

A Gene-microarray approach to the detection of Recombinant Human Erythropoietin doping in endurance Athletes

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Recombinant Human Erythropoietin (r-HuEpo) increases haemoglobin and haematocrit levels thereby potentially enhancing aerobic performance. This has led to the alleged widespread abuse of r-HuEpo in competition by athletes. Direct and indirect approaches to r-HuEpo detection have led to cases of false negatives and false positives requiring an urgent need for these methods to be revised and improved. A gene-microarray based approach might provide more specific, sensitive and robust anti-doping testing models to the detection of r-HuEpo doping. The objective of this pilot study involving three subjects was to adopt a gene-microarray based approach to analyse changes in gene expression associated with r-HuEPO administration. Subjects were administered r-HuEpo every two days for four weeks. Microarray data was analysed using both Illumina and Partek analysis packages. The results were combined and a consistent signature pattern of significant differentially expressed genes were identified. Furthermore, using pathway analysis these genes were shown to participate in erythropoiesis and heme biosynthesis confirming the functional role of r-HuEpo treatment in all subjects. These initial findings seem encouraging for developing anti-doping tests and if successful, the present study design coupled with data from athletes either at sea-level and/or training at altitude could possibly validate several genes as potential markers to altered erythropoiesis. Likewise, the gene microarray approach could be used to formulate novel methods that would identify gene expression profiles relevant to other illicit strategies used by athletes to enhance performance.

Biography

Tushar Chatterji completed his post-graduation in Biomedical Sciences (MRes) from the University of Glasgow with Merit in November 2011. During this time, he underwent two thesis based research projects which were focused towards the 'OMICS' approaches in the area of sports doping. The first project was concerned with demonstrating the metabolomic responses to r-HuEpo administration in athletes and the second was primarily concerned with the gene-microarray approach. The work is expected to be published in international peer-reviewed journals by the end of 2012.

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