


# CHRONIC EFFECTS OF DOPING ON ATHLETES

**Dr.(Prof.) Sinku Kumar Singh**

Head, Department of Physical Education ,  
Swami Ramanand Teerth Marathwada University  
Nanded Maharashtra



**The World Anti-Doping Agency (WADA) defines the *sport* as the celebration of the human spirit, body and mind which is characterized by the following values: ethics, fair play and honesty, health, excellence in performance, character and education, fun and joy, teamwork, dedication and commitment, respect for rules and laws, respect for self and other participants, courage as well as community and solidarity**



# Acute and Chronic effects

## Acute effects

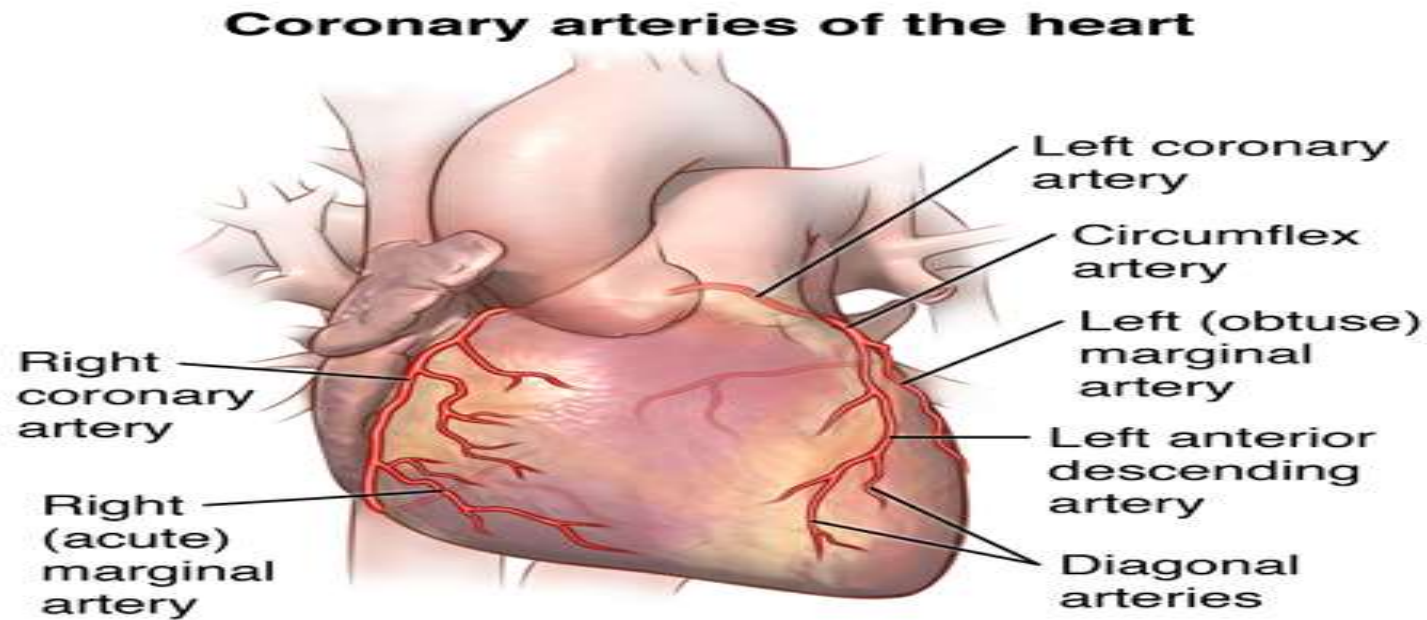
1. **Anabolic steroids (Enhancement of performance )**  
John Ziegler (1917-1983),
1. **Diuretics ( Weight loss)**
2. **Stimulants ( Stimulate CNS)** caffeine, cocaine, amphetamine, modafinil, and ephedrine
3. **Narcotics Analgesic ( Management for Pain ,Migraines )**
4. **Beta Blockers ( Steady and Slow Nerve impulses and Heart beats)**



