

# **Novel natural and synthetic compounds for treating hormone resistant tumors**

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## **Abstract**

Cancer is a leading cause of mortality worldwide. Despite significant advances in medical research, deaths due to cancer are continuously increase. Data from 2010 has shown the colorectal, breast, prostate and lung cancer as the most common in Portugal. Considering the North Region, prostate cancer and breast cancer are the most incident in men and women, respectively. Despite all the improvement in cancer early detection and treatment, the high mortality rates challenges the discovery of new anticancer agents. In the last years, several team members were involved in the study of the bioactive potential of natural and synthetic compounds at the Health and Environment Research Centre at School of Health of the Polytechnic Institute of Porto (CISA-ESS—P.Porto). From previous works, extracts isolated from plants and synthetic compounds, such as ionic liquids and quinoxalines, revealed an interesting bioactive potential as cancer drug. Following these previous approaches and considering the background of the team members in cancer research, the main goal of this project is to infer about the potential of these natural and synthetic compounds as anti-cancer drugs to common North Portugal cancer hormone-resistant tumors, namely castration-resistant prostate tumors and estrogen-independent breast tumors. To achieve such goal, the project has a multidisciplinary team with knowhow in natural compounds extraction, synthetic chemistry, cell culture, molecular biology, and oncobiology, that will carry out the following strategies: a) production and characterization of natural and synthetic compounds to be tested for anticancer potential by CISA members with experience in natural compounds extraction and compounds synthesis; b) *in vitro* assessment of the anticancer potential in prostate and breast cell lines in order to select the most promising compounds by CISA members with an extensive experience in cell cultures and cytotoxicity screening; c) *in vivo* assessment of the

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anticancer potential of the selected compounds using zebrafish as model. This activity includes a collaboration with consultants with a strong expertise in zebrafish model; d) identification of altered gene expression upon treatment with the selected compounds in order to infer about the molecular mechanism of action underlying their cytotoxic effects on tumor cells; e) ascertain of clinical usefulness of altered gene expression on human which might be used to predict therapeutic response and thus serve as biomarkers for clinical management and therapeutical guidance. For these two last activities, the project has Portuguese Oncology Institute (IPO-Porto) as a partner, due to the strong expertise in cancer, namely in PCa and BCa. With this approach, we expect to identify new anti-tumor compounds targeting the most common and incident tumors in the North Region of Portugal.

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## **Keywords**

Breast cancer, Prostate cancer, Ionic liquids, Quinoxalines, *Taraxacum hispanicum*

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