

Seasonal changes in the neuroimmunoendocrine system activity in young adult male rats administered with a balanced controlled diet from weaning

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Temporal changes in the activity of the neuroimmunoendocrine system maintain homeostasis in living organisms^(1,2). The present work analyses the 24 h changes in the activity of the neuroimmunoendocrine system in young adult male rats (3 months old) kept under standard conditions of controlled light (fluorescent cool white bulbs providing 100 lux intensity at the level of the cages) with 12 h light – 12 h dark (light on at 08:00 hours) at $22 \pm 2^\circ\text{C}$ and *ad libitum* access to a balanced diet (AIN-93G; Diets Inc., Pennsylvania, USA) and water. The conditions were identical for all seasons studied. Animals were killed by decapitation at six different time intervals (every 4 h throughout a single 24 h period) during spring, summer, autumn or winter time periods taking as an index the regulatory mechanism of prolactin, a hormone that is involved in the development and maintenance of immune function. The median eminence dopamine concentration, plasma prolactin levels and submaxillary lymph node lymphocyte proliferative capacity were studied. Globally, dopamine concentration in the median eminence showed specific 24 h variation depending on the season studied. Changes in plasma prolactin levels were in accordance with variations in dopamine. Likewise, proliferative capacity of lymphocytes from the submaxillary lymph nodes exhibited specific 24 h variation according to the season (Figure). There were specific seasonal correlations between dopamine, prolactin and the proliferative capacity of the lymphocytes. This outcome may suggest the existence of a seasonal signal that could allow individuals to adapt their physiological functions to the annual environmental changes.

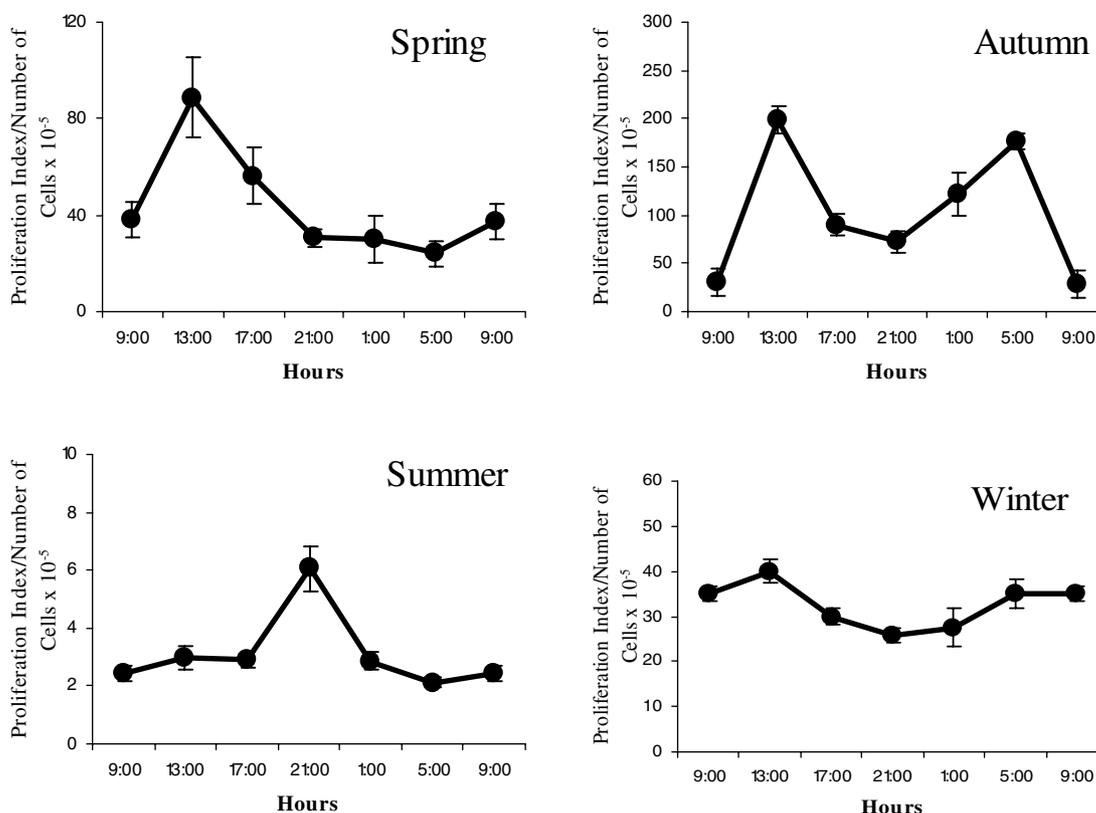


Figure. Proliferative capacity of T lymphocytes stimulated with concanavalin A during spring, summer, autumn and winter measured as proliferative index (stimulated cpm/unstimulated cpm). Values are means with their standard errors represented by vertical bars for eight animals per group.

1. AI Esquifino, D Pazo, RA Cutrera & DP Cardinali (1999) *Chronobiol Int* **16**, 451–460.
2. N Vazquez, E Diaz, C Fernández, V Jiménez, AI Esquifino & B Díaz (2007) *Physiol Res* **56**, 79–88.