



## CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:  
RP140140

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

Award Mechanism:  
Individual Investigator

Principal Investigator:  
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Entity:  
The University of Texas Southwestern Medical Center

### Lay Summary:

Optical visualization of tumor margins and at risk lymph nodes 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 nanoprobes 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 nanoprobes will stay in the off state with minimal fluorescence. Upon reaching the tumor tissues, these nanoprobes will be turned "on" to produce highly fluorescent signals. Compared to conventional always-on imaging probes, these activatable nanoprobes have several advantages. First, it minimizes the background signal, which should greatly reduce the change of false positives 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. Third, the ultra-pH responsive sensitivity (on/off switch = 0.15 pH) and fast temporal response (<5 millisecond) of the nanoprobes are able to improve efficiency of fluorescence generation inside tumor tissues. Ultimately, precise delineation of tumor margins and identification of nodal metastasis will be useful for assisting the surgical oncologists in achieving a complete resection of head and neck tumors with improved patient survival.