

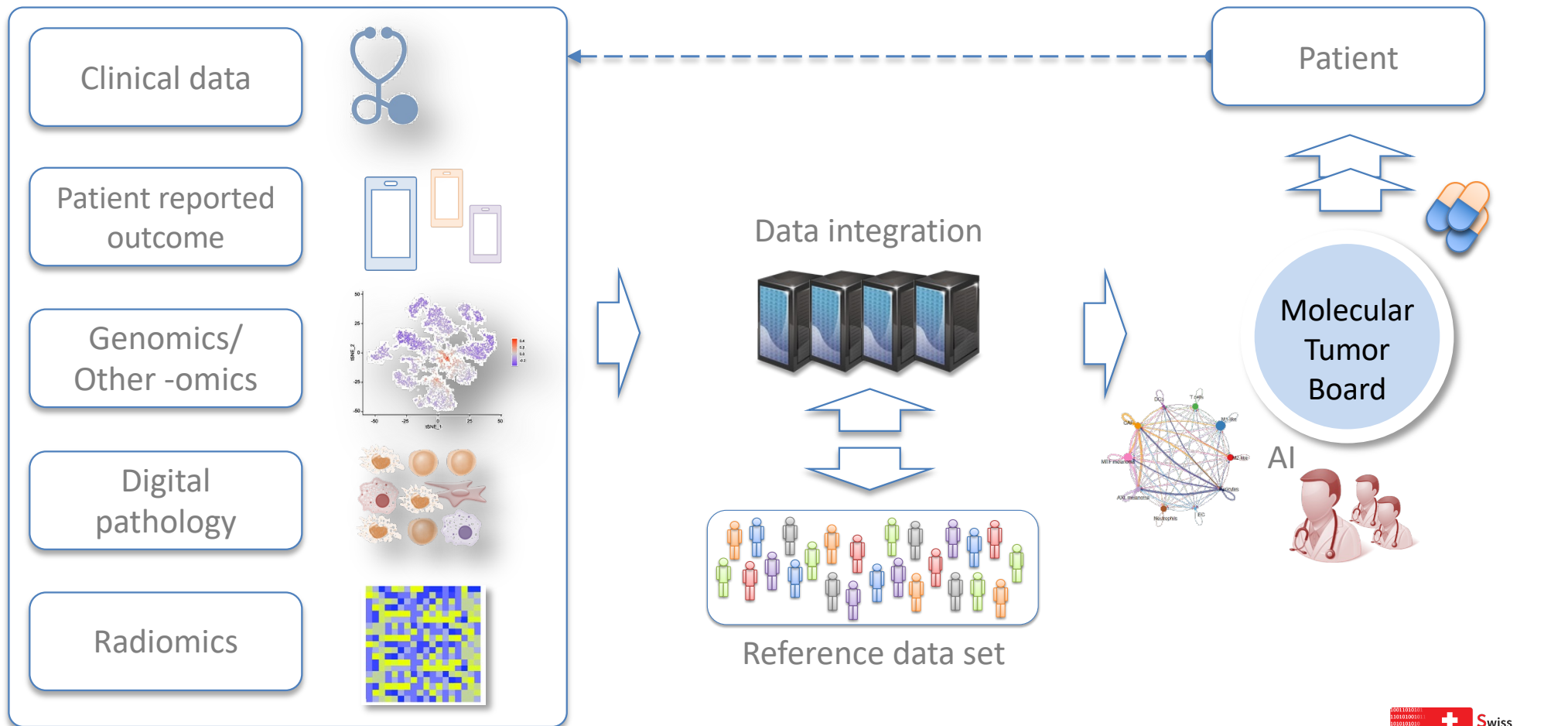
| SPHN Workshop | Bern | 30.10.2024 |

Clinical Research Perspective

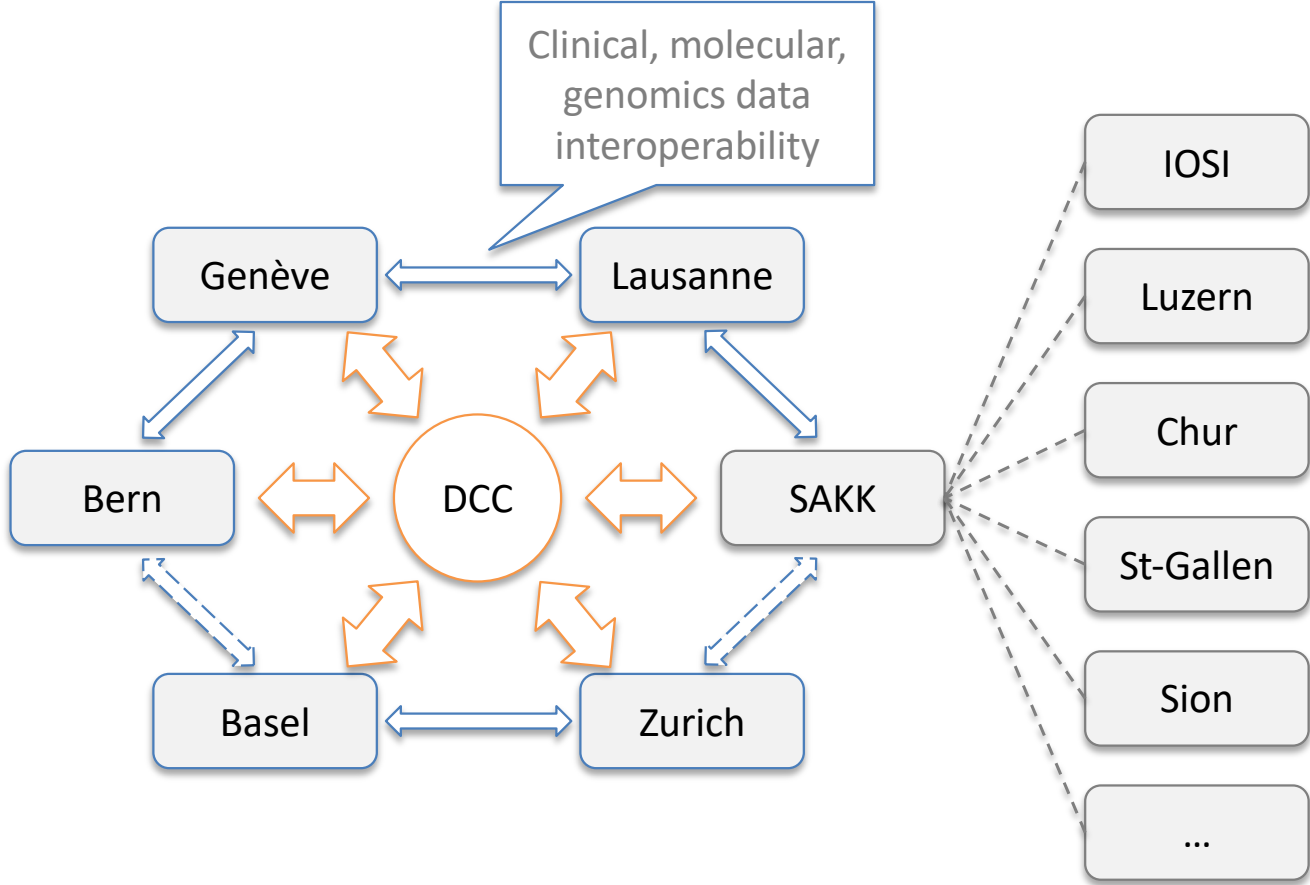
Olivier Michielin, MD-PhD

Head of Department of Oncology and
Precision Oncology Service,
Geneva University Hospital – Geneva
Co-Director of Swiss Cancer Center Leman,
Agora – Lausanne
Professor at the Swiss Federal Institute of
Technology, EPFL – Lausanne

