



CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP120094

Project Title:
Turn ON the Tumor Contrast for Surgical Resection of Head and Neck
Cancers

Award Mechanism:
Individual Investigator

Principal Investigator:
Gao, Jinming

Entity:
The University of Texas Southwestern Medical Center

Lay Summary:

Optical visualization of tumor margins remains as the greatest challenge for complete resection of head and neck cancers. This application will focus on the development of a new paradigm of activatable ON/OFF fluorescent nanoprobe to illuminate tumor tissues or local metastasis for accurate resection of head and neck tumors. Under normal physiological conditions (e.g. during blood circulation or inside normal tissue environment), these nanoprobe will stay in the "OFF" state with minimal fluorescence. Upon targeting the tumor stroma or head and neck cancer cells, these nanoprobe will be turned "ON" to produce highly fluorescent signals. Compared to conventional always ON imaging probes, these activatable nanoprobe have several advantages. First, it minimizes the background signal, which should greatly reduce the chance of false positive diagnosis in non-cancerous tissues. Second, the nanoparticle design allows for a non-linear amplification strategy to turn ON the fluorescence intensity in response to patho-physiological signals (e.g. over-expressed cell surface receptors). Third, the ultra-pH responsive (ON/OFF switch < 0.25 pH) and fast temporal response (<5 ms) of the nanoprobe will be essential to improve the efficiency of fluorescence generation inside tumor tissues. The current nanoprobe platform is adaptable to different fluorescent molecules to generate a set of multi-colored nanoprobe with different targeting ligands to different cancer biomarkers. Co-administration of several nanoprobe may further improve the accuracy of cancer diagnosis. Ultimately, precise delineation of tumor margins and accurate detection of viable cancer cells will be immensely useful for assisting the surgical oncologists in achieving a complete resection of head and neck tumors with greatly improved patient survival.