Gene doping: the hype and the reality

Science, Biology

Genetic manipulation has produced some potential advantages to be able to alter the cells in animal models of human diseases, which may make disease as a thing of the past and help with the development of better pharmaceutical products in order to extend the human life ps, however, there are still major technological obstacles that require further research to ensure the methods and effects of genetic manipulation. The gene therapy products may not only be beneficial to human diseases, but also to athletes in sports.

Some potential targets for gene doping include the induction of muscle hypertrophy, increasing oxygen delivery, and the induction of angiogenesis. Some of them may be undetectable by using current tests. Therefore, in order to prevent athletes from benefiting from novel treatments for diseases, it is important to improve thetechnologyof gene doping and the methods of detection. For some potential targets of gene doping, insulin-like growth factor 1 is an example, which is a protein that can stimulate the proliferation of cells, somatic growth and cellular differentiation.

And myostatin is another protein that negatively regulates the muscle mass. Therefore, overexpression of insulin-like growth factor 1 along with the blockade of the action of myostatin may induce the hypertrophy of muscle. Moreover, increasing oxygen delivery is also important for endurance events. In order to increase the delivery of oxygen, erythropoietin can be used to raise the hematocrit because the expression of erythropoietin leads to an increase in the production of red blood cells and hence an increase in the oxygen-carrying capacity of the blood.

As a result, it might improve the athletic performance, particularly for endurance athletes. Personally speaking, as a guy, I would like to manipulate the insulin-like growth factor 1 because it can increase the muscle mass and induce the hypertrophy of muscle which can make me look more muscular. Also, it can stimulate the proliferation and differentiation of the cells, which can escape age-related muscle atrophy and retain to be young. That is what everyone wants to be! For gene delivery, the genetic material is transferred into the target cell by using a delivery system called vector.

Gene transfer can be divided into ex vivo and in vivo gene transfer. In ex vivo gene transfer, the cells are taken from the individuals to be treated, and then they are genetically modified in the cellcultureby using the viral vector, which is more complicated and expensive. For in vivo gene delivery, the vector is prepared with the gene of interest, so this prepared vector can be used to treat many individuals, which costs less. Actually, both methods of gene delivery have their own benefits and limitations; therefore, a comprehensive gene transfer protocol is required to make sure that there is no risk to the individuals.