

## **Anti-Doping Awareness in Sports**

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**Lecture -6**

**WADA - Prohibited List**

Good morning, friends, and welcome to today's lecture on the World Anti-Doping Agency Prohibited List. This is Week 2, Lecture 1. I'm Professor Dobson Dominic, and I'm your Anti-Doping course facilitator. In Week 1, we looked into the history of international anti-doping, the history behind doping in India, and the history of doping in the Olympics. We also looked into the World Anti-Doping Agency (WADA) Code. So today, we are going to look into the comprehensive World Anti-Doping Agency's Prohibited List.

This week, in Week 2, we are going to look into the World Anti-Doping Agency Prohibited List. What are the substances prohibited in competition only? What are the prohibited methods? What are the prohibited drugs' side effects? And what are the long-term side effects of doping?

These are the broad outlines for today's discussion. We'll first look into the World Anti-Doping Agency Prohibited List 2025. What are the substances that are prohibited at all times? We'll see what are the substances that are prohibited only during the competition. We'll see what the prohibited substances and methods are. We will see what are the major modifications that have happened from 2024 by WADA. This is a broad list of WADA's 2025 Prohibited List.

S0 stands for non-approved substances, S1 for anabolic androgenic steroids, S2 for peptide hormones, S3 for beta-2 agonists, S4 for hormone and metabolic modulators, S5 for diuretics and masking agents, S6 for stimulants, S7 for narcotics, S8 for cannabinoids, S9 for glucocorticoids, P1 (that is in particular sports) is for beta blockers.

Then we have three methods that are banned:

M1 for manipulation of blood and blood components, M2 for chemical and physical manipulation, M3 for the newer gene and cell doping.

For a substance or method to be considered for inclusion in the WADA banned list, two of the following three criteria must be met: the potential to enhance sports performance, an actual or potential health risk to the athlete, or violation of the spirit of the sport. If either the drug or the method satisfies two of these three criteria, then that drug or method will be banned. Some drugs are prohibited at all times. Examples are: anabolic androgenic steroids. Some drugs are prohibited only during competition. An example is amphetamines or stimulants. Some drugs are banned above a specific threshold dosage, and some drugs are banned in a particular specific sport.

Now, looking into what drugs are prohibited at all times: S0 is non-approved substances. S1 is anabolic agents. S2 is peptide hormones, growth factors, related substances, and mimetics. S3 is for beta-2 agonists or beta blockers. S4 is for hormone and metabolic modulators. S5 is for diuretics and masking agents.

Let us look into each of these: This is a group of drugs or substances that are non-approved. Any pharmacological substance not covered in the list and lacking current approval from any government regulatory authority for human therapeutic use.

What are they? Drugs in preclinical or clinical development. So drugs which are not approved can never be used. Discontinued drugs: Some drugs are used and then discontinued. They cannot be used. Designer drugs cannot be used. Substances approved solely for veterinary use, i.e., use in animals, are also prohibited at all times.

So, these are substances which are non-approved and are prohibited at all times for athletes: S1.1 stands for anabolic androgenic steroids, and S1.2 stands for other anabolic agents—substances that have both anabolic (that is, tissue-building) and androgenic (that is, masculinizing) properties. Anabolic androgenic steroids can be derived both endogenously (that is, in a natural form) as well as exogenously in a synthetic form. Athletes in sports like weightlifting and throwing events like shot put and discus throw abuse this performance-enhancing drug to increase muscle power and muscle strength. Having these anabolic drugs has several side effects, which we will look at in subsequent week's lectures.

S2 substances are banned at all times. What are they? EPO and agents, that is, erythropoietins, which affect erythropoiesis. EPO's role is to increase red blood corpuscles in blood and is used by athletes, particularly in endurance sports like cycling and marathon running. S2.2 stands for peptide hormones and the releasing factors. Peptide and glycoprotein hormones are natural substances that act as messengers within the human body and trigger the production of other hormones endogenously like testosterone. S2.3 stands for growth factors and growth factor modulators. What are they? Examples are synthetic drugs like HCG (human chorionic gonadotropin), HGH, or ACTH. They are all used by athletes for muscle strength. So this group of S2

substances—peptide hormones, growth factors, and growth factor modulators—are banned at all times during sport.

S3 stands for beta-2 agonists. Beta-2 agonists, if taken into the bloodstream, have anabolic effects (that is, tissue-building or muscle-building effects), and hence the World Anti-Doping Agency has prohibited the use of beta-2 agonists by athletes.

There are certain exceptions where there is genuine medical need in certain conditions like bronchial asthma—even athletes can suffer from childhood asthma which can continue into adulthood. In such cases, inhaled forms of salbutamol, formoterol, salmeterol, or vilanterol are given. So these beta-2 agonists, if taken for a medical condition, require the athlete and support staff to follow one important principle—that is, you need to apply prior to the usage of this drug for a TUE certificate.

