clinical cases DDIs

Date of report 28 Dec 2022

Reported case interaction between **Ritonavir** and **Anabolic steroids/ Androgen agonists**

Drugs suspected to be involved in the DDI

Perpetrator

Ritonavir

Daily Dose

200 (mg)

Dose adjustment performed

No

Administration Route

Oral

Start date

June 1, 2009

End date

April 27, 2021

Victim

Anabolic steroids/ Androgen agonists

Daily Dose

20 (mg)

Dose adjustment performed

No

Administration Route

Oral

Start date

End date

April 13, 2021 April 28, 2021

Complete list of drugs taken by the patient

Antiretroviral treatment

Darunavir (with Ritonavir or Cobicistat)
Raltegravir
Tenofovir-DF

Complete list of all comedications taken by the patient, included that involved in the DDI

Ostarine, cetirizine PRN

Clinical case description

Gender

Male

Age

45

eGFR (mL/min)

>60

Liver function impairment

No

Description

This is a case of a heterosexual male patient, living with HIV but with no other comorbidity. He is of black African ethnicity. His diagnosis was made in 2002 at the time of his first HIV test, and he was started on ART for the first time in 2004. His regimen of ART was changed three times due to virological failure prior to the time of this DDI. From June 2009 until the time that this drug interaction was identified he was taking the following regimen of ART; Darunavir 600mg bid, Ritonavir boosting dose 100mg bid, Raltegravir 400mg bid, Tenofovir disoproxil 245mg qd. He was also taking Cetirizine PRN for hay-fever symptoms. He had achieved an undetectable viral load on this regimen, except for a blip in June 2018 and a further blip in November 2019. His CD4+

count remained above 600 throughout the time he was on this medication.
He was found on routine bloods in clinic to have significantly elevated liver enzymes. ALT was raised at 1499U/L, and GGT at 149U/L. EGFR was stable at 71. Prior to the blood tests being reported he had been changed to a new ART regimen in clinic, to simplify his medications. He was converted to DRV/c-FTC-TAF and Dolutegravir on 27.4.2021, the same day the above blood tests were taken. The patient was asked to return to clinic where he disclosed that he had been taking gym supplements. He was taking German Pharma's OSTA Max supplement from 13/4/21 to 28/4/21. This is a supplement containing the second-generation Selective Androgen Receptor Modulator (SARM) Ostarine. This is otherwise known as Enobosarm or MK-2866 and is used in body building to increase lean muscle mass, as an alternative to anabolic steroids. There was no alternative cause of liver enzyme increase found and it was noted that there was a potential interaction with ritonavir. He stopped the use of Ostarine and his liver function tests returned to normal over the following four months without any other intervention.

Clinical Outcome

Toxicity

Drug Interaction Probability Scale (DIPS)

Score

5 - Probable

Editorial Comment

An interesting case, similar to other cases previously reported for this interaction.
Enobosarm, also known as Ostarine or MK-2866, is an investigational nonsteroidal selective androgen receptor modulator (SARM) developed for the treatment of conditions such as muscle wasting and osteoporosis. SARMs, including Enobosarm, can be used by athletes to aid in training and increase endurance and fitness, potentially producing effects similar to anabolic steroids. However, SARMs such as enobosarm, have not been approved for therapeutic use by the FDA.
The interactions between CYP3A4 inhibitors, such as cobicistat, and anabolic steroids have been described, with an increase of the steroid concentrations. However, it has reported less frequently with other gym supplements such as ostarine.
Rare cases of ostarine liver toxicity have been previously published (Bedi H et al. ACG Case Rep J 2021). No reliable information about the metabolic or toxicologic pathways of ostarine or other SARMs is available. Thus, it is impossible to conclude if cobicistat has increased ostarine toxicity in this case, although it is plausible given its high and well-known drug-drug interaction potential, and other previously described cases (see other similar case reported in our database https://www.clinicalcasesddis.com/ddis/285/; https://www.clinicalcasesddis.com/ddis/317/).

University of Liverpool Recommendation

N/A

Personal information from the specialist

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