

## **SEASONAL VARIATION IN BODY WEIGHT: AN EXPERIMENTAL CASE STUDY**

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The effect of seasonal variation in ambient temperature on body weight was studied in one subject over three consecutive years (1997-2000), including a shift in the cold season to a tropic environment (1999). The subject was a man, 51 y, body mass index 21.7 kg/m<sup>2</sup>. Ambient temperature was a 24h average as monitored by the Royal Dutch Meteorological Institute at a location within 10 km. Body weight was measured daily, in the morning after getting up with an empty bladder and before any food or water intake, on a scale accurate to  $\pm 0.01$  kg. Ambient temperature ranged between a winter minimum of -3.4, -5.5 and -4.7°C, and a summer maximum of 26.9, 25.8 and 24.4°C over the three consecutive years. Body weight reached a winter maximum of 60.7, 60.7 and 60.3 kg, and a summer minimum of 57.4, 57.2 and 57.3 kg over the same interval. There was a strong negative correlation between body weight and ambient temperature ( $r^2 = 0.58$ ,  $p < 0.0001$ ), apart from the season with the shift from a low to a high ambient temperature. Then, body weight dropped from the winter value of 60.0 kg to 57.6 kg after two weeks in the tropics at 27°C. Surprisingly, body weight remained at a similar value until the summer, despite ambient temperatures down to -4.7°C in late winter. One of the potential mechanisms is a temperature induced rhythm in thyroid activity, where thyroid activity reduced after heat exposure in mid-winter to a summer low with a consequent reduction of body weight. In conclusion, body weight shows a clear seasonal variation triggered by ambient temperature, with a minimum in summer and a maximum in winter, possibly regulated by thyroid activity.