Let's Excel Together

CANADIAN ACADEMY OF SPORTS NUTRITION

Lecture 34:

Substance Abuse in Sports (Doping)

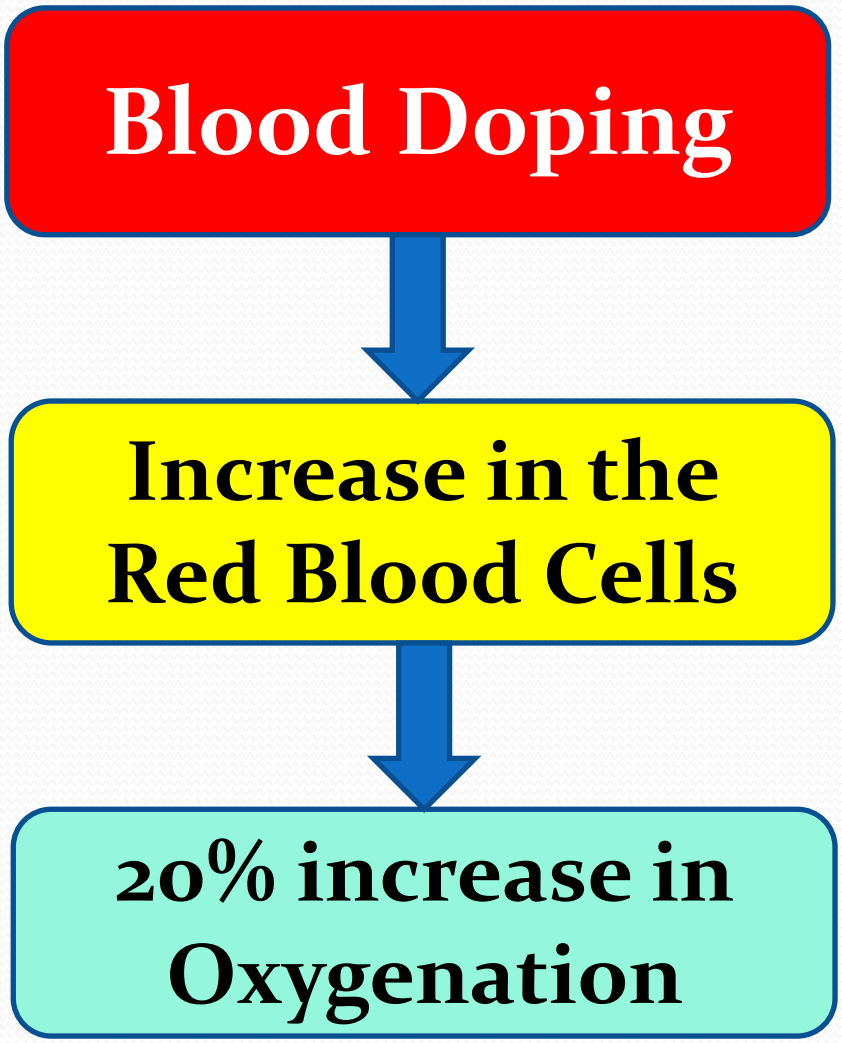
Part 2

Copyright Protection:

Blood Doping:

- **It is the administration of the blood or any blood components for the sole purpose of enhancing performance in sports.**

- **It is prohibited by WADA (world anti - doping agency).**
- **The first confirmed case of blood doping was reported in Montreal Olympic Games 1976: by long distance runner, from Finland.**
- **reindeer milk.**


Blood Doping
Increase in the Red Blood Cells
20% increase in Oxygenation

According to WADA, the followings are prohibited:

