

Project presentation: HITEA

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HITEA

Health Effects of Indoor Pollutants: Integrating microbial, toxicological and epidemiological approaches

Collaborative Project (small and medium-scale focused research project)

Seventh Framework Programme

Theme 6. Environment (including climate change)

Indoor air pollution in Europe - An emerging environmental health issue

[Topic: ENV.2007.1.2.1.1.]

Status: currently under negotiations with the EC

Proposed project start: April 2008

Aims and objectives in HITEA

- to identify the role of indoor biological agents that lead to long term respiratory, inflammatory and allergic health impacts among children and adults
 - the focus is on microbial exposures due to dampness problems of buildings; role of allergens, chemicals and poor ventilation will also be studied
- microbiological, toxicological, analytical and immunological techniques will be applied to elucidate the exposures, their short term and long term health impacts, and the mechanisms behind

The HITEA-Consortium

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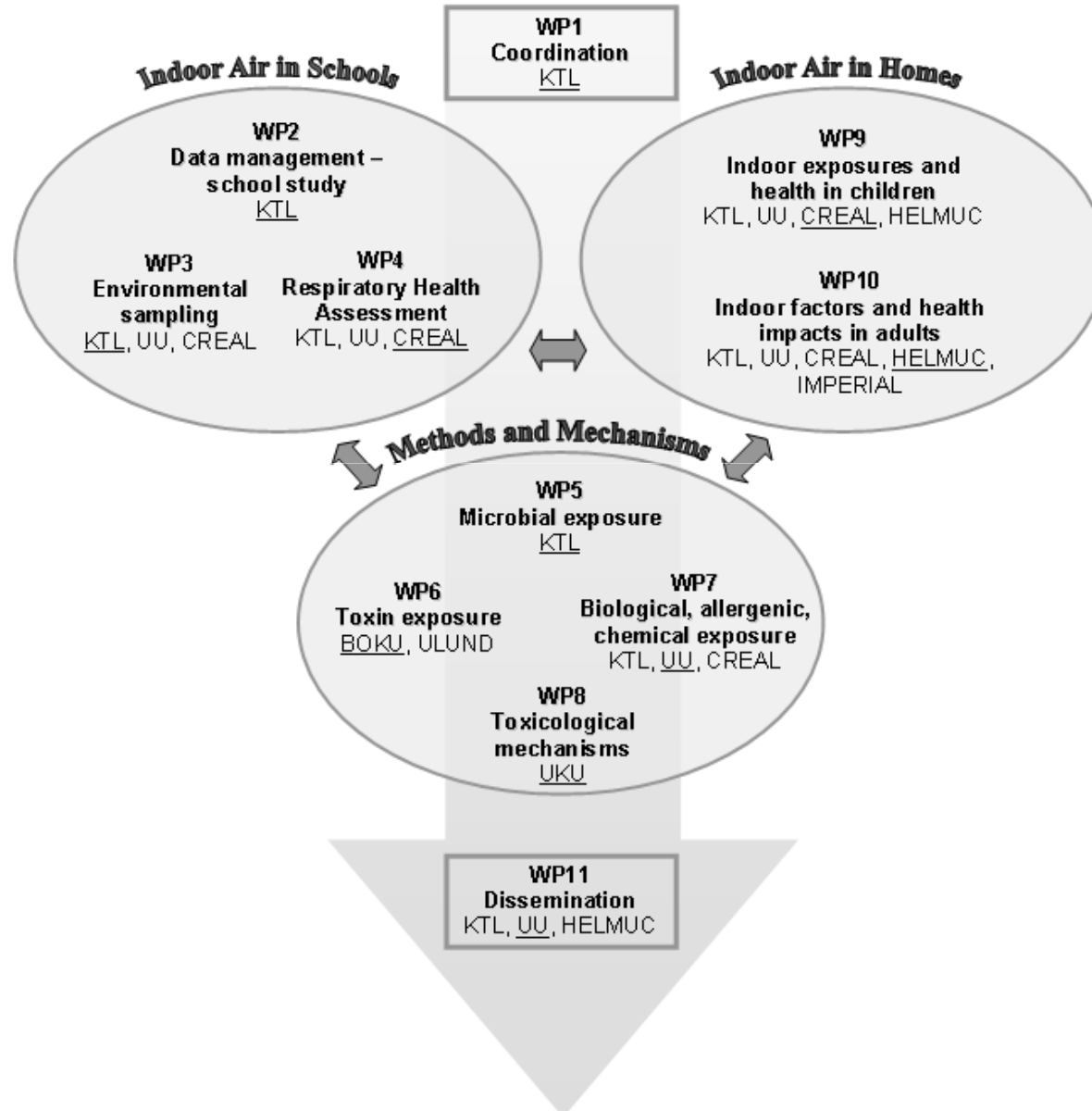
Participants name	short name	Country
Kansanterveyslaitos – National Public Health Institute	KTL	Finland
Universiteit Utrecht	UU	Netherlands
Fundació Centre de Recerca en Epidemiologia Ambiental	CREAL	Spain
Helmholtz Zentrum München – Deutsches Forschungszentrum für Gesundheit und Umwelt	HELMUC	Germany
University of Kuopio	UKU	Finland
Universität für Bodenkultur Wien - University of Natural Resources and Applied Life Sciences, Vienna	BOKU	Austria
Lunds Universitet	ULUND	Sweden
Imperial College of Science, Technology and Medicine	IMPERIAL	United Kingdom

