

PHRT Platforms: Swiss Multi-Omics Center (SMOC)

Represented by Prof. Dr. Nicola Zamboni, ETH Zürich

2nd Jointed Personalized Health Day, Bern, August 2022

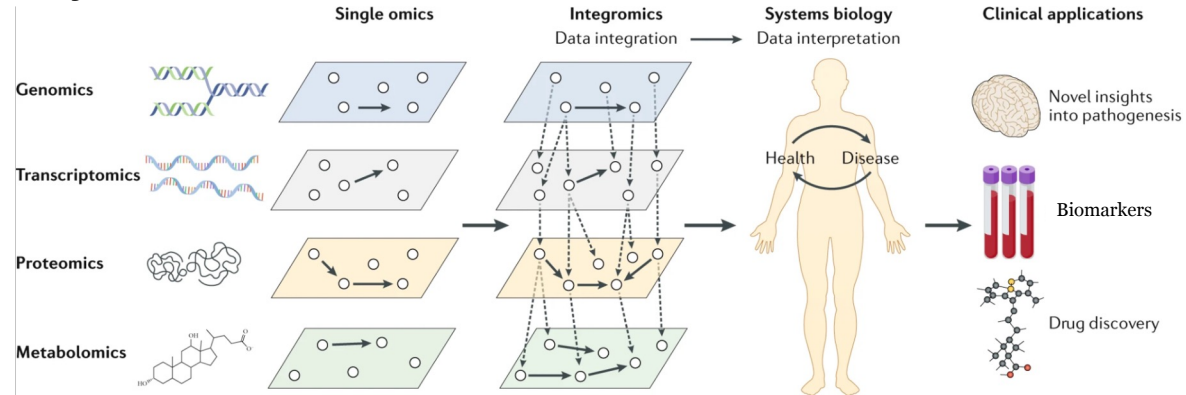
PH builds on the combination of clinical and molecular data

Sample digitization is a necessity!

Clinical samples cannot be regenerated. Turning clinical specimens into searchable and reusable digital biobanks paves the road to retrospective and highly-powered studies.

Sample digitization is an opportunity!

Integrative analyses drive discovery of mechanisms and novel targets.



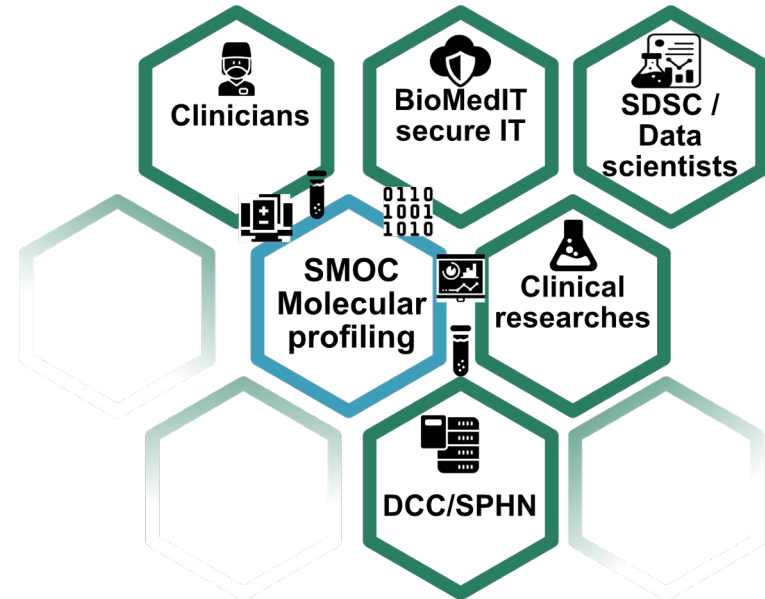
SMOC in a nutshell

Mission: Enable multi -omics analyses of clinical samples

- Deliver clinical-grade, population scale, molecular data enriched with expert data analysis
- Democratize access to data (costs, actionability)
- Move towards a “National competence center”

