

IGF-1 at the crossroads of life-history trade-offs

Ádám Z. Lendvai

az.lendvai@gmail.com

University of Debrecen, Debrecen, Hungary

Insulin-like growth factor type 1 (IGF-1) is a pleiotropic hormone that regulates several life-history traits and has been suggested as a key physiological mechanism regulating ageing, somatic growth, and reproduction. In a series of experiments, we tested how IGF-1 affects feather growth and the expression of plumage ornaments during the natural moult, which is a critical, yet often overlooked somatic growth period in adult birds. We also addressed the physiological and survival costs of elevated IGF-1 levels. These experiments were carried out on bearded reedlings (*Panurus biarmicus*), a common Eurasian songbird with conspicuous sexual dimorphism. We manipulated circulating IGF-1 levels using a novel experimental procedure using polymer-based microparticles that provide a sustained release of IGF-1. Experimentally increased IGF-1 levels do not affect the feather growth rate but speed up the moult and positively affect the quality of the feathers (measured by the number of fault bars). Also, birds with experimentally elevated IGF-1 levels develop sexually selected ornaments sooner and with more intense colouration. On the other hand, IGF-1 treatment affects oxidative

stress in a sex-specific manner, where males seem more sensitive to oxidative damage driven by high circulating IGF-1 levels. These results suggest that IGF-1 plays a role in moult and ornament development, and males may be more susceptible to the costs of IGF-1-induced oxidative stress than females. IGF-1 levels evolve under opposing selection forces, and natural variation in this hormone's level may reflect the outcome of individual optimization.