Breast Cancer Series Treated with Modulated Electro-Hyperthermia (mEHT) a single center experience

Erika, Borbenyi¹, Judit Desfalvi¹, Gyongyver Szentmartoni¹, Tamas Garay¹², Reka Mohacsi¹, Mariann Kvansika¹, Marcell A. Szasz¹, Magdolna Dank¹

¹ Cancer Center, Semmelweis University, Budapest, Hungary
² Faculty of Information Technology and Bionics, Pazmany Peter Catholic University, Budapest, Hungary

Presented at 36th ICHS, Budapest, 2018

Cite this article as:
Breast Cancer Series Treated with Modulated Electro-Hyperthermia (mEHT) -- a single center experience

Erika, Borbenyi1, Judit Desfalvi1, Gyongyver Szentmartoni1, Tamas Garay1,2, Reka Mohacsi1, Mariann Kvansika1, Marcell A. Szasz1, Magdolna Dank1
1Cancer Center, Semmelweis University, Budapest, Hungary
2Faculty of Information Technology and Bionics, Pazmany Peter Catholic University, Budapest, Hungary

Background
mEHT is a relatively new kind of hyperthermia in oncology. It is a further development of the conventional heating methods.

Aim
Our objective in this presentation is to summarize our knowledge about the utilization of mEHT therapy from the practical perspective in breast cancer and summarize our experience in our breast cancer patients treated with mEHT.

Methods
Thirteen patients with advanced breast cancer (12 invasive ductal carcinoma and 1 postirradiation angiosarcoma) were treated in a 20 months period at the Cancer Center of Semmelweis University, with the instruments EHY-2000 and EHY-2030 (Oncotherm Ltd., Budaörs, Hungary). One patient also developed pancreatic cancer, and one patient only attended one session, thus, these were omitted from further analysis.

Results
Two patients were treated for locally advanced disease in a neoadjuvant fashion. The rest of patients were node positive and/or metastatic. The most common metastatic sites were lymph nodes (9), bone (5), liver (4) and lung (4) with cutaneous involvement (2). The average time in treatment was 11.2 weeks (range: 2.4-23.2). Various neoadjuvant and first-line chemotherapeutic protocols were applied, mostly platinum and taxane containing regimen, but also capecitabine, tegafur, mitomycin C, gemcitabine, lapatinib were administered. A two-week break in therapy was necessary in five cases due to local discomfort (2), nausea and weakness (2) and hydrothorax (1). The patients with primary systemic therapy continued with surgery and finished treatment, one patient stopped at week 20 due to inflammed port and eight patients progressed in an average 9.7 weeks.

Discussion
Complementary mEHT treatment of breast cancer patients is feasible and easy to administer. Most durable responses were seen in skin metastases and/or bone and decreasing time with lung and liver involvement. Most important favoring prognostic factors were lower stage and less number of metastases (oligometastatic status with maximally two distant metastatic sites). Younger age was a poor prognostic factor also accompanied with multiorgan metastases (3<).

Grant support: NVKP_16-1-2016-0042
Breast Cancer Series Treated with Modulated Electro-Hyperthermia (mEHT) 
a single center experience

Borbényi E¹, Désfalvi J¹, Szentmártoni Gy¹, Garay T¹,², 
Mohácsi R¹, Kvasnika M¹, Szasz AM¹, Dank M¹

(1) Cancer Center, Semmelweis University, Budapest, Hungary
(2) Faculty of Information Technology and Bionics, Pazmany Peter Catholic University, Budapest, Hungary

Disclosures – conflict of interest

NONE

• M.D./Ph.D., pathologist
• Research funding
  – Hungarian Society of Medical Oncology (indirectly from Roche, Pfizer, GlaxoSmithKline)
  – Bristol-Myers Squibb
  – Hungarian National Research, Development and Innovation Office (NRDI Office), consultant for Oncotherm

• Head of Science - Cancer Center, Semmelweis University, Budapest, Hungary
• Secretary General, Hungarian Society of Senology
• Member of Board of Curators, International Academy of Pathology (IAP), Hungarian Division
Background and aim

- mEHT is a relatively new kind of hyperthermia in oncology.
- It is a further development of the conventional heating methods.

- Our objective in this presentation is to summarize our knowledge about the utilization of mEHT therapy from the practical perspective in breast cancer and summarize our experience in our breast cancer patients treated with mEHT.

Patients and methods

- Thirteen patients with advanced breast cancer
- 12 invasive ductal carcinomas
- 1 postirradiation angiosarcoma
- Pilot study for 20-month period
- Instruments EHY-2000 and EHY-2030 (Oncotherm Ltd., Budaörs, Hungary)

- One patient also developed pancreatic cancer, and one patient only attended one session, thus, these were omitted from further analysis.
Postirradiation angiosarcoma

![Image](image1.png)

Postirradiation angiosarcoma

![Image](image2.png)
Breast cancer intrinsic biology and gene/protein expression

Perou, Nature 2000
Breast cancer intrinsic biology and gene/protein expression

Results

- Various neoadjuvant and first-line chemotherapeutic protocols were applied, mostly
- platinum and taxane containing regimina,
- but also capecitabine, tegafur, mitomycin C, gemcitabine, lapatinib were administered.
- A two-week break in therapy was necessary in five cases due to local discomfort (2), nausea and weakness (2) and hydrothorax (1).
- Two patients were treated for locally advanced disease in a neoadjuvant fashion.
- The patients with primary systemic therapy continued with surgery and finished treatment.
TNBC, neoadjuvant tx

April --» October
Advanced cases

- The rest of patients were node positive and/or metastatic.
- The most common metastatic sites were
  - lymph nodes (9),
  - bone (5),
  - liver (4) and
  - lung (4) with
  - cutaneous involvement (2).
- The average time in treatment was 11.2 weeks (range: 2.4-23.2).
- One patient stopped at week 20 due to inflamed port and eight patients progressed in an average 9.7 weeks.
BRCA case (DOB: 1969)

- BRCA 1, exon 2, nucleotid 189, insertion 1A → aminoacid 39 STOP codon, ONCOGENIC MUTATION

- Primary tumor (2014): ER-, PR, HER2-, p53-, Ki67 50% (pT2N1a)
  - TXT-CBP (6x), irradiation

- Supraclavicular metastasis (2015): ER-, PR-, HER2+ by FISH, p53-, Ki67 80%
  - AC-trastuzumab (4x)

- Thoracic lesion (2016): ER-,PR-, HER2-, Ki67 60%
  - Lapatinib-capecitabine

- Mediastinal lesion (2017): PET/CT
  - Vinorelbine-mEHT

- Suprarenal and LN metastasis (2018): PET/CT
  - ADM-doxorubicin
Discussion

- Complementary mEHT treatment of breast cancer patients is feasible and easy to administer.
- Most **durable responses** were seen in skin metastases and/or bone, and decreasing time with lung and liver involvement.
- **Intrinsic subtype** reflected by routine immunoprofiling is conserved in mEHY treated breast cancer.
- Most important favoring prognostic factors were lower stage and less number of metastases (oligometastatic status with maximally two distant metastatic sites).
- Younger age was a poor prognostic factor also accompanied with multiorgan metastases (3<).

Conclusion and directions

- Heterogeneity in the breast cancer population
- Survival improved greatly in the past 20 years
- Tumor biology is reflected
- Patients have more opportunities to get into clinical trials
- Heavily pretreated cases emerge
- Dismal prognosis when recruited to mEHY
Thank you

Grant support: NVKP_16-1-2016-0042