Overall strategy in HITEA

The study consists of three closely linked parts:

- 1) **Indoor Air in schools:** dampness and moisture problems and associated exposures to biological agents in schools across Europe (longitudinal field study)
 - role of multiple exposures in school environments for children's and teachers' respiratory health
- 2) **Indoor Air in Homes:** integrates several European-wide children and adult population cohorts, and emphasizes on the long term health impacts of biological agents in the home environment
- 3) **Methods and Mechanisms:** extensive exposure assessment to biological and other agents of interest in schools and homes across Europe
 - usage of previously validated parameters and novel molecular technologies
 - toxicological characterization and mechanistic studies

Overall structure and interdependencies of the WPs and study parts in HITEA



Contribution of HITEA to the EnVIE concept:
Effects → **Exposures** → Sources → Policies

The major effort in HITEA is on elucidating and describing indoor biological exposures, with emphasis on microbial exposures (in addition, allergens, chemicals, cleaning agents, and poor ventilation)

- microbial, immunological, toxicological, and dampness related properties of indoor air in school buildings in three climatic regions across Europe (FI, NL, SP - total 18 schools) will be characterized
- extensive microbial analysis of house dust samples (N~3000) to determine exposure characteristics in existing European children (PIAMA, LISA, INMA, LIKUAS) and adult (ECRHS II) cohorts

Contribution of HITEA to the EnVIE concept: **Effects** → Exposures → Sources → Policies

Respiratory, inflammatory and allergic health effects among children and adults are measured and described along with the exposures

➤ In the school study:

longitudinal respiratory health assessment in pupils and teachers, to elucidate short term health effects, potentially leading to long term impacts (spirometry, inflammatory markers in nasal lavage and blood, EBC)

➤ In the population cohorts:

- long-term effects of indoor exposures during early life on respiratory, inflammatory, and allergic health parameters, and development of immune function (children cohorts)
- long term effects of indoor microbial exposures on lung function, bronchial hyperactivity, and respiratory symptoms (adult cohort)

Contribution of HITEA to the EnVIE concept: **Effects ↔ Exposures → Sources → Policies**

Associations between indoor biological agents and health are strong,
but causative agents and disease mechanisms are largely unknown
→ **HITEA aims to identify causal links**

- Exposure characteristics of indoor air in schools will be combined with measured short term health effects in school children and teachers
- Mechanistic information will be provided, with focus on respiratory health and on cytotoxicity, inflammatory, and oxidative stress related pathways
- Comprehensive new exposure data (microbial agents) will be combined with extensive health data from existing European-wide population cohorts (LISA, PIAMA, INMA, LUKAS, ECRHS II)

Contribution of HITEA to the EnVIE concept: Effects → Exposures → **Sources** → Policies

Information on sources will be particularly available from the school study (and linked to measured exposures where possible)

- prevalence of dampness in approx. 300 schools in three climatic regions in Europe (FI, NL, SP) through questionnaire:
 - general information on building and maintenance, HVAC
 - dampness/moisture/mould in the schools

- technical characteristics and IAQ in 48 schools through building inspections (8 'damaged', 8 'control' schools/country):
 - observation of buildings characteristics, moisture damage, and potential contributors to poor IAQ (maintenance, sources of dampness/mould, particles, VOCs, ...)

- environmental sampling in 18 selected schools (6 schools/country):
 - sampling of settled dust for microbial and allergen measurements indoors; in addition, sampling of outdoor air
 - sampling of PM_{2.5} and NO₂ (indoor and outdoor)
 - CO₂, temperature, humidity and ventilation

Contribution of HITEA to the EnVIE concept:
Effects ↔ Exposures → Sources → Policies

Steps of progress in recent years

- Knowledge:
 - Potential importance of microbial exposures as protective agents against allergy
 - Potential importance of indoor microbial growth as source of causal agents of health effects
 - Potential importance of microbial secondary metabolites (toxins) as causal agents
 - Observation that small particles (down to nm size) are also emitted from microbial growth (potential mechanism of toxin exposures)

Contribution of HITEA to the EnVIE concept: Effects ↔ Exposures → Sources → Policies

Progress in practices

- Increase in awareness about potential health risks with dampness, moisture and mould
- Finnish guidance to occupational medical practitioners (Majvik II recommendation): how to identify and treat a mould exposed patient?
- Microbial detection methods in progress (DNA-based); need still validation

Contribution of HITEA to the EnVIE concept:
Effects ↔ Exposures → Sources → **Policies**

Progress in policies

- WHO guidance under preparation
- EU SCHER opinion about IAQ
- US Academy of Sciences, Institute of Medicine: report of dampness and mould, including recommendations (2004)
- In many US states, efforts for preparing guideline values
- Updating of building codes in some countries

Contribution of HITEA to the EnVIE concept:
Effects ↔ Exposures → Sources → **Policies**

Urgent proposals for policies *etc.*

- Introducing general guidelines/guidance on harmfulness of dampness/moisture and mould on health on national level
- Guidance and regulations how to control the problem must also be mainly on national level, due to variations in climate and building practices
- Guidance to medical practitioners to identify and cure patients with health effects due to mould exposure
- In research, the most urgent need is to clarify the role of microbial toxins

Contribution of HITEA to the EnVIE concept:
Effects ↔ Exposures → Sources → **Policies**

Urgent needs for policies etc.

- All the issues mentioned need some complementing research efforts, but the main core of information is already available
- Preparation of guidance would ideally be done on national level, but by networking with other European countries