What does TUE stand for? Therapeutic Use Exemption is mandatory for usage of inhaled beta-2 agonists.

Based on the recent publication, the doses of inhaled Formoterol were updated to ensure that ergogenic effects are not achieved. So, this is a newer modification in the 2025 guidelines. WADA comes up with periodic modifications in the usage of beta-2 agonists. S4 stands for hormone and metabolic modulators. These drugs help in enhancing performance by either increasing testosterone or increasing the availability of circulating testosterone, either by stimulating the secretion of luteinizing hormone or human chorionic gonadotropin. Examples include clomiphene, tamoxifen, and other selective estrogen receptor modulators (SERMs), myostatin inhibitors, and anti-estrogenic agents. These drugs are mostly used in sports like weightlifting and athletics where muscle strength is needed. Hence, WADA has prohibited the use of hormone and metabolic modulators.

S5 are diuretics and masking agents. Diuretics are commonly known as “water pills.” They act on the kidneys to increase urine flow and also increase sodium excretion. This causes an athlete to urinate more frequently and leads to loss of body weight and masking of drug usage. Some athletes use diuretics to reduce body weight in sports that are based on weight categories. Other athletes use it as a masking agent, to flush out any prohibited drug from their system before undergoing a doping test.

Now let us look into the prohibited methods: These are mostly newer substances and newer methods which are prohibited by WADA. M1 stands for manipulation of blood and blood components. M2 stands for chemical and physical manipulation. M3 stands for gene and cell doping. So, blood doping is the use of certain techniques and substances to increase the red blood cell mass. What does this do? This enhances an athlete's aerobic

capacity and endurance. It also enhances oxygen transport to the muscles and thus enhances performance. So this is commonly used in sports like cycling and marathons, and hence blood doping is prohibited.

Gene doping is the non-therapeutic use of genes, genetic elements, and cells to enhance an athlete's performance. These genes and cells are directly injected into the athlete's system. This is still in the experimental phase but has potential use for athletes to enhance muscle strength and hence is prohibited by the World Anti-Doping Agency.

Now we come to drugs that are prohibited only in competition. So far we looked at drugs that are prohibited at all times. Now let us look at drugs that are prohibited only during the competition. S6 are stimulants. Stimulants increase alertness and reduce fatigue. It also increases aggression and competitiveness in an athlete. But this can lead to anxiety, heart attack, and even death. Hence stimulants are banned. Common examples are amphetamine, cocaine, and ephedrine. S7 are narcotics. Narcotics are very potent painkillers, used to reduce pain and allow the athlete to perform through the pain. But this is very dangerous as it can lead to addiction and also serious long-term effects on the body and performance. Examples are morphine and oxycodone. S8 are cannabinoids. These are derived from the cannabis plant. Cannabinoids and their products are banned. Their presence in the athlete's body in competition is considered a doping violation. The use of cannabis by athletes can have short-term as well as long-term side effects. It can reduce concentration, impair coordination, and impair decision-making.

S9 are glucocorticoids. Glucocorticoids are a class of corticosteroids. They reduce inflammation in the body and are used in the treatment of conditions like asthma, autoimmune diseases, and allergic reactions. When used in high doses, glucocorticoids can have performance-enhancing effects. They can be used to mask pain and inflammation during competition. Hence, systemic use of glucocorticoids (oral, intravenous, intramuscular, or rectal) is prohibited during competition. However, other routes like inhalation, topical, or local injections are permitted but require a Therapeutic Use Exemption (TUE) approval if used.

There is a new monitoring program that has been proposed by WADA in the 2025 prohibited list. These are substances that are not currently banned but are being monitored to assess patterns of misuse in sport. In 2025, the monitoring program includes Bupropion, caffeine, nicotine, and Tramadol. These substances are being monitored in sports like cycling and athletics for potential misuse. Another new update is the inclusion of Tramadol. Tramadol is a powerful pain-relieving opioid that is not currently on the banned list but is being monitored. In 2024, UCI (Union Cycliste Internationale) implemented a ban on tramadol in competition. Now WADA has included it under the monitoring program for all sports to assess its use and effects.

So what are the summary points? WADA's Prohibited List is updated annually. It includes substances and methods that meet two of the following three criteria: potential to enhance performance, actual or potential health risk, or violation of the spirit of sport. The list is divided into substances prohibited at all times, in competition only, and in particular sports. Athletes and support staff must stay informed and consult with anti-doping organizations before using any medications or supplements. TUEs are essential for certain medical conditions requiring prohibited substances or methods. The 2025 Prohibited List includes updates to dosages, new monitoring substances, and ongoing vigilance against emerging doping methods.

Thank you, and we'll continue with the next lecture soon.