
CLINICAL EVIDENCES AND TRIALS IN MODULATED ELECTRO-HYPERTHERMIA: ESTABLISHING PROOF OF EFFICACY IN MEDICAL ONCOLOGY

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LIFETIME PROBABILITY OF DEVELOPING CANCER AND CANCER-RELATED MORTALITY

In Hungary, the lifetime probability of developing cancer has reached significant levels, with men having a 56.9% probability and women having a 51.9% probability. The cancer-related mortality rates are similarly high, at 27.6% for men and 21.7% for women. These rates are expected to rise due to demographic shifts, with an anticipated 18% increase in the population aged 60 and above by 2030. This demographic change will likely lead to a 35% increase in cancer incidence and a 30% rise in cancer deaths among individuals aged 65–85 years. These statistics underscore the urgent need for effective and accessible cancer treatments to manage the growing cancer burden.

PATIENT-CENTRIC CLINICAL TRIALS

The shift towards patient-centric clinical trials emphasizes the importance of involving patients as active collaborators in their treatment processes. Key priorities in this approach include increasing the transparency of clinical trials, utilizing communication and wearable technologies for real-time monitoring, ensuring cybersecurity, automating clinical trial supplies, and supporting patient reintegration. These approaches leverage self-reported and real-world data to enhance the relevance and impact of clinical research.

OPTIMAL TREATMENT FOR VARIOUS CANCERS

Modulated electro-hyperthermia (mEHT) offers a promising treatment alternative for patients unable to undergo conventional therapies due to comorbidities, limitations of conventional curative procedures, or severe metastatic activity. The presentation discusses the effectiveness of mEHT in treating various cancers, including cervix cancer, glioblastoma, non-small cell lung cancer (NSCLC), breast cancer, castration-resistant prostate cancer (CRPC), Wilms tumor, sarcomas, gynecologic tumors, hepatobiliary cancers, and astrocytoma. For instance, in NSCLC, mEHT has demonstrated improved disease control rates and overall survival compared to traditional treatments.

CLINICAL AND ECONOMIC EVALUATION IN GLIOBLASTOMA MULTIFORME (GBM)

A retrospective cohort study evaluated 54 patients with recurrent glioblastoma multiforme (GBM) treated with dose-dense temozolomide (ddTMZ) and mEHT, comparing them with five pooled cohorts (114 patients) treated with ddTMZ alone. The analysis demonstrated that ddTMZ combined with mEHT is cost-effective, yielding significant budget savings and a favorable cost-benefit profile over eight years. This combination significantly improved survival outcomes, suggesting that mEHT enhances the cost-benefit profile of ddTMZ regimens for recurrent GBM.

PROSPECTIVE RANDOMIZED CLINICAL TRIALS

Future directions include conducting prospective randomized clinical trials to validate the efficacy of mEHT in early-stage adjuvant or neoadjuvant settings. One notable trial is the

Neoadjuvant Concomitant Modulated Electro-hyperthermia in HER2-negative Breast Cancer trial (NeoHTerMa). This trial investigates the benefits of integrating mEHT with standard neoadjuvant chemotherapy in HER2-negative breast cancer. The study is a randomized, open-label trial involving female patients aged 18 years or older with locally advanced, unilaterally localized HER2-negative breast cancer. The trial compares the effectiveness of a standard neoadjuvant chemotherapy regimen (wTAX +/- P + AC) with and without the addition of mEHT. The primary outcome measure is the percentage of tumor size reduction, while secondary outcomes include complete pathological response rates, treatment response patterns, and quality of life assessments. The study aims to enroll 120 patients and spans over 27 months. Details about this trial can be found online at [ClinicalTrials.gov \(NCT05889390\)](https://ClinicalTrials.gov/ct2/show/study/NCT05889390).

QUALITY OF LIFE (QOL) DATA

Quality of life (QoL) is a crucial consideration in cancer treatment, and the presentation highlights various studies that demonstrate the positive impact of modulated electro-hyperthermia (mEHT) on QoL for patients with different types of cancer.

1. **Glioblastoma Multiforme (GBM):** In patients with recurrent GBM, the combination of dose-dense temozolomide (ddTMZ) and mEHT significantly improved survival outcomes compared to ddTMZ alone. This combination was not only effective in extending overall survival but also proved to be cost-effective, highlighting the dual benefit of mEHT in enhancing patient outcomes while reducing healthcare costs.
2. **Non-Small Cell Lung Cancer (NSCLC):** Studies in NSCLC patients have shown that mEHT enhances disease control rates and overall survival. Patients undergoing mEHT reported improved QoL, with significant relief from symptoms such as fatigue, dyspnea, and pain. These improvements underline the potential of mEHT to enhance both clinical outcomes and the daily lives of patients battling this aggressive cancer.
3. **Breast Cancer:** The ongoing Neoadjuvant Concomitant Modulated Electro-hyperthermia in HER2-negative Breast Cancer trial (NeoHTerMa) is particularly noteworthy. This trial explores the integration of mEHT with standard neoadjuvant chemotherapy in HER2-negative breast cancer patients. By comparing tumor size reduction and pathological response rates, the study aims to establish the efficacy of mEHT in improving treatment outcomes and QoL for breast cancer patients. The NeoHTerMa trial represents a significant step towards validating mEHT's role in breast cancer treatment and could pave the way for broader adoption of this therapy.

TAKE HOME MESSAGES

Modulated electro-hyperthermia (mEHT) is emerging as a powerful adjunct treatment for various types of cancer, offering several key benefits that make it a valuable addition to current oncology practices.

1. **Cost-Effectiveness:** mEHT is a cost-effective treatment option compared to traditional oncological treatments. Its ability to enhance the efficacy of existing therapies, such as chemotherapy and radiotherapy, without significantly increasing costs makes it an attractive option for healthcare systems looking to optimize resources while providing effective care.

2. **Safety:** mEHT has an excellent safety profile, with minimal adverse effects reported in clinical studies. This makes it a suitable option for patients who might not tolerate conventional treatments due to comorbidities or other health issues.
3. **Versatility:** mEHT can be used in combination with other cancer therapies or as a standalone treatment. Its versatility allows it to be integrated into various treatment regimens, providing flexibility for oncologists in tailoring personalized treatment plans for their patients.
4. **Enhanced Outcomes:** Clinical studies have shown that mEHT increases local response rates, extends overall survival, and improves the quality of life for patients. These outcomes are particularly significant for patients with aggressive or advanced cancers, where traditional treatments alone may not be sufficient.
 - The NeoHTerMa trial, a breast neoadjuvant hyperthermia prospective randomized investigator-initiated non-sponsored audited trial, is another milestone for mEHT. This trial aims to validate the efficacy of mEHT in combination with standard neoadjuvant chemotherapy for HER2-negative breast cancer. The trial's results are expected to provide robust evidence supporting the integration of mEHT into mainstream cancer treatment protocols, further solidifying its role in oncology.

By integrating the latest clinical findings and practical experiences, this presentation underscores the significant benefits of mEHT in oncology. It advocates for the broader adoption of mEHT in clinical practice to improve patient outcomes and quality of life, offering hope and improved care for cancer patients worldwide.

REFERENCES

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