The use of performance enhancing drugs in sports: Doping

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Since centuries ago, man has always tried to find ways to improve human performance whilst suffering less in doing so. People who were thought to be the best were preferentially fed better diets and given treatments that were considered to be beneficial to their performance.

Scandinavian mythology states that drinks, probably containing *Amanita muscaria* mushroom, were administered to Norse warriors with the aim of enhancing performance, despite causing the person to verge onto the brink of insanity! In the early 19th century, Dr Albert Schweitzer noted that in Gabon, Africa, the inhabitants were able to ingest leaves or roots and work all day without feeling hunger or thirst, yet still displaying gaiety all throughout.[1]

In 1807, Abraham Wood admitted to making use of opium in order to remain awake for 24 hours during the endurance walking race of Britain.[2] This resulted in race organizers increasing the walking distances to over 500miles, as this increased the number of spectators. Similar endurance events were developed for cyclists, as organizers thought that it is more 'spectacular' to see cyclists reach total exhaustion and fall off their bike, often causing multiple cyclists to fall! This brought more spectators (who paid at the gate), increased the prize winnings and thus provided a great incentive for people to make use of substances in order to try to stay awake to ride these great distances.

However, the dark side soon emerged, when the riders started to suffer from extreme exhaustion and hallucinations. The participants would require weeks to recover, and some never returned to normality. The public started to get outraged at this, calling it brutality.

Strychine was also found to be utilized in the 1904 Olympics and actually thought to be necessary for endurance races, such as the marathon. Thomas Hicks was on the verge of collapsing during the 1904 Olympics marathon, when his trainer, Charles Lucas intervened by injecting him with strychnine, handed him a glass of brandy and set him off running once more. He required a further injection 4km away from the finish, but was still awarded the gold medal.

The father of anabolic steroids in the US is John Ziegler (1917–2000), who after learning that the Russians made use of performance enhancing drugs to be successful, worked with the CIBA pharmaceutical company and developed oral anabolic steroids. This came in the form of methandrostenolone, appearing in the market in 1960. That same year, in the Olympics in Rome, a Danish cyclist Knut Jensen collapsed and died during a 100km cycle race. Amphetamines and a drug called nicotinyl tartrate were found in his system.

In the 1970s, East Germany was intentionally providing its athletes with anabolic steroids. Ages started from 10 years old, and they were given to athletes without divulging what the pills were, just stating that they were 'vitamins'. This resulted in Germany greatly increasing the number of gold medal winners in the Olympics, yet it was rare for an athlete to be banned for doping. It is estimated that 10,000 athletes were involved, many of which still bare the mental and physical scars of their side effects, some of whom are still seeking compensation.

However eventually the ban on anabolic steroids, as well as its testing were enforced. In 1988, Ben Johnson won the 100m sprint event in the Seoul Olympics, yet he then tested positive for steroids. Carl Lewis and Marion Jones had similar stories splashed over the media, and their Olympic titles stripped off them. It appeared that the use of performance enhancing drugs was rampant, without any form of control throughout and many top American athletes, were testing positive for banned substances.

In 1998, the whole Festina team taking part in the cycling Tour de France was disqualified following a find in the team car of a large amount of performance enhancing drugs, including EPO (erythropoietin).

These and other similar reports are alarmingly on the increase in the sporting world.

The use of performance enhancing drugs in sports, also known as doping, is becoming a larger problem in all types of sport. Doping is defined as any substance or drug that, when taken, gives an athlete an unfair advantage relative to a 'clean' athlete. The main aim of doping is to enhance athletic performance.[3] The banning of these drugs promotes a more level playing field which is what all sporting organisations seek to achieve.

This led to the formation of the World Anti-Doping Agency (WADA). WADA was established in 1999 as an international independent agency composed and funded equally by the sport movement and governments of the world. Its key

activities include scientific research, education, development of anti-doping capacities, and monitoring of the World Anti Doping Code.

The main reason for banning performance enhancing drugs is the alleged risk of harming the athlete's health (including the risk of causing death), providing an equal opportunity for all athletes as well as promoting 'clean' sports to the general public. Yet although there seems to be general consensus amongst sports people, as well as the International Olympic Committee (IOC), that the use of performance enhancing drugs is unethical, there is an ongoing controversy on the use of modern sporting equipment and specialised sports suits/garments in that these also enhance athletic performance and may thus be considered as 'technological doping' as they aid performance and give an unfair advantage over fellow athletes.

Going back to the 'conventional' type of doping, the latest form of doping is in the form of blood doping, where athletes make use, or rather abuse, blood transfusion or EPO. EPO is a natural growth hormone that works by stimulating the production of red blood cells to increase their number, hence increasing the oxygen carrying capacity and the VO_2 max, which is positively correlated to success in endurance sports such as long distance swimming, cycling, running, rowing and skiing.

Since the 1990s athletes have abused EPO as it is less easy to detect than blood transfusions, however an official test to detect EPO only started to be carried out in 2002. Although EPO is used for medicinal purposes, athlete abuse can raise the haematocrit up to 70%, making the blood more viscous as a result of this polycythaemia. This strains the heart and can cause heart failure and may result in sudden cardiac death especially whilst the athlete is sleeping.

Athletes who are tested for doping and found to have an unusually high haematocrit level will receive a doping ban. This led athletes to time their EPO use in relation to competition time, in order for their haematocrit to return to a 'within range' level of normal. Dopers and their support crew know how long it takes for the substances to be cleared out of the body, or to remain at exactly the upper border of the legal limits, whilst maintaining their performance enhancing effect. They use this knowledge to their benefit.

Previously athletes were only tested after winning a competition, so this enabled this type of doping to be practiced without getting caught, so the next step was to introduce out-of-competition testing. Competitive athletes were to consent to a doping test even out-of-competition periods. This presented other problems, as athletes do not live in one location, or can conveniently be out of town if a doping control person had to request a dope test. This could be done purposely to avoid being caught with doping. However, WADA has initiated the Anti-Doping Administration and Management System (ADAMS), where an athlete must log online and state their location for an hour each day. This will enable doping control officers to test an athlete on any given day. If the athlete is absent, the athlete will be sanctioned.

WADA also issues a list of banned substances, which is revised annually. This can be located on www.wada-ama.org/. This list also contains medications used to treat illnesses. If an athlete requires a medication from the banned list, and there is no other alternative, a therapeutic use exemption must be applied for. A sports medicine doctor or a similar specialist is required to fill in this form along with documentary evidence of the athlete's condition. The athlete will be informed whether or not their medication is accepted for general well-being purposes.

There are also a number of over-the-counter medications, notoriously cough and flu medications, that contain banned substances, such as ephedrine. A doctor may prescribe this legally and the athlete ingests the medication, yet when tested for doping, a positive result is found, resulting in the athlete being sanctioned. The Global Drug Reference Online (www.globaldro.org) is a useful tool for doctors and athletes alike, where they can input the name of the proposed medication and information about whether or not it is a banned substance will be provided. This is also useful to check about food supplements that may contain prohibited substances within them.

The fight against doping is a constant upward battle, yet despite science's advances over time, the 'cheats' are always one step ahead and know how to cover up doping, until anti-doping agencies have time to catch up.

One worrying fact about doping... when a group of elite athletes were asked if they would take a pill that would guarantee them sporting success, yet as a result they would certainly die by the age of 40 years, a staggering more than 60% of athletes replied positively!

References

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