

TUMOR DETECTION AND TREATMENT BY MEANS OF THERMOGRAPHY AND LASER IRRADIATION

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While passive thermal imaging of temperature difference between tumor and neighboring tissue provides limited contrast, active thermography with external thermal modulation may provide higher contrast presumably due to the distinct thermal response from the tumor tissue. We have investigated physiologically relevant parameters such as response rate with respect to thermal modulation and relaxation time. This new imaging modality in the infrared regime may prove useful as a label-free and non-invasive screening tool. On the other hand, we propose a novel use of controlled thermal injury from non-ablative fractional laser irradiation for early treatment of tumor growth with a fiber-based thulium laser at 1927 nm. We investigated the potential cancer prevention effect with mouse model of early tumor. This laser treatment could potentially be an alternative anticancer modality for early tumorigenesis in a minimally invasive manner.

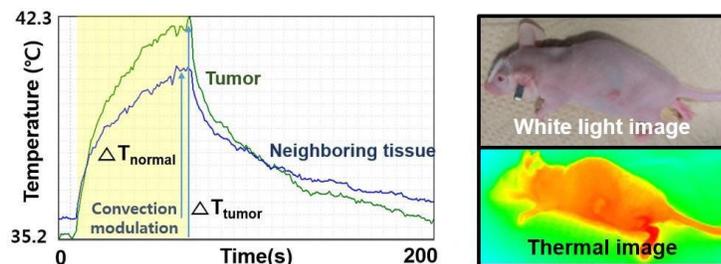


Figure 1 – Active thermal imaging with convectional heating in xenograft tumor model (A) Temperature changes in tumor and neighboring tissue over time. Convection heating was applied for 60 sec followed by natural recovery. (B) White light image and on representative thermal image at time 130 sec.

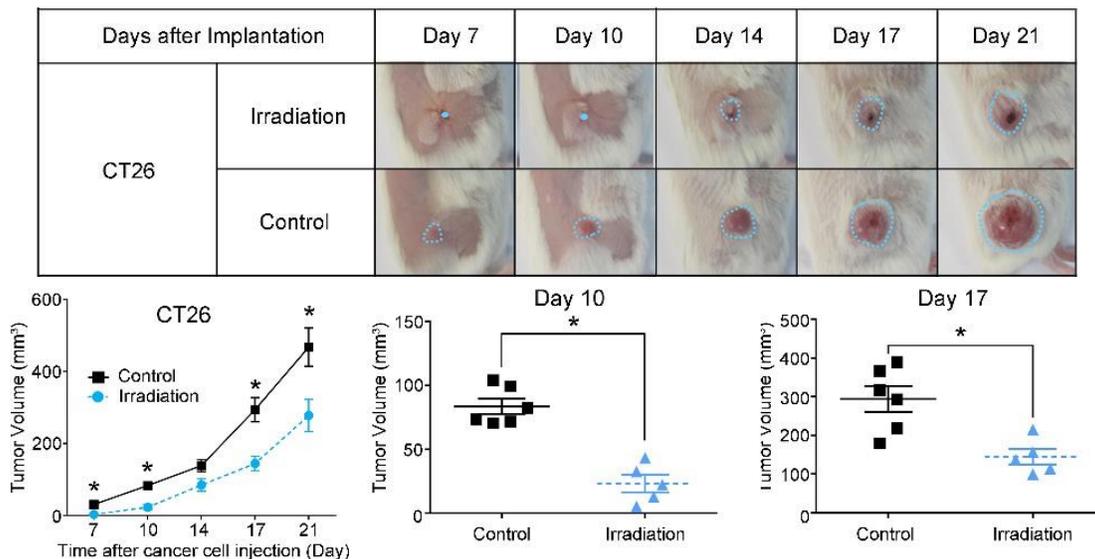


Figure 2 – Tumor volume changes in xenograft tumor models. (A) Representative images of serial tumor volume (TV) changes during the follow-up periods. The blue-dotted lines show the contour of the tumor. A single dot means no significant tumor lesion at the site. (B) In the CT26 implanted tumor model, the irradiation group (blue-dotted line) had smaller mean TVs than the control group (black solid line). On day 10 and day 17 after CT26 injection there is a statistically significant difference in TVs between the irradiation and control groups (Yoo et al., *Current Optics and Photonics*, Vol. 1, No. 1, In press)