

Alligators, Contaminants and Steroid Hormones

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Steroids are essential for successful reproduction in all vertebrate species. Over the last several decades, extensive research has indicated that exposure to various environmental pollutants can disrupt steroidogenesis and steroid signaling. Although steroidogenesis is regulated by the hypothalamic-pituitary axis, it is also modified by various paracrine and autocrine factors. Furthermore, the classical two-cell model of steroidogenesis in the developing ovarian follicle, involving the granulosa and theca cells in mammals, may not be universal. Instead, birds and probably reptiles use the two thecal compartments (theca interna and theca externa) as sites of steroid production. We have documented that embryonic or juvenile exposure to a complex mixture of contaminants from agricultural and storm water runoff leads to altered steroid hormone profiles in American alligators. Our observations suggest that alterations in plasma steroid hormone concentrations are due in part to altered gene expression, modified hepatic biotransformation and altered gonadal steroidogenesis. Future studies must examine the interplay between endocrine and paracrine regulation in the development and expression of gonadal steroidogenesis in individuals exposed to endocrine disrupting contaminants at various life stages if we are to fully understand potential detrimental outcomes.