

Transillumiantion imaging of the isolated prostate in polarized infrared light as cancer diagnosis preface

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Background: Despite the tremendous advances in the diagnosis, a prostate cancer remains as a second cause of cancer death in men worldwide. The drawback of the existent imaging method is that they cannot detect prostate carcinoma at the early stage of development. Besides, the methods are partially invasive. This circumstance resulted in searching of simple, non-invasive method for the detection of prostate cancer. In our earlier investigations, we have shown that near infrared radiation (NIR) penetrates biological tissues and particularly prostate tissue. In the present work we show that NIR can be used for the visualization of cancer outgrowth in the prostate *in vitro*.
Methods: Experiments were carried out on the prostates derived from the radical prostatectomy. Infrared light emitting diodes (850-920 nm) were utilized for transillumintion of prostates. Polarized NIR was captured by a charge coupled device (CCD) camera after passing the prostate. Prostate infrared images were visualized by a computer, coupled with CCD camera.
Results: Experiments show that the optical density of cancerous and healthy prostate tissues differs from each other. Thereby, NIR penetrates healthy tissue readily than malignant one. Consequently, cancerous outgrowths are seemed as the dark spots on the bright background in a NIR transillumiantion images. Polarized IR light enhances transillumiantion images quality. In the figure 1 is shown transillumiation images of one of prostates.

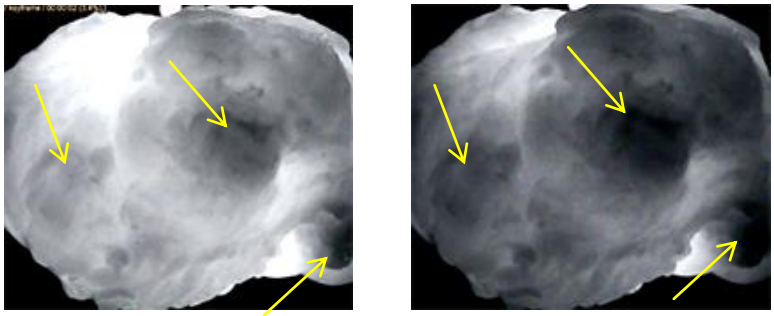


Figure 1. Infrared image of cancerous prostate: left-in non-polarized light. Right- in polarized light. Cancerous outgrowths appears as dark sops and are shown by arrows.

Prostates were investigated with standard histomprphological methods after NIR investigation. Results of infrared and histomprphological investigations, concerning the cancer location, were compared. The comparisons show the coincidence of both findings in all cases. Developed software measures the ratios of brightness intensities of malignant and healthy tissues of prostate in the NIR transillumiantion images. Based on statistically reliable number of experimental data, software calculates so called "confidence intervals" for the data. This gives opportunity to determine malignancy of any new unknown prostate with 95% probability.
Conclusions: Method of prostate cancer outgrowth NIR detection might be used in future for prostate cancer visualization and diagnosis *in vivo*.
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Biography: Besarion Partsvania has completed his PhD at the age of 28 years from Tbilisi State University and postdoctoral studies from Georgian Technical University. He is the head of bio-cybernetic dep. of the Georgian technical University. He has published more than 85 papers in reputed journals.