Precision oncology: integrating multiple data streams



The Swiss Personalized Oncology (SPHN Driver): SPO



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 **Swiss**

 **Personalized**

 **Oncology**



HUG Hôpitaux
Universitaires
Genève

 **Universitätsspital
Basel**

 **SAKK**

INSELSPITAL
UNIVERSITÄTSSPITAL BERN
HOPITAL UNIVERSITAIRE DE BERNE
BERN UNIVERSITY HOSPITAL

USZ Universitäts
Spital Zürich

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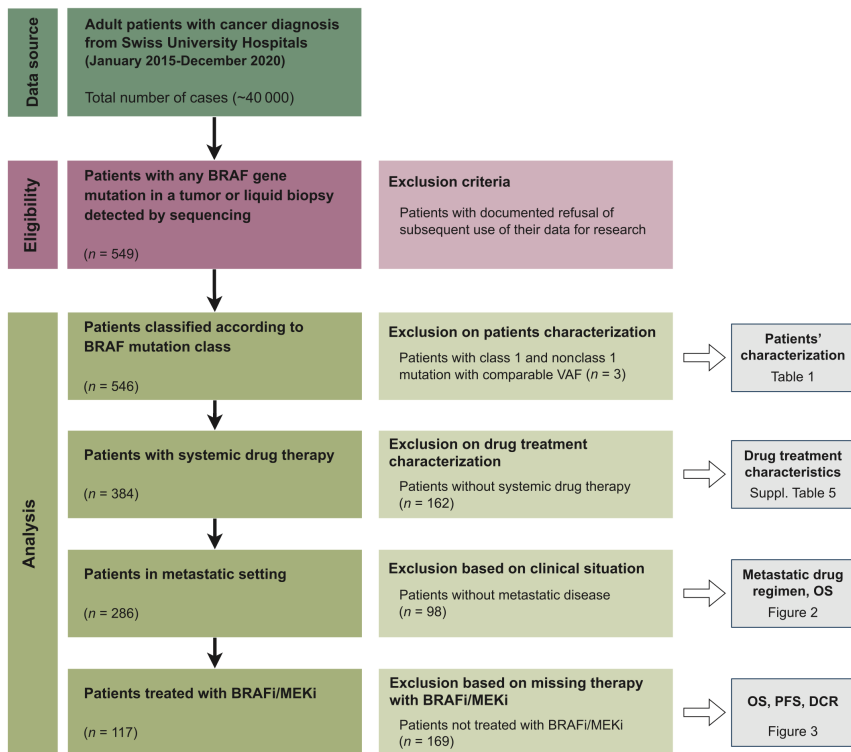
 **Swiss**

 **Personalized**

 **Oncology**

The Swiss Personalized Oncology (SPHN Driver): SPO

- The first nation-wide studies are now being conducted¹

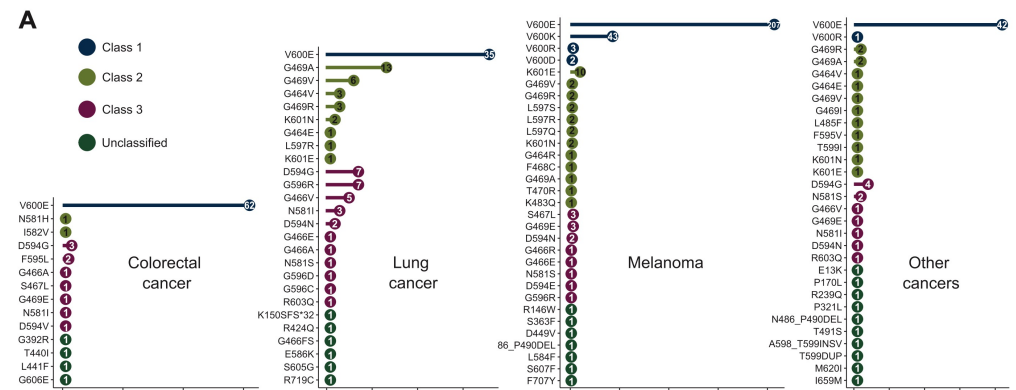


ORIGINAL ARTICLE

Real-world occurrence, therapy, and outcome of patients with class 2 or 3 BRAF compared with class 1 BRAF-mutated cancers

