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Genetic Fingerprint of Immunosuppression Following Half-marathon Running in Microarray Study

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ABSTRACT

Introduction: An acute bout of exhaustive exercise such as marathon or half-marathon running can interfere with immunity, reflected by transient immunosuppression and inflammation like reaction following the event. To gain more insights into these mechanisms, the capacity of whole blood cultures in profiling gene expression in response to endotoxin (LPS) was studied in athletes before, 30min after, 3h after and 24h after a half-marathon run. **Methods:** Four well trained men and 4 well trained women participated and gene expression patterns were assessed in LPS-stimulated (1h) and unstimulated whole blood using Affymetrix GeneChip microarrays. **Results:** exercise significantly altered several genes in LPS-stimulated and unstimulated blood cultures of male and female athletes. A row of genes with prominent anti-inflammatory function were strongly up-regulated in unstimulated cultures in both sexes (ARG-1, SOCS3, DUSP-1, BMX, GOS2, CD177, and GJB6). In the same cultures a row of highly inflammatory and apoptotic genes were down-regulated (Granzymes A-M-B-K-H, PRF1, SPON2, Granulysin, KLRF1, PLEKHF1). Some of these genes which were significantly up-or down-regulated in unstimulated cultures were also strongly regulated in LPS-stimulated cultures (GJB6, ARG-1, ORM2, KLRF1, TRA@///TRD@, Granzymes, SPON2). In addition, there were some strongly regulated genes which could only be detected in LPS-stimulated cultures but not in unstimulated cultures. Among these, TNIP3, PLAU, HIVEP1, and SLED were up-regulated and IFN- β , IFN- γ , L-12B, CXCL4, CXCL10 and TRAF1 were significantly down-regulated. **Conclusion:** there is a row of genes which are strongly regulated through exercise but can only be detected in (endotoxin) stimulated cultures. This is direct evidence showing that the response to pathogens is strongly down-regulated following prolonged exhaustive exercise through different ways.

Key words: Half-marathon; Immunosuppression; Endotoxin; Gene expression; whole Blood