Gene Doping

What are they?
A gene is a biological unit of heredity and simplified codes for the manufacture of one protein. In some cases these genes are defect and hold wrong information leading to a lack of synthesis or vice versa. In this case gene therapy tries to repair the defect gene, such as increasing muscle proteins for the purpose of enhancing physical performance. The use of any means of genetic manipulation as an attempt to increase or decrease physiological factor is prohibited. This includes attempts to change hormonal control of production of normal substances in the body. There are two main methods of blood doping. An athlete could inject extra red cells, either from a donor or previously harvested from the athlete’s own blood, or take a drug to boost their production.

Status on the prohibited list
Gene doping comes under M3 on the list of methods prohibited.

Examples
- Erythropoetin (Epo) stimulating erythropoiesis.
- Insulin-like growth factor-1 (IGF-1) insulin-like growth factor binding protein (IGFBP) for the control of muscle growth.
- Vascular endothelial growth factor (VEGF)-angiotensine converting enzyme (ACE) being a vasodilatator.
- Endorphins
- Myostatin/growth differentiation factor (gdf-8) or transforming growth factor-b (tgf-b) as a negative muscle growth regulator.

Who might use them and why?
Effects on performance would be varied and could be considerable. Results would depend on the type of gene transferred, of which there are wide possibilities, meaning gene doping could be used by all types of athletes to improve their performance in a number of ways. These include the improvement of endurance, muscle strength and size, and faster recovery from injury and fatigue.

Potential harmful side effects
Side-effects will depend on a number of factors, including the gene being transferred and the method of transfer. However, some of the major side effects reported include:
- Cancer
- Virus Infections
- Autoimmunisation
- Heart Attack and stroke
- Damage of skeletal muscle
- Rupture of tendons and ligaments
- Flu like symptoms

Methods