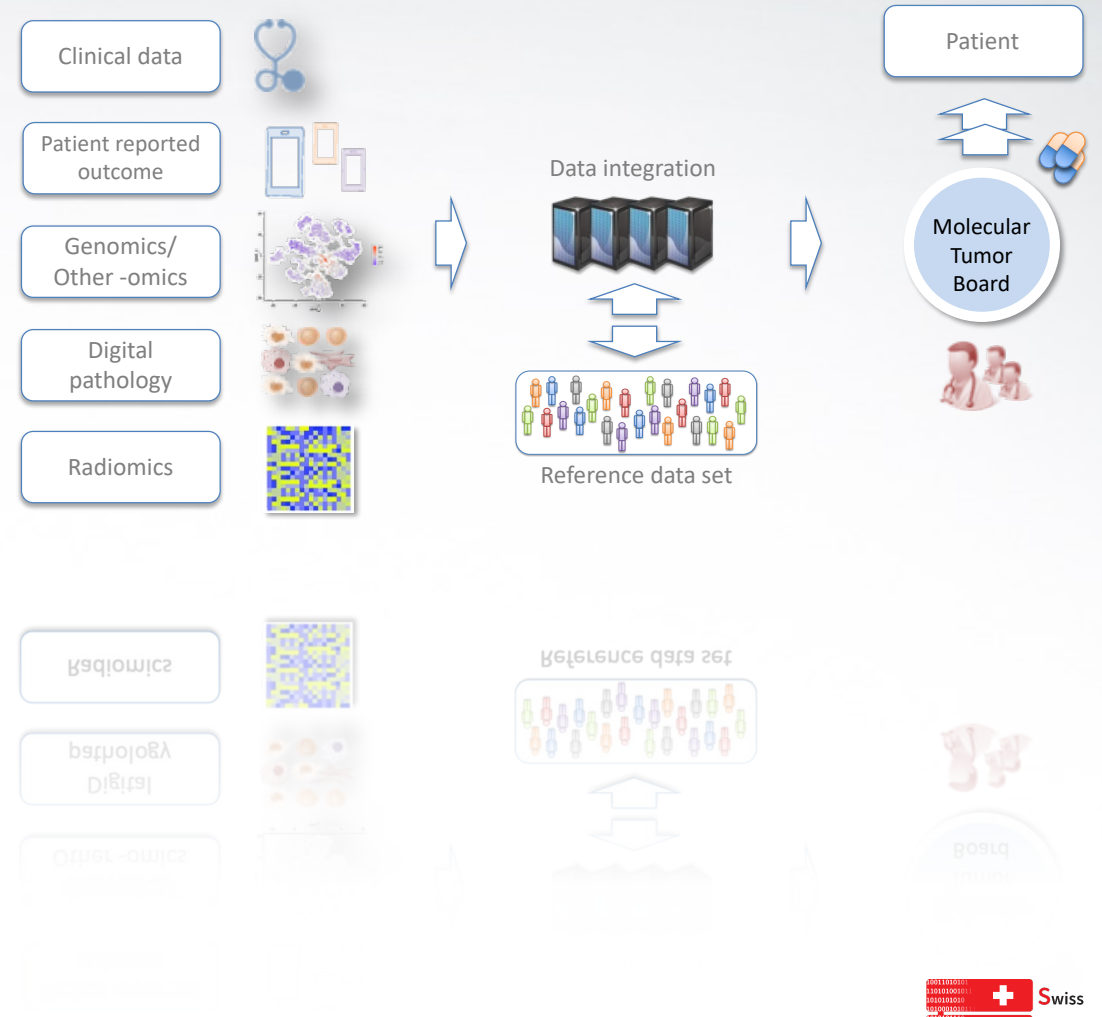
S. Pradervand¹, N. Freundler¹, B. Gosztonyi², L. Roncoroni², R. Achermann³, T. Schwenk⁴, G. de Fraipont⁵, J. Garessus¹, S. Haefliger⁶, A. B. Leichtle⁷, M. K. Kiessling², T. Mueller-Focke², F. S. Krebs^{8,9}, V. Zoete^{8,9}, P. Tsantoulis⁵, O. Michielin⁵, C. Britschgi^{2,10,†} & A. Wicki^{2,†}

¹Centre Hospitalier Universitaire Vaudois – CHUV, Department of Oncology, Lausanne; ²Department of Medical Oncology and Hematology, University Hospital Zurich, University of Zurich; ³Department of Medical Informatics, Universitätsspital Basel – USB, Basel; ⁴Oncology, Hematology and Transfusion Medicine, Kantonsspital Aarau, Aarau; ⁵Geneva University Hospitals – HUG, Geneva; ⁶Department of Medical Oncology, Inselspital, Bern University Hospital, University of Bern; ⁷Department of Clinical Chemistry, Inselspital – Bern University Hospital and Center for Artificial Intelligence, University of Bern, Bern; ⁸Computer-Aided Molecular Engineering Group, Department of Oncology UNIL-CHUV, Ludwig Institute for Cancer Research Lausanne, Lausanne; ⁹Molecular Modelling Group, Swiss Institute of Bioinformatics, Lausanne; ¹⁰Swiss Group for Clinical Cancer Research (SAKK), Bern, Switzerland

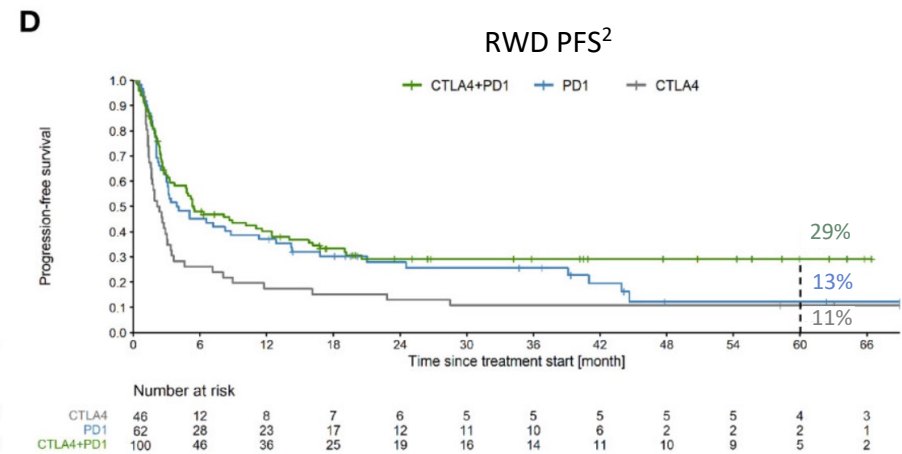
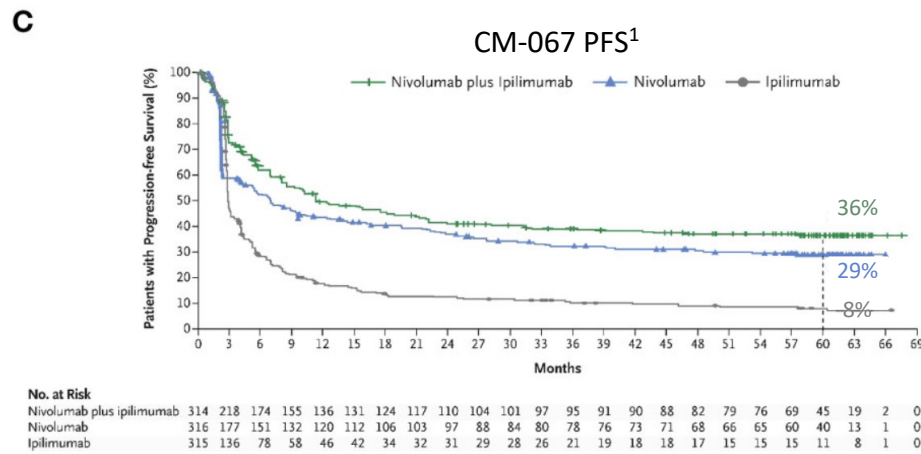
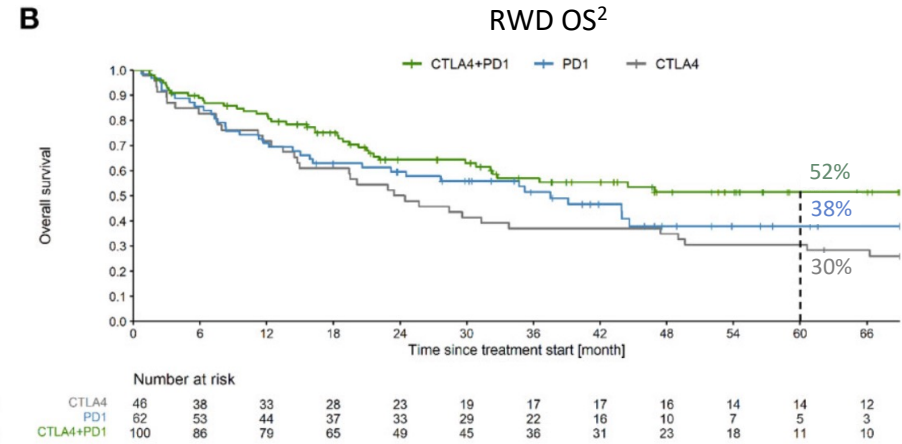
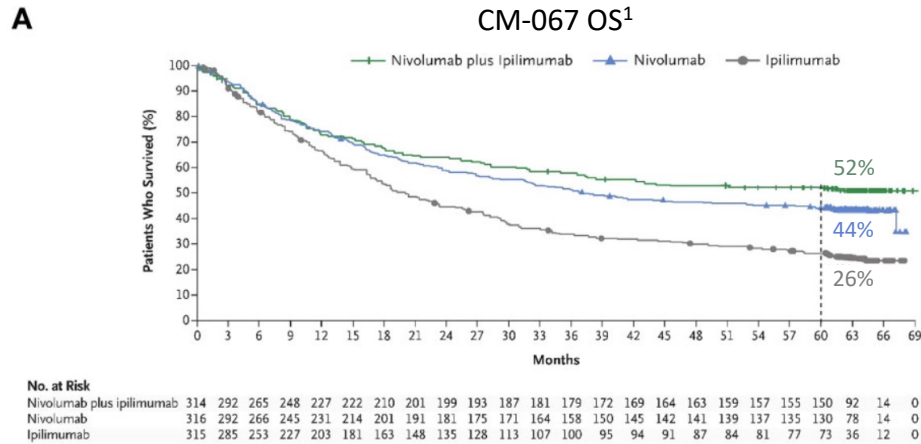


