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Sexually Dimorphic Effects of Chronic Exercise and Myocytic Androgen Receptor Overexpression on Body Composition in Sprague dawley Rats

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Abstract : In humans, exercise improves symptoms of various pathological states, although exercise adaptations seem to differ in response to sex. Skeletal muscle anabolism is thought to be regulated by androgen receptor (AR) through poorly specified mechanisms. Interactions of AR and exercise on muscle phenotype remain inconclusive in males, and undetermined in females. We hypothesized that sex differences in exercise adaptations are regulated by the androgenic system and the type of exercise performed. Here we examined interactions between a muscle-specific AR overexpression transgene (HSA-AR) and forced aerobic exercise paradigm on muscle and adipose exercise adaptation in male and female rats. We used dual-energy X-ray absorptiometry (DXA) to examine body composition adaptations post 9-week exercise protocol. We replicated the effects of HSA-AR on body composition, with males only having increased % lean mass and reduced % fat mass ($P<0.05$). Aerobic exercise improved lean body phenotype significantly, with lesser indices of total and % fat mass ($P<0.01$) in both sexes. Sex-specific effects of exercise included decreased total body mass ($P<0.01$) in males and increased lean mass % ($P<0.001$) in females. Surprisingly, neither AR manipulation nor exercise affected bone parameters in either sex. This varied response in total mass and lean mass according to exercise presents a sexually dimorphic response to exercise. Neither sex showed an interaction between HSA-AR and forced aerobic exercise on body composition. Future work is proposed to examine the effects of exercise type (aerobic versus resistance) and the role of gonadal androgens in sexually dimorphic exercise-mediated mitochondrial adaptations. This work implicates the development of sex-specific exercise therapies.

Keywords : androgen receptor, forced exercise, muscle physiology, sexual dimorphism
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