

## **Description for the general public**

Betaine was first isolated from beetroot, but it can also be found in a variety of food products. Moreover, it is synthesized in a human body from choline. Betaine plays a vital role in many cellular processes, but its best known function is in homocysteine metabolism. This leads to decreased concentrations of homocysteine in the bloodstream. Elevation of blood homocysteine is associated with increased cardiovascular risk. For this reason keeping low levels of homocysteine may have a favorable effect on health. Animal studies showed that betaine may increase muscle mass and decrease abdominal. This indicates its potential use in athletes, because maintaining low body fat and gaining muscle mass is beneficial in most sports. Moreover, betaine can counteract dehydration. Many premises suggest that betaine supplementation may influence physical capacity. Nevertheless, available literature is inconclusive in this matter. In addition, the exact mechanism of betaine action still remains to be fully understood. Basing on that, this project is aimed at assessing the influence of 3-week supplementation with two different doses of betaine on anaerobic capacity, performance in CrossFit-like test, body composition, and betaine metabolism in a group of male speed-strength athletes.

The participants will be divided into two parallel groups. One group will receive 2.5 g, and the second 5 g betaine daily. Each participant will receive betaine supplement and placebo in a random order. We will assess nutrient intake before and during the study. Before and after each supplementation period, physical tests will be performed, body composition will be measured and blood samples will be taken. Wingate test can assess anaerobic capacity, while muscle endurance can be measured with the *Fight Gone Bad* test, which resembles typical CrossFit training. Body composition will be measured using air displacement plethysmography which uses whole-body densitometry. This will enable the evaluation of fat mass and fat free mass alternations. In blood samples, betaine, amino acid (including homocysteine and methionine) and testosterone concentrations will be measured. Those analyses will describe different effects of betaine on the body. Additionally, we plan to test whether the effects of betaine depend on *MTHFR* gene polymorphism, which plays an important role in homocysteine metabolism. Our project can thus fill the basic knowledge gaps, but has also significant application potential.