



Cognitive and Cerebrovascular Effects Induced by Low Dose Ionising Radiation

Coordination
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CEREBRAD background

- CEREBRAD aims to **identify the potential cognitive and cerebrovascular risks** of radiation doses **below 100 mGy** when delivered to a **young child** (pre- or postnatally).
 - Health risks will be assessed via **epidemiological studies** of cohorts of **children**
 - subjected to **radiotherapy treatment** receiving low doses to the brain or
 - exposed **in utero or at young age during the Chernobyl accident.**
 - **Experimental data** will be gathered using **animal models** exposed to radiation at different stages of brain development.
 - Emphasis will be put on the effects of **internal and external exposure**, as well as the **combined effect of radiation and environmental pollutants.**
 - Brain of phenotypically relevant animals will be subjected to **deep cellular and molecular analyses** to decipher the biological mechanisms underlying the cognitive and cerebrovascular effects induced by low dose radiation.
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CEREBRAD partners



CEREBRAD kick-off meeting 11 October 2011, Brussels

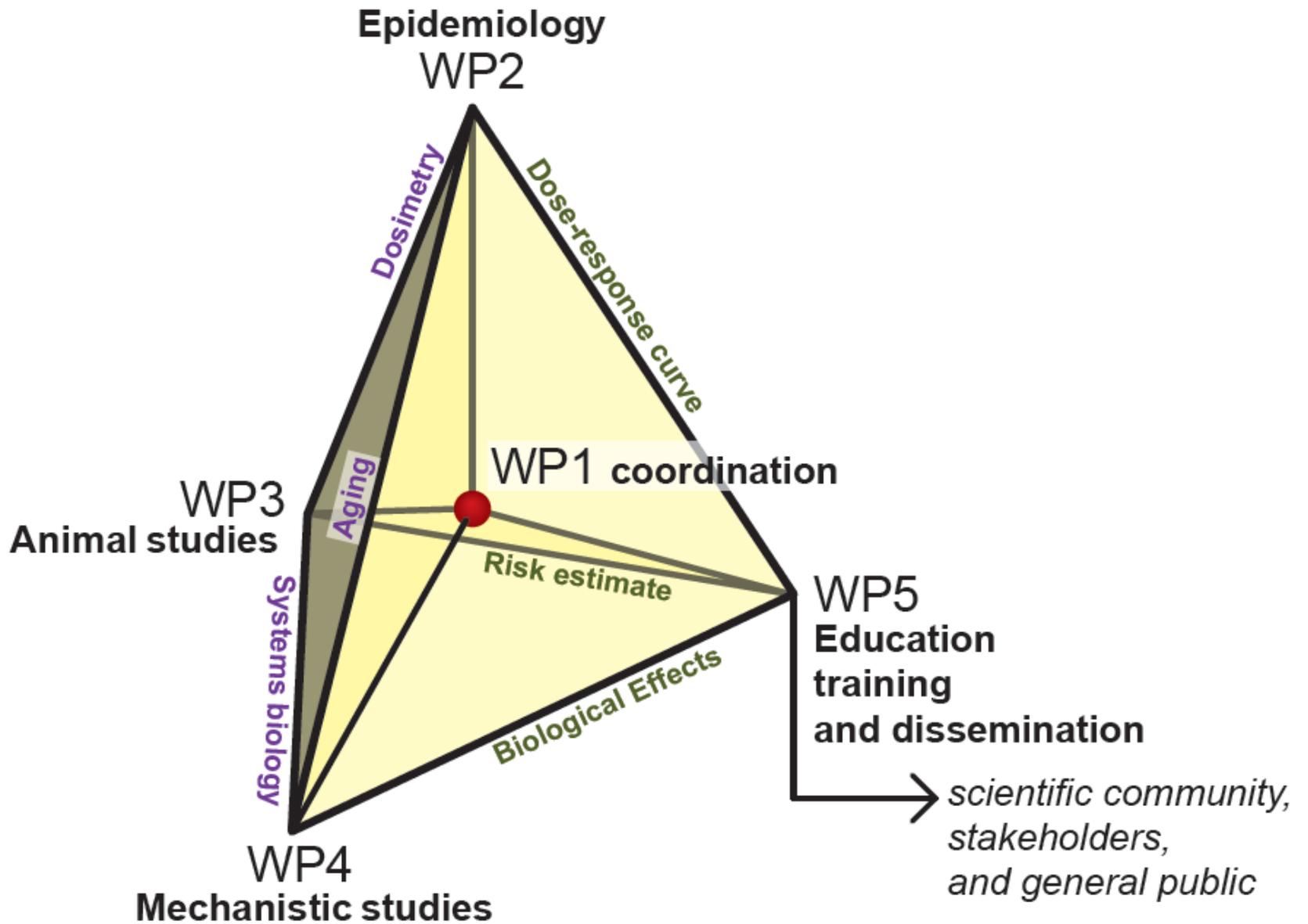
CEREBRAD consortium

Participant no.	Acronym	Organisation name	Country
1	SCK-CEN	Belgian Nuclear Research Center	Belgium
2	EMC	Erasmus University Medical Center Rotterdam	The Netherlands
3	ENEA	Italian National Agency for New Technologies, Energy and the Environment	Italy
4	HMGU	Helmoltz Center for Environmental Health	Germany
5	NRIRR	Frédéric Joliot-Curie National Research Institute for Radiobiology and Radiohygiene	Hungary
6	URV	University Rovira i Virgili	Spain
7	UU	Uppsala University	Sweden
8	RCRM	Research Centre for Radiation Medicine of the National Academy of Medical Sciences of Ukraine	Ukraine
9	AUTH	Aristotle University of Thessaloniki	Greece
10	UBHAM	University of Birmingham	UK
11	IGR	Institute Gustave-Roussy	France



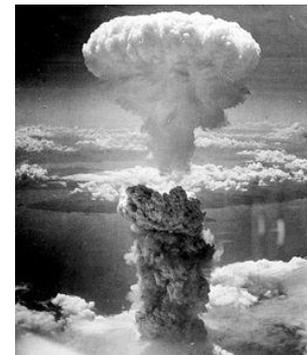
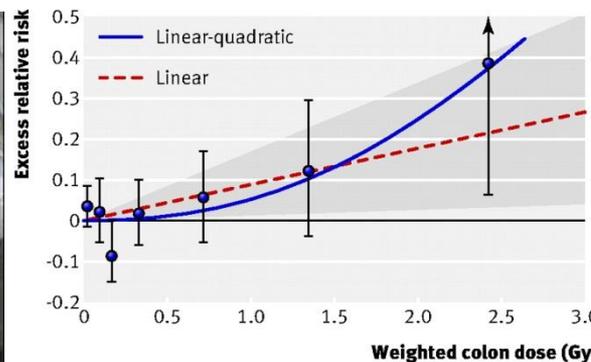
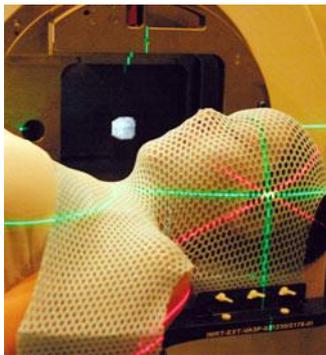
CEREBRAD objectives

