Obesity is currently the number one cause of preventable disease, surpassing smoking. More than 230 diseases have been reported to co-exist with obesity, including hypertension, cardiovascular disease, and type 2 diabetes mellitus (T2D). Specifically for T2D, body weight contributes more than age and ethnicity to T2D prevalence, and even modest weight loss improves T2D conditions. However, weight loss is challenging for those with severe obesity. Severe obesity is defined as having a BMI ≥40 kg/m2, corresponding to a body weight of about 125 kg for those with a height of 1.75 m. Often diet and lifestyle changes alone cannot induce long-term weight loss for those with severe obesity. One effective treatment for weight loss is bariatric surgery, which results in long-term weight loss and reverses obesity-related diseases, including T2D. The results are so significant that bariatric surgery is currently recommended for obese diabetic patients by the International Diabetes Federation, the American Diabetes Association, and the American College of Surgeons.

There are different methods for bariatric surgery, with varying complexity and risks. Sleeve gastrectomy (SG) is a newer method with a simpler method and fewer risks than other methods. Nevertheless, SG delivers similar weight loss rates. So since 2016, SG has become the most common method globally, including in Poland. However, SG has lower T2D remission rates. So, identifying patients who can benefit the most from SG is useful for the clinic.

To facilitate patient selection, we aim to develop prediction models using data collected from patients before surgery. The patients were collected from an ongoing longitudinal study (Bialystok Bariatric Surgery Study) that follows patients before and after surgery for up to four years. In addition to clinical data, we will profile microRNAs (miRNAs) from serum samples to identify predictive biomarkers. Since 2016, more than 500 patients joined the study, and up to June 2022, 158 SG patients had T2D before surgery. We have done a pilot study with 44 patients and identified several potential miRNA biomarkers.

For this project, we will expand the sample size by profiling pre-surgery serum miRNAs for an additional 100 patients. So the final sample size will be 144 patients. We will ensure high-quality miRNA data using QC panels and profile miRNA using qPCR panels designed specifically for serum samples. We will also compare machine learning approaches to identify prediction models with the highest accuracy. Additionally, we will expand our pilot study to predict T2D remission beyond 12 months after surgery.

We believe our research will help validate our pilot study to propose potential biomarkers for T2D remission after SG, at 12 months, and for up to four years post-surgery. Our project can also serve as a basis for further research into the role of microRNAs in T2D remission after significant weight loss.