Partner Search Form
Horizon Europe
Health

Date 12.06.2025	**Deadline** 09/2026

CONTACT			
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Organisation type			
Research organisation type ☐ Research Organisation ☒ University ☐ Company ☐ Other	**Is your company a Small and Medium Sized Enterprise (SME*)?** ☐ YES ☒ NO	**Number of employees:**	~4,000 (EPFL)

Short introduction of key areas of institute's research:

EPFL (Ecole Polytechnique Federale de Lausanne) is one of Europe's leading technical universities, consistently ranked among the world's top institutions in engineering and natural sciences. Our group operates with **breast cancer cell cultures** as well as the research and development of non-invasive tools for early cancer detection based on **volatile organic compound (VOC) analysis.** This work builds on more than 15 years of expertise in **olfactory sensing methodologies** and their application to biomarker detection and disease diagnostics.

Our group has an established track record in **odorant biology** and **breast cancer research**. Previous work by Horst Pick and collaborators demonstrated that specific odorants can activate both olfactory receptors and the human estrogen receptor α (ERα) in breast cancer cells, leading to changes in gene expression and cellular proliferation. These findings established a unique link between volatile organic compounds (VOCs) and breast cancer biology. This expertise in cancer cell research and VOC-mediated signaling provides a strong foundation for the group's current efforts to develop VOC-based approaches for early cancer detection.

Current research focuses on the identification and characterization of volatile organic compound (VOC) signatures associated with breast cancer, with the goal of developing **non-invasive methods** for early cancer detection. To identify robust and **disease-specific VOC biomarkers**, the group works with breast cancer cell lines through an ongoing collaboration with the Brisken Laboratory at EPFL, a leading laboratory in mammary gland biology and breast cancer research. In addition, the group investigates VOC profiles produced by breast cancer cells under both non-oxidative and oxidative tumor microenvironment conditions in vitro, enabling the distinction of biomarkers directly associated with cancer cells from those influenced by the surrounding microenvironment.

In parallel, the group collaborates with CHUV (University Hospital Lausanne), which provides sweat samples collected from breast cancer patients for VOC analysis. This translational approach allows the comparison of in vitro findings with patient-derived samples, facilitating the validation of candidate biomarkers and supporting the development of clinically relevant VOC-based diagnostic strategies.

More broadly, the group is committed to advancing **non-invasive approaches** as a cornerstone of future cancer screening and early detection. Recognizing that VOC profiles arise from complex interactions between host metabolism, the tumor microenvironment, and associated microbial communities, we also investigate the potential contribution of **tumor-related bacteria (TRB)** to volatile signatures in biological matrices, particularly sweat. By disentangling these biological sources of VOCs, our aim is to identify metabolic alterations associated with tumor development at the earliest possible stages, potentially enabling disease prediction before the onset of clinical symptoms.

Former participation in an FP European project? ☐ YES ☒ NO	**Project title / Acronym:** Our group has not yet directly participated in EU Framework Programme projects as a partner. EPFL as an institution is an experienced EU project participant with a broad portfolio of projects and expertise; see ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE

Expertise / Commitment offered	
Description of your expertise:	**Our group's expertise spans breast cancer cell culture models, gas-phase volatile organic compound (VOC) analysis by GC–MS, protein engineering for biorecognition systems, microfluidics, and the physicochemical characterization of tumor microenvironment components.** In particular, our group investigates extracellular matrix elements such as collagen and fibronectin, including their controlled oxidative modification using a Knudsen Flow Reactor to reproduce physiologically relevant tumor microenvironment conditions and assess their impact on VOC production. Building on these capabilities, current research focuses on the characterization of VOC profiles derived from both breast cancer cell cultures and sweat samples collected from breast cancer patients, with GC–MS serving as the primary analytical platform. By integrating controlled in vitro models with clinically relevant patient samples, the group aims to identify **and** validate **robust VOC biomarkers for non-invasive cancer detection.** Our group is actively building **bio-based selective VOC sensing platforms** and has protein production and characterization capabilities in house supporting this development.
Keywords specifying your expertise:	Volatile organic compounds (VOCs), transcutaneous VOC emission, sweat analysis, non-invasive early detection, GC-MS, biorecognition elements, breast cancer, cancer biomarkers, protein production, protein engineering, odorant receptors, cancer cell biology, tumor-related bacteria (TRB), skin microbiome, saliva, tears, earwax, urine, microfluidics, Knudsen flow reactor
Commitment offered:	☒ Research ☐ Demonstration ☐ Training ☒ Technology ☐ Dissemination ☐ Other:

Interested in participation in project types:	☒ Research & Innovation Action	☐ Innovation Action	☐ EIC Pathfinder

Work Program research areas: indicate your interest
Our group strongly believes in non-invasive detection strategies and sees them as the future of early cancer prediction. In the context of sweat VOC analysis, the microbiome is considered a potential confounder of cancer-derived VOC signals and would contribute to a broader picture of the disease profile. Particularly of interest are: • **Non-invasive early cancer detection via accessible matrices**: characterization and validation of cancer-associated VOC signatures in non-invasive matrices, supporting the development of early, patient-friendly detection strategies. • **Analytical method development for complex VOC mixtures**: GC-MS-based approaches for the detection, identification, and quantification of trace-level cancer-associated VOC markers in biological matrices, including data analysis for biomarker discovery and validation. • **VOC profiling in cell cultures and clinical samples**: identification of VOC markers emitted by cancer cell lines validation against clinical samples from cancer patients. • **Bio-based selective VOC capture platforms**: protein engineering and production of biorecognition elements for selective and targeted binding to cancer-relevant VOC markers, aiming to enhance the specificity of downstream GC-MS-based detection. • **Microbiome as confounder and disease contributor - tumor-related bacteria (TRB)**: interest in understanding whether specific microbial communities - in particular tumor-related bacteria (TRB) - genuinely contribute to the VOC composition of biological matrices and whether the lifestyle or other clinical parameters can influence the microbiome. • Contribution of **tumor microenvironmental elements** in **cancer progression** and **tumor-specific signature volatiles**

Call topic(s): HORIZON-MISS-2026-02-CANCER-02 – Microbiome for early cancer prediction before the onset of disease

Profile of partner sought	
Role	☒ technology development ☒ research ☐ training ☐ dissemination ☐ demonstration ☐ other _____
Country /region	☒ Europe

Expertise required	We are seeking collaboration with a coordinator and partners who possess strong expertise in the following areas: • **Microbiome research and VOC metabolomics**: characterization of microbial VOC metabolites associated with cancer risk and onset; experience with microbiome profiling and GC-MS analysis • **Clinical oncology and cancer screening**: access to longitudinal cohorts and biological sample collections across cancer types; experience with non-invasive biomarker studies and ethical frameworks for multi-year patient follow-up • **Bioinformatics and data science**: multivariate analysis of complex VOC datasets, machine learning for cancer risk

	stratification, integration of metabolomics and multi-omics data for biomarker discovery and validation • **Epidemiology and study design**: methodology for longitudinal biomarker studies, sample stratification, and statistical frameworks for early cancer prediction • **Sensor development**: Gas sensing product development, product design and implementation • **Translational and regulatory expertise**: experience supporting the pathway from research findings toward clinical validation; knowledge of IVD regulatory frameworks for non-invasive detection assays is a plus

I agree with the publication of my contact data: ☒ YES ☐ NO