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Unit I5 – Climate change and environmental risks

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EUROPEAN COMMISSION

European Research on Environment and Health

Projects of the Sixth Framework Programme

edited by
Climate Change and Environmental Risks Unit

Environment Directorate

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Foreword

The European Union has been at the forefront of research in the area of environment and health since the start of the Fifth Framework Programme of Research (FP5 – 1998-2002), which included an Environment and Health key action¹. The recent finalisation of over 90 multinational multidisciplinary projects funded by FP5 has greatly expanded our understanding of the complex linkages between environmental risk factors and their effects on the health of individuals and populations.

This knowledge has been central to the development of national and EU policy initiatives designed to protect the environment and promote human health throughout the community, such as the European Environment and Health Action Plan, adopted in 2004. Its main aim is to improve the understanding of the link between environmental factors and health. The implementation of the goals of this action plan through research started in the Sixth Framework programme (FP6 - 2002-2006) via the funding of many large- and small-scale research projects on health topics identified as priorities in the Action Plan².

This booklet will bring you a short overview of the FP6 projects, most of which are still ongoing and which are being funded by four Directorates (Health, Biotechnologies/Agriculture/Food, Industrial Technologies, and Environment) in the European Commission's Directorate-General for Research. This has allowed the concerted efforts and funding of research to tackle a multitude of issues related to environment and health. First results became available during the course of 2007. We hope that the reader will find in this overview some answers to important questions raised by the general public, scientific community or policy-makers on environment-health linkages.



Manuela Soares

Director

European Commission

Research Directorate-General

Environment Directorate

¹ http://ec.europa.eu/research/environment/themes/projects_en.htm

² For more information, go to: http://ec.europa.eu/environment/health/index_en.htm

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The Environment and Health team in 2008

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For news and activities of our Directorate, see the EU Research for the Environment newsletter³ and the Directorate website⁴

More details on the projects is available in two catalogues downloadable from:

<http://cordis.europa.eu/food/projects.htm>

http://ec.europa.eu/research/environment/pdf/global_change_ecosystem.pdf

³ http://ec.europa.eu/research/environment/index_en.htm

⁴ http://ec.europa.eu/research/environment/index_en.htm

Reviews and establishment of state of science of priority E&H issues

CAIR4HEALTH

Clean air for health - research needs for sustainable development policies

EC contribution €0.4M
www.cair4health.eu



- Strengthening and exploitation of research results obtained by European and other projects related to air quality and health impacts, with reference to the EU Environment & Health Action Plan.
- Identification of the technology development and deployment needs in the area of air pollution and health impact mitigation, for the Environmental Technology Action Plan and the Thematic Strategy on the Urban Environment.
- Support for the European Commission by providing advice on its R&D priorities.
- Facilitation of the interaction, dissemination and future development of air quality and health research programmes, clusters, and networks.
- Enhancing the global dissemination of air quality and health research.

COST281

Potential health implications from mobile communication systems

EC contribution €95,000
www.cost281.org



- COST281 is part of the COST framework, aimed at European cooperation in the field of scientific and technical research.
- Better understanding of the possible health impacts of emerging technologies, especially related to information and communication technologies that may result in exposure to electromagnetic fields.
- Scientific evaluation of the data available for use by various decision-makers involved in the risk management of electromagnetic fields.
- Serving as a basis for risk communication efforts related to emerging technologies, electromagnetic fields and possible health risks.
- Collection of data, at the European level, on electromagnetic field exposures related to emerging technologies.

EMF-NET

Effects of the exposure to electromagnetic fields: from science to public health and safer workplace

EC contribution €1.5M
www.jrc.cec.eu.int/emf-net



- Providing a framework for the coordination and collation of the results of national and EU-level studies on electromagnetic fields.
- Establishment of expert groups focused on the improvement of specific aspects common to research in this field.
- Supporting “informed decision-making” for regulation and risk communication by harmonising results and providing information to regulatory bodies, industries and consumer associations.
- Providing a framework for coordinating results, their dissemination, producing an inventory of all ongoing research and the prompt identification of research priorities and needs.

ENVIE

Coordination action on indoor air quality and health effects

EC contribution €0.8M
www.envie-iaq.eu/home.html



- Increase the understanding of the public health impacts arising from indoor air quality across Europe.
- A novel approach that starts with the most pronounced indoor air health-related outcomes, then determines the main exposures, causes and sources and thereby outlines the most relevant policies.
- Identify the most widespread and significant indoor causes for these health impacts, evaluating the existing and optional building and housing-related policies for controlling them.
- Addressing in particular how indoor air quality might be contributing to the rise in asthma and respiratory allergies, together with other acute and chronic health impacts.
- Building on the existing scientific experience rather than conducting new research, reviewing the literature and articles that have accumulated in domestic and international indoor air research projects over the past 20 years.
- Dissemination of the results through the organisation of annual conferences and reports.

HENVINET

Health and environment network

EC contribution €3.2M
www.henvinet.eu

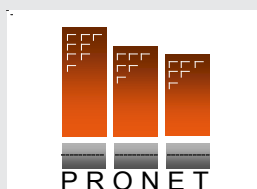


- Establishment of long-term cooperation between researchers, policymakers, and other stakeholders in the field of environment and health research and assessment.
- Establishment of expert teams for each of the four priority diseases of the European Environment and Health Action Plan (allergy/asthma; cancer; neurodevelopmental disorders; endocrine disrupting effects), to summarise the current scientific basis regarding the links between health and the environment, including the integration of research by New Member States.
- Efficient dissemination of all resulting materials (policy-relevant research results and summaries, best practice, decision support-tool descriptions), by uploading into a dynamic web-based information system and making them available to stakeholders outside the project.
- Promoting closer linkages with policy-making through enhanced dissemination.
- Validation and exploitation of decision support tools, led by the joint efforts of environmental experts, experts on the modelling of environmental effects on physiology and health experts.

PRONET

Pollution reduction options network

EC contribution €0.8M
www.proneteurope.eu



- Facilitation of exchange and evaluation of interventions on environment and health exposure reduction measures on a regional level.
- Promoting the implementation of successful initiatives in other regions of Europe.
- Focus on the exchange of useful practices in two areas: the improvement of indoor air quality and the reduction of traffic-related health hazards.
- Dissemination of results amongst stakeholders across Europe, and using the results to make policy recommendations at the regional level.

