



## WGI – PROGRESS REPORT

RAQUEL CONCEIÇÃO (PORTUGAL), ILJA OCKET (BELGIUM)



MC MEETING, LISBON, 14-15 JANUARY 2020

# RELATION BETWEEN WG1 AND WG2

## INTERRELATED OBJECTIVES

**WG1:** Advancing knowledge of dielectric and thermal properties

- **Identify gaps** in knowledge of dielectric and thermal properties
- **Develop new standards** for measuring and reporting of dielectric and thermal data
- **Coordinate R&D** towards accurate dielectric and thermal data

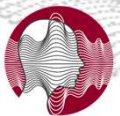
**WG2:** Better thermal-based EM therapeutics

- Investigate **physiological changes** as tissue/cells is/are heated
- Understand impact of **local perfusion**
- Facilitate and promote quality assessment
- Evaluate the accuracy of treatment planning
- Analyse tools and techniques for planning and treatment
- Develop **new applications** and treatments (protocols, planning)



## WGI TASKS

- T1.1 **Identify gaps** in knowledge of dielectric and thermal properties (missing tissues, frequency ranges, temperatures, etc.)
- T1.2 Examine dielectric and thermal measurement techniques; **consensus on best measurement practice**
- T1.3 **Standard protocol** for dielectric & thermal measurement reporting (including data and meta-data)
- T1.4 Dielectric and thermal property **measurement campaign to fill gaps** identified in T1.1
- T1.5 Dielectric and thermal **repository development**



# KEY QUESTIONS

- How should we measure dielectric properties?
  - Sample preparation, *in vivo* vs. *ex vivo*, *animal* vs. *human*
  - Calibration techniques, limitations of (slim) coaxial probe, required accuracy for proper downstream use of data in 3D models
  - Sample manipulation during measurement
  - Issues of tissue non-uniformity and spatial resolution – sensing volume
  - Different protocols for different types of tissues and applications (HT vs. RFA/MWA)
- How should we report data?
  - Meta-data on tissue, sample preparation protocol description, microwave calibration reporting



# MALTA MEETING (VALETTA)

DECEMBER 3-4, 2018



- Session objectives
  - Provide initial overview on experience within network on dielectric tissue measurements
  - Initiate first discussions on best practices, arrive at first set of **standardized guidelines**
- Topics covered during talks
  - Dielectric spectroscopy on tissues, with emphasis on tissue preparation protocols
  - Industrial perspective (SPEAG, NEUWAVE)
- Conclusions
  - Limited control over hydration during measurement is one of the main confounders – gear some STSM's to this issue
  - Different spectroscopy tools: established (coaxial probe, transmission line, parallel plate) and emerging (MRI based)



# ROMANIA MEETING (SIBIU)

JULY 8-9, 2019



- Session objectives
  - Dive deeper into confounding effects (dielectric measurements)
  - Deepen discussions on best practices for dielectric measurements
  - Provide first overview of network expertise on thermal measurement techniques
- Topics covered during talks
  - Dielectric properties: temperature dependencies on calibration - sensing volume (depth) – effect of sample dehydration
  - T-dependent properties: first overview
- Key conclusions
  - Issue of tissue non-uniformity not well addressed – need to further understand requirements and solutions
  - Sensing volume not well defined, especially depth
  - Physical/ML models to aid in “connecting dots” for future database?

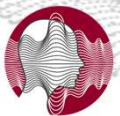
# WGI DELIVERABLES

- **DI.1 Standardised guidelines** for dielectric & thermal measurements
  - **Deadline Q1 2020**
- **DI.2 Reporting standards** for dielectric & thermal data
- **DI.3 Open access data repository**



## DI.1 – STANDARDIZED GUIDELINES ARE WE READY TO CONSOLIDATE?

- Conclusions and open issues
  - Reporting of microwave calibration error (often lacking)
  - Need for better sample preparation and monitoring (control of temperature and hydration over time)
  - (?) More discussion/work needed on perfusion?
  - (?) Distinction between properties for hyperthermia and ablation (T-range)
  - (?) Guidelines when using nano-agents
- Proposed process
  - Chapter definition by MC and WGI leaders (this meeting)
  - Contributions by volunteers (make list during this meeting)

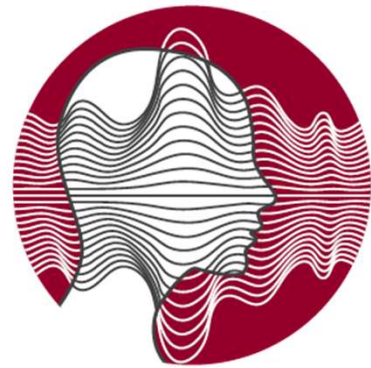




# WGI OBJECTIVES FOR NEXT GRANT PERIOD

- Finish deliverable D1.1
- Strengthen WGI-WG2 interactions
  - Towards goals of quality assessment, accuracy of treatment planning (WG2) but also towards reporting standards (D1.2) and database (D1.3)
- Start work towards a COST white paper (**evidence-based international consensus statement**) on reporting framework
- Further leverage on and extend collaborations created with STSM's
- Grow presence on social media and other dissemination channels





myWAVE