

Metrology for next-generation safety standards and equipment in MRI

a joint research project within the European Metrology Research Programme

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Background

- European Metrology Research Programme (EMRP), dedicated EU programme (article 185) for National Metrology Institutes only
- EMRP call "Health" (2011): 75 proposals, 11 selected for funding
- "MRI Safety" project:
 - April 2012 – March 2015
 - partners and collaborators from 5 European countries
 - role of industry: advisors and stakeholders, but no financial contributions, no direct influence, no active role

Need

- WHO 2011: JRP goals "high priority research need"
- MRI: ~30 million exams per year in EU
- almost banned by EMF directive 2004/40/EC
- safety standards inconsistent, emerging technologies not covered
- ~8 % of EU pop. (implant carriers) excluded from MRI

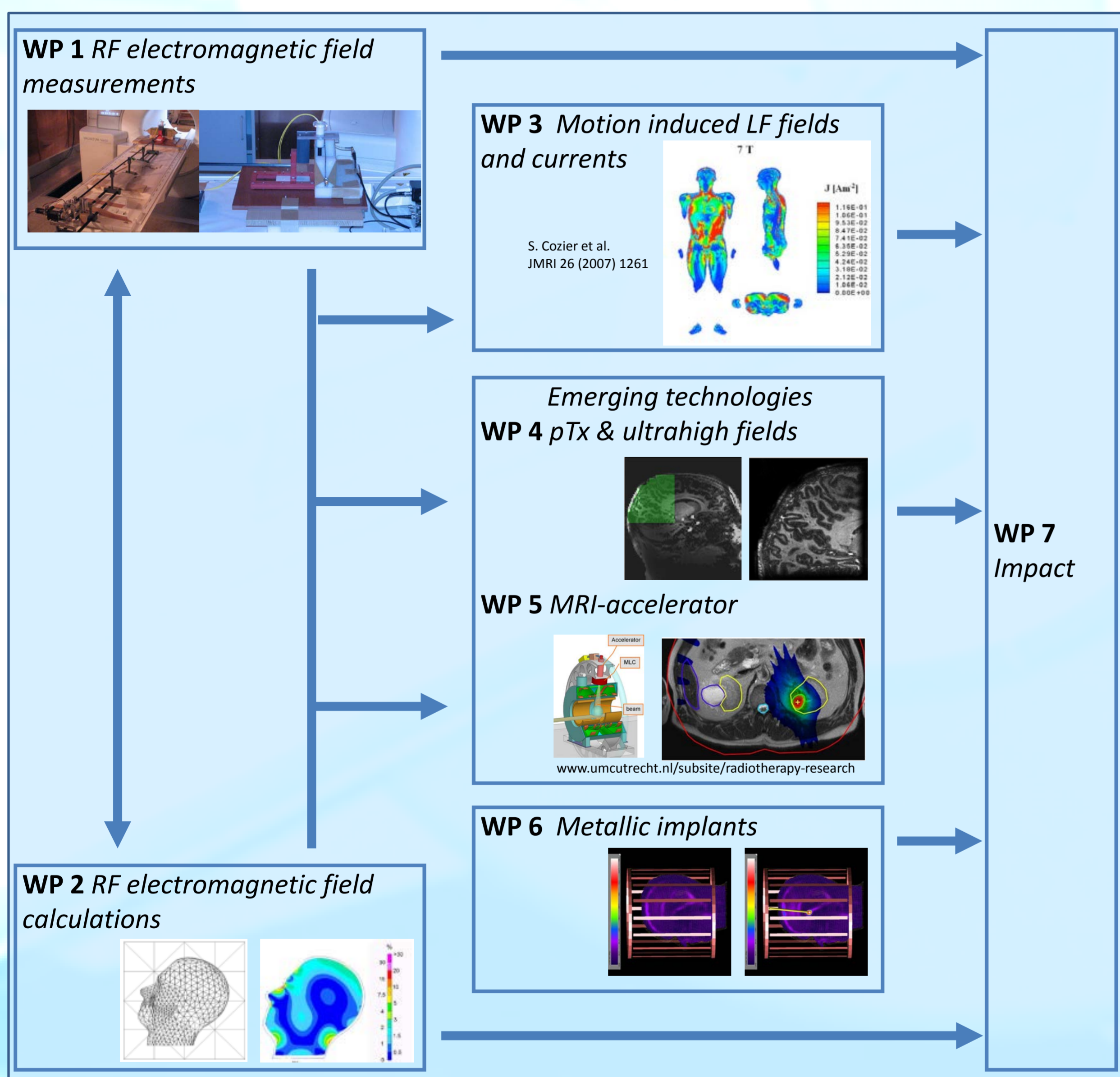
Objectives

Promote and expand safe use of MRI technology

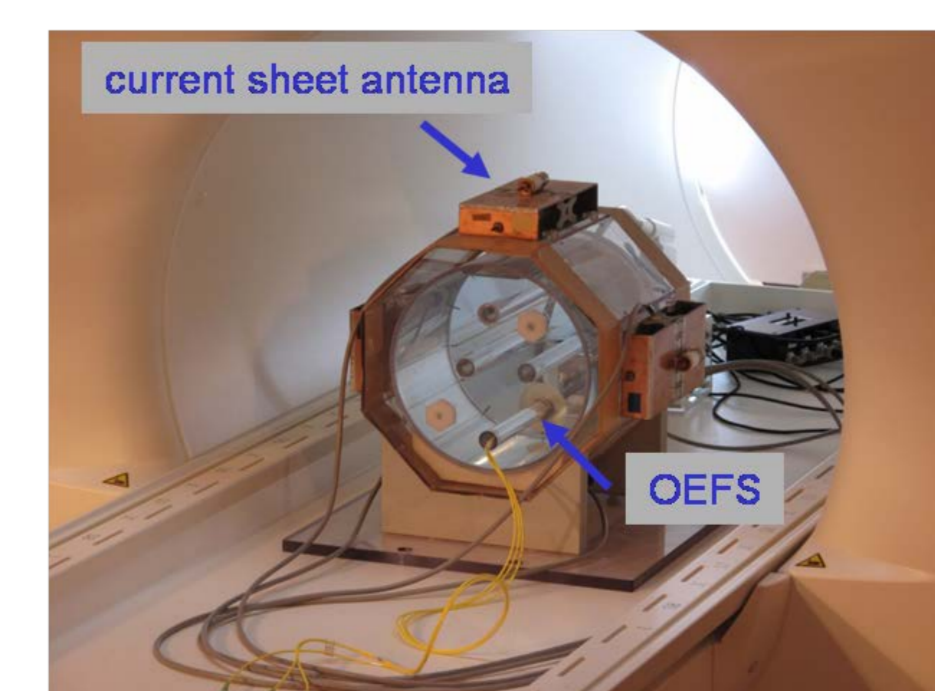
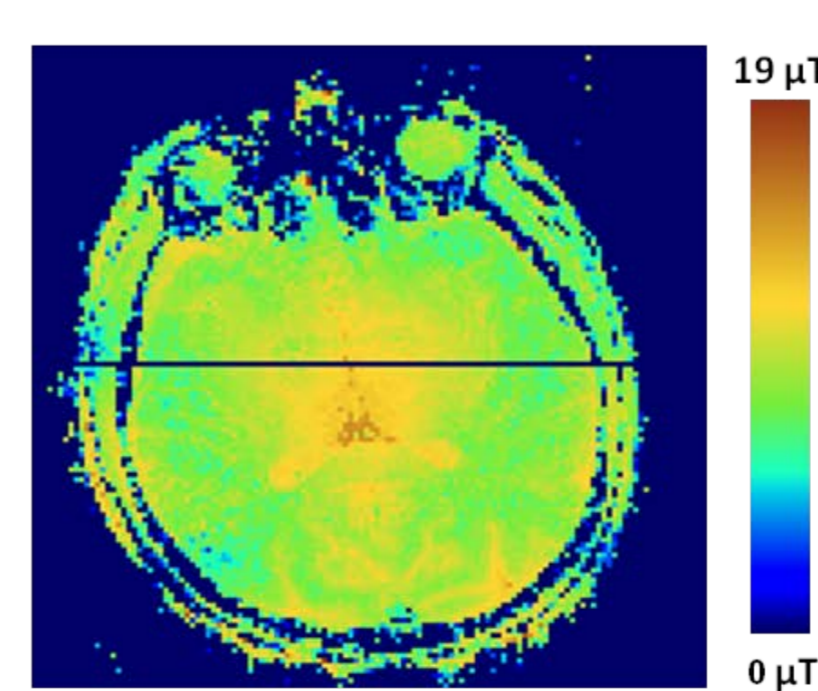
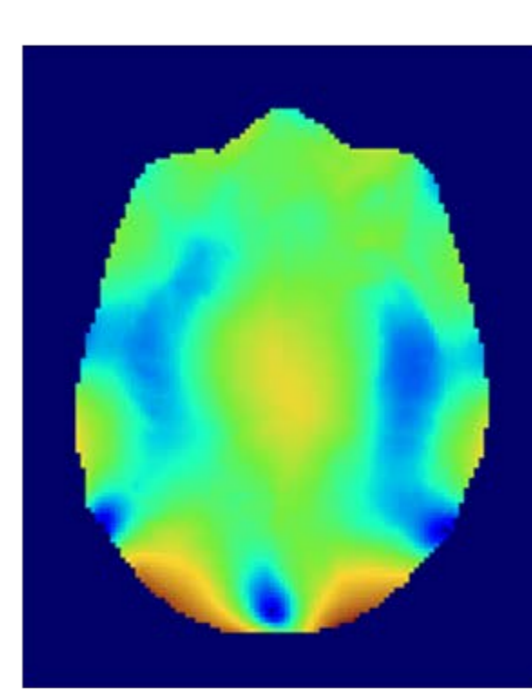
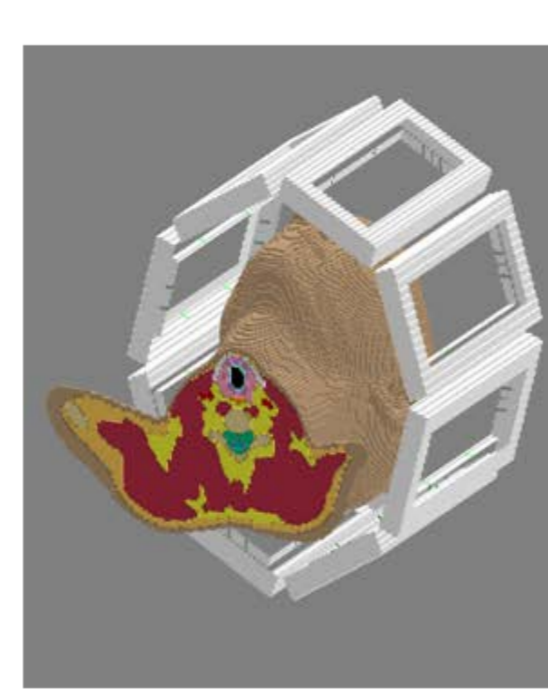
- Develop theoretical models to deduce RF EM fields inside the human body
- Validate theoretical models by traceable measurements
- Evaluate risk to humans from moving through strong magnetic fields
- Assess local SAR hazards due to emerging technologies in MRI
- Assess non-SAR hazards due to emerging technologies in MRI
- evaluate effects of MRI on passive medical implants

Beyond the state of the art

- *Metrological modeling:*
 - electromagnetic field (EMF) simulations outside and inside human body
 - validate externally by calibrated field probe measurements
 - validate internally by quantitative MRI field mapping
- patient safety concept for parallel transmission
- metric to assess implant safety
- photon dosimetry for MRI accelerators
- biological response to photons at high B fields



Partners



Letters of Support



Collaborators