Human biomonitoring, biobanks, harmonisation

ESBIO

Development of a coherent approach to human biomonitoring in Europe

EC contribution €1.1M
www.eu-humanbiomonitoring.org/sub/esbio.htm



- Development of a coordinated approach for biomonitoring based on existing expertise available in Member States surveillance programmes and results from research.
- Elaboration of how biomonitoring results can be integrated most efficiently with environmental monitoring and registered health data.
- Development of strategies to increase transparency and communicate biomonitoring results to stakeholders, including the establishment of open websites with links to national and international activities.
- Elaboration of scenarios for the use of biomonitoring results for policymaking.

PHOEBE

Harmonising population-based biobanks and cohort studies to strengthen the foundation of European biomedical science in the post-genome era

EC contribution €0.8M
www.populationbiobanks.org



- Establishment of a cost-effective and harmonised network of population-based biobanks and longitudinal cohort studies across Europe and Canada, allowing greater collaboration and avoiding repetition.
- Identification and description of large population-based biobanks and longitudinal cohort studies in Europe, focusing on those that can contribute to the investigation of genetic and environmental determinants of complex diseases.
- Identification of new biobank opportunities in Europe, especially for genetically isolated populations.
- To create an operational infrastructure for the evaluation of ongoing large-scale genotyping efforts in population cohorts.
- To lay the groundwork for a harmonised approach to the assessment of a wide range of complex phenotypes and lifestyle exposures.
- To establish ethical-legal and governance criteria that will enable data and sample sharing for research purposes.

NORMAN

Network of reference laboratories and related organisations for monitoring of emerging environmental pollutants

EC contribution €1.9M
www.norman-network.com



- Establishment of a European network of reference laboratories, research centres and related organisations (including standardisation bodies) in order to:
 - improve the exchange of information on emerging environmental contaminants;
 - encourage the validation and harmonisation of common measurement methods and monitoring tools so that the demands of risk assessors and risk managers can be better met.
- NORMAN will develop into a source of information on emerging environmental substances, keeping stakeholders and the public informed about the state of monitoring, risk assessment, and management of emerging substances, and that through databases, newsletters, workshops and contact points.

Testing of chemicals, in vitro methods

A-CUTE-TOX

Optimization and pre-validation of an in vitro test strategy for predicting human acute toxicity

EC contribution €9.0M
www.acutetox.org



- Development of an in vitro test strategy to replace in vivo testing (animal testing) of the acute toxicity of chemicals.
- Anticipated corollary results of this overall objective are decreased testing costs and improved scientific validity of the results.
- Generation of in vivo and in vitro databases: results of previous studies will be compiled into comprehensive databases of in vivo and in vitro acute toxicity data.
- Selection and refinement of in vitro tests: a wide range of in vitro test types will be evaluated and the most promising and accurate ones will be further refined.
- Development of an in vitro test strategy: integrate the knowledge amassed into an expert system capable of providing a reliable value for a chemical's acute in vivo toxicity.
- Implementation of in vitro test strategy: the in vitro test strategy developed should gain regulatory approval and become widely implemented in industry.

CAESAR

Computer assisted evaluation of industrial chemical substances according to regulations

EC contribution €1.5M
www.caesar-project.eu



- Production of models to be used for regulatory purposes, (such as the implementation of the REACH proposal) for the prediction of the toxicity of chemical substances in a transparent manner, by applying new and unique modelling and validation methods.
- Reduction of animal testing and its associated costs.
- Achievement of a wide applicability and acceptability of models by a network of stakeholders to address the targets of the (Q)SAR models and the features for model use.
- Promotion and exploitation of CAESAR activities.

CARCINOGENOMICS

Development of a high throughput genomics-based test for assessing genotoxic and carcinogenic properties of chemical compounds in vitro

EC contribution €10.4M
www.carcinogenomics.eu



- Development of in vitro methods for testing the carcinogenic properties of compounds as an alternative to current rodent bioassays for assessing chemical genotoxicity and carcinogenicity.
- The major goal is to develop a battery of mechanism-based in vitro tests representative for various modes of carcinogenic action in the lungs, liver and kidney, reducing costs and animal testing and speeding up the identification of substances potentially harmful to man.
- The application of “omics” technologies to robust in vitro systems, exploring stem cell technology to generate responses from a set of model compounds causing genotoxicity and carcinogenicity.

EXERA

Development of 3D in vitro models of estrogen-reporter mouse tissues for the pharmacotoxicological analysis of nuclear receptors-interacting compounds (NR-ICs)

EC contribution €2.2M
www.altaweb.it/exera/



- Development of novel 3D in vitro models of mouse tissues from five major organs for the pharmacotoxicological analysis of oestrogen receptor-interacting compounds: liver, skin and bone (non reproductive systems), ovary and testis (male and female reproductive systems).
- Integration of innovative technologies such as the 3D cultures, established transgenic mouse lines and genomic platforms for characterisation of ER-ICs.

NHR DevTox

A prospective analysis of the mechanisms of nuclear hormone receptors and their potential as tools for the assessment of developmental toxicity

EC contribution €0.1M
website not available

- Production of a prospective analysis of the mechanisms of nuclear hormone receptors and their potential as tools for the assessment of developmental toxicity.
- Investigation of the role of nuclear hormone receptors in developmental and reproductive biology and review the state of science in the field.
- Definition of a practical research programme about developmental toxicity and the role of nuclear receptors.
- Development of a plan to for the future assessment of the relevance of in vitro systems as predictive models for development toxicity.

OSIRIS

Optimized strategies for risk assessment of industrial chemicals through integration of non-test and test information

EC contribution €10.0M
www.osiris.ufz.de



- Development of integrated testing strategies (ITS) for the REACH regulatory framework, allowing for the increase of non-testing information for decision making and reducing animal testing. This will include the development of operational procedures for the evaluation of chemical substances in a risk-driven, context-specific and substance-tailored manner.
- Elaboration of methods and guidance for transparent and scientifically sound use of chemistry-driven information in ITS.
- Efficient strategies and guidance for the exploitation of all types of biological information on toxic effects of chemicals in ITS, focusing on reduced animal use and informed extrapolation.
- Development of criteria for exposure-informed testing as foreseen in REACH and refinement of relevant exposure assessment methods accordingly.

