

WG2 - Towards better thermal-based EM therapies

COST Action CA17115
Working Group 2 Meeting

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Milstones & Tasks

Establish clinical
needs for
thermal-based
interventions

M1

❖ Investigate deficiencies and challenges in existing EM therapeutic technologies and treatment protocols (T2.1)

❖ Are methods in other fields applicable to EM therapeutics? (T2.2)

D2.1: Clinical needs to be addresses with EM Therapeutics

Sept. 2019 [Q1Y2]

Optimised HT
and ablation TP
techniques

M2

❖ Develop, validate & optimise algorithms for TP and feedback control, as part of QA. (T2.3)

D2.2: Optimized hyperthermia and ablation Treatment Planning techniques

May 2021 [Q3Y3]

Optimised HT
and ablation
feedback
techniques

M3

❖ Support improved TP based on accurate EPs knowledge and non-invasive personalised data estimates. (T2.4)

❖ Investigate novel applications for EM therapeutic technologies. (T2.5)

D2.3: Optimized hyperthermia and ablation feedback techniques

May 2022 [Q3Y4]

D2.1 – Clinical needs to be addressed with EM Therapeutics

M1 Establish clinical needs that thermal-based interventions may be used to address

D2.1 – Clinical needs to be addressed with EM Therapeutics

Background and motivation for D2.1

Electromagnetic (EM) hyperthermic technologies hold great potential in the treatment of diseases, especially for cancers that are resistant to standard regimens. These technologies modify tissue temperature: hyperthermia heats the diseased tissue to make it susceptible to treatments, and ablation heats the tissue until it is destroyed. Overall, these techniques have shown significant potential and there is substantial opportunity to solidify their use clinically and to apply them to a wider range of medical conditions.

Contributing to the stagnant market of EM hyperthermic medical devices is the fact that researchers working on the development of medical technologies are often not fully aware of the clinical challenges facing novel medical devices. Hence, workgroup (WG) 2 the MyWAVE Action takes a holistic approach, by bringing together key players in the field of fundamental and translational research and medical professionals, to create a comprehensive overview of the clinical needs to be addressed with EM Therapeutics. In this way, we aim to stimulate and guide efforts into design and development of novel EM hyperthermic technologies, so that they can reach patients faster and improve treatment outcomes.



1. Devices and QA
2. Treatment planning
3. Realtime dosimetry
4. Quality assurance

D2.1 – 1. Devices and QA

- ❖ Affordable systems
 - ❖ cheaper devices
 - ❖ cheaper production costs MNPs
 - ❖ HTA

- ❖ Reproducibility of system performances
 - ❖ over their life time: appropriate QA procedures to be repeated regularly
 - ❖ during treatment execution: appropriate measurements

- ❖ Magnetic hyperthermia
 - ❖ prediction tool for temperature, MNPs
 - ❖ magnetic fluid dose

D2.1 – 2. Treatment planning

- ❖ TP validation
- ❖ Knowledge and related influence of dielectric, thermal and physical properties of tissues (↪ WG1)
 - ❖ dependence on time and temperature
 - ❖ dependence on healthy vs malignant
 - ❖ dependence on different patients
- ❖ Agreement on thermal dose parameters
 - ❖ validation against clinical outcome
- ❖ Uncertainty/variability management
 - ❖ influence of uncertainty in knowledge of tissues' properties
- ❖ User interaction
 - ❖ operator friendly

D2.1 – 3. Realtime dosimetry

- ❖ Standardized treatment monitoring procedures
 - ❖ invasive thermometry
 - ❖ complexity of existing guidelines; revision required
 - ❖ non-invasive thermometry
 - ❖ validation and standardization required
 - ❖ inter-operable navigation systems
 - ❖ key performance indicators needed

- ❖ Relation between temperature and tissue damage
 - ❖ biological mechanisms of action (HT; TA)
 - ❖ studies correlating CEM43 with tissue damage (HT)
 - ❖ characterization of different tissues (CEM43/HT)

D2.1 – 4. Quality assurance

- ❖ Quality assurance protocols
 - ❖ to be fulfilled prior commercialization, accepted by the authorised organisations (e.g. ESHO, STM, etc.)

- ❖ Repository of all performed treatments for meta-analysis

- ❖ Lexicon...

Today's WorkShop



Towards standardized simulations for hyperthermia
treatment planning



Investigate the deficiencies and challenges in existing
treatment protocols & new approaches in
hyperthermia treatment planning and
standardization.

Towards standardized simulations for hyperthermia treatment planning

- 8:45 – 8:55** Introduction
- 8:55 – 9:25** **Dario Rodriguez**, “Standardizing Language and Data for the Thermal Medicine Community”
- 9:25 – 9:55** **Hana Trefna**, “Standardization in hyperthermia: a plethora of work to be done”
- 9:55 – 10:25** **Petra Kok**, “Hyperthermia Treatment Planning: Clinical applications and QA”
- 10:25 – 10:45** **Coffee Break**
- 10:45 – 11:15** **Bryn Lloyd**, “Virtual Population 4.0 - First Generation of Neuro-functionalized Computational Anatomical Models”
- 11:15 – 11:35** **Gennaro G. Bellizzi**, “Impact of Realistic Patient Modelling in Hyperthermia Treatment Planning: Introducing the Erasmus Virtual Patient Repository”
- 11:35 – 11:55** **Julian Bonello**, “A study of gold nanoparticles of different sizes and geometries for the focusing of microwaves”