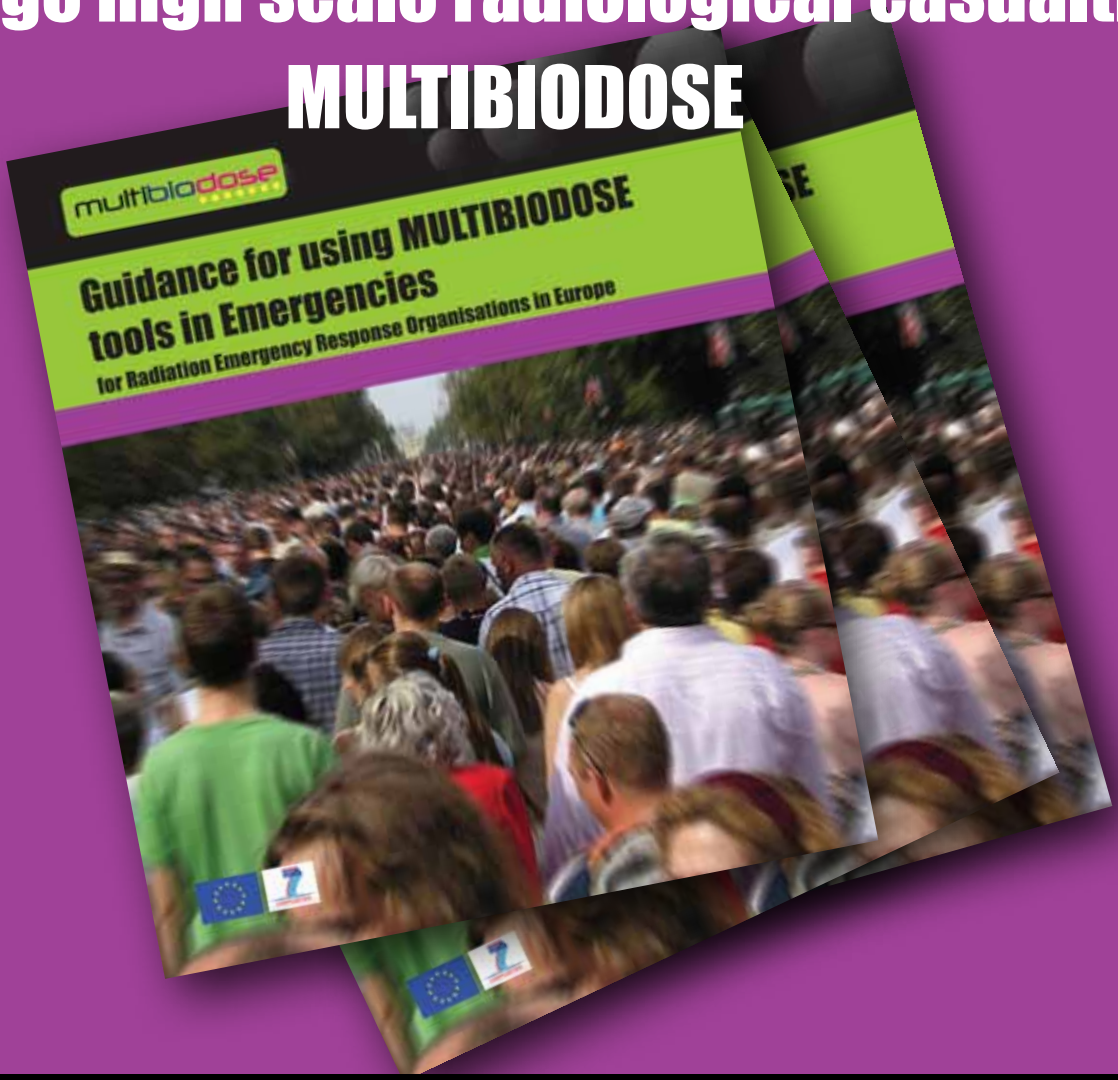
multibiodose

BULLETIN
No. 04 • May 2013

Multi-disciplinary biodosimetric tools to manage high scale radiological casualties

MULTIBIODOSE



The aim of MULTIBIODOSE is to analyse a variety of biodosimetric tools and adapt them to different mass casualty scenarios

This bulletin is the last of four bulletins published by the MULTIBIODOSE project and will focus of the final outcomes of the project that were achieved during the whole duration of the project (i.e. 1st May 2010 - 31st April 2013) but completed during the last year of the project, i.e. from May 2012.