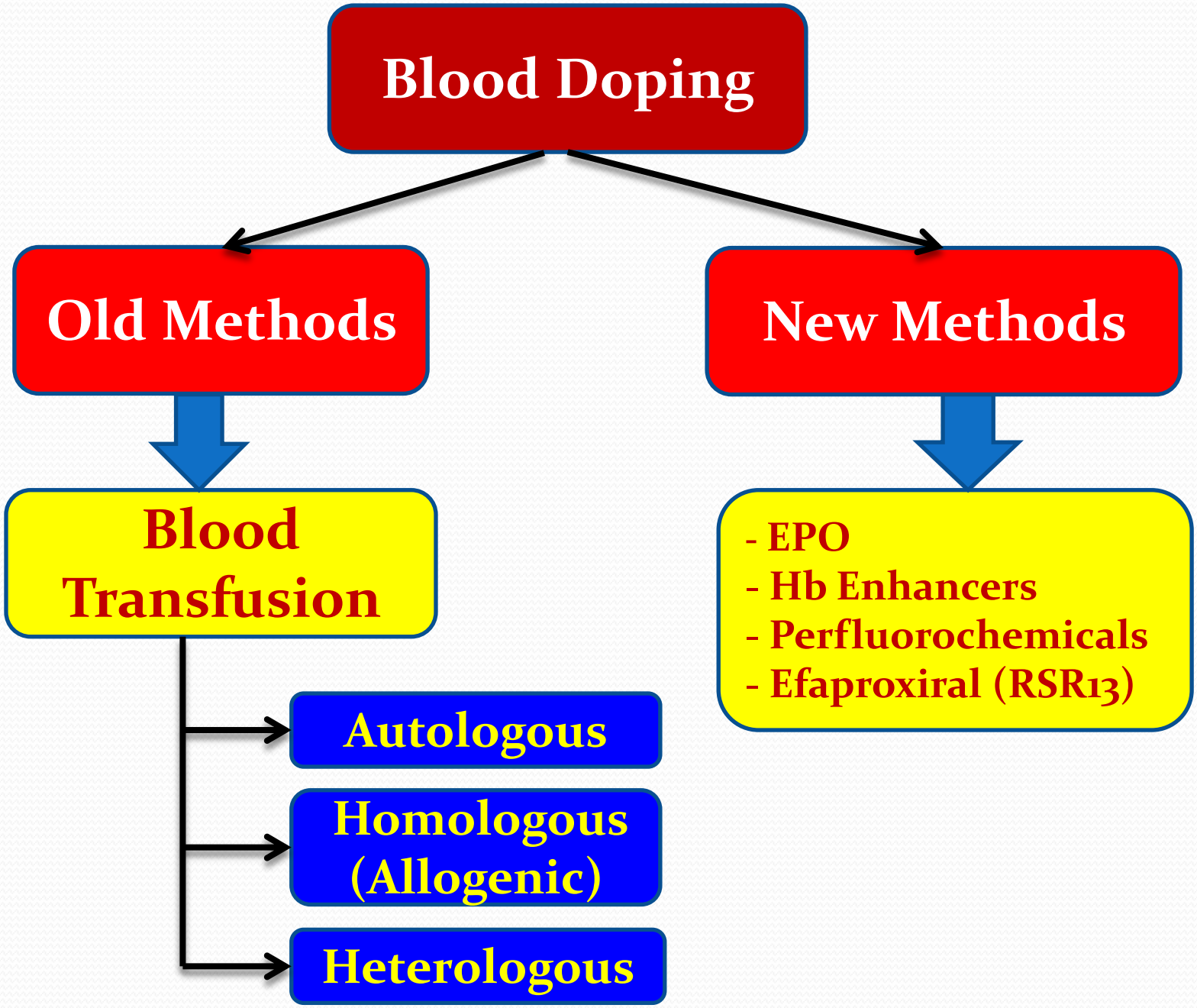
- **1) The Administration or reintroduction of any quantity of autologous, allogenic (homologous) or heterologous blood or red blood cell products of any origin into the circulatory system.**

- **2) Any form of intravascular manipulation of the blood or blood components by physical or chemical means.**

- **3) Artificially enhancing the uptake, transport or delivery of oxygen. Including, but not limited to:**
- **Perfluorochemicals.**
- **Efaproxiral (RSR13).**
- **EPO (Erythropoietin).**
- **Modified haemoglobin products, such as:**

  - haemoglobin-based blood substitutes.

