

Gastroesophageal reflux disease (GERD) is the most common esophagus disease. Physiological reflux of gastric content from the stomach into the esophagus occurs in the majority of individuals. When these reflux episodes occur more frequently, it will lead to GERD. Prolonged exposure of the esophagus mucosa to contact with gastric contents and persistent inflammation promotes damage to mucosal cells, resulting in the replacement of squamous epithelium by cylindrical epithelium with the presence of goblet cells (intestinal metaplasia). Such changes are called Barrett's esophagus (BE). Gastroesophageal reflux disease is an established risk factor for BE. BE represents the initial step in the histopathologic progression to the esophageal adenocarcinoma (EAC). The incidence of GERD, BE and EAC has been increasing rapidly in Europe and the US in the last years and incidence of EAC have surpassed esophageal squamous cell carcinoma. In addition, the number of EAC cases recorded in recent years has been increasing more dynamically than other gastrointestinal cancers. Changes in lifestyle, and mainly dietary habits such as a diet high in fat, leading to obesity, have been epidemiologically linked with the development of EAC. Obesity, in particular, abdominal adiposity associated with this an increased release of pro-inflammatory adipokines, have been implicated in the GERD-BE-EAC cascade. Many studies have demonstrated the benefits of physical exercise in several chronic diseases, including cardiovascular and metabolic diseases, and cancer. More importantly, it has been demonstrated that physical activity is also associated with a reduced risk of EAC. Exercise may not only lead to a reduction of abdominal obesity but also could have beneficial action, via a release of anti-inflammatory myokines counteracting the pro-inflammatory and carcinogenic adipokines by taking part in cross-talk between skeletal muscle and adipose tissue. Although epidemiological studies confirm both the critical role of obesity and the release of pro-inflammatory adipokines in the pathogenesis of BE and EAC as well as the protective role of physical activity, the mechanisms of these effects are unknown. There is no experimental research regarding this problem. So far, the role of adipose tissue-muscle cross-talk in the pathogenesis of BE and EAC and potentially protective role of myokines has not been studied. Therefore, the aim of the project is to investigate whether, in experimental conditions, physical activity can have a protective effect and counteract the progression of changes in the esophagus mucosa towards BE and EAC. The research will be conducted using the latest in vitro laboratory techniques on cell lines and specialized in vivo techniques in an experimental animal model to obtain results that will have the best possible impact on the clinical picture of this disease observed in humans. A better understanding of the mechanisms of potentially beneficial effects of physical exercise can be an essential element in establishing the foundations of effective therapy and contribute to improving the quality of life in patients with these diseases.