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Case Report

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Extremely Elevated Levels of CK in a Male Adolescent Caused by Consummation of Dietary Supplement Containing Creatinine

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Abstract

On the occasion of a routine examination including a blood test in a 14 yrs. old adolescent an extremely elevated AST, ALT and CK (300IU) has been seen. In the following 3 days CK level increased to 17.230 IU, CK-MB less than 1%. The boy used a nutrition supplement containing creatine monohydrate (up to 20g/day) and vitamins concomitant to heavy physical activity.

After stopping the intake of this supplement CK-levels decreased dramatically within a few days.

The use of creatine monohydrate supplements should be used only under medical supervision.

Keywords: Creatine Monohydrate; Supplements for Body Builders; Extremely Elevated CK Levels; Normalization of CK After Withdrawal of Creatine Supplement

Introduction

Blood levels of CK (CPK/creatine phosphokinase) are associated with the amount of destruction of myocytes and consequential release of intracellular elements. Normal levels should be expected between 55 and 170 U/l. Elevated levels of CK hence, show an abnormally high destruction of muscle cells.

The use of dietary supplement is getting more and more common among athletes. Expecting an improvement in physical performance it has become popular to consume dietary supplements among different sports. Especially bodybuilders do expect gain of muscles and weight using dietary supplement as creatine monohydrate, with one of well known its major (side-) effects: gain of muscle mass.

In the following case, creatine monohydrate, carbohydrates and vitamins were used as a food supplement and are now accused to have caused or at least to be a cofactor of an enormous elevation of CK-MM.

Case Report

During a routine examination, a 14-year-old boy with extremely elevated ALT, and AST and CK (3000 IU) were seen. In the further check-up, 10 days later a further elevation of CK was measured.

The young patient with an athletic body stated to work out regularly, up to five times a week, and four hours a day. In addition, he took a nutrition supplement containing vitamins and creatinine. He did not report any subjective disorders.

The following three days, an increase of CK up to 17230 U/l occurred, whereby the ratio of CK-MB as less than 1%. The highest measured Myoglobin level was 1728 ng/ml.

The patient developed an infection a few days before the highly elevated levels were measured but did not report about any pain or disorders.

As advised, he stopped his work out and consummation of food supplements, with a dramatic decrease of CK within a few days. He received intravenous fluids and diuretics to protect him from renal failure, whereas he had been discharged with normal CK levels a few days later.

Three weeks before the following check-up the patient had started his work out again, without consuming any supplements. He showed slightly elevated CK levels around 450 U/l, which can be seen as normal according to a higher amount of muscle cell destruction due to his workout.

The pivotal question is, if there is any connection between the consumption of the mentioned supplements and a destruction of muscle cells.

In this case creatine is a main part of the consumed substances. It is often consumed by athletes, usually in amounts of up to 20g daily. Typical side effects are the gain of body mass, muscle cramps, renal and gastrointestinal disorders **[1]**. Several other side effects have been described, but nevertheless the consumption of oral creatine monohydrate is considered to be harmless.

The contents of the three supplements consumed are mentioned in the following table.

Supplement 1	
Contents	per 100g
Protein	30 g
Carbohydrates	64 g
Fat	1 g
Vitamins	
Ascorbic acid	60 mg
Niacin	18 mg
Vitamin E	10 mg
Pantothenic acid	6 mg
Vitamin B6	2 mg
Vitamin B2	1.6 mg
Vitamin B1	1.4 mg
Folic acid	0.2 mg
Biotin	0.15 mg
Vitamin B12	1 mg

Supplement 2	
Contents	per 100g
Carbohydrates	92 g
Of which starch	90 g
Of which lower sugar types	< 0.5 g
Protein	< 0.5 g
Fat	< 0.5 g

Supplement 3	
Contents	per 100 g
Creatine monohydrate	100 g

Discussion

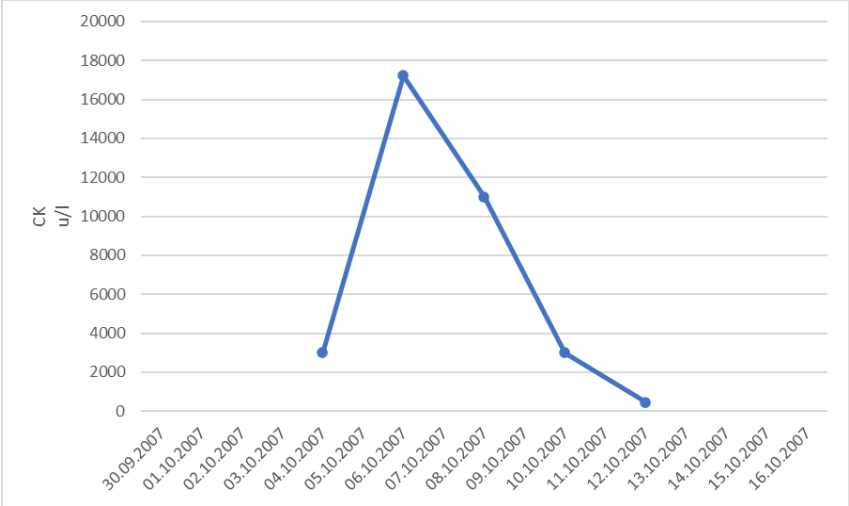
The measured levels of CK in this case have exceeded values that were usually measured, in healthy athletes. Some possible causes are discussed:

CK - levels exceeding 1000 U/l can be caused by muscular dystrophy. Also, the age of 14 years would match a muscular dystrophy type Becker Kiener, but no typical symptoms like difficulties when running or ascending stairs were found in this patient. On top of that, the patient shows an above-average muscular strength.

CK - levels exceeding 3000 U/l up to 157700 U/l were found in sportsmen, especially when they acutely increased their physical activity. Any recent use of alcohol or dietary supplement was denied by these sportsmen **[2]**.

Also, the consumption of wild mushrooms like tricholoma equestre can cause rhabdomyolysis with CK - levels up to 226067 U/l in woman and 34786 U/l in men **[3]**.

There are also reported cases of postinfectional severe rhabdomyolysis possibly associated with a CMV infection **[4]**.



A singular link between his consumption of dietary supplements, work out and highly elevated CK - levels could be found:

After stopping his work out and consumption of dietary supplements, the CK - levels normalized.

When he did his work out without consumption of any supplements his CK- levels were only slightly elevated.

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Thus, it appears that substances containing creatine, which are being primarily consumed to gain muscle mass, are the main cause of the period of extremely elevated levels of transaminases and CK in this case.

Creatine monohydrate can be acquired in „health “stores and in fitness centres without any prescription. Due to the lack of knowledge of ling time effects, creatine monohydrate should only be supplied if strictly indicated and under monitoring of renal/hepatic function and side effects.

Reference

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