

## **Modulated electro-hyperthermia therapy combined with gold-standard therapies for primary, recurrent and metastatic sarcinomas**

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**Introduction:** After surgery sarcoma has high incidence of local recurrence and distant metastases. It is mostly resistant on radiotherapy and shows only limited response to chemotherapy. Presently a study showed the efficacy of conventional hyperthermia for sarcoma cases [1]. Our objective study modulated electro-hyperthermia (mEHT) [2], combined with conventional therapies for various sarcomas.

**Methods:** 13 sarcoma patients were treated by mEHT (EHY2000+ device). Patients aged between 18-73 years. Histologic type is 2 rhabdomyosarcoma, 2 synovial sarcoma, 2 chondrosarcoma, 1 osteosarcoma, 3 leiomyosarcoma, 1 malignant peripheral nerve sheath tumor, 1 spindle cell sarcoma and 1 malignant fibrous histiocytoma (MFH). Treatment modality was 5 postoperative radiation therapy (RT) and mEHT, 2 combined RT and mEHT for primary lesion, 2 combined RT and mEHT for recurrent sarcoma at original region and 4 combined RT and mEHT for metastatic lesion. mEHT was applied 2-3 times a week. Post-operative RT was applied 50.4 Gy in 28 fractions and other RT was applied 30-39 Gy in 10-13 fractions.

**Results:** 5 patients who received post-operative RT and mEHT didn't show local recurrence. One MFH patient received RT 50.4 Gy and 27 times of mEHT and showed good partial remission (PR). Patient with peripheral nerve sheath tumor received RT 30 Gy and tumor mass regressed continuously by 108 sessions of mEHT. One recurrence rhabdomyosarcoma patient received RT 30 Gy and 12 times of mEHT in neck for 1 month with PR. The chondrosarcoma patient who had recurrence at pelvic bone replacement region after surgery, received RT 30 Gy and 50 times of mEHT with PR. 1 patient received RT 30 Gy in 2 weeks and 48 times of mEHT in metastatic lung lesion and showed good PR. Patient with chondrosarcoma had chest-wall metastasis received RT 30 Gy in 10 fractions and 47 times of mEHT showed partial regression. A patient had cervical spine metastasis and received RT 30 Gy and 5 times of mEHT. Patient with osteosarcoma had multiple lung metastasis received chemotherapy and 84 times of mEHT. Metastatic cancer almost disappeared but one lesion that was out of the range of electrode is progressed.

**Conclusion:** Primary, recurrent, and metastatic sarcomas were well responded to mEHT treatment. Furthermore mEHT effectively controlled pain and reduced the side effects of the combined therapies.[1] Issels R, et.al, *Lancet Oncology*, 11:561-570, (2010) [2] SzaszA, et.al, *Oncothermia-Principles and Practices*, Springer, (2010)