

## THE MAIN OBJECTIVES & EXPECTED RESULTS

Operational demonstration of the use of human biomonitoring data for aggregate and cumulative health impact assessment through the development of new standards for HBM data interpretation in conjunction with environmental and exposure information **in four selected areas of South Europe (Greece, Italy, Spain and Slovenia).**

Improvement of our knowledge regarding **cause-and-effect relations** between different environmental stressors, biomonitoring data and observed adverse health outcomes taking into account exposure and health effect modification due to intrinsic (such as genetic susceptibility) and extrinsic (such as diet and socio-economic status) factors.

Through pro-active dissemination, CROME-LIFE will raise the level of understanding among policy makers and increase awareness of the local public and competent authorities in the selected countries with regard to the possibility of using advanced biomonitoring and environment and health data analysis for efficient exposure assessment and health risk management **resulting in a significant improvement of the decision-making processes on environment and health issues.**

CROME-LIFE will support the European Environment and Health Action Plan (EHAP) by extending health impact assessment methods and tools. By doing so, environment and health impacts of policy measures addressing environmental problems can be assessed reliably at the local/regional level through the proper coupling of environmental monitoring, human biomonitoring and health status data resulting in taking **more targeted public health protection measures and a better use of the currently sparse financial resources.**

Based on international experience these actions are expected to produce:

- Reduction of neurodevelopmental disorders (including IQ growth mitigation) in the children population on the order of 10-20%;
- Reduction in reproductive toxicity observations on the order of 15-20%; and
- Reduction of childhood cancer observed after 3-4 years in areas contaminated with Cr6+ on the order of 20-30%

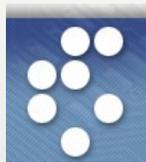
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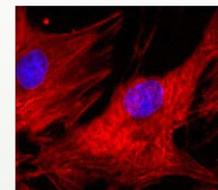
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*The publication was financed by the LIFE ENVIRONMENT Project LIFE12 ENV/GR/001040*

**website:** [www.crome-life.eu](http://www.crome-life.eu)



With the contribution of the LIFE financial instrument of the European Community

LIFE12 ENV/GR/001040

## ENVIRONMENTAL PROBLEM TARGETED

The main environmental problem targeted by CROME-LIFE is the assessment of the impact on human health due to exposure to chemical agents originating either from environmental contamination, or from consumer products (food contact materials, construction materials, cosmetics, clothes, etc.) **in four distinct areas of the Mediterranean basin (Greece, Slovenia, Italy and Spain).**

The pollutants that will be studied in CROME-LIFE may affect human health in different ways:

- **Exposure to metals** such as Hg and Pb has been linked to neurotoxic effects such as developmental retardation, birth defects and even death in some instances of exposure to very high concentrations. In addition, metalloids such as As may be responsible for increased incidence of testicular, lung and breast cancer, skin lesions as well as a decline in the quality of sperm and advent of type II diabetes.
- **Organic substances** such as PCBs and persistent organic pollutants (POPs) such as PBDEs can be associated with neurodevelopmental disorders in the form of physical, cognitive, sensory and speech impairment, including in particular learning disabilities and intellectual retardation and diabetes.
- **Pesticides** (e.g. organochlorine and organobromine compounds) have been linked to a wide range of serious and often fatal conditions: cancer, leukaemia, miscarriages, genetic damage, decreased fertility, liver damage, thyroid disorders, diabetes, neuropathy, still births, decreased sperm counts, asthma, and other auto-immune disorders.

