

Editorial

Research infrastructures are committed to provide access to the most advanced, unique, and large-scale resources, instruments and expertise in Europe. These services enable European scientists to conduct competitive and cutting edge research. The necessity to focus on research infrastructures in Radiation protection has been highlighted in the HLEG report in 2009. Since then, large EURATOM projects such as DoReMi, OPERRA, STAR... include specific WPs and tasks dedicated to infrastructures.

completed for the other radiation protection platforms, NERIS, and Medical Use. The resulting database will have to be searchable. Then, to best utilize existing resources, the emphasis will be on promoting the visibility and use of mature infrastructures, so as to avoid unnecessary costs and duplication. Moreover, the sustainability of rare but necessary facilities (such as those for internal contamination) will be given priority. Furthermore, an effort will be made to harmonize practices and protocols amongst multiple facilities. The use of certain types of infrastructures or the analysis of resulting data requires a high level of expertise and training. Working closely with WP7- Education and training, WP6 will examine the possibility to develop specific training courses built around the use of infrastructures. Last but not least, funding strategies will be developed.

The CONCERT Infrastructure Bulletin will be published each month (10/year) in order to develop the means to better inform radiation protection scientists of those facilities that are best adapted to their research needs

and to increase the visibility of recommended infrastructures. Three infrastructures will be described; one amongst exposure platforms, one amongst databases, biobanks, and cohorts and one amongst analytical platforms. These will then be published as a web-Handbook.

I invite you to provide your feedback concerning the Bulletin and to indicate how we can improve it. Your comments will be most welcome.

WP6 participants: CEA, LTP NMBU/NRPA, IRSN, CIE-MAT, RIVM, BfS, MTA-EK, SCK-CEN, STUK, HMGU, UniPv, ISS, KIT, EEAE, LTP SU/MELODI, NRPA, NCRPP, UL, LTP GSI/HMGU, LTP CTU-FBME/SURO

Promote the visibility of selected research infrastructures

- Listing the infrastructures
- Develop and update quality criteria and lists of recommended infrastructures
- Increase the visibility of recommended infrastructures

Harmonize practices and protocols

- Maintaining STORE, FREDERICA and other databases
- Incrementing databases
- Retrospectives studies
- Harmonization and exercises

Strategy for facilitating Access to infrastructure

- Identification of the needs to support sustainability of critical (including rare) facilities
- Developing training
- Existing procedures
- Funding scheme (within infrastructure/within project)

WP6 tasks and subtasks

Surveys performed in former projects have revealed **that the prevailing opinion is that most necessary infrastructures are already available** although not at the bench of each user. Indeed, besides the funding of experiments, the access to state of the art infrastructures is a major bottleneck. It will be the major focus of CONCERT-WP6: Access to Infrastructures.

Infrastructures include so-called large infrastructures such as exposure facilities including those for animal and plant experiments (both laboratory and field facilities), epidemiological cohorts, biobanks, databases and analytical platforms (including e-infrastructure). The WP6 tasks and subtasks are described in the scheme. The first focus will be the listing of infrastructures and the description of requested criteria. Extensive lists of relevant large infrastructures were generated for low dose research, radioecology, and dosimetry, but they need to be updated, to include those of all European partners and to be

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CONCERT WP6 Leader
« Access to
Infrastructures »



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Future events:

- 11 Nov 2015 :** ExB meeting, Munich, Germany
- 12 Nov 2015 :** MB meeting, Munich
- 11 Jan 2016:** 1st Call launch

WP 6 News:

- 31 Oct 2015: D6.1**
Recommendations for infrastructure related topics for the 1st CONCERT call and Recommendations for funding schemes to support infrastructure use for the 1st CONCERT call input to WP3
- 9 Nov 2015 : WP6 Working Dinner:**
19h30-21h30 - Munich at 7th MELODI WS
- 31 Jan 2016: D6.2**
List of recommended infrastructures for radio protection research