Exercises

One of the important final steps of the project was the validation of how the MULTIBIODOSE tools perform in a concerted action in a mass casualty scenario. This was tested by organizing two exercises: the first one tested the performance of biodosimetric triage for cytogenetic assays and γH2AX foci (biological assays), and the second one tested performance of OSL and EPR assays (physical assays) using components of smartphones. Information about the exercises is given below.

Exercise for testing triage categories for biological assays

For Workpackage 6, dealing with statistics and MULTIBIODOSE software, the final aim was to validate the triage categorisation software package which has been developed as part of the project. The performance of each of the MULTIBIODOSE assays also had to be compared with the other assays. In order to fulfil these aims **an exercise took place in November 2012** which tested **the capabilities of the MULTIBIODOSE project partners in terms of implementation of the biological assays and the provision of the triage status results (low exposure: < 1 Gy; medium exposure: 1 – 2 Gy; high exposure: > 2 Gy) by the MULTIBIODOSE software.**

Actual WB equivalent dose, Gy	Actual triage category	Mean Measured Dose, Gy	SD, Gy	Triage category	Correct category?
0	0-1 Gy	0.224	0.069	0-1 Gy	Yes
0	0-1 Gy	0.054	0.059	0-1 Gy	Yes
0.495	0-1 Gy	0.953	0.183	0-1 Gy	Yes
1.5	1-2 Gy	1.727	0.263	1-2 Gy	Yes
1.5	1-2 Gy	1.731	0.237	1-2 Gy	Yes
1.815	1-2 Gy	2.515	0.281	2+ Gy	No - High
1.815	1-2 Gy	2.149	0.263	2+ Gy	No - High
2.75	2+ Gy	2.966	0.301	2+ Gy	Yes

The combined triage results from a total of 128 individual measurements from seven participating laboratories operating the dicentric, micronucleus and/or the gamma-H2AX focus assay are shown in in table 1 and demonstrate that the triage categorisation was highly successful. The two control dose points (0 Gy), the low dose partial body dose point (0.495 Gy – a mix of 1.5 Gy: 0 Gy, 33%:66%), the medium dose point (1.5 Gy) and the high dose point (2.75 Gy) were all correctly assigned. The two high partial body dose points (1.815 Gy – a mix of 2.75 Gy: 0 Gy, 66%:33%) were incorrectly assigned to the high rather than the medium exposure category. This is not a problems because for triage purposes, it is recommended that individuals receiving a partial body dose of ≥ 2 Gy should be highlighted for further investigations.

Exercise for EPR/OSL assays in mobile telephones

In the period between November 2012 and March 2013, Work package 5, dealing with EPR and OSL assays in portable electronic devices, carried out the **inter-comparison exercise of**

EPR/OSL assays. The exercise had two aims: to validate the MULTIBIODOSE protocol among a large number of laboratories, and to disseminate the method so as to prepare the basis for a network that could increase the response capacity to cope with a mass casualty radiological emergency in Europe. Twenty institutes from thirteen European countries and two US institutes participated in the inter-laboratory exercise. The participating institutes were all EURADOS members. Thirteen institutes took part in the OSL exercise, and eleven in the EPR one. During a two-day preparatory meeting, organized at IRSN, the participants were trained on the use of the protocols and had the opportunity to gain expertise on the various steps of the method, i.e. sample preparation, measurement, signal evaluation and uncertainty assessment.

The participants received four blind samples (glass from smartphone touchscreens for the EPR exercise, and intact mobile phones for the OSL exercise) irradiated with doses between 0–4 Gy. The results of the EPR exercise were presented at the EPRBIODOSE 2013 conference in Leiden, Netherlands, whereas the OSL results will be presented at the Solid State Dosimetry conference in 2013 in Recife, Brazil.

European institutes and universities that participated in the EPR/OSL exercise.

