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Brussels, 11th of November 2015

Subject | Minutes of the WG meeting

“Coating requirements for magnetic particles to be used for magnetic hyperthermia”, 2nd Management Committee Meeting and ICoN Dissemination conference

of COST Action TD1402 - Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy (RADIOMAG)

*St. Raphael Resort, Limassol, (Cyprus)
27-29th of October 2015*

1. Welcome to participants

The participants were welcomed 9:30 h by the local organiser Andreani Odysseos. Next, the Action Chair Simo Spassov welcomed the participants and opened the meeting.

2. Adoption of the agenda

adopted

3. Meeting content

1st day, 27th of October

Morning

The Chair presented an update of the double blind SAR calibration exercise (*cf.* annex A3), including a timeline, followed by a lively plenary discussion, mainly about

- The necessary concentration of nanoparticles in the ferrofluids to be fabricated by the Providers. It was agreed on that an iron concentration between 3-5 mg /ml should be sufficient.
- Method of determining the iron concentration. The method to be used cannot be prescribed, because the laboratory infrastructure varies from Provider to Provider. However, the method used should be mentioned in the data sheet accompanying the samples
- Next actions: Simo will send out the vials asap after the Limassol meeting, Thanh will prepare the sample data sheet, later a result data sheet will be provided by Daniel Ortega/Silvio Dutz

The discussion took longer as expected, the next talk was shifted after the coffee break. During the second part of the morning session resent research activities of participants were presented in the field of nanoparticle fabrication and characterisation. Christer Johansson from WG2 (Chair of FP7 project NanoMag) presented his project on standardisation of magnetic NP analysis methods, which was of



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particular interest in view of the ongoing SAR inter-laboratory comparison. The session took longer as expected and one talk was postponed after the lunch.

Afternoon

The last talk of the morning session was presented, then participants separated for individual WG discussion on concrete measures for the action strategy.

Next, the WG representatives: Thanh Nguyen WG1, Simo Spassov (substitutional for WG2) and Carlton Jones WG4 presented the discussion outcome and animated the plenary debate.

WG1

- Discussion and revision of the WG1 action strategy (*cf.* Annex M3)

WG2

- Paul Southern: Multicore particles better for MFH due to magnetostatic interaction
- Feedback on Pauls method for the SAR determination – Pauls sends around his paper including downloadable Excel spreadsheet
- Exchange between Luc Dupré, Christer Johansson, Paul Southern, Quentin Pankhurst on modelling hysteresis loops including non-equilibrium effects
- Luc Dupré is interested if the surface anisotropy affecting the SAR. Calculations exit for nanowires but need to be studied for single/multicore particles
- Question to WG1: is it possible to determine the surface roughness of a magnetic NP via this surface area measurements (Nanoflowers) SAX method
- Nanoscale energy transfer to evaluate: Christer Johansson
- Invite Carlos Rinaldi for next workshop (expert in nanoscale energy transfer)
- Safety levels for MFH building of phantoms revision (Luc), standardised way for revising the Brezovich criterion PhD project (WG3 input required Spirou)

WG4

Carlton Jones who replaced Olivier Sandre, informed the participants about the ongoing activities. WG4 is busy with precise frequency and field intensity determination in MFH systems. A protocol is currently elaborated. From internal WG discussions resulted, that non-invasive and contactless thermometry methods are promising for MFH application (*e.g.* thermal variation of the signals in MRI or in MPI for in vivo MFH, or of luminescence/fluorescence probes for in vitro MFH), and WG4 will go in that direction through future STSM applications (*cf.* Annex A4).

After the plenary debate, the Chair gave an update about the activities concerning the Action webpage. It was discussed and agreed on the proposal of Neolab (*cf.* annex A5) and the Action logo (annex A6). The Chair will execute an official offer for the website development immediately after the meeting.

The session was closed at 6:30 PM and informal discussions continued during the conference dinner.

2nd day, 28th of October

Morning

The morning session was devoted to oral presentations dealing with scientific advances in RADIOMAG research. The presentation “*An Overview- Calibration exercise for proprietary products available to the*



Action – WG1 Chair or representative” was cancelled, because this was presented already the previous day. Instead, flash poster presentations were given. An extensive coffee break was allowed for poster presentations/discussions.

Instead of separated WG meetings, a general plenary discussion was hold after the coffee break. The following was pointed out:

- WG1 provide mapping of coating techniques / types and send to WG3 for evaluation
- WG1 who can fabricate which type of magnetic NP: Nanoflower / cubes /spherical
- Eleni Efthimiadou has an animal testing facility (mice toxicity, tumour efficacy), also Fernando Plazaola and Olivier Sandre are experienced in MFH animal testing
- WG2: provide a table with who can do what (techniques / instrument)
- WG3 provide available testing protocols
- Expertise of members separated by WG / update existing files (WG1/WG3/WG4)
- SAR values in function the viscosity of the carrier fluid
- Heat map (methods how this is done, in dependence of the excitation for future MFH treatment planning)
- For modelling/prediction of cell death: development of a MFH energy deposition concept instead of temperature for future treatment planning, in order to have a measure of MFH induced cell death during successive MFH sessions
- For experimental control: CEM₄₃ values instead of “heat dose”

Afternoon

The whole afternoon was dedicated to the MC meeting (*cf.* Annex M1 & M2).

4. Next Meeting

The next meeting will take place in Athens, Greece, 7th – 8th of April 2016.

5. Closing

The Action Chair thanked the local organiser for the excellent organisation of the meeting, the participants for their contribution, and closed the meeting closed around 6 PM.

6. Dissemination conference 29th of October 2015

Within the frame of the 2nd International Conference on Nanotheranostics (ICoN) a session on thermotherapy was organised by RADIOMAG members, i.e. Session I – Emphasis Session: Challenges in Thermotherapy (*cf.* Annex A7). Four oral presentations were given by RADIOMAG members and Chair presented briefly COST RADIOMAG Action to non RADIOMAG members present at the ICoN conference (*cf.* Annex A8).

7. Abbreviations

| | |
|-----|----------------------------|
| AOB | Any other business |
| CG | Core Group |
| EMA | European Medicines Agency |
| ERT | External radiation therapy |
| FF | Ferrofluid |
| FP | Frame Work Programme |



| | |
|------|-------------------------------|
| GP | Grant period |
| MC | Management Committee |
| MFH | Magnetic fluid hyperthermia |
| NP | Nanoparticle |
| SAR | Specific absorption rate |
| STSM | Short term scientific mission |
| W+B | Work and budget plan |
| WG | Working Group |

List of Annexes

- Annex A1:** Workshop programme
- Annex A2:** Signed COST Attendance list
- Annex A3:** Chair presentation Calibration exercise
- Annex A4:** WG 4 scientific update
- Annex A5:** Neolab proposal for website development
- Annex A6:** Action logo
- Annex A7:** ICoN conference programme
- Annex A8:** Introduction RADIOMAG (ICoN)

- Annex M1:** Agenda MC meeting
- Annex M2:** MC meeting minutes
- Annex M3:** RADIOMAG member statistics
- Annex M4:** ToDo-Done list of the Brussels CG meeting
- Annex M5:** STSM budgets and information
- Annex M6:** financial information for GP1
- Annex M7:** preliminary financial information for GP2
- Annex M8:** Revised Action strategy
- Annex M9:** W+B plan GP2