

## American Cancer Society – Institutional Research Grants 2015

“Restriction Spectrum Imaging for Pre-surgical Assessment of Neoadjuvant Treatment Response in Rectal Cancer”

Daniel Simpson, MD

**Background:** Trimodality therapy with neoadjuvant chemoradiation is currently the standard of care for locally advanced rectal cancer, but there is emerging evidence that a “wait and watch” approach may allow select patients with a good response to neoadjuvant therapy to avoid the morbidity of radical surgical resection. Current techniques for assessing treatment response before surgery provide relatively poor concordance with pathologic specimens. Restriction spectrum imaging (RSI) offers several potential advantages over traditional imaging techniques that may improve the diagnostic accuracy of presurgical assessment of treatment response.

**Objective:** The purpose of this study is to evaluate for tumor response following neoadjuvant chemoradiation using our novel RSI technique and correlate with pathologic specimens following surgery.

**Specific Aim 1:** Use RSI-MRI to examine chemoradiation-induced changes within pre-specified regions of interest (ROI) within rectal primary tumors and lymph nodes. We will measure the mean RSI cellularity index within these regions to determine if there are detectable changes between pre- and post-treatment images.

**Specific Aim 2:** Determine the association between radiographic response by RSI and pathologic response. We will measure pre-surgical cellularity index within pre-specified ROIs and correlate these with matched histopathologic regions within the excised tumor specimen.

**Study Design:** We propose a novel, translational study to prospectively examine 30 patients undergoing neoadjuvant chemoradiation to the pelvis followed by total mesorectal excision for locoregionally advanced rectal cancer using our advanced diffusion MRI technique (restriction spectrum imaging, RSI), to measure tumor cellularity using RSI scan before and 6 weeks after the completion of chemoradiation and correlate pre-surgical images with pathologic tumor response.

**Cancer Relevance:** The proposed project is a novel translational study to analyze tumor response to neoadjuvant chemoradiation. The data acquired through this study will improve our understanding of radiologic tumor treatment response and provide an image-based approach for determining which patients would be optimal candidates for rectal sparing treatment. Thus, this clinically relevant, highly translational study has the potential to transform the management of rectal cancer.