Summary:

Exposure platforms	FIGARO
Databases, Biobanks, Cohorts	FREDERICA
Analytical platforms	RENEB

Next issue

November 2015



Exposure platforms

FIGARO

Low Dose Irradiation Facility at the Centre for Environmental Radioactivity

The Norwegian University of Life Sciences (NMBU) has had a gamma irradiation facility on campus since 1952. In 2003 a facility for low-dose exposure ecotoxicological experiments was opened and used for a variety of chronic and sub-chronic exposure studies (e.g., fish, mussels, earthworms, plants). With the support of DoReMi, the facility underwent extensive upgrades in 2012 in order to meet the requirements for small rodent chronic exposure experiments. The present facility, FIGARO, at the Centre of Environmental Radioactivity (CERAD), is equipped with a climate control system (temperature, light, humidity), and is fully approved as an animal research facility, including the use of GMO rodent and other plant and animal models.

The capacity for small rodent irradiation depends on the dose rate and the animal cage system. FIGARO has access to both [ScanClime](#) and Innovive racks. As an example, irradiation of up to 150 mice can be carried out at 2 mGy/hr with an additional 80-160 controls, and larger numbers can be accommodated at lower dose rates. DoReMi has supported collaborative projects involving long-term irradiation of mice (up to 3 months). These projects involved the successful transport, irradiation and return of



Ole Christian Lind

Photo: H. Sparre/NMBU

ID Card:

Exposure type:

External (internal possible), multiple stressors

Source:

Co-60

Dose rate:

3 Gy - 400 uGy/hr

Irradiation type:

Gamma

Irradiated organism type:

Cell cultures, animals (small rodents, fish, amphibians, invertebrates), plants. Multi-species microcosms. Approved for GMO organisms.

Address:

Centre For Environmental Radioactivity (CERAD), Norwegian University of Life Sciences, PO Box 5003, 1432 Aas, Norway

Access:

Joint research collaborations only, ongoing applications

Supporting lab:

Molecular and biochemistry analysis or sampling for biobanking, histology and microscopy analysis, plant cell culture, dissection.

Internet link:

www.nmbu.no/cerad

Contact:

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Coordinator of laboratory animal science

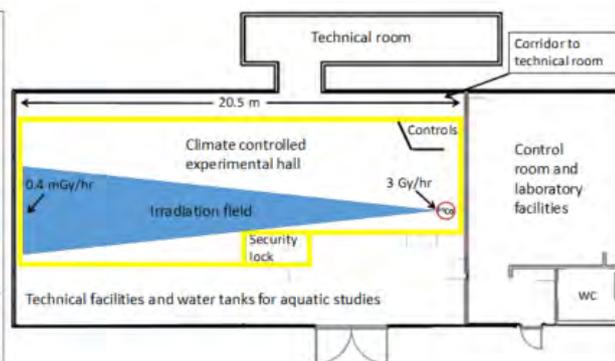
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Related to:

ALLIANCE/MELODI



The NMBU FIGARO gamma irradiation facility. Left: The ^{60}Co source installation located at the front of the experimental hall. Right: Outline of the facility. The ^{60}Co irradiation source (red circle) is at the front end of a climate controlled experimental hall (shown in yellow).

FIGARO is primarily designed as an external gamma irradiation facility, although it is also authorised for radionuclide internal exposure (including alpha emitters), as well as other chemical stressors (e.g., metals, organics, nanoparticles) and UV exposure. The irradiation source is 12 Ci Co-60 which provides a continuous dose rate field from 3 Gy/hr (at source) down to 400 $\mu\text{Gy/hr}$ (when maximally loaded) and allows simultaneous, chronic exposure of samples over the whole dose-rate field. Temperature and pH controlled flow-through systems are available for aquatic organism exposures. The climate control specifications for the experimental hall are: Temperature: 4 - 37°C (+/- 1°C) Light: ca. 50 - 300 lux with automatic dimmer (10 min) Humidity: 45 - 65% (ScanClime) Ventilation: 300 m³/h.

