



Research Programs in Progress:

- **Actions to Improve Elderly Well-being & Promote Active Aging**
 - ✓ To determine the prevalence of poor nutritional status among elderly
 - ✓ To assess factors related to the nutritional status of the elderly
 - ✓ To assess the key factors that have a statistically significant impact on frailty
 - ✓ To identify the key determinants of the risk of frailty among older adults
- **Investigation of the Health Impacts of Climate Change in Crete**
 - ✓ To investigate the impact of climate change on hospital admissions due to chronic diseases
 - ✓ To assess the impact of climate change indexes on common morbidity and mortality disease
- **DOPANTS**

The objective of DOPANTS was the development of polymeric nanocomposite specimens with enhanced mechanical and antimicrobial properties (Financed by the Hellenic Mediterranean University)

 - ✓ Fabrication of specimens from reinforced polymer using various techniques and different concentrations to study the mechanical and antibacterial properties of the material
 - ✓ Characterization of the antibacterial properties of the polymeric nanocomposites
- **XeMiBio**

The impact of food-derived microRNAs (XenomiRs) in extracellular matrix remodeling and microbiota during malignant melanoma. (Financed by the Hellenic Foundation for Research and Innovation (H.F.R.I.))

 - ✓ Graphene/chitosan nanoparticles will be developed to deliver the selected microRNA
 - ✓ These nanoparticles will be used as a drug delivery system for the further evaluation of microRNAs in a future in vivo study on a mouse melanoma cancer model

Contact information:

Dr. Evridiki Patelarou, Professor | epatarou@hmu.gr

Dr. Minas M. Stylianakis, Asst. Professor | stylianakis@hmu.gr

Dr. Alexandros Argyriadis, Asst. Professor | argyriadis@hmu.gr

Dr. Vasileios Tzatzadakis, Postdoctoral Researcher | vtzatzadakis@hmu.gr

Eirini Stratidaki, Ph.D. Researcher | ddk74@edu.hmu.gr



Public Health, Epidemiology, Environmental & Biomedical Applications Lab (PHENBIO)

Research activities

PHENBIO conducts cutting-edge research in Public Health, Epidemiology, Environmental Science, and Biomedical Applications.

- Our work in epidemiology and public health currently focuses on the effect of environmental exposures on health from the early life through adulthood and the development of personalized interventions to prevent disease development.
- Through Life Cycle Assessment (LCA) analysis the environmental footprint of functional nanomaterials and composites is evaluated in terms of environmental and human health impact indicators.
- Potential applicability of polymer (bio)nanocomposites in advanced biomedical applications (medical tools/devices, drug delivery systems, and tissue engineering is investigated.

Public Health

Actions to Improve Well-being & Promote Health

Health Monitoring

- Development and implementation of strategies to reduce environmental and occupational health risks.
- Regular assessments to detect malnutrition and weight loss.
- Home visits for personalized dietary guidance and support.

Frailty Prevention Through Nutrition

- Adapted diets for chewing and swallowing difficulties, including soft and pureed foods.
- Meal planning with appropriate utensils to ensure adequate intake.

Nutritional Support

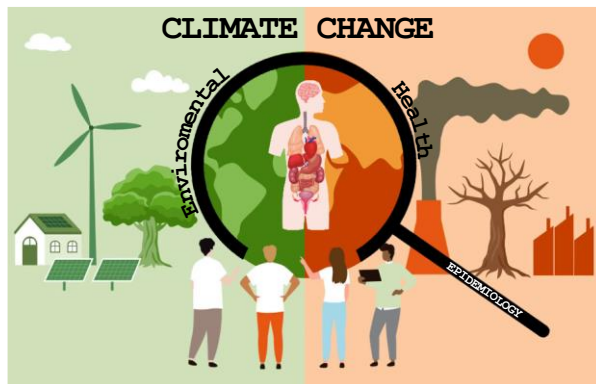
- Provision of liquid and semi-solid meals for those with eating difficulties.
- Customized meal plans to maintain strength and overall health.
- Training for caregivers to recognize and manage nutritional deficiencies.



Epidemiology



Investigating the Health Impacts of Climate Change in Crete

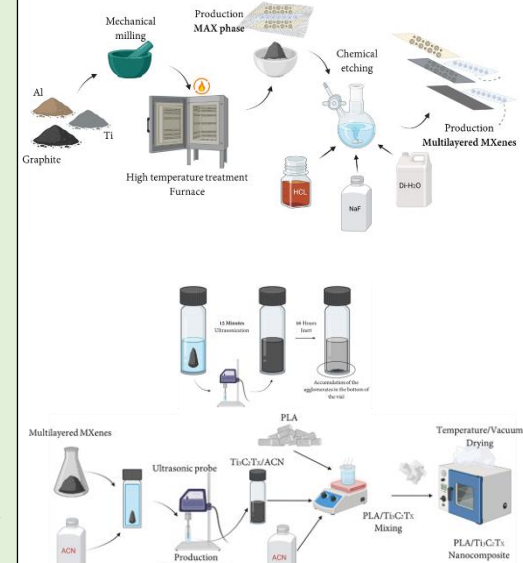


- Understanding the effect of temperature and air pollution on hospital admissions.
- Examination of long-term impacts of climate change on chronic conditions and overall public health.
- Evaluation of how temperature fluctuations and air pollution influence mental health outcomes.
- Examining the impact of temperature and air pollution on mortality.
- Assessing the link between ambient temperature, air pollution, and suicide rates.
- Providing insights for preventive strategies to safeguard public health in Crete.

Life Cycle Assessment

PHENBIO integrates Life Cycle Assessment (LCA) to evaluate the environmental and human health impact of nanomaterials and preparation processes.

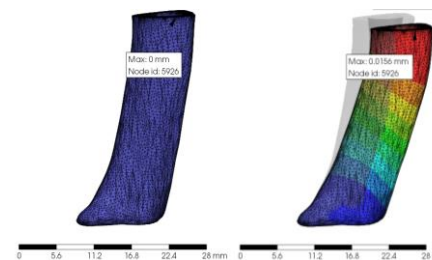
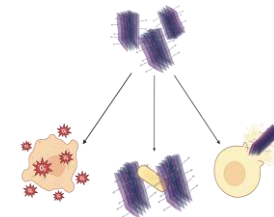
- Sustainability evaluation of functional nanomaterials and composites; entire life cycle analysis - from raw material extraction to end-of-life disposal
- Human health indicators determination to assess potential risks associated with exposure to chemicals and manufacturing emissions
- Recent research in our lab has applied LCA to polymeric nanocomposites
- Our work aligns with the European Union's sustainability goals
- Through LCA-driven innovation, we strive to optimize several synthetic processes of nanomaterials, to accomplish minimal environmental harm and enhanced human safety, ensuring a balance between technological advancement and ecological responsibility.



Biomedical Applications



MXene Nanoparticles (Ti₃C₂T_x)



PHENBIO also explores the development of biopolymers and nanoparticles for biomedical applications, with a strong focus on antibacterial nanocomposites.

- Our research investigates the role of functional nanomaterials towards the enhancement of the mechanical, thermal, and antimicrobial properties of neat biopolymers (e.g. PLA)
- Nanomaterials incorporation is expected to extend the service life of polymer-based medical devices while improving their biocompatibility and performance
- Finite Element Analysis (FEA) is carried out to model biological tissues, enabling materials behavior prediction within biomedical applications
- Through a combination of experimental and computational modeling, valuable outcomes are extracted to understand the interaction between biomaterials and living tissues, supporting next-generation medical technologies development