

7-2015-3177 | Targeting and Imaging of Long-non-coding-Oncogenic-RNA by In-situ Imaging of micro-metastases

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Background

- Fluorescence guided surgery is currently clinically approved for non-specific fluorescent molecules (ICG and MB) and is therefore limited in terms of sensitivity and specificity.
- Most cancer targeted fluorescent molecules in clinical development are based on systemic delivery of these agents prior to the operation.
- To the best of our knowledge, none of these molecular probes target specific RNA biomarkers that are over-expressed in cancer.

Our Innovation

A novel targeting and Imaging of RNA-based Oncogenic markers in human tissues: We have designed a FIT-PNA with a red-emitting fluorophore (BisQ) that targets an oncogenic lncRNA (long non-coding RNA) termed CCAT1. CCAT1 was discovered by Aviram Nissan, along with his colleagues, and is found to be highly expressed in a variety of cancers (colon, gastric, hepatic, breast, etc...). We discovered that CCAT1 FIT-PNA can detect this biomarker in fresh human tissue taken directly after cytoreductive surgery. The signal is bright and is obtained within 1-2 minutes after spraying the tissue with CCAT1 FIT-PNA .

Applications for use:

Provided that the technology is safe in humans (which is still unknown) such FIT-PNAs may provide a novel platform for fluorescence guided surgery for a variety of indications including: HIPEC surgery, brain tumor surgery, breast cancer resection, and colonoscopy.

Highlights

- FIT-PNAs (forced intercalation- peptide nucleic acids) are DNA mimics that fluoresce only after hybridization to their RNA biomarker target.
- FIT-PNAs are cell permeable and highly stable.
- If designed properly, FIT-PNAs can detect a point mutation in RNA (in living cells).

Key Features

- Any RNA biomarker may be designed and targeted by FIT-PNA.
- The fluorescent readout is bright, allowing an improved detection of less abundant RNA biomarkers.
- PNAs are stable in biological medium and have been shown to be well tolerated in animals after systemic administration.
- FIT-PNAs may be sprayed on the tissue (during surgery) and not given systemically. This provides an easier regulatory route for clinical development.

Development Milestones

Seeking funding for ongoing research and industrial collaboration, especially for the development of such FIT-PNAs for (1) fluorescence guided surgery and (2) fluorescence guided colonoscopy. Milestones include (1) toxicology study; (2) designing other FIT-PNAs for various RNA biomarkers; (3) extending the fluorescence to the Near IR.

Patent Status

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