  - microencapsulated haemoglobin products.


Blood Doping
Old Methods
New Methods
Blood Transfusion
- EPO
- Hb Enhancers
- Perfluorochemicals
- Efaproxiral (RSR13)
Autologous
Homologous (Allogenic)
Heterologous

- **Autologous blood transfusion is the collection and re-infusion of the person's own blood or blood components.**

- **Homologous (allogenic) blood transfusion is collecting and infusing the blood of a compatible donor into him/herself.**

- **Heterologous blood transfusions are those that involve someone infusing blood and its components from a different species.**

Autologous Blood Transfusion:

Athlete is taken to high altitude
3 - 7 days before competition

↓

Extracting Blood

↓

Storing for Competition Day:
Liquid form: 6 weeks in - 4 C degrees
Frozen form: few years in - 80 C degrees

↓

Re-infusion of blood products
to athlete on competition day

Technical difficulties of Blood Doping, transfusion type:

- 1) Needs a medical team.
- 2) Requires a highly sterilized environment.
- 3) Needs equipment.

EPO (Erythropoietin):

- **Erythropoietin (EPO) is a hormone produced by the kidneys (90%) and liver (10%).**

- **It promotes the formation of red blood cells by the bone marrow.**
- **The biologic half life of EPO is 6 to 48 hours.**
- **EPO production may increase up to 1000 times in response to hypoxic stress.**
- **EPO can increase VO2max by a significant amount.**

EPO Test:

- **The patient is usually asked to fast for 10 -12 hours (overnight).**
- **The patient lies down quietly and relax for 20 - 30 minutes before the test.**
- **Normal levels of erythropoietin range from 4 - 24 mU/ml (milliunits per milliliter) (average 10 mU/ml).**

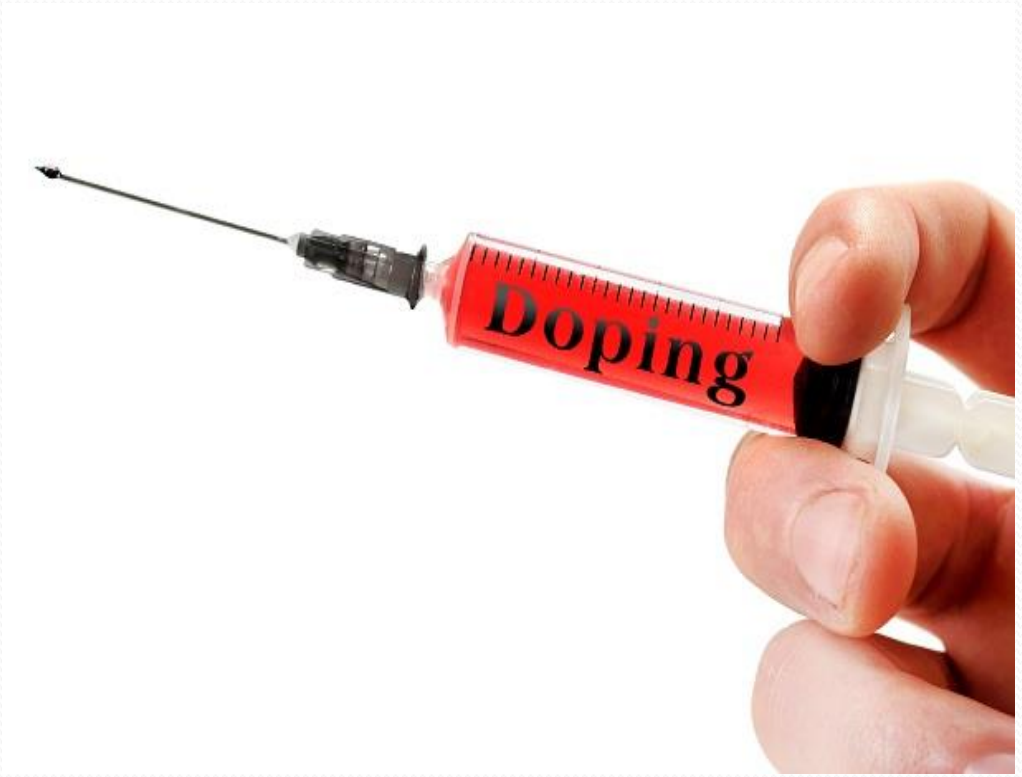
Synthetic EPO:

