Thyroxine and body condition in a viviparous skink, *Niveoscincus metallicus*

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Introduction

Seasonal variations in body condition are found in many vertebrates, and reproductive success may be dependent on the optimal amount of stored energy to maintain offspring as well as adult body condition before and after parturition (Madsen and Shine 1996). Therefore having the mechanisms to mobilise and store this energy are important.

Hormonal influences (e.g. oestradiol (E2)) on energy metabolism in reptiles are well documented (Ho et al 1982). However, the role of thyroxine (T4), a metabolic hormone, on energy mobilisation and storage and the link to different reproductive phases is not well understood.

The role of T4 in energy metabolism via storage and mobilisation of fats during two distinctly different reproductive phases was investigated in the viviparous skink, *Niveoscincus metallicus*.

Methods

Adult female *Niveoscincus metallicus* were administered with a dose of saline, thyroxine (T4), exogenous 17β-oestradiol (E2), testosterone (T), corticosterone (B) or a combination of the hormone (E2, T, or B) plus T4.

The abdominal and tail fat were measured during two reproductive phases, post parturition and vitellogenesis. Body condition was measured using the residuals of the regression of the snout-vent length (SVL) against mass.

Results

1. Post parturition

- Significant reduction in tail ($F_{8,72} = 3.11$, $p = 0.0176$) and abdominal fat ($F_{8,72} = 6.86$, $p < 0.0001$) in all treatments with T4
- Significant reduction in body condition in T4 treatment group ($F_{7,75} = 4.55$, $p = 0.003$)
- Pattern of reduced body condition in treatments which included T4

2. Vitellogenesis

- No changes in mean tail fat (orange bars) between treatments ($F_{7,76} = 1.93$, $p = 0.08$)
- Significant changes in mean abdominal fat (green bars) with hormone treatments ($F_{7,76} = 2.55$, $p = 0.02$)
- Reduction in body condition in all treatments except B ($F_{7,75} = 4.55$, $p = 0.0003$)

Tail and abdominal fat

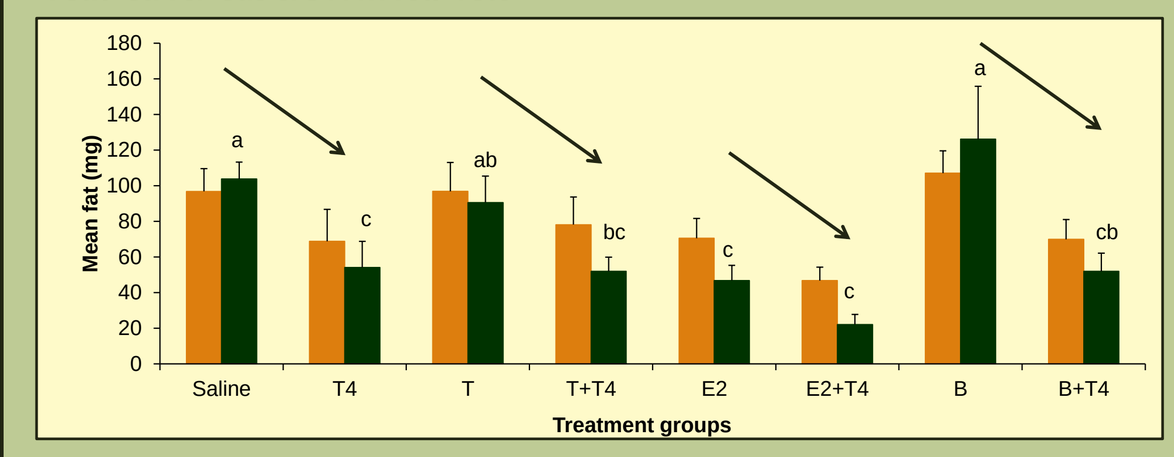

Figure 1a.Mean (±SE) tail (orange bars) and abdominal (green bars) fat mass of female lizards treated during the post parturition period. Differing letters above the bars denote significant differences (*p*<0.05).

Tail and abdominal fat

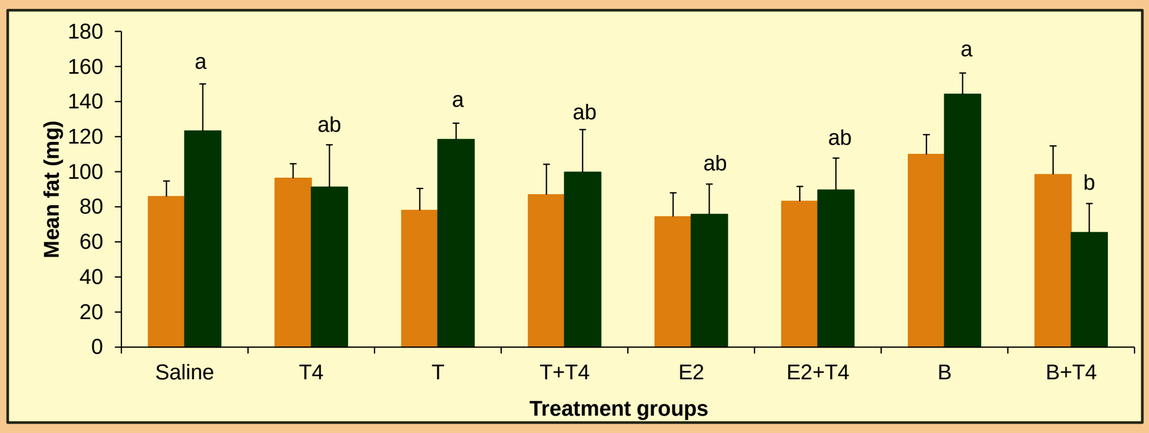

Figure 2a.Mean (±SE) tail (orange bars) and abdominal (green bars) fat mass of female lizards treated during the vitellogenic period. Differing letters above the bars denote significant differences. (*p*<0.05)

