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SARMs – effects, side effects and markets

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DISCLAIMER

There is presently no authorised medicinal product including any SARM on the market. The Swedish Medical Products Agency has not evaluated any such product. The information included in the presentation is solely the view of the presenter and is not representing any conclusion from the Agency.



CONTENT



What is a Selective Androgen Receptor Modulator (SARM)?



What do we know about them?



Are they legal?



Where can I buy them?

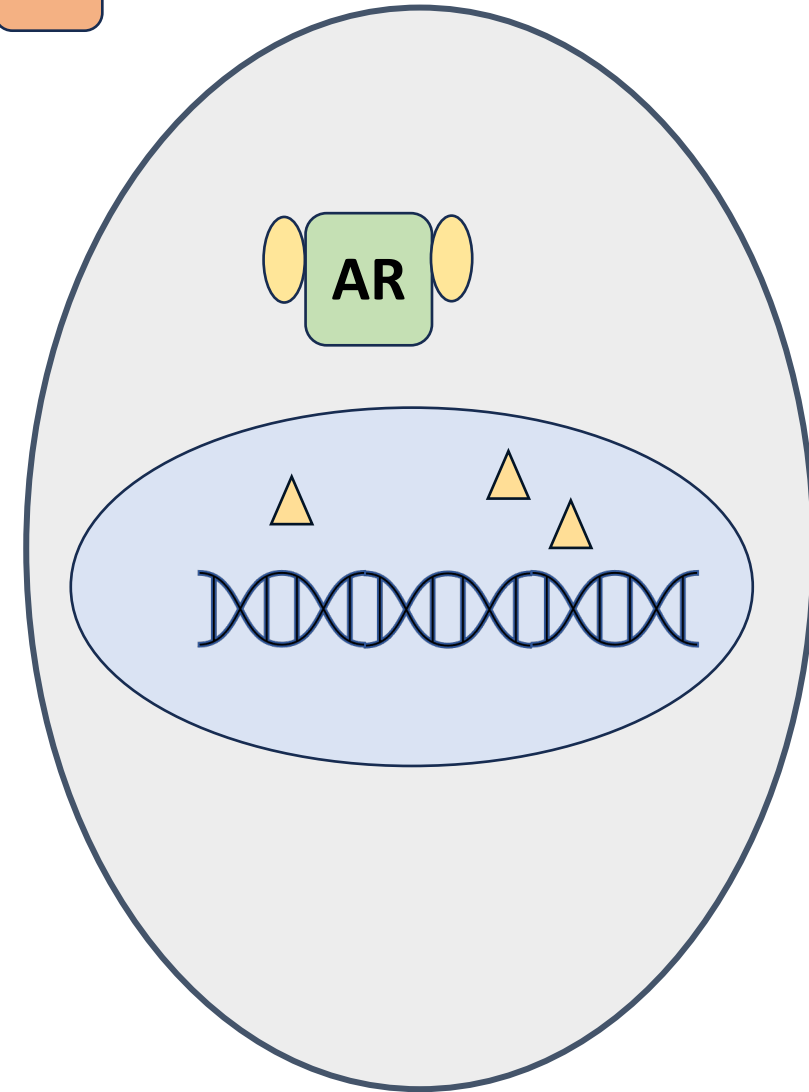


ANDROGENIC SYSTEM

TESTOSTERONE

- Involved in male sexual characteristics (ANDROGENIC)
- Involved in building and sustaining muscle and bone structures (ANABOLIC)
- Ligand to the androgen receptor

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SELECTIVE ANDROGEN RECEPTOR MODULATORS

CHARACTERISTICS

- **Low effect on e.g. prostate and testicles (NON-ANDROGENIC)**
- **High effect on receptor in muscles and bones (ANABOLIC)**
- **Tissue specific**
- **Oral administration**