- **Using recombinant DNA technology, erythropoietin has been synthetically produced for use as a treatment for persons with certain types of anemias, such as anemias from chronic kidney failure and dialysis:**
- **Epoetin alfa.**
- **Epoetin beta.**
- **Epoetin delta.**
- **Epoetin omega.**
- **Epoetin zeta.**

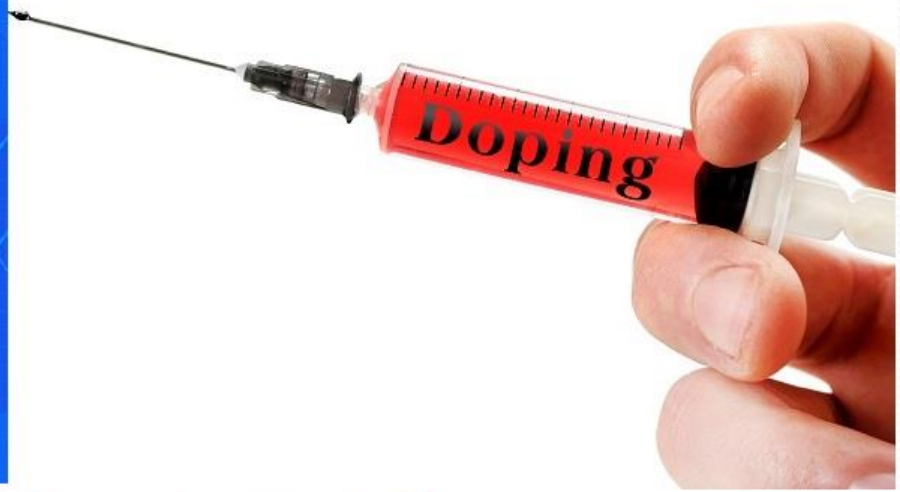
Who Use Blood Doping?

Blood doping is used in endurance sports:

- **Boxing.**
- **Biathlon.**
- **Cross country skiing.**
- **Cycling.**
- **Distance running.**
- **Horseracing.**
- **Mixed martial arts.**
- **Race walking.**
- **Triathlon.**



Using EPO hormone is the most common type of Blood Doping among endurance athletes!



Canadian Academy of Sports Nutrition

Dangers of Blood Doping:

- 1) **Increased blood viscosity** which may cause headaches, chest pain, heart attack and stroke.

- 2) **Transfusion – induced diseases**:

- Hepatitis.
- HIV.

Soda Doping:

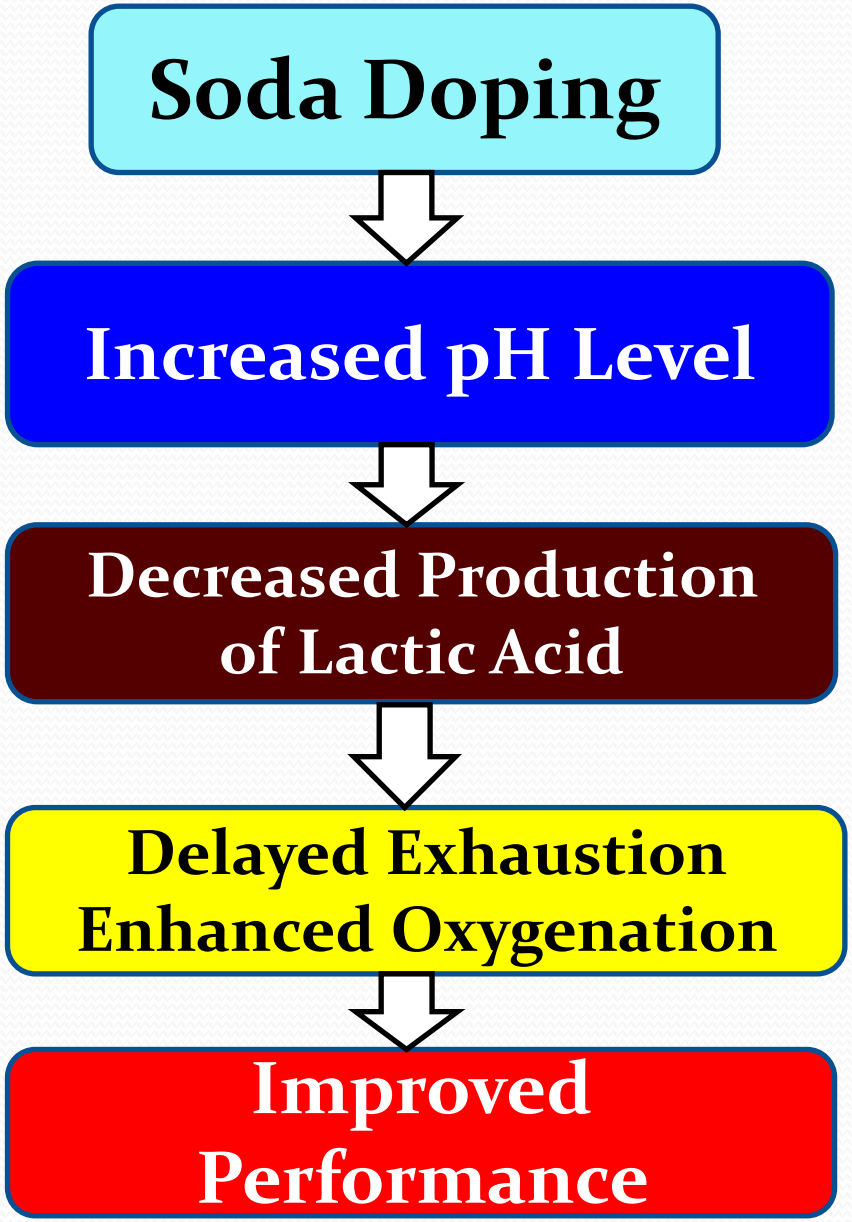
- **It is manipulating the pH level of the body for the sole purpose of enhancing athletic performance.**
- **It is not in the list of WADA separately.**
- **It is a subtype of blood doping: Artificially enhancing the uptake, transport or delivery of oxygen.**

- **The name "SODA" originates from the name of baking soda (sodium bicarbonate).**

Sodium Bicarbonate.

- **Soda doping in medicine is called "Alkaline Diuresis".**

- **Alkaline Diuresis is used in the management of acidosis and elimination of some medications (drug overdose) that make the body acidic.**


Soda Doping
Increased pH Level
Decreased Production of Lactic Acid
Delayed Exhaustion
Enhanced Oxygenation
Improved Performance

Procedure:

To make the body alkaline:

- You need a high doses of baking soda (5 grams /kg).

Alkaline Diuresis:

- A solution of serum dextrose 5%, sodium bicarbonate, sodium chloride, and potassium chloride.

Other Benefits of Sodium Bicarbonate:

- **Indigestion and heartburn.**
- **CPR (cardiopulmonary Resuscitation).**
- **Metabolic acidosis.**
- **Cancers.**