¹Pradervand, *ESMO Open* 2024

Precision oncology: exploiting clinical data



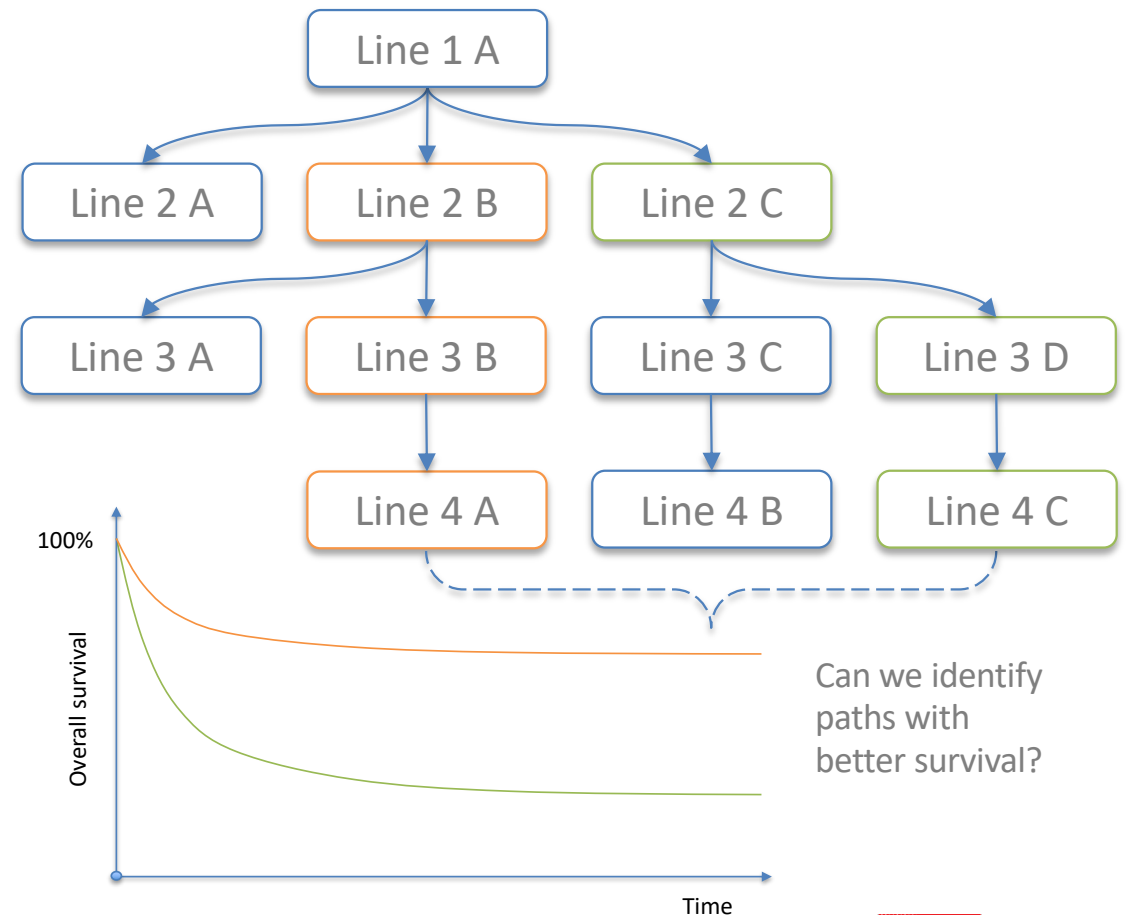
Clinical data: real-world data vs Checkmate-067 – 1st line



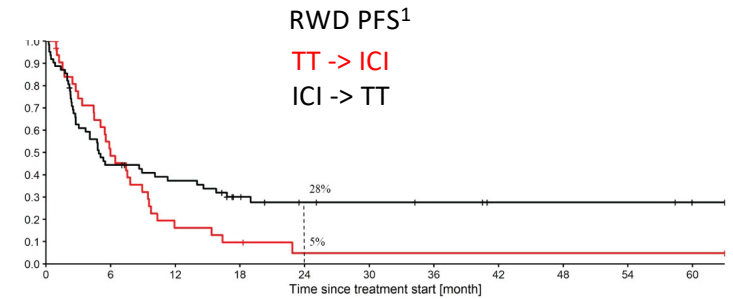
¹Larkin, NEJM 2019;
²Wicky, *Frontiers* 2023

Process mining to study patient's trajectories

- Clinical data -> sequence of events:
 - Treatments
 - Evaluation Scanners
 - New treatments
 - ...
- **Process discovery** allows to identify relevant (frequent) pathways
- **Conformance checking** allows to check whether cohorts of patients follow defines pathways, e.g. guidelines
- Important information can be projected onto these pathways, including PFS or OS