1.Istituto Superiore di Sanita', Italy 2. Institut de Radioprotection et de Sûreté Nucléaire, France 3. Helmholtz Zentrum Muenchen, Germany 4. Università di Palermo, Italy 5. Medical University of Gdansk, Poland 6. CEA – Centre de Saclay, France 7. Linköping University, Sweden 8. University of Oslo, Norway 9. Université Catholique de Louvain, Belgium 10. The Henryk Niewodniczański Institute of Nuclear Physics Poland 11. IRSN and S. V. University, India 12. Naval Dosimetry Center, MD-USA 13. University of Balikesir, Turkey

MULTIBIODOSE guidance

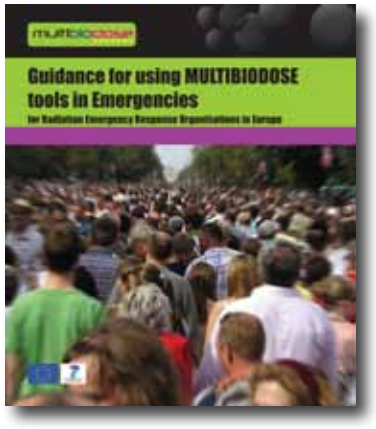
During the last year of the projected the Guidance on using MULTIBIODOSE tools in emergencies had been developed. The guidance is intended for authorities involved in radiation protection and emergency preparedness and response. The electronic version of the guidance is available on the MULTIBIODOSE web page: www.multibiodose.eu. The printed version of the guidance will be distributed among relevant European radiation emergency preparedness, radiation protection and health protection authorities.

Participants of the preparatory meeting for EPR/OSL exercise. The meeting took place at IRSN in Fontenay-aux-Roses, France.

The combined application of MULTIBIODOSE (MBD) tools is recommended in order to comprehensively manage complex radiation exposure scenario.

The MBD consortium proposes that:

- In an emergency situation a MBD laboratory in the affected country (or another national laboratory designated to perform biodosimetry) will act as the “core” or “administrative” coordinating laboratory.
- This laboratory will be in charge of the decision regarding which assays should be used and how other laboratories can be involved.
- The laboratory will give advice to the health and radiation protection authorities about collection of samples.
- This laboratory will collect the results from other MBD laboratories and will apply the MBD statistical software for the whole spectrum of applied MBD assays. In the end, this laboratory will provide the health and radiation protection authorities with dosimetric and radiological triage categorisation results to support medical and public health decisions.



Last MBD Consortium events

MULTIBIODOSE and BOOSTER meeting, Leiden, Netherlands, March 23rd, 2013

On the occasion of the EPRBioDose International Conferences, 24-28 March 2013, Leiden, Netherlands, a workshop was organised for the partners of the MULTIBIODOSE and BOOSTER EU 7th Framework SECURITY projects. First, the coordinators of both projects gave overview lectures describing the aims and programs of both projects. Thereafter, leaders of work packages and tasks presented the results. A discussion followed where the project partners could get to know each other and exchange experience. BOOSTER and MULTIBIODOSE complement each other in that BOOSTER focuses mainly on developing tools for measuring contamination, while MULTIBIODOSE focuses on biodosimetric tools. All participants agreed that the meeting was successful in that it opened the road for possible future collaboration between the partners.

Coordinators of the Multibiodose and Booster projects lead the discussion about possible future collaboration

Discussions between the members of both consortia

The MULTIBIODOSE consortium meeting during the EPRBioDose 2013, in Leiden.

During the afternoon of March 26th 2013 the MULTIBIODOSE consortium meeting was organized. The meeting was almost entirely devoted discussions about the contents of the first draft of MULTIBIODOSE guidance. It was agreed that the second draft to be distributed to all consortium members and the feedback to be collected by e-mail.

MULTIBIODOSE Final Annual Meeting at Baglio Oneto, Marsala, Italy, May 7th–9th, 2013

The meeting was organized in Baglio Oneto, near the historical town Marsala, by the Italian partners. The MBD consortium thanks the Italian colleagues for the terrific organisation of the meeting.

The meeting addressed the three most important and urgent issues that demanded to be discussed by the whole consortium: the software, the guidance and a strategy on how to proceed after the end of the project. The project coordinator Andrzej Wojcik summarized the project and stated that the major outcome is a functioning network of biodosimetry laboratories in European countries with validated methods that are ready to use. All partners agreed that MULTIBIODOSE was highly successful in that it significantly improved the radiation emergency preparedness in Europe.

