Evaluating the effect of the Ionic liquid [C16Pyr] [Amp] in hormone-resistant tumors using an *in vivo* zebrafish assay

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Abstract

The NASYTHOR project, aimes to study the potential of novel natural and synthetic compounds as anti-cancer drugs on hormone-resistant tumors. One of the objectives is the evaluation of the *in vivo* efficacy of the anticancer activity of the compounds using *Danio rerio,* zebrafish embryo as a model. In this work we describe the general methodology, advantages and disadvantages. Among a large range of advantages in the use of zebrafish in cancer research, the high level of genetic and physiologic homology with humans, including brain, digestive tract, musculature and vasculature can be highlighted. Also, the immature immune system of the embryos favors xenotransplantation of human cancer cells, and makes these animals a promising experimental model to tumorigenesis, angiogenesis, invasion and metastasis. The ionic liquid cetylpyridinium ampicillin [C16Pyr] [Amp] induces cytotoxicity in hormone-resistant breast and prostate cancer cell lines. To study the possible use of [C16Pyr] [Amp] as an anticancer, the toxicity towards zebrafish embryos should be evaluated first by an acute toxic assay that should be carried out following the OECD 236 Guideline. The test should include increasing concentrations of [C16Pyr] [Amp], selected within those required for an antitumor effect, that should be determined previously. A control treatment and a treatment with K2Cr2O7 as a positive control should also be used. Following the acute assay with the fish embryos, and considering the toxicity results obtained, studies should proceed to evaluate the potential inhibitory effect of the [C16Pyr] [Amp] on breast and prostate cells injected in the perivitellin space of zebrafish. Culture prostate and breast line cells, selected for their sensitivity to [C16Pyr] [Amp] should be harvested and prepared for microinjection. Zebrafish fertilized eggs should be incubated for 48-72h in fish water, collected and dechorionated.

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Anesthetized embryos should be injected with the same cell number. After confirmation of the microinjection success, embryos will be transferred and incubated in [C16Pyr] [Amp] treatments prepared with fish water and previous selected [C16Pyr] [Amp] anti-tumor effective concentrations. With this work we intend to contribute to the development of cancer research, increasing the knowledge of the process of prostate and breast hormone-resistant tumor cells development in the living zebrafish embryo model.

Keywords

Ionic liquids, hormone resistant tumors, zebrafish model

Acknowledgements. This research is a result of the project NORTE-01-0145-FEDER-024156, supported by Norte Portugal Regional Operational Programme (NORTE 2020), under the PORTUGAL 2020 Partnership Agreement, through the European Regional Development Fund (ERDF) and by the Foundation for Science and Technology (FCT).