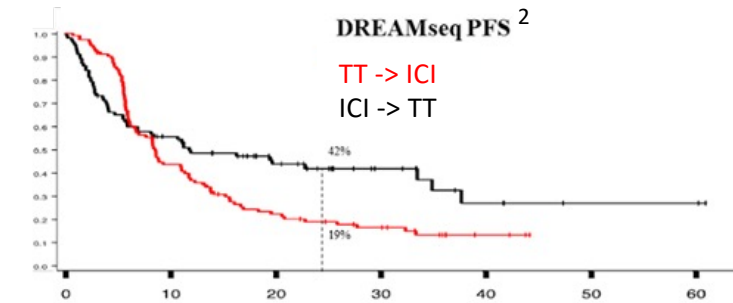


Melanoma real-world data analysis using process mining¹



Number at risk

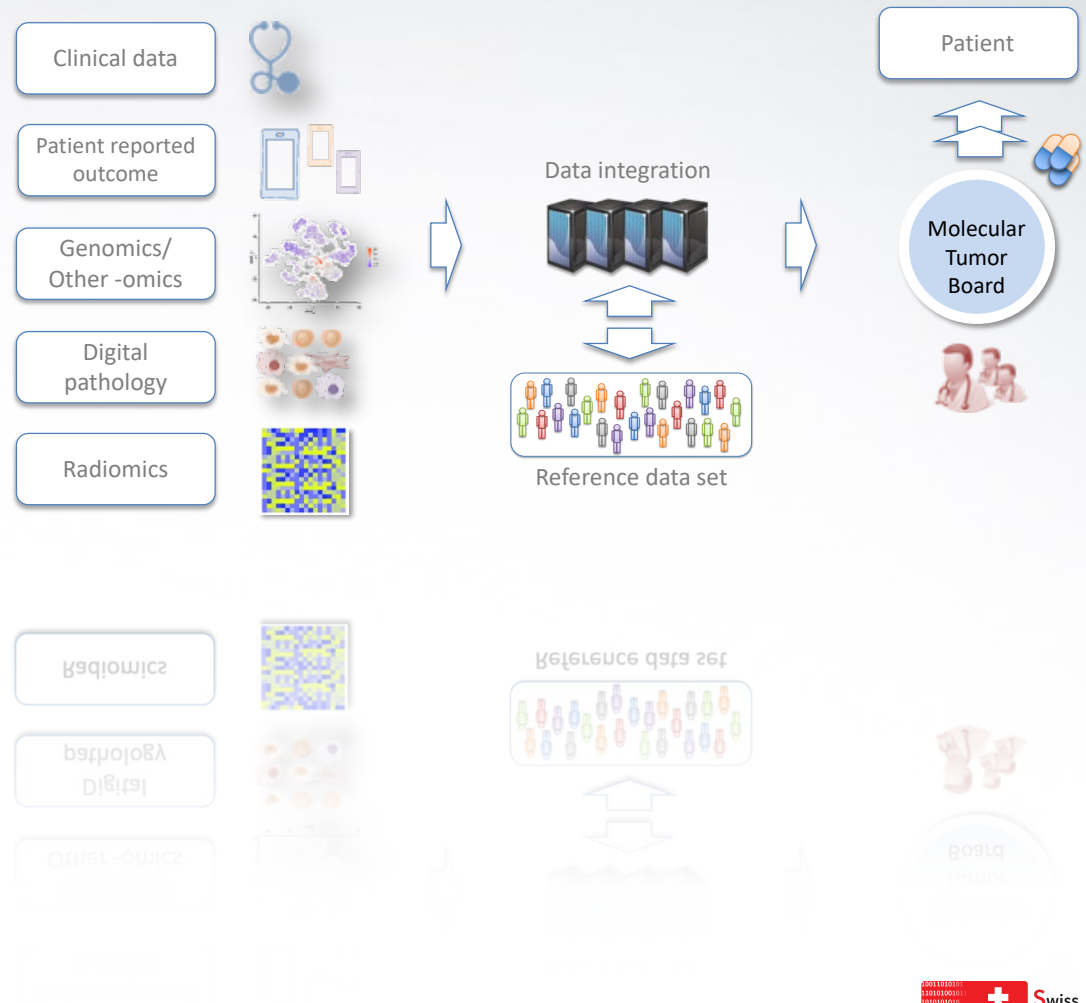
TT->ICI	33	15	5	3	1	1	1	1	1	1	1
ICI->TT	62	27	21	13	9	8	7	5	5	5	3



¹Wicky, *Frontiers* 2023;

