

CAN NEAR-INFRARED SPECTROSCOPY EVALUATE LOW URINARY TRACT SYMPTOMS IN BENIGN PROSTATE HYPERPLASIA: MODEL FOUNDATION

Hypothesis / aims of study

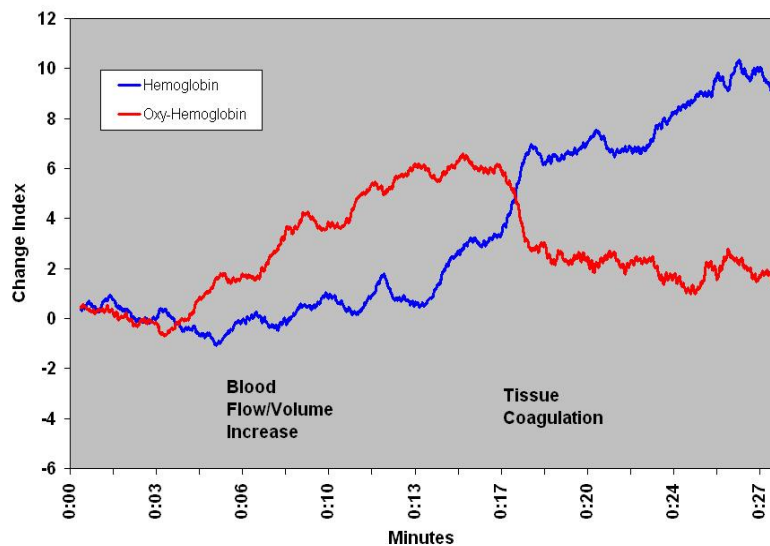
To explore the possibility of applying near-infrared spectroscopy (NIRS) for the evaluation of low urinary tract symptoms (LUTs) in benign prostate hyperplasia (BPH) model. By using transurethral microwave thermotherapy (TUMT) to verify the modeling foundation.

Study design, materials and methods

Prostates 18 ~ 42 g in 13 male Beagle dog (3 ~ 8 years old, weighting 15 ~ 20 Kg) were monitored with UroDynamix NIRS Transducers placed transrectally during transurethral microwave treatment using a Prolieve Thermodilatation System at 15 ~ 50 W. Laser diodes at three wavelengths sequentially emitted energy into the prostate through fiberoptics. Receivers placed at distances from the emitter allowed monitoring of various depths and volumes of tissue. Custom computer algorithms evaluated laser reflections for changes in oxygenation. A real time graphical display was used to indicate changes in blood volume/flow and tissue coagulation at various depths in the prostate.

Results

An initial rise in both Hb and HbO₂ reflective of vasodilation was seen followed by a drop in HbO₂ within 3 ~ 7 minutes as microwave power was ramped up. Continued increases in Hb were then recorded, likely indicating metabolic demand during tissue heating. A precipitous drop in one or both signals were seen within 12 ~ 32 minutes as thermal coagulation progressed, reflecting a rapid reduction of blood volume/flow and/or thermal degradation of the hemoglobin protein in the monitored volume. Histological evaluation correlated thermal coagulation necrosis with the location of NIRS monitored tissue volumes.



Interpretation

In this study, we observed changes in prostate blood volume/flow changes. Our model can verify those correlation changes.

Concluding message

Non-invasive NIRS appears applicable in the evaluation of prostate tissue condition on BPH model by expressing the alterations in the regional tissue hemodynamics during thermal therapies. NIRS could provide urologists with new methods of physiologic diagnostic evaluation on LUTs.

and histological condition with dynamic real-time condition of the LUTs by monitoring

Specify source of funding or grant	National Technology R&G Program
Is this a clinical trial?	No
What were the subjects in the study?	ANIMAL
Were guidelines for care and use of laboratory animals followed or ethical committee approval obtained?	Yes
Name of ethics committee	ethics committee of Capital Medical University