Body condition

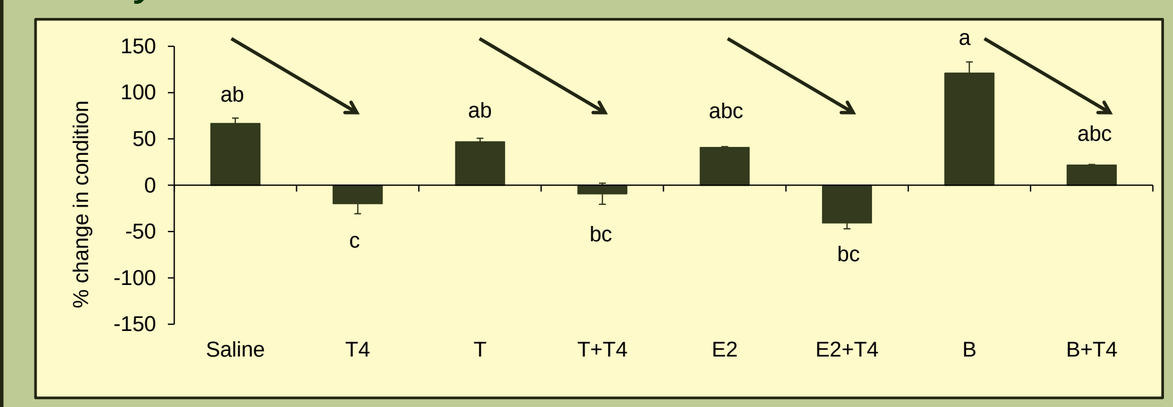

Figure 1b. Percentage change in body condition (mean ± SE) between pre- and post-treatment body condition residuals from the regression of mass against SVL during the post parturition period. Differing letters above the bars denote significant differences (*p*<0.05).

Body condition

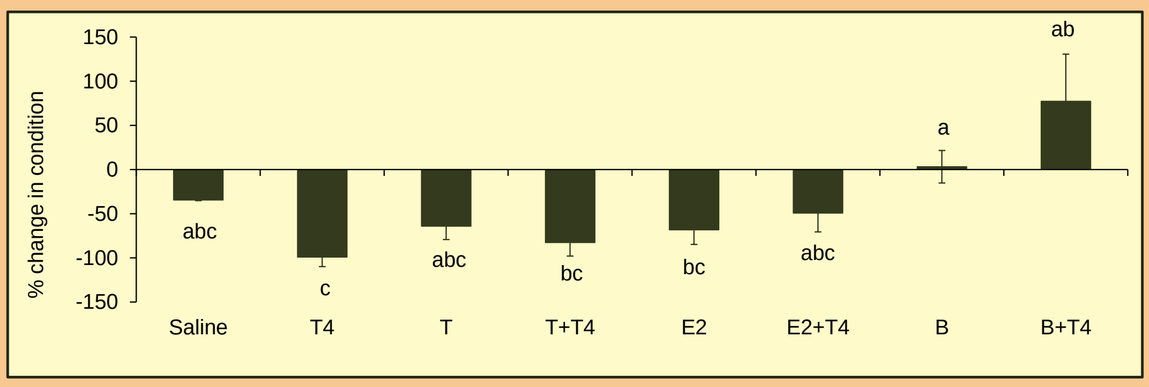

Figure 2b. Percentage change in body condition (mean ± SE) between pre-and post-treatment body condition residuals from the regression of mass against SVL during the vitellogenic period. Differing letters above the bars denote significant differences (*p*<0.05).

Discussion

There is a seasonal component to the effects of T4 sensitivity on fat mobilisation and body condition with the effects being more pronounced during post parturition than vitellogenesis.

Tail and abdominal fat mobilisation patterns suggest evidence for resource partitioning during two different reproductive phases.

Body condition loss during the vitellogenic phase is not reflected in the loss of abdominal and/or tail fat suggesting lipid loss from other tissues (e.g. liver lipids, Lacy et al 2002).

References: Ho, S.M., Kleis, S., McPherson, R., Heisermann, G.J. and Callard, I.P. (1982) Regulation of vitellogenesis in reptiles. *Herpetologica* ***38, 40-50.*** Lacy, E.L., Sheridan, M.A. and Moore, M.C. (2002) Sex differences in lipid metabolism during reproduction in free-living tree lizards (*Urosaurus ornatus). General and Comparative Endocrinology* ***128, 180-192.*** Madsen, T. and Shine, R. (1996) Determinants of reproductive output in female water pythons (*Liasis fuscus: Pythonidae). Herpetologica* ***52, 146-159.***