Bankhead-Coley Cancer Research Program

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Radiation Oncology
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Florida Research Challenge
(2-year project)

Project Title: Genomic and Dosimetric Determinants of Radiotherapy Outcome in Prostate Cancer

Project Summary: The implementation of novel radiation treatment modalities, such as Intensity Modulated Radiotherapy (IMRT) contributed significantly to reducing toxicity of prostate cancer treatment. However, rectal and urinary side effects, sexual dysfunction, and diminution in quality of life are still quite substantial. We hypothesize that these effects are predominantly a consequence of genetic predisposition and amount of radiation received by the normal tissues. The integration of genomic and dosimetric information in this study will facilitate the development of models that better predict complication risk and consequently quality of life. We plan to analyze Single nucleotide polymorphisms (SNPs) in the DNA-extracted from blood lymphocytes in a unique group of prostate cancer patients treated in a Phase III trial (n=303). The distribution of the received radiation dose and the SNP data will be related to the side effects measured in terms of rectal and bladder toxicity, erectile dysfunction, and quality of life. Building an effective clinical risk model would help physicians identify patients who are either relatively sensitive to radiation (making a case for dose de-escalation or modality modifications) or are resistant to radiation damage (allowing for safe dose escalation). The minimization of the side effects and the maximization of treatment efficacy will bring us much closer to the paradigm of optimizing individualized care.