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## **CORRELATION OF ISOTHERMS WITH ISODOSES FOR PATIENTS WITH BREAST CANCER TREATED BY RADIOTHERAPY – FIRST STUDY**

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Thermal imaging is a non-invasive method that can be used in diagnostics due to it measures infrared radiation released from patient's body. Infrared radiation is directly related to metabolic activity of the imaged tissue. Moreover most tumors have bigger metabolic activity compared to surrounding healthy tissues. Therefore, the cancerous tissue emits more infrared radiation than its vicinity what can be clearly seen and evaluated from thermal image. The basic diagnosis in breast cancer screening is mammography and ultrasound examination. However noninvasive technique that can bring similar or additional information for physician is still needed. The possibility of observing the effects of radiotherapeutic treatment with the use of various non-invasive techniques, including infrared thermography, is particularly interesting.

That is why this studies are focused on correlation of isotherms derived from thermal images with isodoses describing treatment plan for patients with breast cancer treated by radiotherapy.

The study included patients diagnosed with breast cancer who were qualified for radiotherapy treatment. The age range of the patients was 50-70 years . All patients were monitored each week of treatment, during the whole radiotherapy process. The measurements were performed under strictly defined conditions (the patients remained without clothing to the waist about 20 minutes) and were preceded by the process of acclimatization at the temperature of the measuring room. Thermal imaging was done by using the thermal camera FLIR System E60. In the treatment planning system (TPS) the plan was created for each patient. Spatial dose distribution in the patient's body was obtained and presented by the isodoses (lines connecting points with the same dose values). The following areas from the treatment planning system were plotted on the thermograms: target (tumor area) and isodose: 50 Gy, 40 Gy, 30 Gy, 20 Gy and 10Gy.

Obtained results indicated correlation between magnitude of dose represented as isodose and the treated skin temperature. Moreover preliminary analysis showed repeatable increase of the mean temperature in the irradiated area during of treatment.