Organization: Integration of existing expert units

- **genomics** @ Health 2030 Genome Center
- **proteomics** @ ETH Zürich
- **metabolomics** @ ETH Zürich
- Tight collaboration and coordination across Centers
- ~10 PIs/Senior Scientists involved in management



SMOC development foci

	Sample digitization	Convert data into actionable knowledge	Enabling multi omics science
Vision	Delivering cutting-edge, clinical-grade data at scale, speed, and low costs.	Advising customers on experimental design and interpretation of data.	One-stop shop for design, analysis, and interpretation of omics experiments.
Activities	technology development, port high-end to routine, QC/QAs, automatization, streamline workflows, alignment with BioMedIT	Project consulting, tooling, embed prior knowledge in analysis	Simplify complex analyses, wrap integrative tools, coordination across centers, training scientists on multi omics data, demonstrators

SMOC Services

Design

Pre-digitization Consulting

Experimental design, grant writing, budgeting

Sample digitization

- Details @ smoc.ethz.ch
- Full workflow:
 - Sample preparation
 - Acquisition
 - Analysis
 - Integration
 - safe storage and exchange
 - FAIR sharing (BioMedIT)

Genomics

CGAC Clinical Genomic Analysis Center

Clinical Grade Sequencing
(ISO 15189 accredited)

Whole Genome Sequencing (WGS)

Whole Exome Sequencing (WES)

RNA Sequencing (RNASeq)

Fast-track genomic data analysis

Proteotyping

CPAC Clinical Proteotype Analysis Center

Quantitative Proteotyping

Proteotype analysis (DDA, DIA, PRM)

Post-translational modification analysis

Spatial proteotype analysis

Fast-track proteomic data analysis

Metabolomics & Lipidomics

CMAC Clinical Metabolomics Analysis Center

Small molecule analysis

Targeted metabolomics

Untargeted metabolomics

Lipidomics

Fast-track metabolomic data analysis

Integration

Post-digitization Analysis

-omics integration, expert advising on interpretation, validation

SMOC in numbers

	Genomics	Proteomics	Metabolomics
Number of samples (2018-2021)	11,109 <i>+ 28,300 SARS-CoV-2</i>	1,188	14,155
Number of samples from newly funded projects (2022-)	~1,800	~2,100	~5,700

An illustrative case study

Integrated multi-omics reveals anaplerotic insufficiency in methylmalonyl-CoA mutase deficiency

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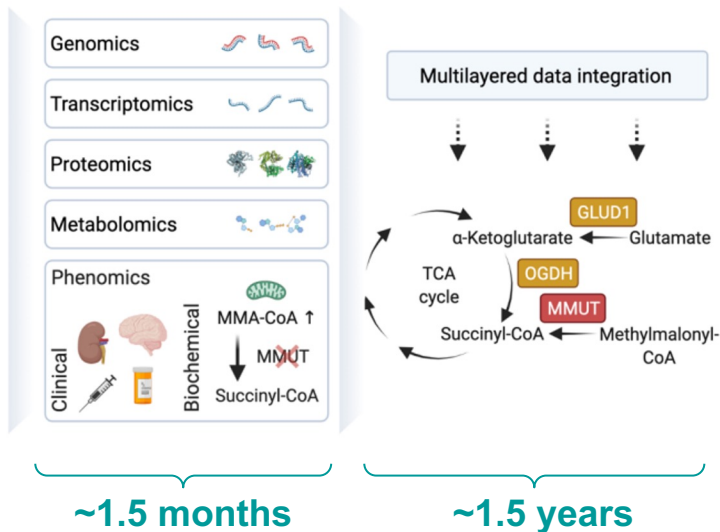
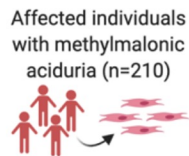
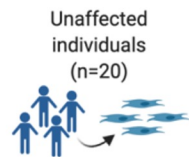
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<http://smoc.ethz.ch>



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Feel free to get in touch with anyone of us to discuss needs and ideas.



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Acknowledgments

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