PREDICTOMICS

Short-term in vitro assays for long-term toxicity

EC contribution €2.3M
www.predictomics.com



- Improving the understanding of the mechanisms of chronic toxicity to identify relevant early changes induced by chronic toxins.
- Development of advanced and innovative liver and kidney cell culture models, including cell transformation and stem cell technology.
- Increasing the sensitivity and accuracy of genomic, proteomic, and cytomic tools for toxicity studies, including the identification of primary and secondary biomarkers.
- Establishment of a hierarchical decision tree, based on the identified primary and secondary biomarkers, as well mathematical models to early anticipate the potential toxicity risk of drugs under development.
- Prevalidation of the screening platform.

RAINBOW

Research on animal and in vitro studies and numerical methods: bridging opportunities through a workshop

EC contribution €0.2M
www.rainbow-project.eu



- Organisation of a workshop to which were invited communities with experience in animal and non-animal data and predictions from computer-based modelling to discuss how to achieve a better risk assessment of chemical compounds, integrating their experiences through the workshop.
- The discussion focused on how to integrate and make optimal use of the different kinds of data.
- The overall objective of the workshop was integration between the multidisciplinary and multisectoral competencies.

REPROTECT

Development of a novel approach in hazard and risk assessment or reproductive toxicity by a combination and application of in vitro, tissue and sensor technologies

EC contribution €9.1M
www.reprotect.eu



- Provision of an array of in vitro tests for the investigation of the different aspects and phases of the reproductive cycle, aiming to contribute to the development of intelligent testing strategies for the compilation of reliable and valid safety information.
- Bringing about, by this new testing strategy for reproductive toxicology, a decrease in the number of animal tests and providing more detailed information on mechanisms of toxicity in the different target tissues.
- Making it possible to screen for reproductive toxicity during the lead selection phase in the drug development process and providing a refined hazard identification of chemicals.
- Dissemination activities, with a view to informing the regulatory process in particular.

RETHINK

Minipigs as models for the toxicity testing of new medicines and chemicals: impact assessment

EC contribution €0.2M
www.rethink-eu.dk



- Evaluation of the potential impact of toxicity testing in the mini-pig as an alternative approach in regulatory toxicity testing that can contribute to the replacement, refinement and reduction of animal testing (3Rs).
- The issues to be covered in this impact assessment include animal welfare and ethical issues, the development of new medicines and chemicals, safety testing issues and genomics and emerging technologies issues.

SENS-IT-IV

Novel testing strategies for in vitro assessment of allergens

EC contribution €11.0M
www.sens-it-iv.eu



- Development of strategies to replace animal testing with in vitro alternative assays for identifying skin and respiratory sensitizers in relation with the use of safe ingredients by the chemical, cosmetic and pharmaceutical industries.
- Creation of in vitro tests and test strategies allowing for the testing of sensitising potency of new and existing chemical entities produced by European industries, for classification, labelling and risk assessment.
- Coordinated and extensive characterisation of the impact of compounds on cell-cell interactions for identification of the key mechanisms of sensitisation.
- Development of assay systems that model sensitisation rather than irritation and toxicity.

TESTMETEDECO

Development of test methods for the detection and characterisation of endocrine-disrupting chemicals in environmental species

EC contribution €0.2M
website not available

- Development of test methods for the detection and characterisation of endocrine disrupting chemicals in environmental species.
- Participating in a pan-OECD effort to synthesise research efforts in the EU, the USA and Japan with a view to creating new methods for screening and testing the hazard assessment of chemicals in environmental species.
- The EU contribution is specifically in the validation work – the statistical report writing, and coordinating aspects.

Effects and mechanisms of exposure to environmental stressors: allergy/asthma

EUOPREBALL

The prevalence, cost and basis of food allergy across Europe

EC contribution €14.1M
www.euoprevall.org

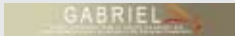


- Delivering an improved quality of life to food allergy sufferers by developing knowledge-based holistic approaches to managing the problem.
- Establishing the prevalence of food allergies in adults and children, and the patterns of reactivity to the five main allergic foods across Europe.
- Identifying new and emerging food allergies in Eastern Europe and the Far East.
- Investigating the relationship between genetic and environmental factors
- Providing a library of highly characterised, authentic food allergens, and information about the effect of the food matrix and food processing in modulating the allergenic properties of foods.
- Developing novel diagnostic and predictive tools and methods.
- Ascertaining the socioeconomic impact and cost of food allergies, and their treatments, to the European Community.

GABRIEL

A multidisciplinary study to identify the genetic and environmental causes of asthma in the European Community

EC contribution €11.0M
www.gabriel-fp6.org



- Post-genomic approach to understanding the molecular basis of asthma, aiming at preventive and therapeutic control.
- Integrated multidisciplinary programme that brings together specialists in epidemiology, genetics, genomics, proteomics, bioinformatics, statistics, environmental ecology and immunology to focus on the causes of asthma.
- Identification of how gene-environment interactions cause the development of asthma, translating the findings into cellular and genomic models to identify the molecular mechanisms.
- Study of rural farming environments, which are more protective against asthma, in order to develop novel therapeutics.
- Integration of the results into the European knowledge base for patient understanding and disease prevention.

GA²LEN

Global allergy and asthma European network

EC contribution €14.4M
www.ga2len.com



- Establishment of a European network of excellence, bringing together 31 partners and over 50 collaborating centres. The teams have excellent track records conducting specific integrated multidisciplinary research programmes on issues relating to the environment (including outdoor and indoor pollution), nutrition, lifestyle (including occupation), infections and genetic susceptibility.
- Study of allergy and asthma throughout the course of life, including intrauterine life and the foeto-maternal interface.
- Study of interactions between genetic and environmental factors in early life and the development of allergies, via existing and new birth cohorts.
- Investigation of the gene-environment interactions, via genetic and epidemiological studies, that might have underpinned the dramatic increase in allergy rates in the EU.
- Through region-specific epidemiological studies, investigation of the impact of nutritional status on allergic disposition.
- Dissemination of information to patients and the public.

