed for use with human serum. In addition, a protocol for measurement of progesterone in human serum by enzyme linked immunoassay was adapted for use with mouse serum. Elevated serum progesterone levels indicate pregnancy in the mouse and can be used in the assessment of fertility.