P002 Near infrared light in prostate cancer diagnosis

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Introduction & Objectives: Despite 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 cancer 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) can be used for the visualization of cancer outgrowth in the prostate in vitro. On the other hand, recent investigations show that circular polarization light can persist better its polarization property during propagating through turbid media compared with the linear polarization light. Using circularly polarized light improves the quality of image recovery in dense turbid media. It is obvious, that prostate tissue represents turbid media. In present work we show that utilization of circular polarized infrared light enhances cancerous prostate IR images.

Materials & Methods: Experiments were carried out on the prostates derived from the radical prostatectomy. Infrared light emitting diodes (LED) (850-920 nm) were utilized for transillumintion of prostates. Polarize filters for circular polarization working in NIR region was utilized for polarization. Circular 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. After NIR investigation prostates were investigated with standard histomorphological methods.

Results: Experiments show that the optical density of cancerous and healthy prostate tissues in circularly polarized IR light significantly differs from each other. Polarized IR light enhances transillumiantion images quality-i.e. enhances contrast and depth resolution in polarization imaging using circularly polarized light. Cancerous outgrowths are seemed as the dark areas on the bright background in a NIR transillumiantion images. Results of infrared and histomprphological investigations, concerning the cancer location, were compared. The comparisons show the coincidence of both findings in all cases.

Conclusions: Method of circularly polarized IR light might be used in future for prostate cancer visualization and diagnosis in vivo.