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### Possibility of using near infrared irradiation for prostate cancer imaging

Modern methods for prostate cancer diagnosis are: Measurement of the Prostate-Specific Antigen (PSA) - The major drawback of this method is its relative lack of specificity. Increase of PSA may also be caused by benign prostatic hyperplasia, inflammatory process, trauma, etc.; Digital Rectal Examination (DRE) - The drawback of this method is that it requires extremely high skills from the physician and depends on subjective perception; and Trans-Rectal Ultrasound (TRUS) - It is impossible to reliably differentiate these lesions from prostate cancer based on ultrasonographic characteristics alone. The biopsy complications include: Painful infection, bloody semen, inability to urinate and bleeding rectum; besides biopsy correlates with the risk of disease extension and cancer progression. The existing methods of prostate cancer imaging are: Magnetic Resonance Imaging (MRI), Computed Tomography (CT) and Positron Emission Tomography (PET). Imaging methods are highly complicated and could not be used widely in clinics. In addition, these methods are partially invasive. This circumstance resulted in searching of a more simple, non-invasive and inexpensive method for the detection of prostate cancer. On the other hand, infrared radiation penetrates biological tissue. In the present work, we show that near-infrared radiation can be used for visualization and diagnosis of cancer outgrowth in the prostate in vitro. Experiments were carried out on the prostates derived from radical prostatectomy. After this operation, a prostate was examined by use of infrared rays. Light emitting diodes (LED) (850-920 nm) were used. For obtaining of the prostate infrared images, a computer coupled charge-coupled device (CCD camera) was used. Developed software gives opportunity to measure brightness of intensities corresponding to malignant and healthy tissues and calculate their ratios. Software calculates confidence intervals of these ratios for malignant and healthy tissues. After investigation in infrared light, prostate is investigated with standard histomorphological methods for detecting cancer location. Experiments have shown that infrared light differently penetrates malignant and healthy tissues of prostate: Optical density of malignant tissue is much higher than optical density of healthy tissue. Therefore, the cancerous formation is seen as a dark area on the bright background in the infrared image. Locations of cancerous outgrowths determined with standard histomorphological investigations entirely coincides with cancerous locations determined by infrared investigation.

### Biography

Besarion Partsvania has completed his PhD at Tbilisi State University, Georgia. He is the Head of Biocybernetic department at Georgian Technical University. He has published more than 85 papers in reputed journals.

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