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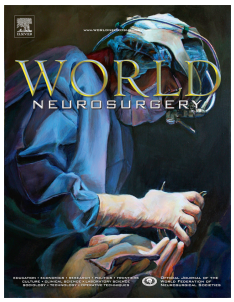

Magnetic Resonance Thermometry-Guided Laser Interstitial Thermal Therapy in Neurosurgery, a Promising Tool for Dural Based Lesions?

Yimin Shi, Ying Mao

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Magnetic Resonance Thermometry-Guided Laser Interstitial Thermal Therapy in Neurosurgery, a Promising Tool for Dural Based Lesions?

Yimin Shi and Ying Mao

Department of Neurosurgery, Huashan Hospital, Fudan University, Shanghai 200040, China. P.R.

To whom correspondence should be addressed:

Ying Mao, Ph.D., M.D. *[E-mail]: yingmao168@hotmail.com*

Commentary on: Magnetic Resonance-Guided Laser Ablation for the Treatment of Recurrent Dural Based Lesion: A Series of Five Cases **by Dr. Michael Ivan et al. World Neurosurgery**

[Key words] *Laser interstitial thermal therapy, Magnetic resonance thermometry, Dural based lesions, Neurosurgery.*

An alternative method of intracranial tumor elimination other than invasive craniotomies has always been what we are chasing after for a fairly long time. Multiple modalities of stereotactic tumor ablation such as cryoablation, ultrasound, radiofrequency, microwave, etc. emerged as the times require. Among them, magnetic resonance imaging-guided laser interstitial thermal therapy (LITT) is a minimally invasive treatment modality which uses laser energy delivered through a fiber-optic catheter within the target area to ablate tissues, and it has gradually become a promising tool in neurosurgeons' armamentarium.

Introduced in early 1980s, LITT system has been popularized in destroying malignant hepatic, renal, pulmonary and other metastatic lesions percutaneously[1]. The hypoxic environment, common in tumors, made cancer cells more susceptible to the thermal energy[2], which can be converted from the energy of light. Photons emitted from the optical fiber are absorbed by chromophores in the tumor, causing excitation and the subsequent release of thermal energy[3]. By maintaining the temperature above a critical threshold (usually above 43□), the LITT system is supposed to cause a protein denaturation and an irreversible tissue coagulation. However, conventional LITT systems shared multiple disadvantages. Limited to the materials and designs of the laser probe, heterogeneous heat conduction around the fiber tip may cause insufficient or excessive lesion ablation. Difficulties in the estimation of the composition within the tumors, on the other hand, would lead to uncontrolled thermal gradients and transition zones between normal and abnormal tissue. Also, lacking an effective temperature monitoring approach, the over-heated