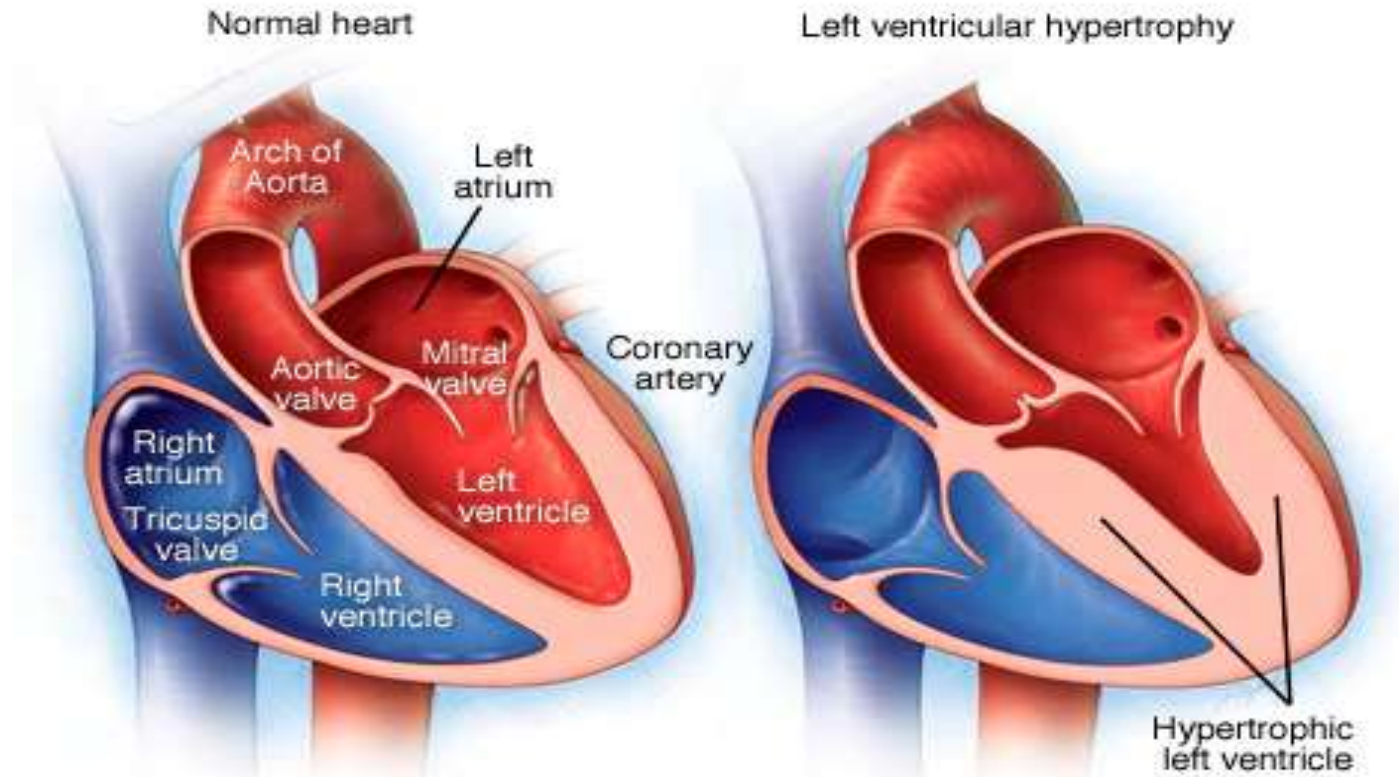
# Chronic (Adverse ) effects of Anabolic agents

