

## Evaluation of bioactive extracts as promising natural chemotherapeutic agents- an *in vitro* approach

Cancer is one of the most leading causes of death worldwide. According to a recent report by the World Health Organization (WHO), the disease accounted for 7.9 million deaths in 2007 and the projection is that this number will increase up to 18 million in 2020. In particular, colorectal cancer is the third most common form of cancer in men (after prostate and lung) and the second in women (after breast). Diet and lifestyle are pointed to be major risk factors for developing this type of cancer.

Epidemiological data suggests that the ingestion of bioactive compounds from fruits and vegetables, such as phytochemicals, may contribute to reduce the incidence of cancer in humans. The mechanisms by which these compounds inhibit tumorigenesis include inhibition of tumour cell mediated protease activity, attenuation of tumour angiogenesis, and induction of cell cycle arrest and promotion of apoptosis. In addition, it has been reported that combining natural compounds with chemotherapeutic drugs is a promising strategy to enhance the inhibition of tumour survival.

The aim of this project is to evaluate the anticancer properties of bioactive extracts in order to develop a promising natural chemotherapeutic agent. The study will be performed using human HT29 colon cancer cells, which is a widely used model for *in vitro* colorectal cancer studies.

In a first approach, the candidate will evaluate the antiproliferative activity of the bioactive extracts on HT29 cell growth using MTT, BrdU and Cy-Quant assays. The effect of incubation time as well as the concentration of the bioproducts will be studied in order to determine the effective dose values.

In an effort to characterize the mechanism of action of the bioactive products, cell cycle analysis and induction of apoptosis in HT29 cells will be carried out by FACs (Flow Cytometry Analysis), and the generation of reactive oxygen species will be monitored using the DCFH fluorimetric assay.

Finally, the anticancer effectiveness of the bioproducts will be compared with drugs such as doxorubicin and 5-fluoracil. Moreover, studies with drug-resistant HT29 cancer cells will be performed in order to evaluate the bioproducts potential in overcoming the main drawback of chemotherapy.