

Project title: Investigating the anti-cancerous effect of antioxidant extract from spent coffee grounds on the functioning of normal and cancerous skin cells.

Abstract for the general public

Coffee is one of the most popular beverages in the world, with more than 8,000 tons of spent coffee grounds (SCG) generated every day in Europe alone. Nowadays, the problem of waste accumulation is becoming more and more serious, so it is extremely important to test new possibilities for its use and processing. The EcoBean company, a spin-off of the Warsaw University of Technology, is highly involved in the valorization of spent coffee grounds with one of their main products - the antioxidant extract. This project aims to investigate the usage of antioxidant extract obtained from SCG in anti-cancer therapies.

Cancer is one of the leading causes of death worldwide. The skin, as the largest organ of our body, is particularly exposed to dangerous external factors such as ultraviolet radiation, which has been defined as the main cause of skin cancer. The scientific world is constantly searching for compounds that will be effective in anti-cancer therapies, but also as supporters of these therapies. Great hopes are associated with antioxidants, which can neutralize the effects of cellular oxidative stress and reduce the release of dangerous free radicals. The studied extract is rich in polyphenols, flavonoids and caffeine, compounds with high antioxidant properties. As part of this study, the effect of the SCG extract on normal skin cells, melanoma cells at different stages of progression and squamous cell carcinoma will be tested on 2D and 3D models. The cytotoxicity and genotoxicity of the extract, as well as the type of induced cell death, will be determined. In addition, the effect of the extract on gene expression and protein production will be checked by analyzing key markers of the apoptosis process. The conducted research will allow us to gain unique knowledge about the impact of antioxidants contained in spent coffee grounds on skin cells and determine their possible applications in anticancer therapy.