Project Title: Early Detection of Lung Cancer by analysing Volatile Organic Compounds in Human Breath

Status	Feasibility Study- Total cohort 100: 50 healthy and 50 Lung cancer patients
Clinical Partner	Chirugisches Zentrum Zurich and Lungen Zentrum, Hirslanden Clinic Zurich Switzerland
Principal Investigator	Prof. Dr. Othmar Schöb
Co-Principal Investigator	Dr. Karl Klingler
Collaboration and technology developer	Vital View Diagnostics AG
Diagnostic Area	Oncology / Lung Cancer
Methodology	VOC biomarker profiling with Breath-based spectrometry combined with AI/ML pattern analysis for lung cancer detection

Study Purpose:

The project aims to evaluate whether breath analysis can:

- Differentiate between healthy individuals and patients
- Detect lung cancer early
- Distinguish between cancer stages

Key approach:

- Develop method standardization for breath-based technologies
- Build a theoretical **VOC spectral library**
- Method development for breath VOC detection and spectrometric analysis
- Develop pattern-recognition algorithms and VOC identification

Results and Conclusion:

Following Mass spectrometric and Ion mobility testing the following results were obtained:

- 33 theoretical VOCs listed from robust literature review as identified by mass spectrometry
- Mass spectrometry run: Approximately 250 VOCs identified, with 28 differentiating VOC between healthy and lung cancer cohort, and at least 8 VOCs showing significant difference. One unique VOC identified.
- IMS runs: Spectral pattern differences with machine learning algorithms. Reference spectral library and proprietary software in development.

The feasibility study for Breath analysis using IMS offers a promising, non-invasive, fast, portable and cost-effective method for lung cancer screening and monitoring, with the potential to significantly improve early detection and patient outcomes. IMS sampling to be continuously done for the remaining cohort for developing robust machine learning algorithms and future AI-analysis.

Outlook

The same core breath-collection, technology and AI-analysis architecture can be extended to additional high-value indications.

Possibilities Target expansion areas include:

- Screening other cancers (Glioblastoma, Pancreatic, Liver, etc. cancers)
- Early detection metabolic disorders including diabetes and liver disease
- Longitudinal monitoring:
    - Post cancer surgery
    - Cancer therapy
    - Preclinical model development - mouse (lung) cancer models for cancer therapy evaluation studies as a research modality for in vivo longitudinal evaluation of cancer therapy response.
    - Potential applications of the technology platform in organ -on-chips models can also be contemplated.