

Response to aerobic training reveals key differences in cardiovascular adaptation in an adenine diet induced model of chronic kidney disease

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Background: Rat models generated by selective breeding for low (LRT) or high (HRT) response to aerobic training closely embody human phenotypes and can be used to understand the exercise-disease linkages. Aerobic endurance training has been proposed as a model of exercise intervention capable of improving or minimizing the negative consequences of chronic diseases including chronic kidney disease (CKD).

Objectives: We hypothesized that resistance to aerobic training induces kidney damage in CKD settings.

Methods: Male and Female LRT and HRT rats (~ 17 months of age; n = 30) were freely fed with rodent chow supplemented with 0.75% of adenine for the induction of CKD.

Results: At the beginning of the experimental study, LRT rats showed greater body weight and lower arterial blood pressure (systolic, diastolic, and mean pressures) than HRT rats. Following two weeks of adenine diet, body weight of LRT rats remained higher in comparison to HRT rats, consequently both heart and kidney weight / body weight ratio were reduced in LRT (vs. HRT) after two weeks of adenine diet. However, after indexing heart weight to tibia length, which avoids biases because of disease-induced body weight changes, we noted that the heart weight / tibia length ratio was significantly increased in LRT vs HRT rats (2.51 ± 0.58 vs 2.13 ± 0.28 , $p < 0.027$). Kidney weight / tibia length unchanged between the groups.

Conclusion: Our preliminary findings show a better response of HRT rats in terms of cardiovascular adaptations after diet induced CKD. Molecular analyses are being currently performed to further investigate the impact of resistance to exercise induced aerobic training on inflammatory response, renin angiotensin system, pro-inflammatory signaling, and kidney fibrosis.