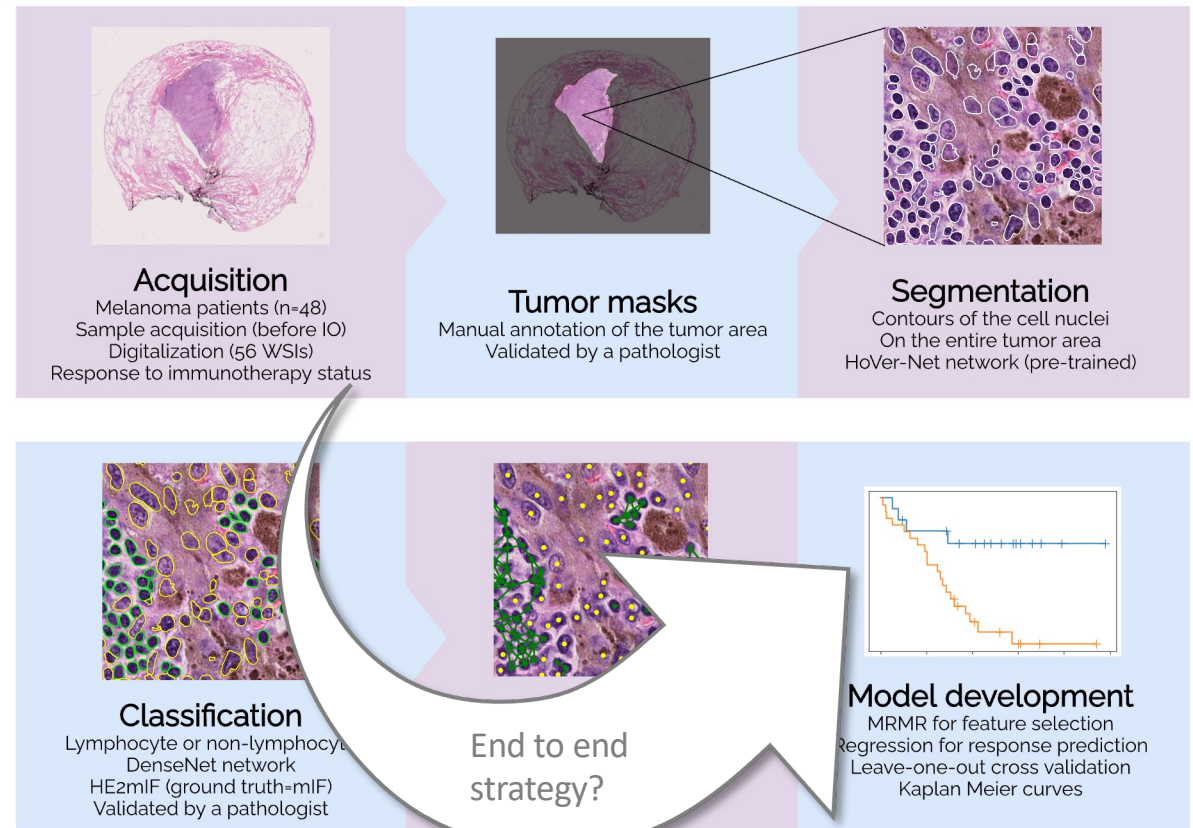
²Atkins, *JCO* 2023

Precision oncology: moving towards spatial -omics

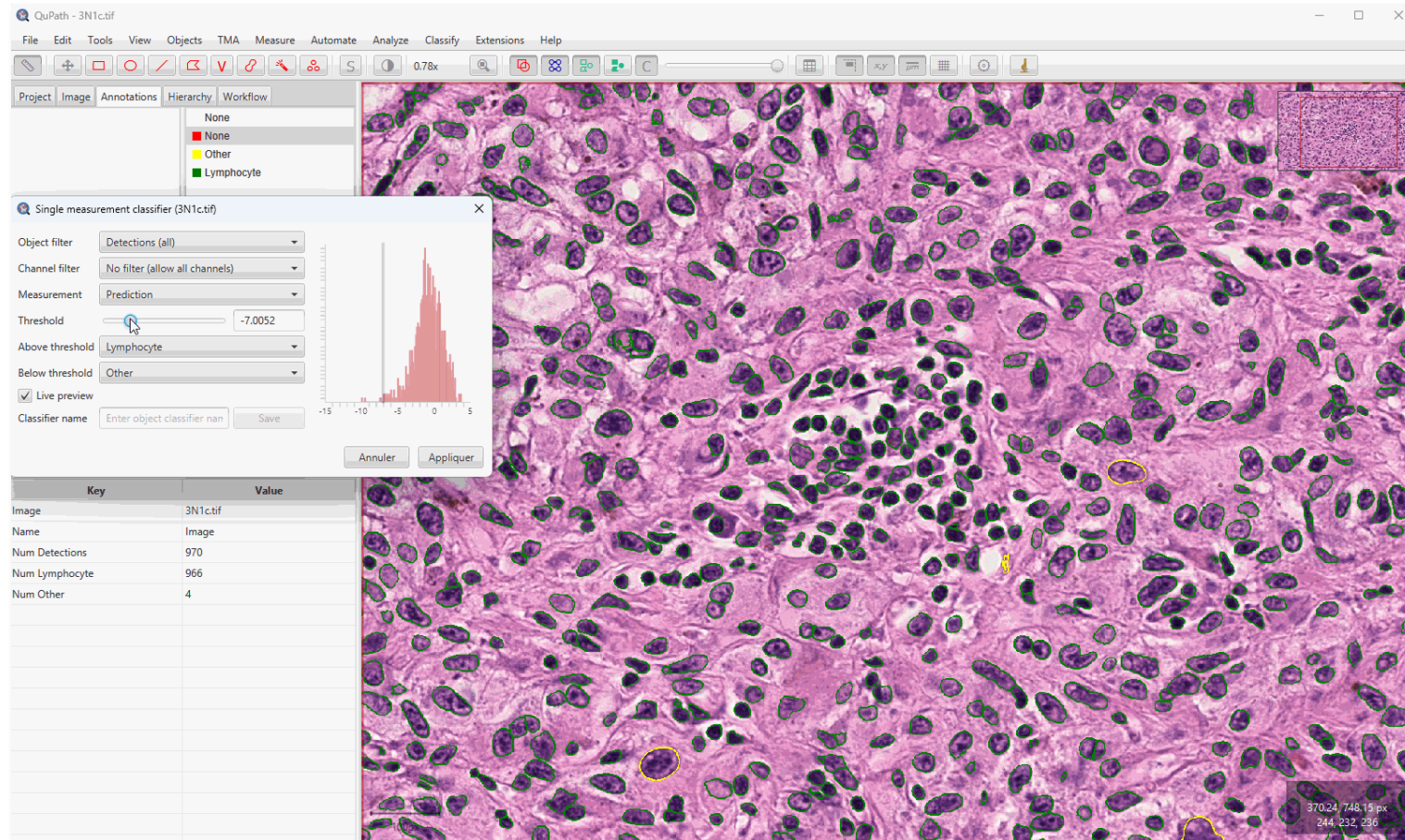


Digital pathology-based IO predictive biomarker: overview

- Goal: develop a predictive image-based digital pathology biomarker for IO therapy response in metastatic melanoma
- Quantify local tumor-infiltrating lymphocyte microenvironment via features extracted from H&E pathology images
- Go beyond what is visually possible to reproducibly quantify
- Application in precision medicine: identify optimal patient treatment plan based on retrospective cohort evaluation
- H&E is available for most patients
- Tight collaboration with DDIAG and Prof. Rubbia



Digital pathology: detecting cell composition from H&E



Visualization with different classification thresholds on a ROI in QuPath (lymphocytes in green, other cells in yellow)

