

Public Abstract

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Title:Dietary nutrients implicated in the etiopathogenesis of human and animal diseases

Hyperthyroidism is a spontaneous disease that results in an abnormal elevation of circulating concentrations of one or more thyroid hormones. Despite being the most commonly diagnosed endocrine disorder of domestic cats, the etiopathogenesis remains unknown. My dissertation research sought to investigate whether the dietary nutrients selenium, water, and taurine cause an overstimulation of the thyroid gland and alter the function of the hypothalamic-pituitary-thyroid axis. Because feline hyperthyroidism is clinically and pathologically similar to toxic nodular goiter or Plummer's disease, one of the most common types of hyperthyroidism in humans, I sought to determine if cats are a better animal model than rats for studying dietary causes of hyperthyroidism. To my knowledge, this is the first project to conduct simultaneous animal studies where two species are assessed for suitability as animal models for a human disease and concurrently conduct hypothesis-driven research on potential dietary etiologies of a disease that affects both the domestic feline population and humans. This unique experimental design provided strong support that cats are a better animal model of toxic multinodular goiter, because we were able to establish that cats have an individual set-point for thyroid-stimulating hormone (TSH) which similar to humans. Additionally, we showed that there was a positive correlation with taurine consumption and circulating triiodothyronine (T3) in female rats but not male rats. Women are five to eight times more likely to suffer from a thyroid disease. Our findings indicate future research is needed to determine if supplemental taurine and consumption of high taurine diets predisposes women to thyroid gland disorders. Furthermore, in cats, consumption of water significantly altered the production of T3 and caused a 20% increase in activity level. Because consumption of canned cat food has been the only consistently identified risk factor in epidemiological studies, our results indicate future studies should focus on the relationship between water consumption and feline thyroid physiology.