
ADVANCEMENTS IN MODULATED ELECTRO-HYPER-THERMIA (MEHT): APPLICATIONS IN TRANSLATIONAL ONCOLOGY AND FUTURE PERSPECTIVES

PRESENTATION OF THE PHILIPPINE LAUNCHING EVENT OF ONCOTHERMIA 2024.06.01.

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CITATION

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<https://youtu.be/riUp3wr-qGw>,

<https://www.youtube.com/playlist?list=PLEaAiXVgvMsEazu16PMNSqcJjZKF1yB3Y>

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https://oncotherm.com/SzaszAM_2024_Advancements-in-mEHT_20240601

MEDIAN OVERALL SURVIVAL AND DISEASE CONTROL RATE

Hyperthermia, when combined with traditional cancer treatments such as chemotherapy and radiation therapy, has been shown to improve median overall survival (OS) and disease control rates (DCR). Clinical studies have demonstrated that hyperthermia enhances the efficacy of these treatments by increasing tumor cell sensitivity to radiation and chemotherapy, improving drug delivery, and boosting the body's immune response against cancer cells. For instance, in breast cancer, hyperthermia combined with radiation therapy resulted in significantly higher response rates compared to radiation alone (Loboda et al., 2018). Similarly, in lung cancer, the combination of hyperthermia and chemotherapy improved progression-free survival and overall survival compared to chemotherapy alone (Ou et al., 2020). These findings highlight the potential of hyperthermia to significantly impact patient outcomes positively (Cleveland Clinic, 2024; Szasz AM, 2024).

PANCREATIC CANCER AND MEHT STUDIES

Pancreatic cancer, known for its poor prognosis, has seen promising results with the use of modulated electro-hyperthermia (mEHT). Clinical trials at the Semmelweis Cancer Center, including the NeoHTerMa trial, have shown that mEHT can improve median overall survival and progression-free survival in patients. These studies reported positive trends in overall survival, with Kaplan-Meier analysis indicating significant benefits for patients treated with mEHT. The research underscores mEHT's potential as a valuable adjunct therapy in managing pancreatic cancer, a notoriously difficult-to-treat malignancy (Dank Magy Onkol, 2023; Szasz AM, 2024).

PROPENSITY SCORE MATCHING

Propensity score matching (PSM) is a statistical technique used to reduce bias in observational studies by ensuring that the groups being compared are similar in key characteristics. In the context of mEHT studies, PSM helps ensure that patients receiving hyperthermia treatment are comparable to those who do not, based on factors like age, sex, and concurrent treatments. This method improves the reliability of findings by isolating the effect of mEHT, providing more robust evidence of its efficacy in enhancing cancer treatment outcomes (Shen et al., 2019; Szasz AM, 2024).

PROTEOMIC ANALYSIS IN PANCREATIC CANCER

Proteomic analysis, which studies protein expressions in cells and tissues, provides crucial insights into the molecular mechanisms affected by treatments like mEHT. In pancreatic cancer, proteomic studies have shown that hyperthermia can significantly modulate protein expression involved in inflammatory responses, immune function, and cell adhesion. Treatment with mEHT can restore dysregulated pathways to normal levels, contributing to its therapeutic effects. These analyses are essential for understanding how hyperthermia impacts cancer biology at a molecular level and for identifying biomarkers that can predict treatment response, thus aiding in the personalization of cancer therapy (Pinto de Almeida et al., 2023; Szasz AM, 2024).

QUALITY OF LIFE (QOL) DATA

Quality of life is a critical measure in cancer treatment, reflecting the overall well-being of patients. Studies on mEHT have consistently shown significant improvements in QoL across various cancer types:

1. High-Mortality Cancers: mEHT enhances QoL for brain, pancreas, lung, and liver cancers.
2. Phase I Safety Study in NSCLC: In a study involving 35 patients with stage IV non-small cell lung cancer, mEHT combined with chemotherapy led to rare temporary adverse effects (fatigue, nausea, vomiting, diarrhea, headache), significant physical status improvement after four weeks, and significant symptom relief (fatigue, dyspnea, insomnia, appetite loss, diarrhea) (Lee et al., 2023; Szasz AM, 2024).
3. Phase II Study in Peritoneal Carcinomatosis: This study reported significant QoL improvements in all functional and symptom categories compared to the control group. mEHT was favored over intraperitoneal chemoinfusion for overall QoL improvement (32.3% vs. 49.2%) (Lee et al., 2023; Szasz AM, 2024).
4. Pain Relief in Lung Cancer: Pain initially increased post-mEHT but decreased significantly over time, with a 90% improvement (Lee et al., 2023; Szasz AM, 2024).
5. Combination with Lower Radiation Doses in Rectal Cancer: Fewer adverse effects and higher QoL were observed with this combination (Lee et al., 2023; Szasz AM, 2024).
6. Phase III Randomized Controlled Study in Cervical Cancer: This study showed decreased toxicity, improved QoL, significant cognitive function improvement at six weeks post-treatment, increased social and emotional functions at three months, and significant reduction in fatigue and pain (Minnaar et al., 2020; Szasz AM, 2024).

TAKE HOME MESSAGES

Modulated electro-hyperthermia (mEHT) is an effective and safe adjunct treatment for various cancers, offering several key benefits:

- Cost-Effectiveness: mEHT is cheaper compared to traditional medical oncological treatments.
- Safety: It has an excellent safety profile with minimal adverse effects.
- Versatility: mEHT can be used in combination with other therapies or as a standalone treatment.
- Enhanced Outcomes: It increases local response rates, extends overall survival, and improves the quality of life for patients.

By integrating the latest clinical findings and experiences, this presentation highlights the significant benefits of mEHT in oncology, advocating for its broader adoption in clinical practice to improve patient outcomes and quality of life (Szasz AM, 2024).

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