Effects and mechanisms of exposure to environmental stressors: cancer

DIEPHY

Dietary exposures to polycyclic aromatic hydrocarbons and DNA damage

EC contribution €1.5M

www.imp.lodz.pl/diephy/home.htm

DIEPHY

- Providing an adequate base for interpretation of human cancer data using novel approaches towards the induction and repair of DNA lesions from polycyclic aromatic hydrocarbons (PAH), as well as studying the interaction between DNA adducts and oxidative stress.
- Tracing the origin of high levels of background DNA adducts of the PAH type found in certain non-smoking individuals, taking diet and genetic factors into account.
- Assessing protective effects against neoplastic disease of selected dietary constituents.
- Developing sensitive techniques for determining certain types of DNA damage, including cytogenetic effects.
- Gaining new insights into the formation and repair of DNA-adducts generated from PAHs, as well as their relation to oxidative damages and apoptosis.
- Investigating the level of DNA adducts in different human cohorts in Poland, Serbia, and Italy.

ECNIS

Environmental cancer risk, nutrition and individual susceptibility

EC contribution €11.0M

www.ecnis.org



- Network of Excellence devoted to integrating European environmental carcinogenesis research in order to reduce the cancer burden. This includes integration, joint research and spreading of excellence activities.
- Development of biomarkers for carcinogens through molecular epidemiology studies.
- Investigation of how nutrition and genetic disposition affect susceptibility to cancer.
- Development of hazard and risk assessment strategies, and the evaluation of ethical issues arising from the use of biomarkers in cancer research.
- Better understanding of cancer etiology for more effective cancer prevention.



- Improving the scientific basis for the development of health-promoting foods.
- Contributing to policy development through the evaluation of human carcinogens.

EUROLYMPH

Collaborative European action into environmental, nutritional and genetic factors in non-Hodgkin's lymphoma aetiology

EC contribution €0.4M
website not available



- Development of a network of studies to investigate the association between environmental risk factors and non-Hodgkin's lymphoma (NHL).
- Detailed investigation of environmental and nutritional risk factors previously suggested to be associated with NHL, based on the pooled data from the studies participating in the InterLymph consortium (<http://epi.grants.cancer.gov/InterLymph>).
- Production of results on risk of NHL for exposure to different categories of pesticides and solvents, organic dusts, ultraviolet radiation, and contact with animals and animal related products, and on their interplay with genetic susceptibility factors.

NEWGENERIS

Newborns and genotoxic exposure risks: Development and application of biomarkers of dietary exposure to genotoxic and immunotoxic chemicals and of biomarkers of early effects, using mother-child birth cohorts and biobanks

EC contribution €13.6M
www.newgeneris.org



- Testing the hypothesis that maternal exposure to dietary compounds with carcinogenic and immunotoxic properties results in in utero exposure and molecular events in the embryo, leading to increased risks of cancer and immune disorders in childhood.
- Development of biomarkers of exposure, carcinogenic and immunotoxic risks and of susceptibility and application using high throughput techniques, and setting up new biobanks.
- Assessment of dietary exposure of pregnant women to dietary carcinogens and immunotoxins.
- Application of epidemiological surveys of mother/child birth cohorts to study associations between maternal dietary exposure and childhood cancer and immune disorders risks.
- Inform policy makers in the improvement of health policy, food safety and food quality, contributing to better child health.

FURAN-RA

Role of genetic and non-genetic mechanisms in furan risk

EC contribution €1.5M

www.furan-ra.toxi.uni-wuerzburg.de



- Risk benefit analysis of health risks in humans as a result of dietary exposure to furan (present in many foods, especially processed).
- Characterization and quantitation of DNA- and protein binding of furan in liver of rats and mice over a wide dose range. This includes the assessment of the genotoxic and clastogenic potential of furan in rodent liver by comet assay, cytogenetics, and biomarkers of genetic damage.
- Analysis of furan in food, and mechanisms of formation during food processing, as a better basis for exposure assessment from food and mechanisms of formation during food processing.
- Provision of a risk assessment of furan in food.

Effects and mechanisms of exposure to environmental stressors: reproduction, development and ageing

CRESCENDO

Consortium for research into nuclear receptors in development and aging

EC contribution €10.0M
www.crescendoip.org



- Main objective is to exploit new advances in (post-)genomics and bioinformatics and associated technological developments. This will enhance understanding of the basic mechanisms underlying nuclear hormone receptor superfamily (NR) actions, and their translation into the physiological regulation of developmental and aging processes.
- Improvement of understanding of NR signalling in the context of regulatory networks.
- Investigation of the roles of NRs in the continuum of development to aging, with emphasis on complex links between NR signalling, metabolic disease, as well as brain development and aging.
- Increase in knowledge of how NR-related information in the genome impacts on phenotype.
- Transfer of this knowledge into therapeutic leads.

DEVNERTOX

Toxic threats to the developing nervous system: in vivo and in vitro studies on the effects of mixture of neurotoxic substances potentially contaminating food

EC contribution €2.4M
www.imm.ki.se/devnertox



- Development of standardised testing protocols based on the use of multiple in vitro experimental models.
- Identification of specific biochemical, molecular and functional endpoints, based on the mechanism of action of Methylmercury (MeHg) and polychlorinated biphenyls (PCBs), both alone and in combination.
- Evaluation of the neurotoxic effects of MeHg and PCBs during development, including the long-term consequences and gender-related aspects.
- Definition of quantitative measures of observed effects (benchmark doses, EC50, etc.) for risk-assessment purposes, and incorporation of currently available human and animal data to derive guidelines for exposure limits.

FOOD & FECUNDITY

Pharmaceutical products as high risk effectors

EC contribution €1.8M
foodandfecundity.factlink.net



- Development and employment of validated methods for the screening and testing of high-risk pharmaceutical products (mainly oestrogens, androgens and progestogen-like compounds) and their derivatives.
- Determination of their adverse effects on human fecundity, including the origin, fate, and mechanism of action.
- Assessment of their risk on male and female fecundity in various geographical locations and exposure scenarios in Europe.
- Assessment of links between food and fecundity, and develop strategies for risk management.
- Dissemination of the research.