Publications of MULTIBIODOSE project from June 2012:

- **Ahmed EA, Agay D, Schrock G, Drouet M, Meineke V, Scherthan H. (2012) Persistent DNA damage after high dose in vivo gamma exposure of minipig skin. PLoS One. 7(6):e39521**
- **Rothkamm K, Barnard S, Ainsbury EA.,Al-hafidh J, Barquinero JF, Lindholm C, Moquet J, Perälä M, Roch-Lefèvre S, Scherthan H, Thierens H, Vral A, and Vandersickel V-(2013) Manual versus automated γ-H2AX foci analysis across five European laboratories: can this assay be used for rapid biodosimetry in a large scale radiation accident? Mutat Res, in press.**
- **Romm H, Ainsbury E, Barnard S, Barrios L, Barquinero JF, Beinke C, Deperas M, Gregoire E, Koivistoinen A, Kulka U, Lindholm C, Moquet J, Oestreicher U, Puig R, Rothkamm K, Sommer S, Thierens H , Vandersickel V, Vral A, Wojcik A.(2013) Automatic scoring of dicentric chromosomes as a tool in large scale radiation accidents. Mutat Res, in press.**

Several other manuscripts are being prepared.

Presentations of Multibiodose on international meetings from June 2012:

- 1st Joint meeting ARPE-GERPE-GIRSE, Terrasini 3rd-6th October 2012. Oral presentation P.Fattibene
- European Radiation Research 2012, Vietri sul Mare, 15th-19th October 2012. Oral presentation A. Wojcik.
- The 10Th International Symposium on Chromosomal Aberrations (ISCA10), Amalfi, Italy, October 19th-21st, 2012. One poster.
- Seminar of Metasystems, Salisbury YMCA Hotel, Kowloon, Hong Kong, 4th-6th December 2012, lecture A.Wojcik.
- 1st Indo-Swedish Symposium on Assessment and Minimization Oo Radiation Exposure and its Biological Effects. New Delhi, 7th February 2013. Lecture A.Wojcik.
- Seminar At The Hirosaki University, Japan, 7thMarch 2013. Lecture A.Wojcik
- BOOSTER and MULTIBIODOSE, Leiden, The Netherlands, March 23, 2013. Several oral presentations from MULTIBIODOSE WP leaders.
- 3rd Coordination Meeting Of The WHO BIODOSENET, Leiden, The Netherlands, 24.03.2012. Three oral presentations: H.Romm and A. Wojcik.
- The Joint International Symposium on EPR Dosimetry and Dating and The International Conference On Biological Dosimetry (EPRBIODOSE 2013), Leiden – The Netherlands, 24rd-28th March 2013. Four oral presentations: P Fattibene, H.Romm and A. Wojcik. Six posters.
- Conrad Global Conference on Radiation Topics, Munich, Germany, May 13th – 17th, 2013: Two oral presentations: P.Fattibene and H.Romm.
- 8th Future Security Research Conference 2013, Berlin Sept. 17th – 19th, 2013. Oral presentation H.Romm.

Consortium Member institutions:

Stockholm University	Stockholm University (SU), Sweden	STUK	Radiation and Nuclear Safety Authority (STUK), Finland
Bundesamt für Strahlenschutz	Bundesamt für Strahlenschutz (BfS), Germany	UAB Universitat Autònoma de Barcelona	Universitat Autonoma de Barcelona (UAB), Spain
UNIVERSITEIT GENT	Universiteit Gent (UGent), Belgium	ichtj	Institute of Nuclear Chemistry and Technology (INCT), Poland
Health Protection Agency	Health Protection Agency (HPA), United Kingdom	HelmholtzZentrum münchen German Research Center for Environmental Health	Helmholtz Zentrum München (HMGU), Germany
IRSN	Institut de Radioprotection et de Sûreté Nucléaire (IRSN), France		Bundeswehr Institut für Radiobiologie in Verbindung mit der Universität Ulm (BIR), Germany
	Istituto Superiore di Sanità (ISS), Italy	OXFORD	Gray Institute for Radiation Oncology and Biology, University of Oxford (UOXF), United Kingdom
Statens strålevern	Norwegian Radiation Protection Authority (NRPA), Norway	EURADOS	European Radiation Dosimetry Group (EURADOS), European network registered in Germany

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