CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP120941

Project Title:
NIR fluorescence imaging for assessment of lymphatics in cancer treatment and recovery

Award Mechanism:
Bridging the Gap: Early Translational Research Awards

Principal Investigator:
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Entity:
The University of Texas Health Science Center at Houston

Lay Summary:

The lymphatic system is an often overlooked secondary circulation system. The lymphatics are known as the major route for various cancers to spread from the primary disease site to nearby lymph nodes and distant organs. Therefore, the lymphatics frequently are involved in the cancer diagnosis and treatment procedures, and are damaged during the procedures. Lymphedema (LE), a chronic and incurable condition of lymph transport dysfunction that causes swelling and disfigurement, is a common complication after cancer treatment due to the damage to lymphatics. However, the involvement of lymphatics in cancer progression and the cause of LE are not well understood due to the lack of technologies to assess lymphatics.

Recently, we developed and translated a new imaging technique using near-infrared fluorescence (NIRF) to visualize lymphatic structure and function. It allows us to assess the lymphatic function in normal and lymphedematous limbs in human. Also through a single-patient compassionate case study, the complex lymphatics in head and neck (HN) was imaged in a person with HN LE developed after HN cancer treatment. From this compassionate use case, we gained new understandings of the HN lymphatics. However, new questions in HN lymphatics were also raised due to the unexpected findings that contradicted what are traditionally believed. In this proposed study, we will use the NIRF imaging technique to assess lymphatics before and after cancer treatment in HN cancer patients who have a >50% chance for developing HN LE.

If successful, we will gain greater understanding of (i) the involvement of lymphatic in cancer progression, (ii) the effect upon lymphatics by cancer treatment, and (iii) the reorganization of lymphatics after cancer treatment and the progression of LE. New knowledge of the role of the lymphatics in cancer progression and treatment as well as progression of lymphatic dysfunction will translate to better cancer management and survivorship.