

1. **Thank you for the opportunity of presenting my comments, as sent via e-mail. Hello to the many friends present at CERN! These notes are written “in real time”, as I listen to the live broadcast of the meeting, hence excuse their poor coherence....**
2. **Comment on range of needs to be supported by the CERN Radiobiology/Hadron Radiotherapy Project** (a name I have just invented – how about CERN- RHRP?)
3. **Areas to be covered by RHRP:**
 - a)- Issues related to hadron radiotherapy (including radiobiology basis, beam delivery, etc.)
 - b)- Issues related to ion radiobiology modelling (cell cultures, animal studies)
 - c)- Issues related to ion dosimetry (standards, protocols, detectors)
 - d)- Issues related to physical data required for above (input for MC, experimental verification of energy-fluence spectra, etc.)
4. **Particular comments:**
 - I support the “radiobiological data factory”(idea presented by Ken Peach), but there has to be agreement on the RB model to be used as a basis for such measurements. I strongly suggest Track Structure (TST) models, such as Katz’s model, but also other models, to indicate particular areas where the most appropriate model may be selected by experimental results. This means that only predictive models should be selected as basis for designing systematic measurements (along the lines presented by Niels Bassler). We need to know what is result is expected , to design the measurement properly (such as is the case with the Standard Model in HEP)
 - To do this, a large range of ion species and energies (LET) should be covered, in order to cover the range below and above the RBE maximum . RBE is known to depend on track structure, so we expect different RBE-LET dependences for different ion species. Hence, the range of ions to have would need to cover Z=1 through lead or uranium, if possible of energy ranges up to, say 250 MeV/amu.
 - Dose rates: to cover RT issues (Gy/min), but also mGy/min (for radiation protection)
 - Beam orientation & field sizes: a vertical beam (upward, to go through the Petri dish) would be nice, for radiobiology studies, on top of a standard horizontal beam. Beam size – to uniformly cover the area of a Petri dish, but also small c/s for animal experiments.
 - SOBP: passive is minimum requirement ,possibly active – copying available RT solutions (for radiobiology studies, developing a dedicated active beam would be expensive!)
 - Reference radiation source: Co-60 (disused Co-60 RT unit) is much better than X-rays!
 - Equipment for physical measurements: dosimetry (apply/refer to IAEA standards and dosimetry protocols), to measure energy-fluence spectra in different media, as basis for MC models.
5. **Notes on organization**
 - A Biolab unit of the RHRP , to be staffed permanently by CERN-based staff, to assign beam-time, control beam for experiments and review and oversee/manage projects and experiments proposed and performed by a European Consortium of networking laboratories (presumably sponsored by a EU project). An international scientific board to select projects, etc.
 - Closely collaborate with NASA’s Life Project (Frank Cucinotta), to learn from their experience.

That is the best I could do in the time available! Best wishes from Pawel Olko and myself to our Friends at CERN and Manjit in particular!

Mike Waligorski (tel. +48 12 423 10 67, at Centre of Oncology, Krakow Poland)