(*Lemna minor*, Norway spruce, Scots pine, *Arabidopsis thaliana*) and multi-species cosm-exposure.

CERAD/FIGARO is open for collaboration, and we welcome suggestions for projects with CONCERT partners.



Irradiation of zebrafish at the NMBU FIGARO gamma irradiation facility.

Photo: NMBU

FREDERICA

A unique database on the effects of ionising radiation in non-human biota

Knowledge of ionising radiation-induced effects on diverse organisms is crucial to assess the radiological impact on the environment. The FREDERICA radiation effects database was developed to provide an online compilation of the known effects of ionising radiation on non-human species. The database was produced under the EC funded project ERICA (Environmental Risk from Ionising Contaminants: Assessment and Management) and is available online (see link in ID Card).

FREDERICA contains some 30,000 data entries from 1,231 references. The data entries correspond to pairs of points (exposure level, biological

Within the information compiled in FREDERICA, 64% of the data sets have been obtained after acute and transitory exposure to radiation (59 and 5%, respectively), whereas 36% of the data sets have been obtained after chronic irradiation. Chronic irradiation studies are considered to be more relevant to environmental radiological protection [2]. Considering chronic exposure data, fish, mammals and terrestrial plants are the wildlife groups most widely reported, representing 70.5% of the FREDERICA data for chronic irradiation. The information is scarce for bacteria, crustaceans, fungi, moss and lichen, and zooplankton, since only one or two references have been found for these groups. There is no information on the effects of chronic irradiation for amphibians, aquatic plants or reptiles [1].



Almudena Real

FREDERICA offers several search capabilities (see Figure above), for which outputs can be exported as an Excel or text file.

The FREDERICA database has been used in many applications, such as:

- Helping define biological effect levels.
- Inclusion as part of the ICRP Reference Animals and Plants (RAPs) review.
- Inclusion as part of the UNSCEAR review on biological Endpoints.
- Integration into the ERICA Tool to perform environmental risk assessments.

cal effect) along with information on the conditions in which these data were obtained (tested species, life stage, exposure regime, effect endpoint, etc.). The data are organised into wildlife groups (amphibians, aquatic invertebrates, aquatic plants, bacteria, birds, crustaceans, fish, fungi, insects, mammals, molluscs, mosses/lichens, reptiles, soil fauna, terrestrial plants and zooplankton). While the biological effects reported in the database are at an individual level, the endpoints considered include those relevant to possible responses at the population level (e.g. reproductive capacity, mortality, morbidity and mutations) [1].

Each reference in FREDERICA was reviewed for the information that is available to the reader in relation to dosimetry, experimental design and statistics. The information provided was scored to reflect the presence or absence of these key data. This provides a measure of the quality of the information in each reference so that if further work is needed (e.g. to refine risk assessment criteria) those papers which contain most, if not all, of the likely information can be easily found.



ID Card:

Database topic:

Ionising radiation-induced effects

Information available type:

Exposure-biological effect, species, life stage, irradiation regime. Searchable

Data type:

Peer reviewed articles

Link with a biobank:

No

Exportable:

Yes

Species:

Non-human animals and plants

Internet link:

<http://www.frederica-online.org/mainpage.asp>

Access:

Free (user needs to register)

Contact:

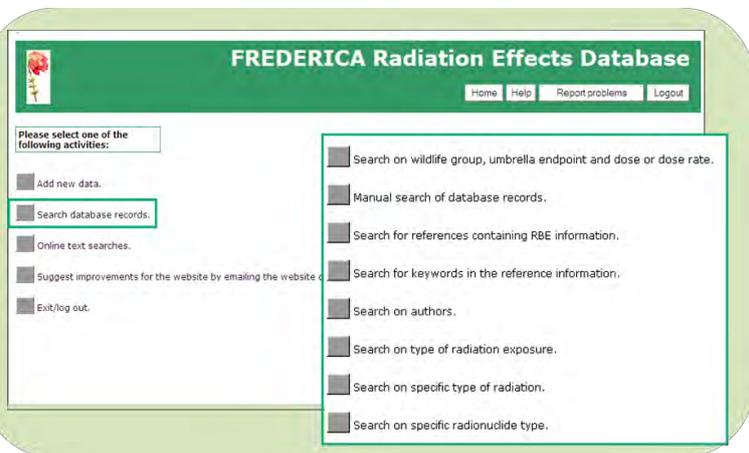
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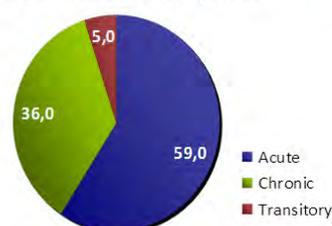
Related to: ALLIANCE



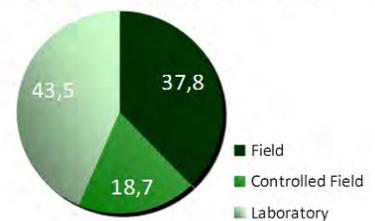
Search capabilities of the FREDERICA database

Information contained in FREDERICA

Type of radiation exposure*



Type of study after chronic irradiation*



* Numbers correspond to % of the references within FREDERICA

[1] THE DEVELOPMENT AND PURPOSE OF THE FREDERICA RADIATION EFFECTS DATABASE. D. Copplestone, et al. Journal of Environmental Radioactivity 99: 1456-1463 (2008).

[2] ISSUES AND PRACTICES IN THE USE OF EFFECTS DATA FROM FREDERICA IN THE ERICA INTEGRATED APPROACH. J. Garnier-Laplace, et al. Journal of Environmental Radioactivity 99: 1474-1483 (2008).

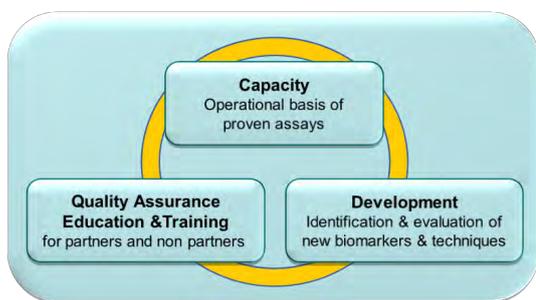


Analytical platforms

RENEB

A network for emergency preparedness and scientific research

RENEB is a European Biodosimetry Network, able to perform large scale rapid biodosimetric dose estimation. Specialized to handle a large number of samples, RENEB contributes to radiological emergency preparedness and large scale research projects. The network infrastructure is based on reliable assays and techniques combined with high performance standards. To enhance the effectiveness of the network, RENEB is linked to global emergency preparedness and response systems as well as to the European radiation research area.



The network was initiated in January 2012 with 23 partners from 16 European countries with the support of the EC (EURATOM FP7, GA 295513). At this time the focus was on emergency preparedness with the aim to significantly increase dose reconstruction capacities in case of large-scale radiological scenarios. Individual dose estimation based on biological samples and/or inert personalized devices has been optimized to support the rapid categorization of many victims according to the received dose. Communication and cross-border collaboration was standardized and cooperation with national and international emergency and preparedness organizations such as IAEA and WHO were initiated.

The value of RENEB to support topics also outside emergency preparedness is now evident. With established strategies to guarantee consistent performance between the partner laboratories, the network has the ability and capacity to contribute to large scale research projects with the analysis of exposure biomarkers. This includes studies on the effects of low doses, group related radiation sensitivity, contribution to non-cancer diseases, and epidemiological studies where sampling and handling of bioprobes is included. RENEB also drives the development and evaluation of new exposure markers with special view to their applicability for addressing acute or protracted exposures as well as exposures dating back years or decades.

