User project report

Zebrafish embryo as a novel model to evaluate the efficacy of short range emitters used for targeted radionuclide therapy

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1. Authors

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2. Context of the project (800 characters max. including spaces)

To develop relevant model to correctly evaluate the efficacy of targeted radionuclide therapy using short- and long-range therapeutic emitters

3. Results and discussion (1000 characters max. including spaces)

Spheroids of increasing sizes were build using PC3 cell line. Irradiation of the spheroids with the radiolabeled gastrin-releasing peptide antagonist RM2, [^{177}Lu]Lu-RM2 and [^{161}Tb]Tb-RM2, showed higher efficacy in small size spheroids (500 cells). A plateau corresponding to the R90 was reached when the size increases.

Regarding zebrafish embryos, there were also implanted with PC3 cells (several cell lines have been tested regarding there ability to disseminate in vivo) and irradiated with [^{177}Lu]Lu-RM2 and [^{161}Tb]Tb-RM2. [^{161}Tb]Tb-RM2 showed greater efficacy at irradiating small metastases than [^{177}Lu]Lu-RM2.

4. Conclusions (800 characters max. including spaces)

Spheroids and zebrafish embryos are relevant models to better evaluate the efficacy of targeted radionuclide therapy

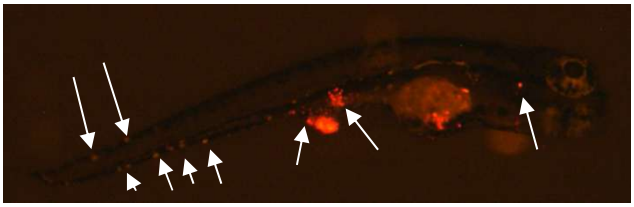

Figure 1. An example of zebrafish embryos implanted with PC3-cells. White arrows show multiple metastasis that have developed in vivo after engraftment

5. Involvement of the PRISMAP services (600 characters max. including spaces)

^{155}Tb was produced at PSI

^{161}Tb was produced at SCK-CEN

6. Feedback to PRISMAP (600 characters max. including spaces)

Issues in ^{155}Tb delivery from PSI due to customs. The parcel has been retained for several days. Radiolabeling at low activity (5MBq) worked but the use of higher activity (150MBq) was not successful presumably due to

the accumulation of non-radioactive metals. Thus; it was not possible to discriminate the efficacy of conversion or Auger electrons from ^{161}Tb compared to ^{177}Lu

7. Publications and other dissemination activities (conferences etc.)

Spheroids as promising models to investigate peptide based targeted radionuclide therapy. EANM 2024.
The use of zebrafish embryos to advance preclinical research in nuclear medicine. EANM 2023

Funding for a prospective monocentric clinical trial using zebrafish embryos in the patient workflow was obtained in 2024. First enrolment is schedule in Jan-26

Appendix 1. Dissemination guidelines for user projects as agreed in the signed User Agreement

Dissemination rules

Only user groups that are allowed to disseminate the results which they have generated under the project may benefit from the access, unless they are working for SMEs.

For each user group project, a publishable project summary and a publishable summary of the results will be published on the European Union Horizon 2020 PRISMAP project website www.prismap.eu. The publication of results in journals or at conferences is strongly encouraged.

To ensure the long-term sustainability of the PRISMAP initiative, proper recognition of the contributing facilities, their services and the involved persons is necessary. All participating PRISMAP facilities shall be acknowledged in the publication. Acknowledgement and co-authorship of PRISMAP staff members who participated in the experiment shall be considered according to the research field best practices and verified with the PRISMAP Technical Manager before any publication.

The user group shall contact the PRISMAP Technical Manager 30 days prior to submission of publications or other communications of results that were obtained by making use of services provided by PRISMAP (radionuclides delivered or medical services provided). The Technical Manager will communicate to the user group the list of PRISMAP facilities and persons that have contributed to each specific project and the way this contribution must be acknowledged in the publication/communication or where co-authorship is required to reflect specific scientific contributions.

Users must comply with Horizon 2020 dissemination rules (i.e. acknowledge that their work was financially supported by the European Union's Horizon 2020 Research and Innovation Programme by including the following acknowledgement: "This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101008571 (PRISMAP)"), and grant open access to resulting publications and related data.

Dissemination shall take place only once legitimate interests regarding intellectual property have been safeguarded. A maximum publication delay of 90 days may be granted for this purpose.

Acknowledgements

The list of name(s) to be mentioned in the acknowledgment section is sent to the technical manager by the main contact of the involved facilities.

A general sentence will be added by the corresponding author of the article (user side):

"The authors would like to thank the members of the PRISMAP consortium and of the PRISMAP user selection panel, coordination and management team for their advice and support."

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