P17 Alternative optical techniques for assessing the aggressiveness of prostate cancer

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Introduction & Objectives: Our objective was to create an infrared imaging technique to assess the aggressiveness of prostate cancer. This study built upon our earlier research, which examined the differences in infrared images between prostate tumors and non-cancerous tissue.

Materials & Methods: After radical prostatectomy formalin-fixed paraffin-embedded tissues (FPE) were prepared and each was placed in numbered containers. Subsequently, slices are cut from the FPE for microscopic analysis and mounted on glass slides (SMG) following a standard processing procedure. It is clear that FPE and SMG are complementary, as they reflect the same localized cancer distributions. First, all SMG were examined under a microscope. Next, we identified areas on the FPE that precisely matched specific sites on the corresponding SMG. This allowed us to determine the aggressiveness of particular regions on the FPE. The FPE sample was positioned between the infrared light source and the CCD camera. When the infrared (IR) light passes through the tissue, it emerges with information regarding its inhomogeneity. We examined the IR images of the FPE samples using our custom software.

Results: In the images, cancerous regions appear significantly darker compared to non-cancerous areas. The software calculated the ratio of the average brightness (RAB) of the malignant area to that of the healthy area.

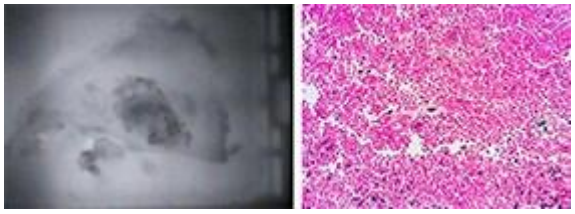

Figure. IR and histo-morphological image of FPE and its SMG. After analyzing 32 cases for each level of aggressiveness, the software determined the interval for RABs with a 95% probability for each level of aggressiveness. RAB range for low-risk prostate cancer falls within 6.8 and 7.2, in intermediate-risk cases- between 5.2 and 6.1. For high-aggressiveness prostate cancer, the RAB interval lies within 4.4 and 5.0. These intervals do not overlap.

Conclusions: This imaging technique is particularly reliable for visualizing cancerous formations that are highly aggressive. As a result, it enables targeted biopsies, reduces the number of biopsy sites needed, and enhances the accuracy of tissue sampling. The IR method can serve as an alternative approach to assess the aggressiveness of prostate cancer both prior to surgery and following radical prostatectomy. The goal of studying postoperative aggressiveness is to pinpoint areas with increased aggressiveness.

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