

FlowSiAM - A Novel Platform for Functional Immunophenotyping

FlowSiAM (**Flow** cytometry-based **Intracellular Staining** in **Activated Monocytes/Macrophages**) is a novel liquid biopsy approach that enables the intracellular detection of disease markers in peripheral blood-derived immune cells. By combined immunostaining of classical surface markers with disease specific antigens, FlowSiAM allows for the identification of functionally distinct subpopulations, particularly within monocytes and macrophages that bear specific signatures of previously captured pathogens or pathologic tissue components. This approach opens new ways for non-invasive diagnostics, disease monitoring, and patient stratification.

The method is increasingly being recognised in diverse biomedical fields, supporting the investigation of diverse pathological conditions ranging from cancer and neurodegeneration to infectious and immune-mediated diseases, as well as fundamental immunological and basic-research related questions. Laboratories and research partners across Germany and Europe are already applying the platform technique to a wide range of clinical and translational projects.



Fast & reliable sample analysis
via Flow Cytometry

The technology builds on research that began nearly two decades ago and has since found wide application in biomedical studies. In 2004, a seminal study by Ralf Herwig and colleagues first reported that tumor antigens from prostate cancer could be detected within macrophages.¹ This discovery laid the foundation for the concept that circulating immune cells can serve as "sentinels" for pathological processes in peripheral tissues.

A few years later, Johannes Coy identified two tumor-associated antigens - Apo10 (a conformational epitope of DNaseX) and TKTL1 (Transketolase-like 1) - as key markers of tumor development and immune evasion.² This led to the development of the EDIM (Epitope Detection in Monocytes) technology, which applies intracellular staining of CD14⁺ monocytes from whole blood to detect pathological signals in cancer patients.³ The EDIM-based "PanTum_{Detect}" test is IVD/CE-certified and currently used in Germany, China, India, and Thailand for tumor detection and early screening.

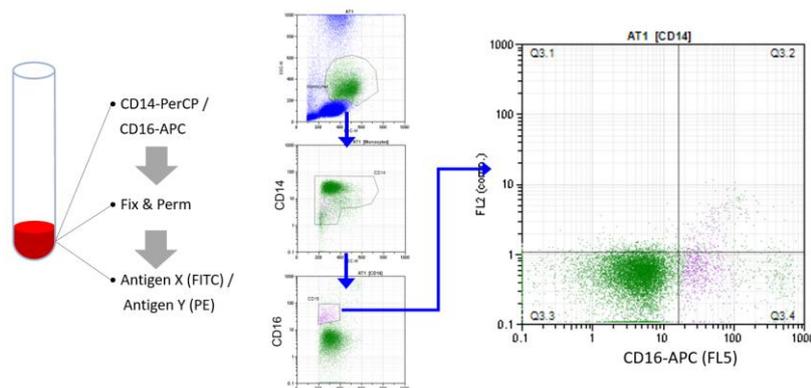


Fig. 1: Overview of the FlowSiAM workflow.

One Technology - Various Applications

FlowSiAM extends the EDIM principle by using flow cytometry as a flexible and high-resolution platform for multiparametric intracellular staining in monocytes and macrophages. While originally developed for use with whole blood (EDTA), the method is now also being applied to PBMC samples in ongoing projects, offering additional flexibility for sample handling, biobanking, and retrospective analyses. As a research-grade and customizable platform, FlowSiAM enables the investigation of a wide range of intracellular targets - including not only tumor-associated antigens, but also markers related to inflammation, metabolism, and others, making the technology adaptable to a variety of research questions and clinical applications.

Beyond its potential in clinical contexts, FlowSiAM also offers exciting opportunities for basic research, such as functional immunophenotyping, biomarker discovery, and in vitro studies on monocyte activation and differentiation. The optimized test set up for combined analysis of surface and intracellular markers in a high-throughput manner makes it a powerful tool for exploring immune cell function under both physiological and pathological conditions.

FlowSiAM Network

We are currently expanding our network of academic and clinical partners and actively seeking collaborations for joint grant applications and pilot studies. If your research focuses on intracellular markers in immune cells or related areas, we are happy to discuss how FlowSiAM could support and complement your work.



References:

- 1 Herwig et al. - Ability of PSA-positive circulating macrophages to detect prostate cancer. *Prostate* 2005; 62: 290-298. <https://doi.org/10.1002/pros.20141>
- 2 Coy JF. EDIM-TKTL1/Apo10 Blood Test: An Innate Immune System Based Liquid Biopsy for the Early Detection, Characterization and Targeted Treatment of Cancer. *International Journal of Molecular Sciences*. 2017; 18(4):878. doi: 10.3390/ijms18040878
- 3 Saman et al. - Biomarkers Apo10 and TKTL1: Epitope-detection in monocytes (EDIM) as a new diagnostic approach for cholangiocellular, pancreatic and colorectal carcinoma. *Cancer Biomark*. 2020; 27(1):129-137. doi: 10.3233/CBM-190414. PMID: 31771043; PMCID: PMC7029314.