(John Ziegler (1917-1983),

## 1. Myocardial Infraction



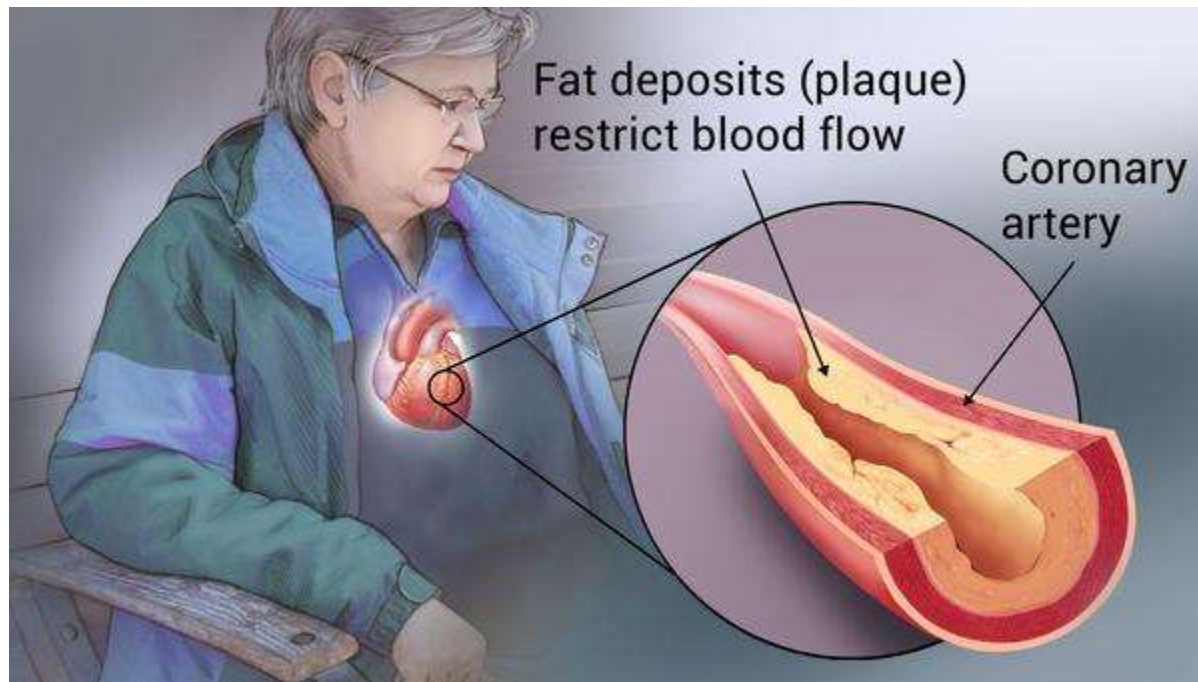
# Left Ventricular Hypertrophy



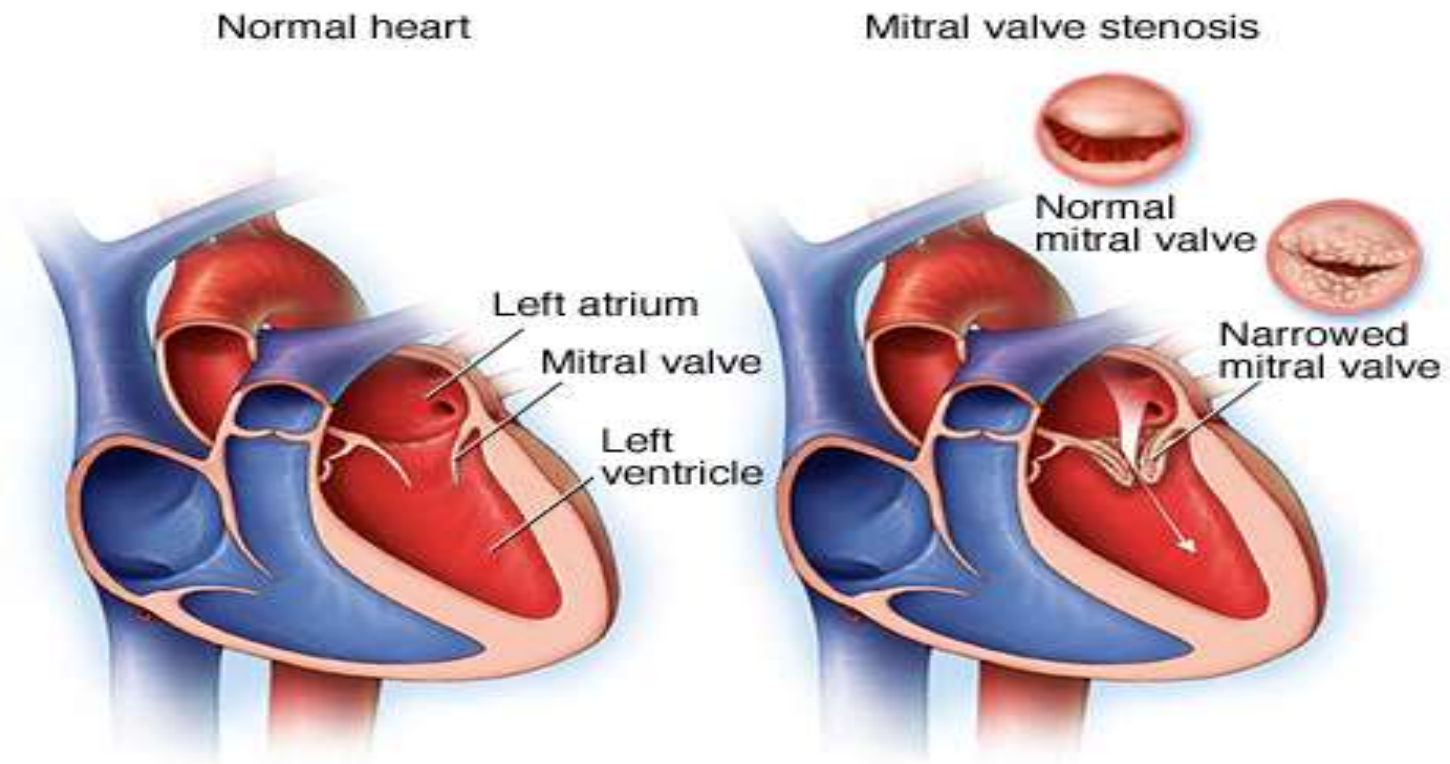
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# Plaque in the Coronary Artery