- ❑ To **increase the statistical power of epidemiological data** about cognitive and cerebrovascular diseases following low-dose exposures.
 - ❑ To **implement animal studies** at low doses to provide experimental evidence on the **shape of the dose-response curve** for cognitive and cerebrovascular effects.
 - ❑ To **employ appropriate dosimetry calculations** for the human and animal studies that will allow the correct evaluation of the doses to the brain structures.
 - ❑ To **identify the molecular pathways** and regulatory networks underlying the effects of low-dose irradiation, and to apply an integrated systems biology approach to combine data from different levels.
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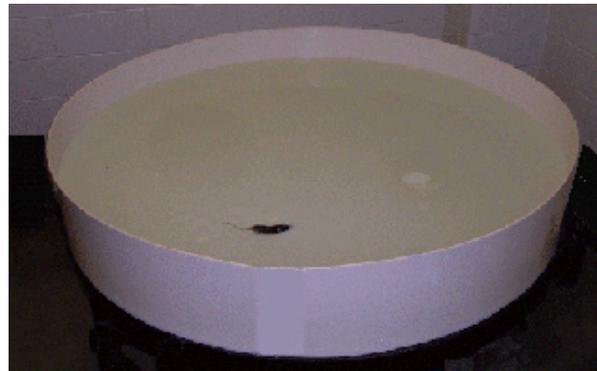
WP2: Human data of cerebrovascular and cognitive late effects

- To validate and localize patients who were treated with radiotherapy for childhood cancer and suffered from cerebrovascular diseases later in life.
- To assess cognitive dysfunctions in individuals exposed during and after the Chernobyl accident.



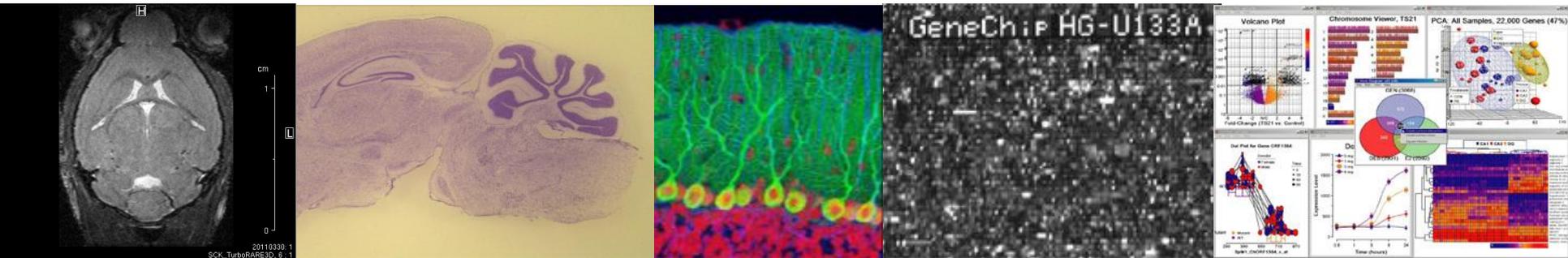
WP3: Cerebrovascular effects in animal studies

- To study cognitive ability and neuro-toxicological effects during *in utero* and neonatal brain development.
- To illustrate the interplay between the vascular and central nervous system in the processing of the response of brain damage induced by low doses of radiation.



WP4: Biological consequences of low-dose ionizing radiation exposure of the central nervous system

- To determine the initial direct events specifically induced by low-dose ionising radiation, which contribute to the etiology of diseases of the CNS.
- To identify a transcriptional and translational fingerprints characteristic for low-dose ionising radiation using advanced bioinformatics for data integration.





Impact

- ❑ CEREBRAD is designed in a way to shed light on different dark spots regarding the cognitive and cerebrovascular effects following exposure to low doses of ionising radiation. A better understanding of such non-cancer effects may have **important implications for risk estimate and protection measures.**
 - ❑ The main impact of CEREBRAD concern the **protection of children bellow the age of years towards exposure to low dose radiation** similar to medical diagnostic procedures (e.g. CT scan).
 - ❑ The experimental design of CEREBRAD will **help to estimate the effect of low vs. high doses of external and internal exposures** to illustrate the direct impact in diagnostic, therapeutic and accidental situations.
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Agenda

- First CEREBRAD annual meeting 22 – 23 October, Tarragona, Spain
 - Students' workshop conference () 24th October, Tarragona, Spain
 - Joint Procardio annual meeting 25 – 26 October, Tarragona, Spain
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Many thanks for your attention

www.cerebrad-fp7.eu