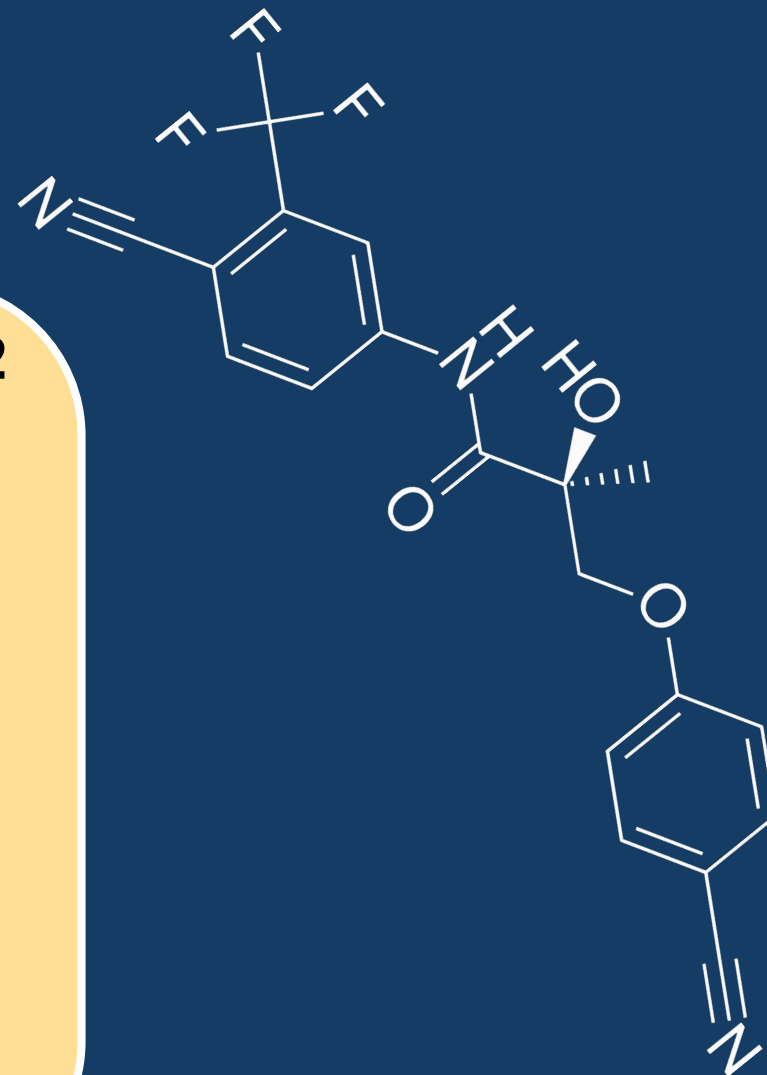
RESEARCH AREAS

Examples:

- **Sarcopenia**
- **Cachexia**
- **Ostereoperosis**
- **Prostate cancer**
- **Breast cancer**

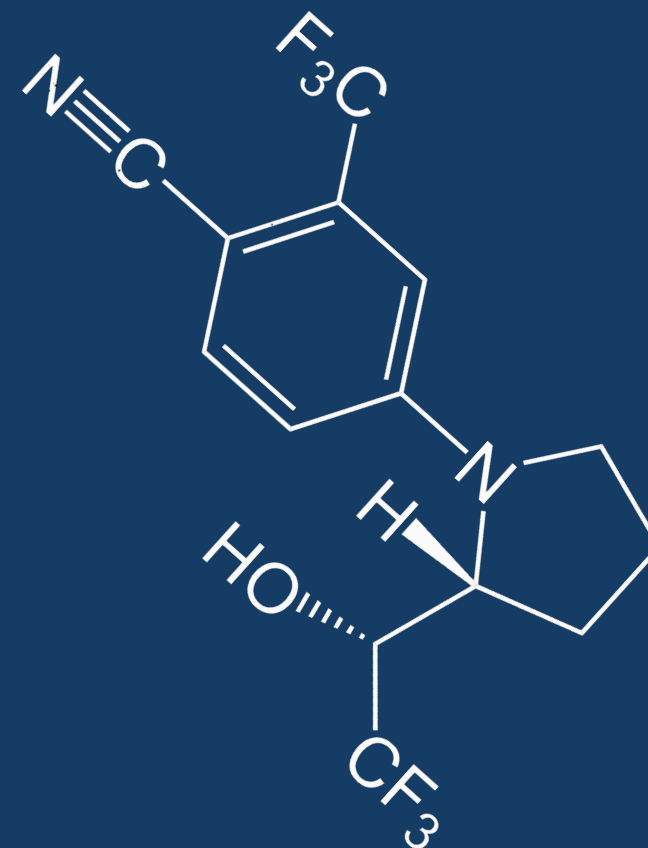
OSTARINE

- **Other names: Enobosarm, MK-2866, gtx-024, S-22**
- **Developing program by Veru (bought from GTX Inc in 2020)**
- **25 previous clinical trials**
- **2 ongoing trials:**
 - Phase III; combination with abemaciclib (CDK4/6-inhibitor) for patients with metastatic breast cancer
 - Phase II: combination with GLP-1 analogue for patients with obesity.