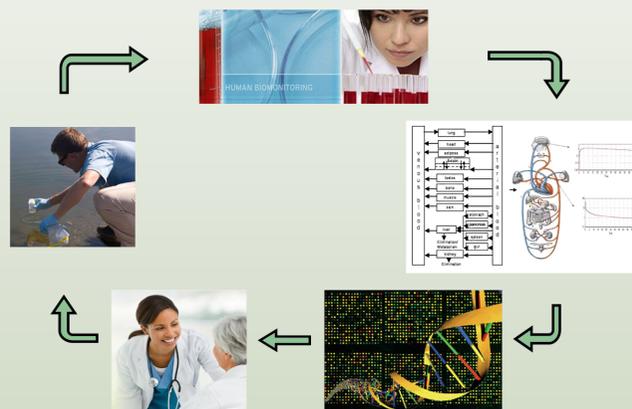
The picture outlined above explains why a quantitative assessment of the impact on human health is a valuable aid to efficient management of the environment. To this aim human biomonitoring (HBM) which is a systematic standardized measurement of chemicals and their metabolites in biological fluids of exposed individuals, is widely considered as a powerful tool for assessing pollution and its associated health effects on a personal level acting as a trigger for actions at population/policy level that would guide the decision making process aimed at protecting population health.

However, despite the HBM data collected throughout Europe, only few of them are translated into concrete policy actions. CROME-LIFE aims at contributing to filling this gap through the development of guidelines for recommendations to policy makers at national, regional and local levels and creating tools that will facilitate environmental decision-making.

## METHODOLOGY

The developed methodology aims at linking environmental monitoring, human biomonitoring and health monitoring data in order to derive environment-wide associations between environmental contaminants and human health. Two different methodological approaches are generally employed for studies of the environment-health interactions: the top-down approach, which would employ biological monitoring of study subjects, and the bottom-up strategy that involves sampling of external exposures.

CROME-LIFE innovates by promoting an integrated approach, as we believe that without a holistic view, combining internal and external exposure, it will not be possible to link outcomes of association studies with policy implications. According to the CROME-LIFE approach the process will start by estimating exposure using human biological monitoring data and work both forwards relating these data to disease and backwards (using reverse dosimetry) to environmental exposures.



Such an integrated approach has a number of advantages over the classical approaches for the following reasons:

1. Known relationships between markers of exposure in the internal and external environment can be used to provide a more complete understanding of an individual's exposure profile. Just focusing on biological monitoring will often just provide a short and, due to the highly variable nature of the metabolome, unreliable estimate of both exposure and the consequent attributable health impact.
2. Opting for a holistic approach will not only provide information on the association between exposure to environmental stressors and health response; it will also often provide direct evidence for risk reduction strategies through interventions at the personal and/or environmental levels.

## MAIN BENEFITS FOR THE POPULATION

The CROME-LIFE approach is expected to contribute to improving the health and life quality of the population involved in the project and consequently result in significant social and economic benefits.

One of the expected key results is the identification of preventive strategies to lower health costs through:

- Using the CROME-LIFE results in comparative risk assessment and cost-benefit analyses of preventive strategies and policy measures to lower health costs.
- Identifying mitigation actions based on exposure profiles (which sources to reduce, which exposures or exposure routes to avoid, which behaviours to change) in order to reduce the risk of disease or the burden of disease at a later stage in life.

Taking into account the European Commission's ambition to increase the average number of healthy life years by two additional years by 2020, it is clear that novel approaches to develop preventive health strategies are needed. By focusing on approaches beyond the 'diagnostic and therapeutic' side of health impact assessment CROME-LIFE will provide new options for cost-efficient active and healthy ageing. Considering the amount of money that can potentially be saved by promoting physical activity, healthy diets, careful and well-informed use of consumer products, life-long prevention and promotion can become key to lowering health costs.

The application of the CROME-LIFE methodology and tools will allow the identification of specific health protection measures to be implemented by the relevant authorities in the four selected countries. Authorities are expected to take these measures in collaboration with and supported by the project team.

Measures that are likely to be adopted on the basis of the CROME-LIFE analysis and conclusions are:

- Rehabilitation of contaminated sites targeting activities in priority areas identified by CROME-LIFE.
- Public awareness campaigns to reduce exposure by behavioural/lifestyle change.
- Enhancement of water filtration systems, limitation of locally produced food consumption in heavily contaminated areas.
- Setting up a continuous/regular human biomonitoring system locally to track closely the evolution of population exposure to the priority contaminants.
- Issue fines to key polluters in the areas of their jurisdiction with a scope to reduce the intensity or de-localise the main pollution/contamination sources.