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Abstract

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Together with the rapidly increasing knowledge on genetic therapies as a promising new branch of regular medicine, the issue has arisen whether these techniques might be abused in the field of sports. Previous experience has learnt that drugs that are still in the experimental phases of research may find their way into the athletic world. The method of gene doping has been included in the list of prohibited classes of substances and prohibited methods per January 1st, 2003. This presentation will address the possible ways in which knowledge gained in the field of genetic therapies may be misused in elite sports.

The principle of gene therapy is based on the delivery to a cell, of a therapeutic gene which may replace an absent or abnormal gene. Recent clinical data showed encouraging gene therapy results in patients with x-linked severe combined immunodeficiency disease and patients with hemophilia B. In addition, angiogenic gene therapy with vectors expressing the human vascular endothelial growth factor for the treatment of coronary artery disease, showed improvement in angina.

Many genes are readily available which may potentially have an effect on athletic performance. Treatment of various sports-related injuries, including muscle injuries, ligament and tendon ruptures, central meniscal tears, cartilage lesions, and delayed bone fracture healing is labor intensive and time consuming. Gene therapy using the transfer of defined genes encoding suitable growth factors into the injured tissue may potentially result in improved regeneration of tissue defects following trauma. Genes encoding for erythropoietin (Epo), Insulin-like growth factor (IGF-1) or vascular endothelial growth factor (VEGF) may be (mis)used to boost red blood cell levels, muscle mass or blood supply, respectively.

The sporting world will sooner or later be faced with the phenomena of gene doping to improve athletic performance. A combination of newly developed detection methods based on proteomics and a clear education program on the associated risks seems to be the most promising preventive method to counteract the possible application of gene doping.