Body size and the daily rhythm of body temperature in dogs

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Abstract

Practically every physiological variable exhibits daily rhythmicity. The daily rhythm of body temperature, like that of many other variables, is often weak in newborns and gains strength as the animals grow. Because of the natural association between physiological maturation and gain in body size, these two processes are naturally confounded. To differentiate between the effects of maturation and the effects of body growth, we took advantage of the large variation in body size that exists among different breeds of the domestic dog. We compared the body temperature rhythms of developing puppies of different dog breeds. Puppies of none of the breeds exhibited statistically significant daily rhythmicity for several days after birth. Regardless of breed or sex, rhythmicity matured over several weeks and attained a stable level by 6 weeks after birth. Body size did not seem to be an important element in the development of rhythmicity because the development was similar in three breeds that differed greatly in body size (Basset Hound, Boxer, and Neapolitan Mastiff). On the other hand, the difference in body size associated with the different breeds had a strong impact on the absolute level of body temperature regardless of age: we found a strong inverse correlation between temperature and body size among the puppies and dams of the three breeds and among 115 adult dogs from 19 different breeds ranging from 2-kg Yorkshire Terriers to 80-kg Great Danes.

Keywords: allometry; body mass; Canis familiaris; circadian rhythm; maturation; rectal temperature