Advances in exercise, fitness, and performance genomics.

An annual review publication of the most significant articles in exercise, fitness, and performance genomics begins with this article, which covers 2 yr, 2008 and 2009. The review emphasizes the strongest articles as defined by sample size, quality of phenotype measurements, quality of the exercise program or physical activity exposure, study design, adjustment for multiple testing, quality of genotyping, and other related study characteristics. With this avowed focus on the highest quality articles, only a small number of published articles are reviewed. Among the most significant findings reported here are a brief overview of the first genome-wide association study of the genetic differences between exercisers and nonexercisers. In addition, the latest results on the actinin alpha 3 (ACTN3) R577X nonsense polymorphism are reviewed, emphasizing that no definitive conclusion can be reached at this time. Recent studies that have dealt with mitochondrial DNA haplogroups and endurance performance are described. Published reports indicating that physical activity may attenuate the effect of the fat mass and obesity associated (FTO) gene risk allele on body mass index are reviewed. Articles that have tested the contributions of specific genes to the response of glucose and insulin metabolism traits to regular exercise or physical activity level are considered and found to be generally inconclusive at this stage. Studies examining ethnic differences in the response of blood lipids and lipoproteins to exercise training cannot unequivocally relate these to apolipoprotein E (APOE) genotypes. Hemodynamic changes with exercise training were reported to be associated to sequence variation in kinesin heavy chain (KIF5B), but no
replication study is available as of yet. We conclude from this first installment that exercise scientists need to prioritize high-quality research designs and that replication studies with large sample sizes are urgently needed.

DOI 10.1249/MSS.0b013e3181d86cec
Alternate Journal MedSciSportsExerc
PubMed ID 20400881