# AAS Increase the risk of Stenosis



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# Chronic (Adverse ) effects of Anabolic agents

- ▶ Deterioration of cardiac ejection fraction
  - ▶ cardiac arrhythmias
  - ▶ Deterioration in systolic function and to diastolic dysfunction
  - ▶ Myocardial hypertrophy
  - ▶ Endothelial dysfunction
  - ▶ Cardiomyocytes
  - ▶ Vasoconstrictions of Artery
  - ▶ Tachycardia and bradycardia
  - ▶ Kidney and liver Disfunction
- 



# Adverse effects of Doping on Diuretics

## ▶ Types of Diuretics

1. Thiazide diuretics (chlorothiazide, chlorthalidone, hydrochlorothiazide)
2. Loop diuretics (Orsemide, Furosemide)
3. Potassium-sparing diuretics



# Diuretics

- ▶ Electrolytic imbalance (Hyponatramia )
- ▶ Cardiac irregularities
- ▶ Dehydration
- ▶ Muscle weakening
- ▶ Hypotension
- ▶ Injuries



# Beta Blockers

- Bradycardia and hypotension
- Left ventricular hypertrophy and dysfunction
- Arrhythmogenic
- Thromboembolic episodes, or
- Myocardial infarction



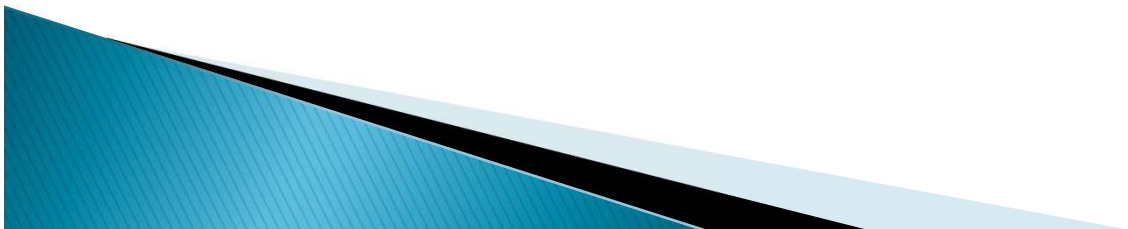
## ▶ **Stimulants:**

- ▶ Stimulants are a class of substances that increase certain types of cell signalling and amplify various physiologic processes throughout the brain and body. In particular, many types of stimulant drugs are associated with heightened dopamine release, which can result in a powerful sense of well-being, increased energy, attention, and alertness
- ▶ The most commonly used of these substances are amphetamines,
- ▶ cocaine, ephedrine, and pseudoephedrine

Long-term **physical effects** of stimulant abuse include :

Psychological function

- ▶ Extreme weight loss.
- ▶ Reduced sexual functioning.
- ▶ Gastrointestinal problems.
- ▶ Muscle deterioration.
- ▶ Chronic exhaustion.
- ▶ Cardiovascular damage.
- ▶ Breathing problems.
- ▶ Headaches.
- ▶ Cerebral hemorrhage.
- ▶ Stroke.
- ▶ Seizure.



