RENEB DEMONSTRATION WORKSHOP

Brussels, 26 November 2015

Feedback from the discussion group on research issues

The group acknowledged that the RENEB laboratories comprise a consortium of excellence within the EU for undertaking biodosimetry and include most, if not all, of the leading European laboratories in this specialised discipline. Given that the frequency of radiation accidents is thankfully low, all the RENEB laboratories already devote much of their time to research. They have in many cases a long and successful history of undertaking research, both singly and in collaboration, extending back decades, long before the inception of RENEB. The discussion group felt that the present consortium is an ideal European resource to support future research projects. There was no doubt that, depending on the particular project and the expertise in appropriate assays, partnership combinations of some RENEB laboratories are ideally suited. However there was some discussion on whether the RENEB network itself could be considered as a central 'official' resource. It depended on how the consortium is structured and some thought may need to be given to firming it up from a group linked by memoranda of understanding to something more binding, perhaps more akin to EURADOS.

RENEB is ideally placed to undertake a wide range of research activities. Firstly, there is research directly related to biodosimetry. This includes the improvement and refinement of near-horizon deployable techniques with both biomarkers of radiation and non-biological methods. The latter, especially, will integrate well with some areas of interest to EURADOS. A good example of near-horizon assays mentioned in the discussion is the work already reported by two RENEB members on combining premature chromosomal condensation with FISH to highlight telomeres and centromeres. Moves to automate this assay will add to the more rapid provision of dose estimates already inherent in the PCC method. Far-horizon scanning for new methods is a function that should also be within the RENEB remit.

Many of the existing assays are well developed so that they are immediately available in the event of small or mass casualty events. Here RENEB also has a function which is probably better described as servicing, rather than research, to maintain their readiness for Europe. The network can serve by providing the means for quality assurance (QA) in the various assays; regular laboratory inter-comparisons are an essential requirement laid down by the ISO standards. RENEB can also work to improve the efficient mobilisation of biodosimetry; communications, exchange of patients' specimens, integrated data collection (e.g., telescoring) and coherent dose reporting. These are all areas that will be particularly stressed in the event of a major radiation emergency that could also cause social disruption.

Apart from human biodosimetry RENEB partners have considerable experience in using a lot of assays that are highly applicable to other areas of radiological research that are supported by various EU programmes. Biomarkers can, for example, be measured in most non-human animal species including invertebrates that are of direct interest to radio-ecological research. Some assays, both at the DNA level and also chromosomal, may also be applied to plant material. In most instances transferring particular assays from human to non-human biota will require research because generally the relevant biological systems, such as the human lymphocyte, are not so well understood in other species.

The assays available to RENEB are also highly relevant to radiological research that is more directed to medical issues. The discussion group noted that a medical radiation research platform is soon to be established by the EU and felt that RENEB had a lot to contribute. Several examples were suggested: Individual radiosensitivity is an area of direct interest to radiotherapy, and possibly some techniques in diagnostic radiology too. There is a strong need for a reliable assay that can distinguish patients likely to over- or under-react to the standard doses used for many conditions and examinations. Several of the chromosomal and DNA biomarkers have been shown to have potential in this respect but need more research to improve their precision. It was noted that one of the RENEB laboratories already has developed a DNA repair assay that is being used clinically in treatment planning for some radiotherapy patients. It would need the resources of a consortium such as RENEB to bring this to wider application.

Another example of a medical application was cited. Treatment with internal radionuclides (e.g., radio-iodine to treat thyroid cancer) can be very effective but there is concern among the clinicians on the unwanted dose delivered to other organs and tissues. For example, what is the effect of radio-iodine on the bone marrow and the possible risk of treatment-induced leukaemia? FISH cytogenetics in easily obtained lymphocytes provides a means of examining biomarkers of damage induced in stem cells and measures the kinds of transmissible chromosomal lesions that are known to be involved in the initiation and promotion steps in carcinogenesis. The FISH methods are established as a routine assay for retrospective biodosimetry in many RENEB laboratories and are easily translatable to such medical questions.

In the event of a major radiological disaster in Europe, long-term research will eventually be established. Just as has happened in Hiroshima, Chernobyl, Mayak/Techa communities the medical authorities will monitor for increased incidences of diseases (cancer, cataract, cardiovascular, neurological). The RENEB consortium has many of the tools needed to provide the dosimetry arm of an epidemiological research programme that will inevitably be set up. From a horizon scanning perspective a long term objective in radiobiology is to find a biomarker for distinguishing cancers cause by radiation from those due to other agents. The discussion group felt that if such a radiation 'fingerprint' ever emerges it is likely to be based on a DNA assay still to be discovered. The types of DNA methods at the gene level currently being researched in RENEB for biodosimetry could well be from where a radiation marker might be found.

The discussion group considered where RENEB gives the most added value to partner laboratories. From the routine biodosimetry aspect RENEB is valuable as a means of providing on-going QA checks. It would be useful if the consortium could issue certificates of competence but their recognition would depend on the degree to which RENEB is considered as a legal entity of proven standing. Apart from this service role the value to individual member laboratories in the field of research could lie in the opportunity to join together in research calls and particularly projects where high capacity large scale studies are needed. The value of being in the consortium would be much enhanced with RENEB being recognised as a point of excellence by various EU platforms; MELODI for low dose research; ALLIANCE for radioecological markers; NERIS for emergency response; and the new Medical radiation platform for issues such as discussed above.

The overall opinion of the discussion was that it was in the interest of Member States to encourage their national laboratories to join the RENEB network not only for strengthen their biodosimetry capacity but also to enhance their research activities. These include both research directly aimed at improving biodosimetry and also the exploitation of their specialist skills to other important areas of radiation research.