

## **The use of “omics” to individualize exercise training**

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Although exercise training improves fitness in most individuals, some will fail to improve, while others may even show adverse effects. Molecular biology offers the potential to identify the biological mechanisms underpinning the variable response with subsequent focused therapeutic intervention. Key to the success of personalized exercise training (PET) methods being developed will be the use of the most advanced molecular biology methodologies broadly identified under the category of “omics” (*i.e.* genomics, transcriptomics, metabolomics and proteomics). A promising recent example from our laboratory with diagnostic potential is the use of “molecular signatures” to detect recombinant human erythropoietin (rHuEpo) doping. In the first systematic studies to be conducted and funded by the World Anti-Doping Agency (WADA), the expression of hundreds of genes were found to be altered by rHuEpo with numerous gene transcripts being differentially expressed after the first injection and further transcripts profoundly up-regulated during and subsequently down-regulated up to 4 weeks post administration of the drug; with the same transcriptomic pattern observed in all subjects. These encouraging results serve to strongly reinforce the feasibility and need for this complex, expensive and technically demanding “omics”-based approach involving leading industry partners for the detection of banned substances and methods. Given this success, a similar personalized/stratified medicine approach is now being applied to individuals undergoing tailored resistance training in view of identifying the true potential of “omics” testing for PET.