# Anabolic Steroids

Acute and chronic kidney problem,  
harmful changes in cholesterol levels

Acne,

High blood pressure,

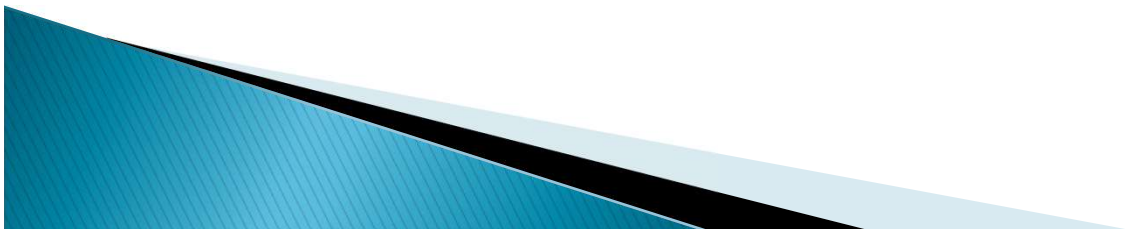
liver damage.

Sudden cardiac arrest and heart attack

Psychological problems

Muscular imbalance

Injuries



# Narcotic analgesics

physical and psychological dependence leading to more serious problem associated with addiction withdrawal and does related respiratory depression. Masculinization among the females increased aggressiveness, moodswing, depression, abnormal menstrual cycle, excessive hair growth on the body in females, acne, reduction in the size of testicles in male, decreased sperm production, potential for kidney, liver dysfunction. Premature aging enlargement of prostate gland, these effects may be permanent with prolonged age. In adolescents, premature closure of growth centers of the long bones may occur, and resulting in stunted growth.

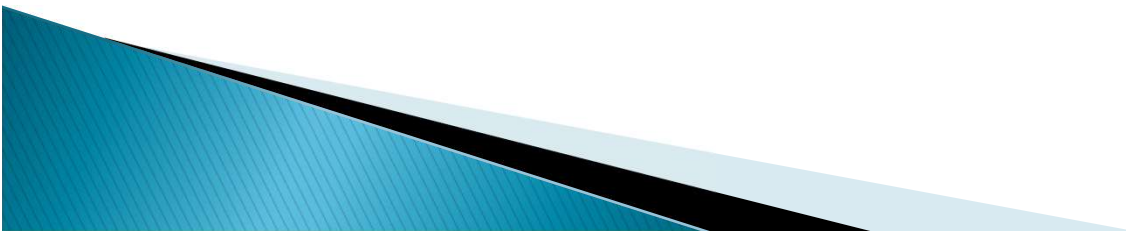


# Blood doping

- ▶ Blood doping is done to temporarily increase blood volume and increase the number of blood cells containing hemoglobin. This overloading the blood with hemoglobin which increases the oxygen-carrying capacity of blood and leads to an increased endurance performance.



hanks





# Categories of prohibited substances and methods (WADA 2018)

- ▶ Substances and methods prohibited at all times (in- and out-of-competition)
- ▶ **A. Prohibited substances**
- ▶ S0. Non-approved substances
- ▶ S1. Anabolic agents:
  - ▶ - Anabolic androgenic steroids
  - ▶ - Other anabolic agents
- ▶ S2. Peptide hormones, growth factors, and related substances
- ▶ S3. Beta-2 agonists
- ▶ S4. Hormone and metabolic modulators
- ▶ S5. Diuretics and other masking agents
- ▶ **B. Prohibited methods**
- ▶ M1. Manipulation of blood and blood components
- ▶ M2. Chemical and physical manipulation
- ▶ M3. Gene doping
- ▶ **II. Substances and methods prohibited in-competition**
- ▶ S6. Stimulants
- ▶ S7. Narcotics
- ▶ S8. Cannabinoids
- ▶ S9. Glucocorticosteroids
- ▶ **III. Substances prohibited in particular sports**
- ▶ P1. Alcohol
- ▶ P2. Beta-blockers