As such, RENEB as an analysis platform is of special interest for the Emergency Preparedness Platform NERIS by adding preparedness in the field of individual dose estimation. Moreover it benefits MELODI and EURADOS by providing capacity for radiation research and specialized biomarker development. Concerning the latter, the radiological Platform ALLIANCE will also profit from RENEB. Last but not least, RENEB provides intercomparisons, specialized courses and seminars open also to laboratories outside the network, thus being of relevance for E&T in the CONCERT-EJP.



Photo: ISS/A. Campa

Ulrike Kulka

RENEB was never meant to be a “time limited or closed club” and strategies were developed to identify “candidates” and integrate them as solid partners. Currently, RENEB comprises 22 partners and 7 candidates from 17 European countries. 16 have already signed a MoU, and thus form the nucleus of a unique growing infrastructure, combining high quality standards in the application and validation of biomarkers and maintenance and advancement of scientific and technical competence.

RENEB Consortium: BfS* Germany, BIR Germany, CEA France, ENEA Italy, HMGU Germany, ICHTJ Poland, INSP* Romania, IRSN France, ISS Italy, IST* Portugal, LAFE* Spain, NCRRP* Bulgaria, NCSR Greece, OKK-OSSKI Hungary, NRPA* Norway, PHE* United Kingdom, SERMAS* Spain, STUK Finland, SU-CRPR* Sweden, UAB* Spain, UGent* Belgium, UNITUS* Italy

RENEB candidate: AMVRC* Italy, DIT* Ireland, FZ Jülich Germany, INFN Italy, RPC* Lithuania, SCK•CEN* Belgium, US Spain

*MoU signed



Photo: ISS/A. Campa



ID Card:

Analytical platform type: biodosimetry, markers of exposure, retrospective dosimetry on biological and inert samples

Main techniques proposed: panel of cytogenetic assays, gene expression assay, gamma H2AX assay, EPR/OSL dosimetry

Capacity: emergency situation: up to 1000 samples per week, depending on assay; research: up to 500 samples per week for several weeks, depending on assay;

Delay to start: Emergency situation: immediately, no delay; Research: dependent on the project

Intercomparison exercise options: possible for all network assays and techniques

Training options: possible for all network assays and techniques

Access: Emergency situation: regulated by national authorities; Research: selection by members

Internet link: <http://reneb.eu>

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Related to: Emergency preparedness: NERIS, Research: EURADOS, MELODI,





Future events:

13-14 Oct 2015: Deep Under-ground Laboratories Integrated Activities in biology , [DULIA-Bio](#), Canfranc, Spain
Registration: over

9-11 Nov 2015: [7th MELODI Workshop](#), Munich, Germany
[Registration](#): until 31 Oct 2015

17-18 March 2016: 18th International Conference on Medical Physics, Radiation Protection and Radiobiology, [ICMPRR 2016](#), London, UK
Registration: until 17 Nov 2015 (for author)

24-25 March 2016: 18th International Conference on Radioactivity and Radiation Protection, [ICRRP 2016](#), Madrid, Spain
Registration: until 24 Nov 2015 (for author)

9-13 May 2016: 14th Congress of the International Radiation Protection Association, [IRPA14](#), Cape Town, South Africa
[Registration](#): until 1st May 2016

4-8 Sept 2016: 42nd Annual Meeting of the European Radiation Research Society [ERR2016](#), Amsterdam, Netherlands
[Registration open](#)

3-5 Oct 2016: International Conference on Research Infrastructures, [ICRI2016](#), Cape Town, South Africa

Issue

Exposure platforms

Databases, Biobanks,
Cohorts

Analytical platforms

Already appeared:

Oct 2015, #1

[FIGARO](#)

[FREDERICA](#)

[RENEB](#)

Coming soon:

Nov 2015, #2

B3, animal contamination facility

The German uranium miners cohort

The Hungarian Genomics Research Network