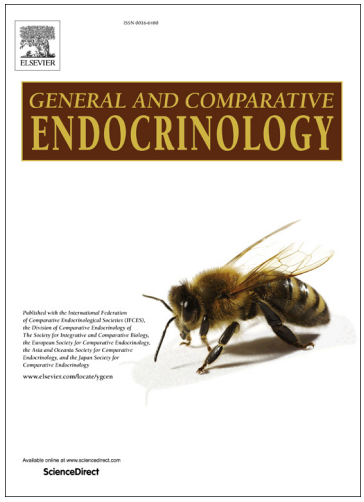

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Corticosteroid responses of snakes to toxins from toads (bufadienolides) and plants (cardenolides) reflect differences in dietary specializations

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HIGHLIGHTS

- Snake corticosteroid responses to toxins vary with dietary specialization and sex.
- Snakes of the genus *Thamnophis* have high stress response to cardenolides.
- Male *Rhabdophis tigrinus* have higher corticosteroid responses than females.

ABSTRACT

Toads are chemically defended by cardiotonic steroids known as bufadienolides. Resistance to the acute effects of bufadienolides in snakes that prey on toads is conferred by target-site insensitivity of the toxin's target enzyme, the Na^+/K^+-ATPase. Previous studies have focused largely on the molecular mechanisms of resistance but have not investigated the physiological mechanisms or consequences of exposure to the toxins. Adrenal enlargement in snakes often is associated with specialization on a diet of toads. These endocrine glands are partly composed of interrenal tissue, which produces the corticosteroids corticosterone and aldosterone. Corticosterone is the main hormone released in response to stress in reptiles, and aldosterone plays an important role in maintaining ion balance through upregulation of Na^+/K^+-ATPase. We tested the endocrine response of select species of snakes to acute cardiotonic steroid exposure by measuring circulating aldosterone and corticosterone concentrations. We found that