Project

You will join an exciting team to develop an intraoperative imaging platform (*PRECISION: Prostate Resection EnhanCed vIa ultraSensitive Intraoperative Optical Navigation*) integrated into surgical instrumentation, capable of real-time microscopic margin and nodal imaging during prostate cancer resection.

In surgery for high-risk prostate cancer it is imperative that all cancer is removed (obtaining clean margins) to receive optimal results, preventing cancer recurrence. Rapid, intraoperative imaging of microscopic residual disease (MRD) remains an important, yet elusive, goal due to the inherent physical limits of optical probes and their requisite imagers. Our platform places the functionality of highly-sensitive fluorescence microscopes into an ultra-thin, planar form-factor, readily integrated into a wide array of surgical tools. We develop an intraoperative versatile laparoscopic probe, achieving previously unattainable speed and sensitivity for molecular imaging.

PRECISION will improve the outcomes of prostate cancer surgery for tumors that are challenging to resect and identify nodal involvement far beyond the sensitivity of current imaging. This platform uses high specificity fluorescently-tagged antibodies coupled with a microfabricated fluorescence imaging platform – just 300 microns thin – directly embedded onto the surface of surgical probes, transforming them into real-time, near single-cell, molecular imagers of tissue. This builds on our custom platform for a microscopic imager, and more in depth information can be found in these references: (1–4)

Expectations:

1. As part of this role, you will develop an intraoperative imaging probe for microscopic and nodal disease building on a platform of chip-scale images. The team is composed of an interdisciplinary group of world renowned prostate cancer surgeons (Matthew Cooperberg) and prostate pathologist (Brad Stohr). You will custom design the ASIC/imager sensor and, to the extent you wish, be involved in the launch of a clinical trial in prostate cancer.

Skills/Tasks

1. The project will include custom integrated circuit design of advanced imagers.
2. Packaging of the final imager so it is compatible with robotic surgical applications.
3. The project will include further development and integration of optical filter technology similar to our approach in (3)
4. We work in a multidisciplinary team to validate the platform in mouse models of prostate cancer.

Experience

1. Significant experience in integrated circuit design. Experience with optical sensors/imagers is preferred. Ability to design low-noise analog circuits, and analog to digital converters is needed.

Laboratory

1. The laboratory is housed within the UC Berkeley EECS Department, and full testing equipment, along with similar and design software is available. You will work with a world class team of circuit designers.

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    a. NIH Trailblazer Award, R21EB027238
    b. NIH New Innovator Award, DP2DE030713

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