Prospective multi-omics in melanoma: Swiss Personalized Oncology Program



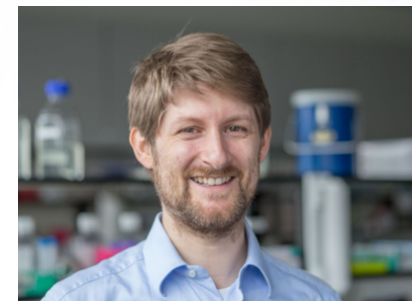
Prof. Mitchel Levesque
Melanoma cohort



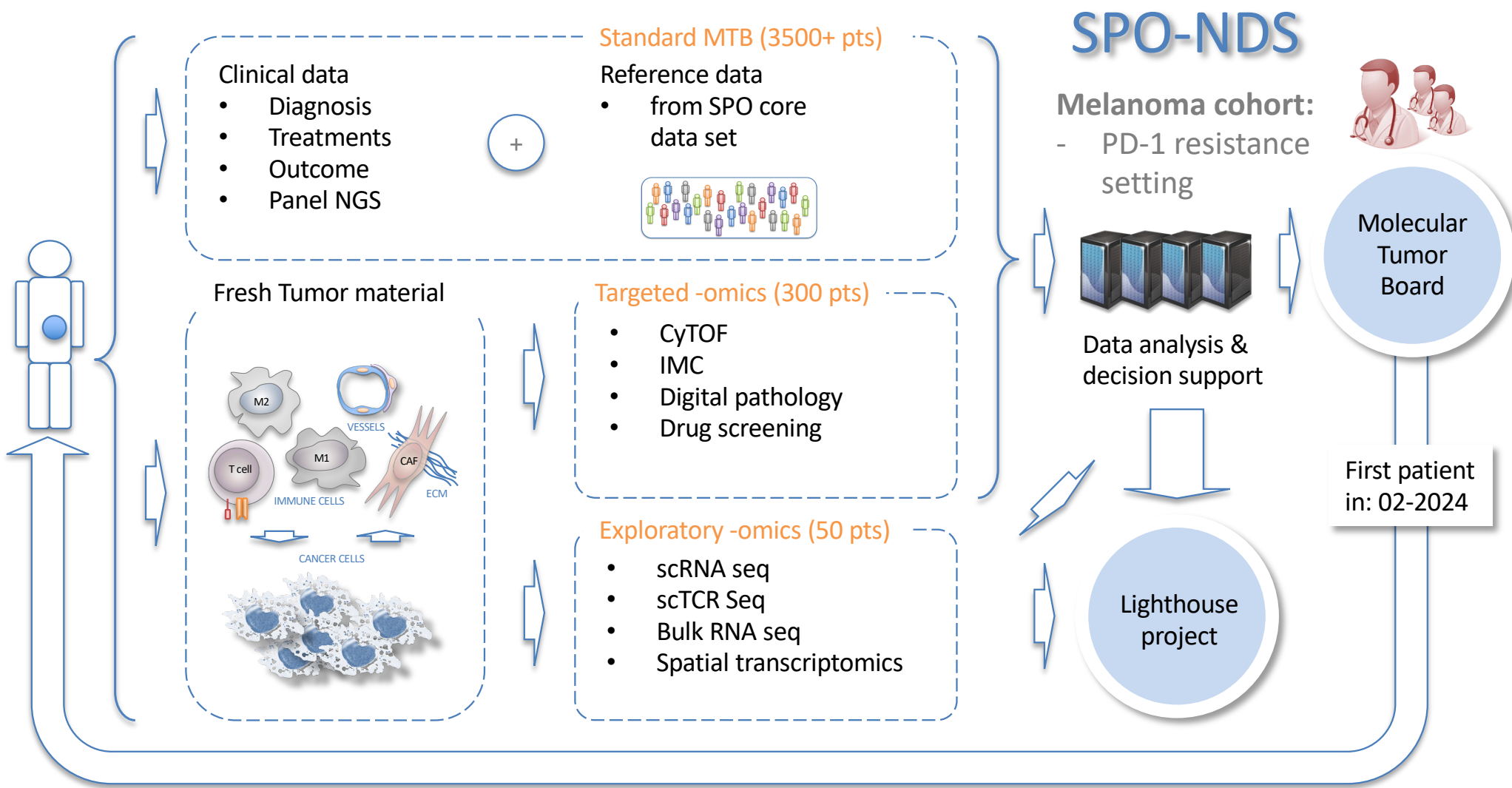
Dr. Egle Ramelyte
Melanoma cohort



Prof. Andreas Wicki
GI cohort



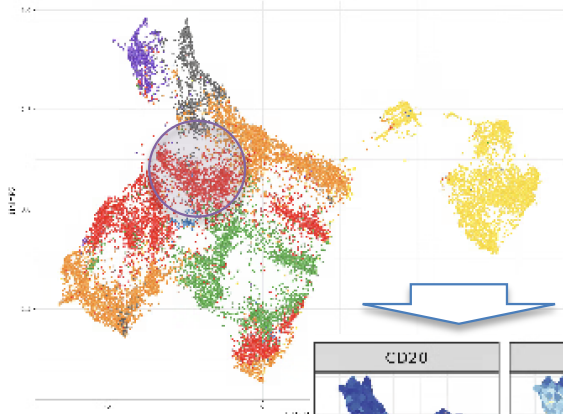
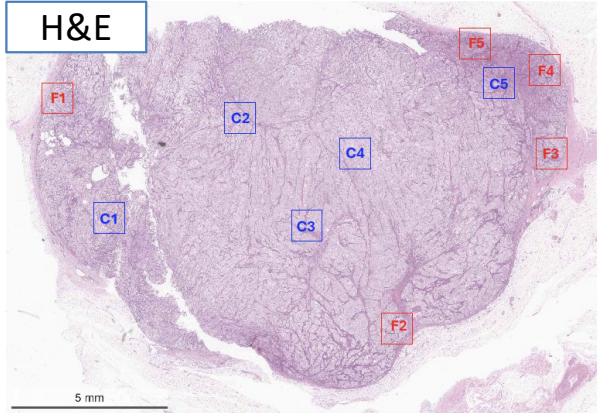
Prof. Bernd Bodenmiller
Main co-PI



Innovative therapeutic options

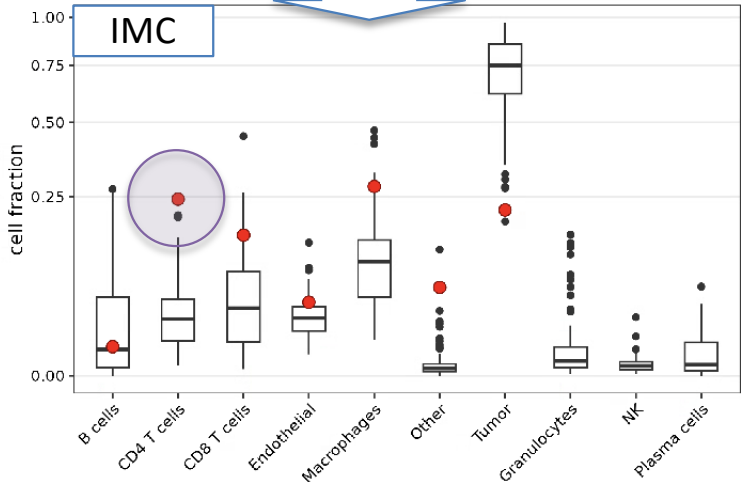
PI O. Michielin & Bernd Bodenmiller

Swiss Personalised Oncology: Imaging Mass Cytometry (IMC)

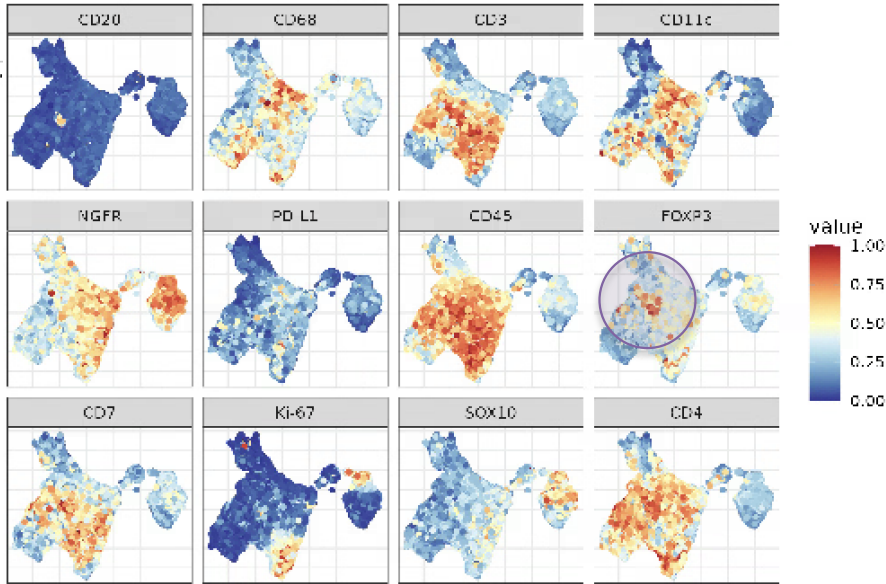


- celltype
- B cells
 - CD4 T cells
 - CD8 T cells
 - Endothelial
 - Macrophages
 - Other