PIONEER

Puberty onset – influence of nutritional, environmental and endogenous regulators

EC contribution €3.0M
cascade.projectcoordinator.net/~pioneer

PIONEER

- Create updated data on the age of puberty onset in the different regions of Europe.
- Identification of genetic and nutritional factors involved in the regulation of the onset of puberty, with special reference to their interactions.
- Development of novel experimental models, including in vivo models, optimised for the investigation of genetic and nutritional factors regulating onset of puberty.
- Definition of specific actions that may be necessary to avoid children from maturing too early sexually.

Multiple effects and mechanisms of exposure to chemicals

ATHON

Assessing the toxicity and hazard of non-dioxin-like PCBs present in food

EC contribution €4.6M
www.athon-net.eu



- Provision of missing critical hazard information, to clarify biological mechanisms underlying the various types of toxicity of NDL-PCBs and to evaluate these data from a regulatory toxicology point-of-view.
- Creation of quality-controlled experimental in vivo and in vitro models for studies of NDL-PCBs.
- Provision of toxicokinetic data for NDL-PCBs.
- Quantitative and qualitative toxicity profiles for NDL-PCBs.
- New classification strategy for NDL-PCB congeners based on effect biomarker information.
- Up-to-date compilation and evaluation of toxicological effect and exposure data on NDL-PCBs and PCB metabolites.

CASCADE

Chemicals as contaminants in the food chain: a NoE for research, risk assessment and education

EC contribution €14.4M
www.cascadenet.org



- Sustainable coordination and integration of European research on the human health effects of chemical residues in food.
- Novel information on the mechanism of action of food-borne chemical residues and contaminants that interfere with hormone signalling, making this information useful for test methods and risk/benefit analyses.
- Development of in vivo, in vitro and in silico test methods to screen for the potential of a broad range of chemical residues in the food, and the identification of exposure biomarkers.
- Risk assessment integrating activities to provide reliable education and information for various stakeholders including the public, policy maker and industrial end-users.

PHIME

Public health impact of long-term, low-level mixed element exposure in susceptible population strata

EC contribution €13.4M
www.phime.org



- Assessment of the impact of exposure to toxic metals for several major groups of diseases of public health concern (brain and nervous system, cardiovascular disease, osteoporosis, kidneys, diabetes) with focus on interaction between toxic elements in mixed exposures and on “new” elements in susceptible groups (foetuses/infants/children, fertile women and elderly).
- Development and validation of new methods for biomonitoring of exposures.
- Definition of geographical patterns/sources of exposure in the EU, especially in children and women
- Research into potential solutions by focusing on the reduction of uptake of toxic elements into plants.
- Horizontal aspects include quality control, gene-environment interactions, training, ethics and dissemination.



Methods for integrated risk assessment of cumulative stressors

ENVIRISK

Assessing the risks of environmental stressors: contribution to the development of integrating methodology

EC contribution €0.9M
envirisk.nilu.no



- Development of an integrated methodological framework to identify health risks caused by exposures to environmental factors, with a view to providing cost/benefit analyses of alternative prevention and targeted policy measures.
- Assessment of existing information on exposure and health effects. Focus on: exposure to atmospheric PAH and effects on pregnancy; exposure to PCBs, dibenzofurans and dioxins and effects on nervous system/endocrine disruption; exposure to atmospheric particles and effects on respiratory system.
- Establishment of links between exposure and health, including framework and protocol development.
- Contribution to the EC Integrated Environment and Health Information Systems (EHIS).

INTARESE

Integrated assessment of health risks from environmental stressors in Europe

EC contribution €12.4M
www.intarese.org



- Development and application of new, integrated approaches to the assessment of environmental health risks and consequences, bringing together scientists in the fields of epidemiology, environmental sciences and biosciences in support of European policy on environmental health.
- Addressing the scientific and information deficits, by specifying the knowledge requirements and developing new systems for monitoring and modelling.
- Building of an operational toolbox for integrated assessment that can be applied to different stressors and environmental media, settings and agents.
- Application of this approach to undertake integrated assessments for a range of key policy areas, including transport, housing, agricultural land use, water management, household chemicals, waste management and climate.

NOMIRACLE

Novel methods for integrated risk assessment of cumulative stressors in Europe

EC contribution €10.0M
viso.jrc.it/nomiracle



- Development of a research framework for complex cumulative risk assessment, including the analysis, characterisation and possible quantification of the combined risks to health or the environment from multiple agents or stressors.
- Development of new methods for assessing the cumulative risks from combined exposures to several stressors (including mixtures of chemical and physical/ biological agents).
- More effective integration of the risk analysis of environmental and human health effects.
- Development of assessment methods which take into account geographical, ecological, social and cultural differences in risk concepts and risk perceptions across Europe.
- Improving the provisions for the application of the precautionary principle and to promote its integration into evidence-based assessment methodologies.

Health impact assessments and cost/benefit analyses

DROPS

Development of macro and sectoral economic models aiming to evaluate the role of public health externalities on society

EC contribution €0.8M
www.nilu.no/DROPS



- Full-chain analysis related to impact of health protection measures related to ozone, heavy metals, PCBs, dioxins and indoor air pollution, in order to support the development of cost effective policy measures against pollution related diseases and their wider impacts.
- Identification of emission reduction measures and their costs for PCBs, dioxins and indoor air pollution, review of existing information for ozone and heavy metals, and the evaluation of the health and non-health benefits of these measures.
- Development of an integrated methodology which allows a split between economic and social benefits, using it to construct a number of emission abatement scenarios.
- Assessment of the macroeconomic impacts of the constructed scenarios for key economic variables, broken down by economic sector.

ESPROME

Integrated assessment of heavy metal releases in Europe

EC contribution €0.9M
espreme.ier.uni-stuttgart.de



- Development of methods and identification of strategies to support the reduction of emissions and the harmful impact of heavy metals.
- Damage assessment concerning heavy metals in the environment and human health in the long term.
- Consolidation, improvement and provision of Europe-wide emissions data for heavy metals, including the improvement of models for heavy metal transport in air, soil and water.
- Collection of data on the possibilities for reducing emissions, including data on costs and the effectiveness of abatement options.
- Collection of data on exposure-response relationships for human health and thresholds for ecosystem damage.
- Estimation of health impacts and ecosystem damage in two scenarios, with costs per country and per tonne of heavy metal released.

