



Novel brachytherapy source Elastin-like polypeptide (ELP): determining diffusion within mice tumor model

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INTRODUCTION

An elastin-like polypeptide (ELP) labeled with iodine-131 has been demonstrated to deliver curative radiation dose to xenografted tumor in mice via an injection to center of a solid tumor. The ELP conjugate is soluble below body temperature and undergoes a thermally triggered phase transition to become an insoluble coacervate at body temperature, allowing I-131 to deliver localized radiation dose to tumor.

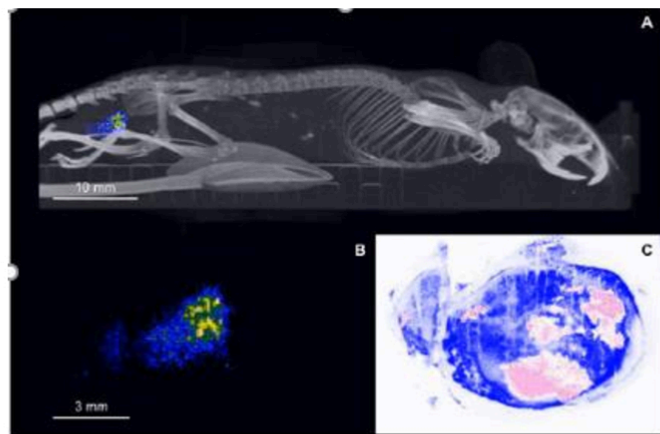
AIM

This work is to quantify distribution of the radioactivity for the purpose of radiation dose calculation.

METHOD

SPECT IMAGING WITH I-125

ELP is labelled with the X-ray emitter I-125, instead of the beta emitter I-131, for SPECT imaging.



One example of SPECT image of the mice tumor model labelled with I-125.

METHOD

DIRECT MEASUREMENT OF ABSOLUTE ACTIVITY

With normalization of total injected activity, SPECT imaging would have allowed determining distribution of absolute activity all over the tumor if not for saturation in the center portion of the tumor on the preliminary SPECT images. However, SPECT imaging alone cannot resolve how much activity is included in the saturation.

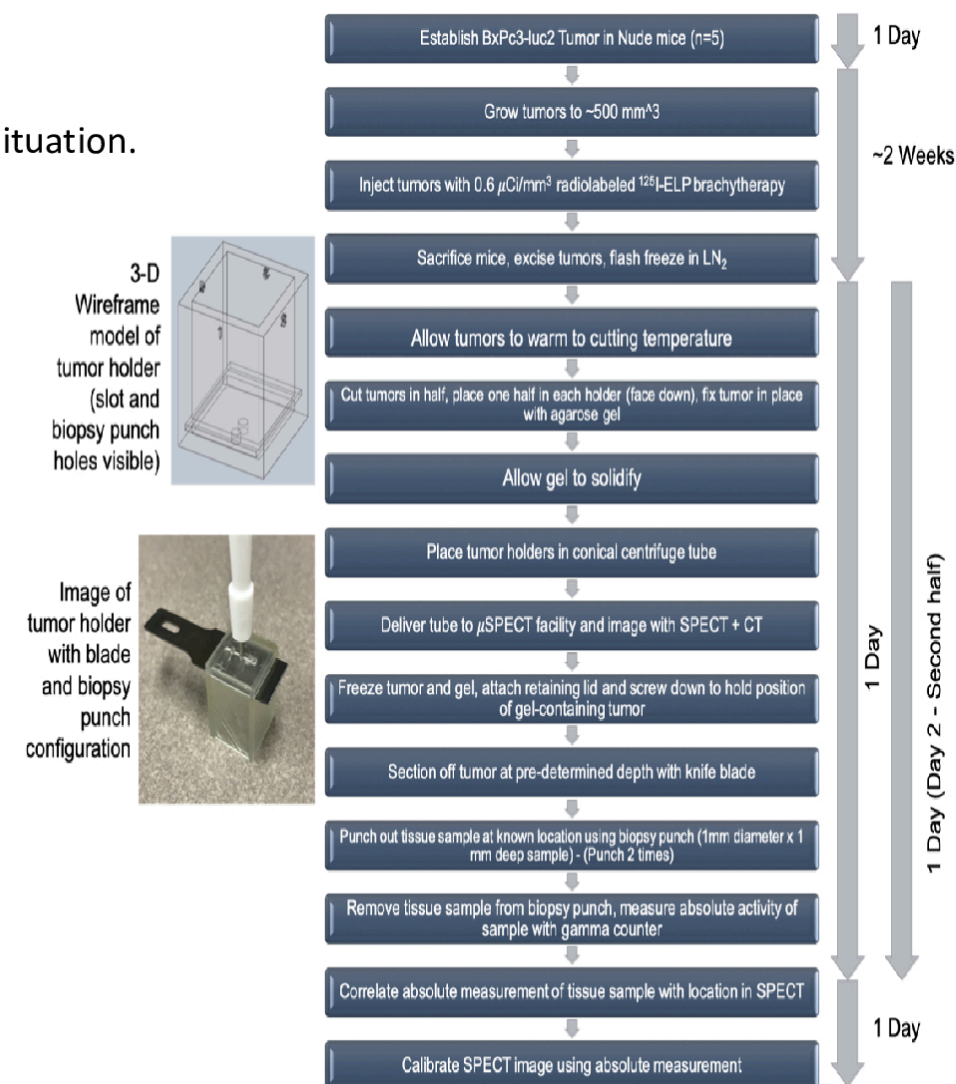
A direct measurement of the absolute activity within the tumor is needed to **calibrate the SPECT intensity to I-125 activity**. To achieve this goal, a few samples are to be taken out from within the tumor model and measured with a gamma counter radioactivity meter.

WORKFLOW

The workflow has been adapted to the COVID-19 pandemic situation.

- Procure and grow tumor in 5 mice,
- ELP (labeled with I-125) injection to tumor,
- allowing for 24 hours for ELP to stabilize in tumor,
- Sacrifice mice, excise tumor
- place in a 3D printed plastic holder and encased in agarose,
- SPECT imaged as a whole volume
- biopsied at multiple locations
- Measure I-125 activity in Gamma Counter,

Measurement of Absolute Activity in an ELP Brachytherapy-Treated Tumor



CONCLUSIONS

With SPECT image intensity correlated with measured absolute activity, dose modelling will be feasible and useful for planning ELP based brachytherapy for future studies.

ACKNOWLEDGEMENTS

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