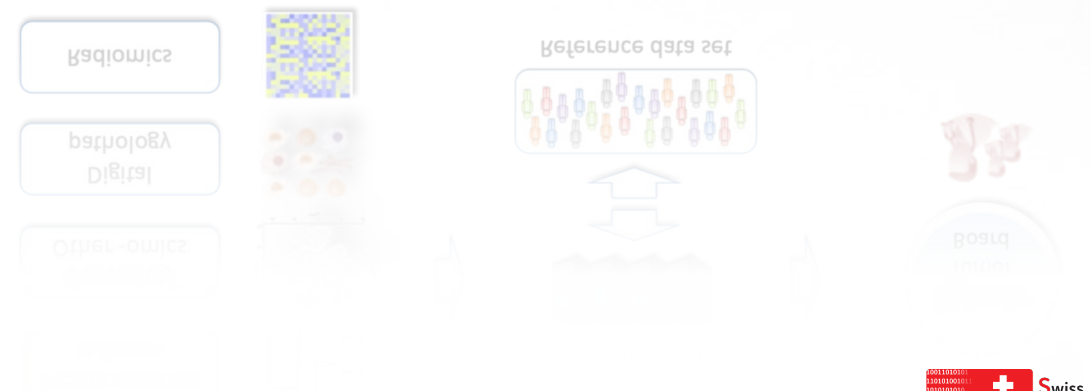
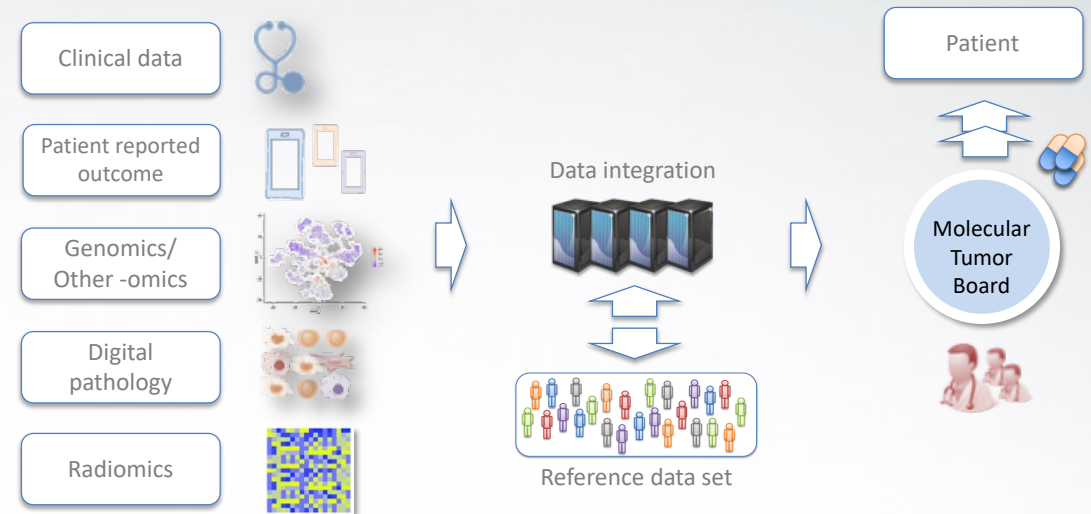
**High Treg infiltrate:
mechanism of
resistance?**



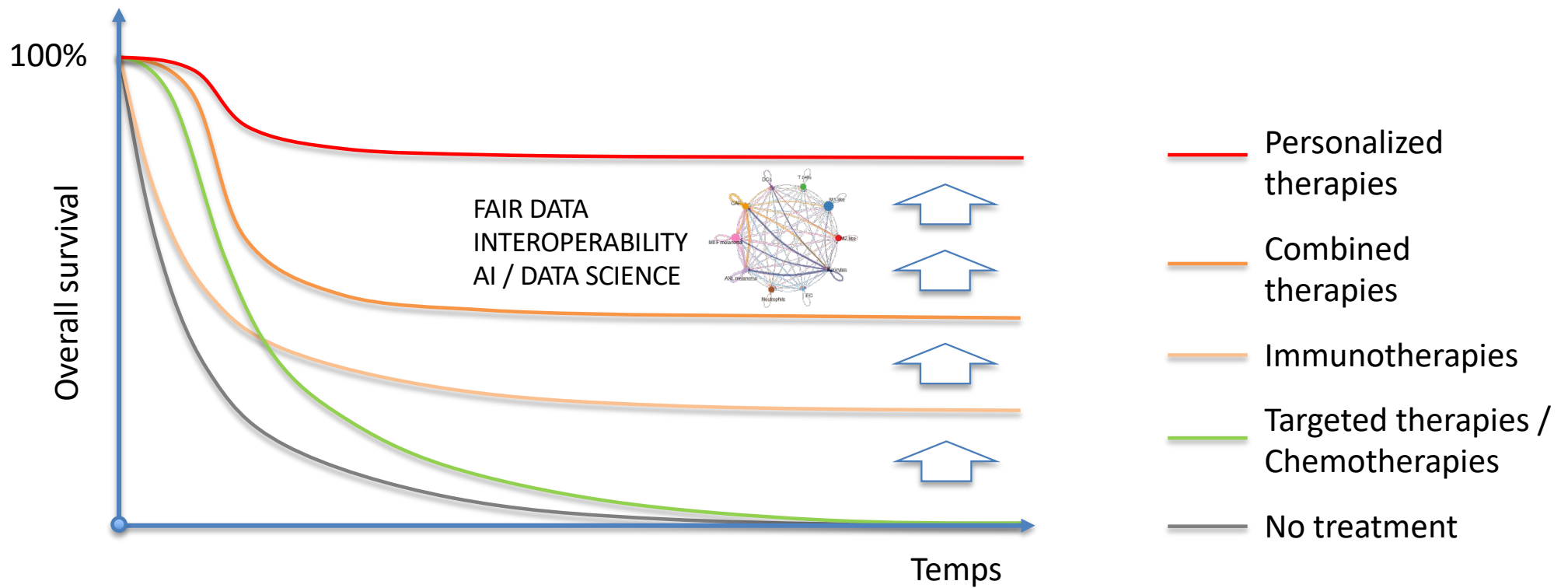
IMC:
cellular
compositio
n compared
to reference
samples
(TuPro)



Conclusion and Outlook



Expected benefit from personalized strategies



| SPHN Workshop | Bern | 30.10.2024 |

**THANK YOU FOR YOUR
ATTENTION!**