2-FUN

Full-chain and uncertainty approaches for assessing health risks in future environmental scenarios

EC contribution €1.6M
www.2-fun.org



- Creation of tools for decision makers to analyse current and future trends in environmental conditions and pressures that may cause health problems.
- Building long-term environmental and socio-economic scenarios, exposure and effects assessment, the provision of uncertainty margins, and the identification of sensitive pathways and risks.
- Development of methodologies, databases, models and software for: future environment and health scenarios; integration of children's issues into risk assessments; uncertainty models; a full-chain approach for health risk assessment.
- Structured dialogue with stakeholders to monitor environment and health scientific initiatives and to incorporate the stakeholders' needs and vision into the development of health risk assessment tools.

• HEIMTSA

Health and environment integrated methodology and toolbox for scenario assessment

EC contribution €5.0M
www.heimtsa.eu



- Creation of a methodology that extends health impact assessment and cost benefit analysis, using the full-chain approach, to improve the evaluation of the environment and health impacts of policy scenarios in key sectors at the European level.
- Development of a related modular integrated assessment system (IAS) for implementing the methodology across Europe.
- Results from using the IAS to apply the methodology for health impact and cost-benefit assessment of European policy scenarios. These results will be disseminated to stakeholders.
- Development of health impact assessment/cost-benefit analysis capabilities in Europe.

METHODEX

Methods and data on environmental and health externalities: harmonising and sharing of operational estimates

EC contribution €1.2M
www.methodex.org



- Improving best practice in external cost assessment, and extension of the ExternE (www.externe.info) analysis to agriculture, industry, waste and other sectors.
- Review of the existing environmental and health externality studies for these sectors
- Provision, for the first time, of an integrated methodology to a high standard across all areas by harmonising information with existing approaches in the energy and transport sectors, and by extending where possible the methodology for application in the new sectors.
- Development of a ‘toolbox’ to assist policy makers in the interpretation and estimation of external costs in new situations and in the treatment of uncertainty.

VERHI CHILDREN

Valuation of environment-related health impacts for children

EC contribution €1.0M
www.oecd.org/env/social/envhealth/verhi



- Examine the means by which environment-related health impacts on children are incorporated in EU member country government decision-making (and in other OECD member country governments).
- Particular focus on the prevalence and use of economic valuation in environmental and health policy-making, particularly with respect to impacts on children.
- Review of statistical tools used to assess the benefits of environmental policies.
- Development of survey instruments that elicit values for mortality risk reduction and the appropriate experiment design for testing hypotheses.
- Survey implementation, data analysis and dissemination, leading to the provision of advice and recommendations to policy makers across Europe and amongst OECD members.

Risk/benefit analyses

BENERIS

Benefit-risk assessment for food: an iterative value-of-information approach

EC contribution €1.1M
www.beneris.eu



- Using a benefit-risk approach with an iterative top-down approach to explore risks of food and its contaminants.
- Development of integrated methods to evaluate both the risks and health benefits related to food items. Analytical methods used to find out the critical uncertainties for decision-making.
- Integrating existing databases and studies, studying their applicability to other countries, and combining them with chemical contaminant measurements for an exposure assessment of both nutrients and contaminants.
- Estimation of health effects using new methods that integrate both epidemiological and toxicological data. Dissemination of results and methods using a new internet interface and other means, and feedback collected.
- The project forms a cluster with the Qalibra project, which is tackling the same problems using complementary methods and approaches.

BRAFO

A specific support action to investigate the risk benefit analysis for foods

EC contribution €0.6M
www.europe.ilsa.org/activities/taskforces/riskassessment/RiskAssessmentChemicals.htm

BRAFO

- Development of a framework that allows a quantitative comparison of human health risks and benefits of foods and food compounds, using a common scale of measurement.
- Applying methodologies to a number of case studies (for natural foods, dietary interventions, and heat processing).
- Adjusting and harmonising the methodologies based on the results obtained and disseminating the results.

QALIBRA

Quality of life - integrated benefit and risk analysis web-based tool for assessing food safety and health benefits

EC contribution €1.9M
www.qalibra.eu



- Development of a suite of quantitative methods for assessing and integrating beneficial and adverse effects of foods, available to all stakeholders as web-based software.
- Development of a generalised modular approach to risk-benefit analysis using menus of dose-response and valuation functions.
- Development of targeted and adaptable risk communication strategies for integrated risk-benefit analysis, and development and testing of programmes and materials for dissemination.
- Use of the methods and software developed by QALIBRA to carry out comprehensive risk-benefit analyses for selected food groups/EU populations, using the results to evaluate and improve the QALIBRA approaches.
- Establishment of a platform for cluster activities between QALIBRA and BENERIS projects.

SAFEFOODS

Promoting food safety through a new integrated risk analysis approach for foods

EC contribution €11.4M
www.safefoods.nl



- Changing the scope of decision-making for food safety from single risks to considering foods as sources of risks, benefits and costs that are associated with their production and consumption, taking into account the social context in which decisions are made.
- Improvement of risk assessment methods and risk analysis practices for foods produced by different production practices and breeding technologies.
- Design of a European working procedure for early identification of emerging chemical or microbial risks in food production chains.
- Development of comparative safety assessment methods for foods produced in different ways.
- Understanding different food risk perceptions, and designing informative risk communication strategies which directly address social concerns.
- Investigation of the role of European institutions involved in risk assessment and management.

Emerging environment and health risks: climate change

CIRCE

Climate change and impact research: the Mediterranean environment

EC contribution €10.0M
www.circeproject.eu



- Development of an assessment of the impact of climate change in the Mediterranean region.
- Prediction and quantification of the physical impacts of climate change in the region.
- Evaluating the consequences of climate change for the society and economy of the local populations.
- Development of an integrated approach to understanding the combined effects of climate change.
- Incorporation of results into a decision support system tool and dissemination, leading to the identification of adaptation and mitigation strategies in collaboration with regional stakeholders.

