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Metabolic profiling of elite athletes with different cardiovascular demand

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Background: Intensive exercise of elite athletes leads to physiological changes in response to increased cardiovascular demand. This study aims to profile metabolic changes in elite athletes from different sport disciplines.

Methods: Metabolic profiling of serum samples from 500 elite athletes from different sports disciplines who participated in national or international sports events and tested negative for doping abuse at anti-doping laboratories, was performed using non-targeted metabolomics-based mass spectroscopy combined with ultrahigh-performance liquid chromatography. Multivariate analysis was conducted using orthogonal partial least squares discriminant analysis. Differences in metabolic levels between athletes with varying cardiovascular demands were assessed by univariate linear models.

Results: Out of 743 analyzed metabolites, 112 novel metabolites that changed significantly with increased cardiovascular demand were detected. These included markers of fatty acid beta oxidation, oxidative stress and energy-related metabolites. GGM sub-networks identified 6 subnetworks that captured the major metabolic pathways perturbed in relation to cardiovascular demand including fatty acids beta oxidation.

Conclusion: Data provide evidence that athletes with high cardiovascular demand exhibit a distinct metabolic profile that may reflect a unique life style characterized by a strict exercise and a special diet. Metabolic signatures associated with elite athletes could potentially be used as biomarkers for their overall health and response to their strict environment.

Biography

Mohamed A Elrayess has completed his PhD at University College London (UCL) in Cardiovascular Genetics in 2002, and then studied the therapeutic utilization of hematopoietic stem cells in cardiovascular disease at the Department of Medicine at UCL for one year. He then spent over seven years working as a Stem Cell Scientist in Eisai Ltd., a major international pharmaceutical company, leading projects focusing on stem cell therapy in various neurodegenerative diseases. He is currently a Senior Scientist at Anti-Doping Lab Qatar, where he leads projects focusing on the role of stem cells in diabetes and genetics and metabolomics of elite athletes and holds an Honorary Senior Lectureship at UCL.

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