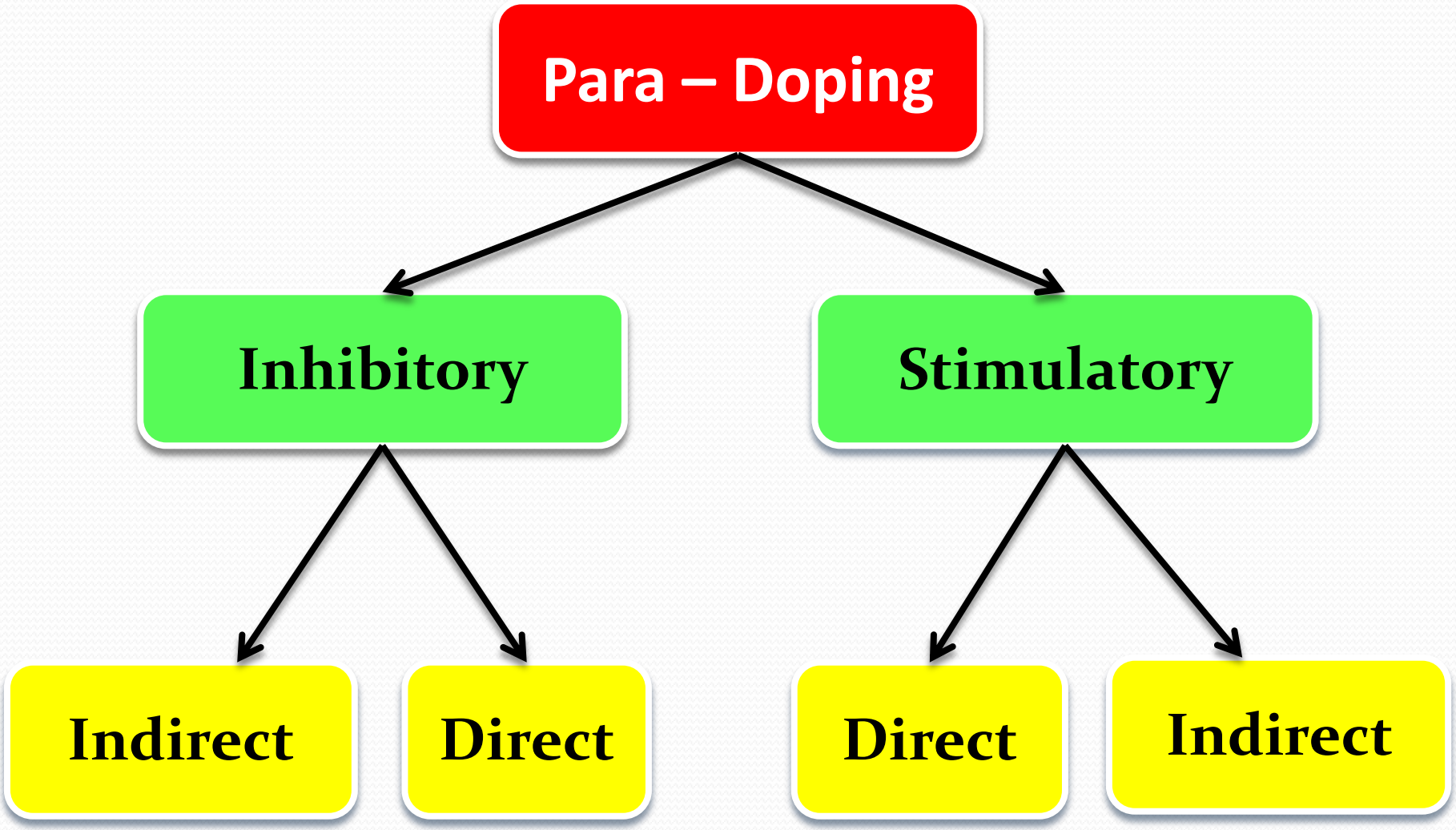
Consequences:

- **Abdominal cramps.**
- **Diarrhea.**
- **Nausea and bloating.**
- **Severe allergic reactions (rash; hives; difficulty breathing; and tightness in the chest)**

Para – Doping:

- **It is to drug someone intentionally to decrease his/her athletic performance or eliminate his/her from an athletic competition.**

- **It is uncommon in sports but may happen.**


Para – Doping
Inhibitory
Stimulatory
Indirect
Direct
Direct
Indirect

Homework:

- **1) Describe how blood doping could improve athletic performance.**
- **2) Describe para – doping.**