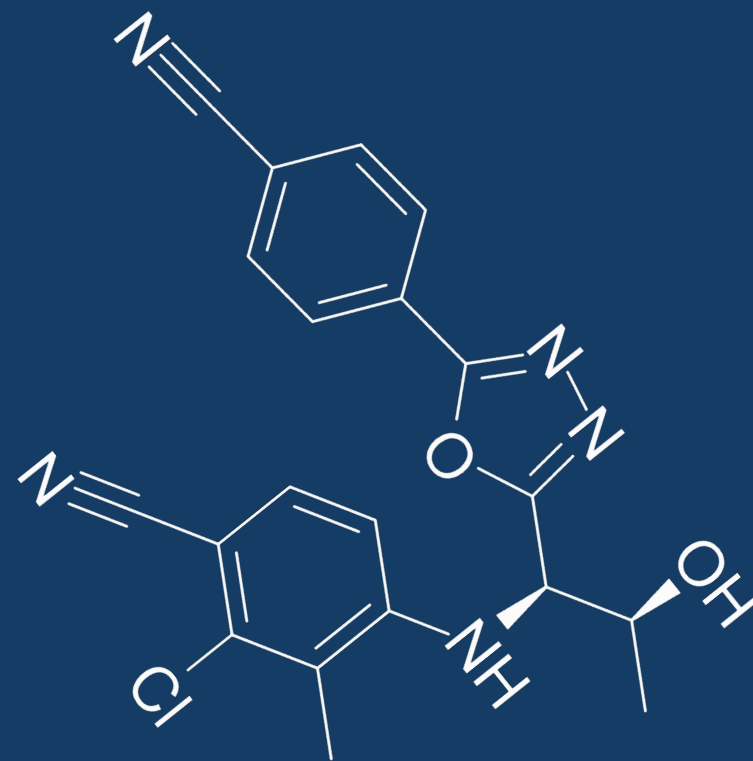
LIGANDROL

- **Other names: LGD-4033, VK5211**
- **Developing program by Viking Therapeutics**
- **3 phase I clinical trials**
- **1 phase II clinical trial.**
 - Patients with hip surgery



RAD140

- **Other names: Testolone, Vosilasarm**
- **Developing program by Ellipses Pharma.**
- **1 phase I clinical trial**
- **1 planned phase 2 clinical trial**
 - Patients with advanced ER+/AR+ breast cancer



LEGALITY

Swedish Doping Act

- **Not a steroid**
- **Not androgenic**
- **No effect on production or release of testosterone**
- **Not doping substances**

Medicines Act

- **Ostarine, Ligandrol, RAD140 medicinal substances**
- **Products are regulated as medicines**

WADA code

- **Prohibited in sports**

SAFETY

HOW DO WE KNOW?

- **Mechanism of action**
- **Animal studies**
- **Controlled human studies**
- **Published case studies**
- **Reported cases**
- **Anecdotes**

FOR SARMs

- **Complex mechanism of action**
- **Some animal studies published**
- **Some clinical studies published**
 - **Elevated ALT/AST**
 - **Lower HLD**
 - **Lower SHBG**
- **20 case reports since 2020**
 - **Liver damage**

CONTROL PROJECT

AIM

Knowledge of SARMs on the Swedish market

METHOD

- **Search for products on the Swedish market**
- **Laboratory analysis of found products**
- **Information from other sources**





Search bar containing a magnifying glass icon, a cursor, a "Sök" button, and icons for keyboard, voice search, and image search.

Sök på Google

Jag har tur

Sverige

ANALYSIS BY NATIONAL FORENSIC CENTRE 2020–2023

SARM	Seizures	Tab/cap	Liquid	Powder
Ostarine	39	30 180 st	36 ml	928 g
RAD140	38	18 685 st	144 ml	119 g
Ligandrol	51	25 434 st	127 ml	173 g
Andarine	6	14 560 st	-	-

ANALYSIS BY SWEDISH CUSTOMS 2016–2023

SARM	Samples	Tab/cap	Liquid	Powder
Ostarine	97	6174 st	680 ml	1636 g
RAD140	45	4401 st	420 ml	760 g
Ligandrol	71	5864 st	1356 ml	496 g
Andarine	3	120 st	-	49 g

ANALYSIS BY OMCLs 2018–2023

Samples*	
Countries	14
From customs and police	76%
From legal internet sites	0,3%
From illegal internet sites	10%
Shops	2,5%
Other	8 %

* Project included other doping substances than SARMs, e.g. ibutamoren and candarine

SARM	No. cases
Ligandrol	49
Ostarine	46
Andarine	34
RAD140	26

SARM on label	Wrong or no SARM by analysis
86	12

CONCLUSIONS



There is a black market for SARMs



No legal Swedish market



There are safety issues



Legal to use, illegal to sell



THANK YOU FOR YOUR ATTENTION!

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