CIRCLE

Climate impact research coordination within a larger Europe

EC contribution €0.2M
website not available



- Fostering European cross border cooperation in national research activities that look at climate change impacts, especially in the area of socio-economic developments.
- Enhancing cooperation in national research programmes and strengthening administrative linkages.
- Establishment of a sound knowledge base of national activities and prepare the grounds for a multinational network of research programmes in Europe.
- Working towards the creation of a European Research Area (ERA) on climate change impact research.
- This specific support action, with nine partners in seven countries, was followed by the synonymous coordinated action, below.

CIRCLE

Climate impact research coordination for a larger Europe

EC contribution €2.8M
www.circle-era.net



- This coordinated action continued where the previous project left off, this time with the participation of 21 partners in 12 countries, and a further nine observers from another eight countries.
- The primary goal remains fostering greater linkages and cooperation between national research programmes in order to help create a European Research Area on climate change impacts.
- Adopting an interdisciplinary approach that allows the exchange of knowledge and experiences between research groups, including the integration of the various disciplines concerned, like climatology, meteorology, hydrology, biology, soil sciences, marine sciences and forestry, building technologies, sociology and medicine.
- Working towards more coordinated planning between national programmes and the eventual establishment of transnational research programmes and joint calls.

EDEN

Emerging diseases in a changing European environment

EC contribution €11.5M
www.eden-fp6project.net



- Identification, evaluation and cataloguing of European ecosystems and environmental conditions linked to global change, which can influence the spatial and temporal distribution and dynamics of pathogenic agents.
- Development of coordinated European approach to provide predictive emergence and spread models, including early warning, surveillance and monitoring tools and scenarios.
- Combination of spatial data (earth observation data, GIS, etc) with epidemiological data.
- Study of a range of indicator human diseases that are especially sensitive to environmental changes within a common scientific framework.
- Dissemination work to raise public awareness and assist decision makers.

ENSEMBLES

ENSEMBLE-based predictions of climate changes and their impacts

EC contribution €15.0M
www.ensembles-eu.org



- Development of an ensemble prediction system for climate change, based on the global and regional Earth System models developed in Europe, validated against quality controlled, high resolution gridded datasets for Europe, to produce the first objective probabilistic estimate of uncertainty in future climate at the seasonal, decadal and longer timescales.
- Reducing the uncertainty in the representation of physical, chemical, biological and human-related feedbacks in the Earth System through the integrated system.
- Maximising the exploitation of the results by linking the outputs of the ensemble prediction system to a range of applications, including agriculture, health, energy, insurance and weather risk management.
- Development of scenarios and policy implications. The results are disseminated to stakeholders and the public.

MICRODIS

Health and socio-economic impacts of extreme events

EC contribution €5.0M
www.microdis-eu.be



- Strengthening the preparedness, mitigation and prevention strategies that can reduce the health, social and economic impacts of extreme events on communities.
- Investigation into the relationship between extreme events and their health, social and economic impacts.
- Development and integration of concepts, methods, tools and databases towards a global approach, including impact models and integrated vulnerability assessments.
- Improving human resources and coping capacities in Asia (India, Indonesia, Philippines and Vietnam) and Europe through training and knowledge-sharing.

POLYSOA

Polymers in secondary organic aerosols

EC contribution €0.8M
polysoa.web.psi.ch



- Application and development of different sophisticated analytical methods to measure high molecular weight compounds of secondary organic aerosol (SOA) polymers, which pose a potential but unknown risk to health, air quality and the climate.
- Characterisation of the chemical and physical bulk parameters.
- Investigation of particle-cell interactions, as well as the distribution and localisation of particles.
- Testing cell cultures for the presence of reactive oxygen species and/or inflammatory species.
- Establishment of a basis for assessing the risk of this new category of airborne contaminants to health, air quality and climate change.

Emerging environment and health risks: waterborne stressors

EPI-BATHE

Assessment of human health effects caused by bathing waters

EC contribution €2.0M
www.aber.ac.uk/iges/research/epibathe



- Investigation of the level of risk associated with bathing water exposure, providing scientifically robust assessments in support of future reviews and revisions of the Bathing Water Directive.
- Adding value to existing datasets through a new analysis that systematically integrates existing data, maximising their policy utility and clearly defining the main gaps requiring further epidemiological investigation.
- Filling these gaps by designing and implementing targeted epidemiological investigations of key EC waters (covering at least Mediterranean and new member state locations).
- Facilitation of a quantitative risk assessment using the information derived from these studies.

HEALTHY WATER

Assessment of human health impacts from emerging microbial pathogens in drinking water by molecular and epidemiological studies

EC contribution €2.4M
www.helmholtz-hzi.de/en/healthy_water/



- Gathering knowledge on pathogenesis of emergent microbial pathogens in drinking water and understanding their transmission to humans.
- Development and validation of molecular detection technologies for emerging microbial pathogens to provide a format ready for mass application in drinking water samples.
- Molecular surveys and comparative studies of emerging microbial pathogens in European drinking water sources and supply systems.
- Understanding the human health impacts of emerging pathogens.
- Determination of epidemiological correlations with molecular and environmental data and assessment of risk for emerging waterborne microbial infections in Europe.

HI-WATE

Health impacts of long-term exposure to disinfection by-products in drinking water

EC contribution €3.5M
www.hiwate.org

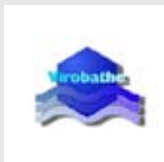


- Investigation of the potential human health risks associated with long-term exposure to low levels of disinfectants and by-products occurring in drinking water and food processing.
- Determination of the disinfection by-product composition and levels in drinking water in various regions in Europe.
- Identification of the determinants of disinfectants and their by-products and the development of predictive models.
- Assessment of the risk posed by disinfection practices and disinfectant by-products to reproductive systems and cancer.
- Risk/benefit analyses including quantitative assessments of risk associated with microbial contamination of drinking water versus risks from disinfectants and by-products.
- Assessment of the policy implications of current disinfection practices and water and health policies across the world.

