Metabolic syndrome is collection of symptoms that include abdominal obesity, high triglycerides in the blood, low levels of high-density lipoproteins (the so called good cholesterol), high fasting glucose levels, and high blood pressure. Metabolic syndrome is a growing health care problem, particularly in developed countries. Postmenopausal women suffer more often from metabolic syndrome than other group of people. It is possible that this is related to hormonal changes occurring in women during that period (mainly a reduction of estrogen levels), but also to the deposition of fat in the waist area (abdominal obesity). In addition, the metabolic syndrome is associated with a higher risk of cardiovascular diseases or fatty liver.

Human metabolism consists of hundreds biochemical reactions. Metabolic syndrome is caused mainly by abnormalities of lipid metabolism. However, different biochemical reaction can often affect each other. There are some evidence suggesting that metabolic syndrome may also be linked to abnormal one-carbon metabolism, which consists of related methionine, homocysteine, folate, and choline pathways. Several chemical compounds involved in one-carbon metabolism are nutrients derived from diet. The source of methionine are eggs, meat, fish, brazil nuts, sesame seeds, and the source of folate are green vegetables, legumes, kiwi, oranges, cereal, while choline can be found mainly in meat products and egg yolks. Abnormal one-carbon metabolism can also be caused by different gene variants (gene polymorphism). Enzymes of high importance for one-carbon metabolism are MTHFR and PEMT. PEMT for example is responsible for synthesis of choline in the body. This process is significantly reduced in postmenopausal women, and for that reason they are more prone to effects of choline deficiency.

The main objective of the project is to answer to the question whether metabolic syndrome causes changes in one-carbon metabolism in postmenopausal women.

We plan to enrol a group of postmenopausal women with and without metabolic syndrome and to compare several parameters in both groups. Several biochemical markers associated with metabolic syndrome will be measured: blood lipids and fasting glucose levels. In addition, food intake assessment will be done by the dietary records method. Anthropometric measurements will include body mass and height measurements, as well as analyses of body composition. Biomarkers of one-carbon metabolism will be analysed: including homocysteine, choline, trimethylamine, trimethylamine oxide, betaine, and folic acid. We will also analyze how polymorphisms of genes encoding enzymes of one-carbon metabolism may affect those parameters.

No studies with the similar aims has been conducted so far. Obtaining the answers to the research questions of this proposal is important for the development of basic knowledge on human metabolism. In particular, on interactions between lipid and the one-carbon metabolism.