VIROBATHE

Methods for the detection of adenoviruses and noroviruses in European bathing waters with reference to the revision of the Bathing Water Directive 76/160/EEC

EC contribution €2.2M
www.virobathe.org



- Creation of improved rapid detection methods for water-borne noroviruses and adenoviruses in marine and fresh recreational waters.
- Surveillance data on the target viruses through a range of EU recreational waters.
- Technology transfer to non-participant laboratories through a “Tech-Transfer” workshop at the end of the project.
- Increased confidence in water quality monitoring for EU bathing waters.

Emerging environment and health risks: nanoparticles

CELLNANOTOX

Cellular interaction and toxicology with engineered nanoparticles

EC contribution €2.6M
www.FP6-cellnanotox.net



- Assessment of the risks of occupational and general population exposure to industrially-manufactured nanoparticles (NPs), generating new knowledge on potential health risks and providing a database for risk assessments, recommendations and regulations.
- Development of innovative multidisciplinary tests and indicators for the toxicological profiling of NPs.
- Unravelling of the correlation between the physicochemical characteristics of nanoparticles (NPs) and their toxic potential on various organs of the human body.
- Understanding the relationship between size and surface chemistry on the deposition, uptake, translocation and toxicity of industrially important and novel synthesised NPs.

DIPNA

Development of an integrated platform for nanoparticle analysis to verify their possible toxicity and the eco-toxicity

EC contribution €2.8M
www.dipna.eu



- Creating new instruments and bioassays to assess the risk to human and animal health posed by nanoparticles.
- Proposing new parameters for the detection of nanopollution and the evaluation of occupational nanotoxicology, in order to promote prevention and nanosafety in manufacturing and handling.
- In vitro tests of interaction of engineered nanoparticles (NP) with cells, and the identification of the modes of NP-cell interaction.
- Application of laboratory-developed cellular models in the field investigations.
- Development of new immuno- and nano-toxicological tests and the establishment of new sensors for specific NP-induced biological effects.
- Assessment of the health risk for nanotechnological operators, citizens and end-users and identification of safety procedures, including safety criteria and the development of standards for policy makers.

IMPART

Improving the understanding of the impact of nanoparticles on human health and the environment

EC contribution €0.7M
www.impart-nanotox.org



- Ensuring that knowledge of the health and environmental implications of nanoparticles does not lag behind the technological advances, by fostering communication links between regional, national and international initiatives in order to reduce duplication of effort, pool expertise and facilitate co-operation between networks.
- Review of latest developments related to nanoparticle exposure and the risks to human health and the environment, making recommendations for future research, and guidelines for future nanoparticle standards and exposure limits.
- This project forms a research cluster with the complementary work of the Nanotox project (below).

NANOTOX

Investigative support for the elucidation of the toxicological impact of nanoparticles on human health and the environment

EC contribution €0.4M
www.impart-nanotox.org



- Provision of investigative support for the elucidation of the toxicological impact of nanoparticles on human health and the environment, documenting the potential methods of dispersal and contamination by nanoparticles and nanocrystals.
- Mapping of current national and international research and development activities, and providing an online European database.
- Identification of barriers to the development of safer methods, to survey standards, and to develop guidelines and recommendations for best practice for safe production and use of nanoparticles.
- Promotion of closer collaboration between nanotechnology researchers and industrial end-users.

NANOINTERACT

Development of a platform and toolkit for understanding interactions between nanoparticles and the living world

EC contribution €3.3M
www.nanointeract.net



- Co-ordination of the levels and routes of nanoparticle exposure in the future, the means of entry and subsequent transport processes in living organisms, and thereby typical concentrations residing in the different organs.
- First complete assessment of all aspects of nanoparticle-physiological systems.
- Determination of the whole range of biological processes, both intra- and intercellular, caused or affected by nanoparticle-cell interaction, helping to identify those processes that may cause diseases.
- To reduce the full study of nanoparticle-evaluation-biological process to a simplified version for more general use, leading to first steps of 'tools' or kits for screening nanoparticles for their potential to interact with cells, helping towards the development of a nano-toxicology methodology.

NANOSAFE₂

Safe production and use of nanomaterials

EC contribution €7.0M
www.nanosafe.org



- Development of an integrated system addressing potential hazards related to nanoparticles, in particular for health and environmental protection, in order to ensure safe and secure industrial production.
- Development of detection tools, traceability and characterisation techniques for engineered nanoparticles that can determine personal exposure.
- Health and hazard assessment and a method for evaluating nano-toxicity through the creation of a database on toxicology and a generic technology analysing toxicity.
- Designing safe industrial production systems and applications.
- Addressing environmental risk issues, through a life cycle analysis and a review of current risk analyses and health and safety procedures, including the dissemination of work to relevant stakeholders.

NANOSH

Inflammatory and genotoxic effects of engineered nanomaterials

EC contribution €2.4M
www.ttl.fi/Internet/partner/Nanosh/Main+Page



- Delineation of exposure and health effects of selected nanoparticles relevant to the occupational environment.
- Characterisation of nanoparticles (size, distribution, dissolution agglomeration properties, surface area and activities) and exposure levels.
- Evaluation of the genotoxicity of nanoparticles, especially the oxidative DNA damage, DNA strand breakage and chromosomal damage in lung cells.
- Exploration of lung inflammation induced by exposure, including the development of allergic asthma.
- Investigation of the effects of nanoparticles on microcirculation and microvascular effects.

PARTICLE_RISK

Risk assessment for particle exposure

EC contribution €0.8M
website not available

- Investigation of the possible adverse health effects from exposure to new types of particulates.
- Gathering a databank of novel particulates and characterising their physical properties and chemical composition, and developing methods to detect and quantify their presence in living tissue.
- Assessment of the uptake and transport of these particulates in living systems.
- Development of novel methods for nanoparticle risk assessment and new in vitro procedures for testing toxicity.
- Creating a panel of stakeholders to facilitate dialogue between researchers, industry and regulatory bodies.

European Commission

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Over sixty multidisciplinary pan-European research projects dealing with environment and health issues were funded by the European Commission's Research Directorate-General in the Sixth Framework Programme of Research (2002-2006). Most of these projects are still ongoing and are presented in this catalogue. The projects presented address a multitude of issues ranging from health impacts of climate change to improved integrated environment and health risk assessment methodologies. This overview should be useful to many stakeholders including the scientific community and policy makers.

