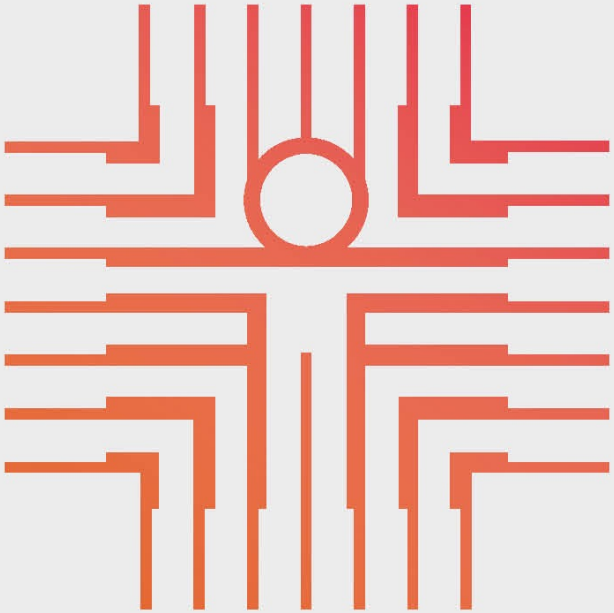
Digital pathology repositories:

A deep learning paradise?

Prof. Inti Zlobec

19.03.2021, Digital Opening Event CAIM



UNIVERSITÄT BERN
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Pathology

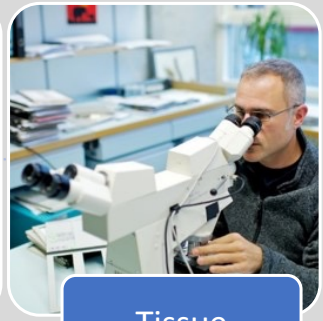
A pillar for personalized medicine

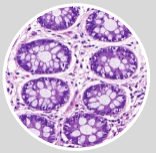

Patient

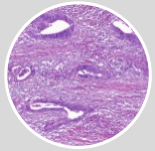

Tissue

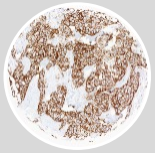

Blocks

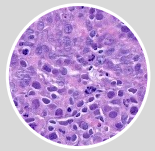

Slides

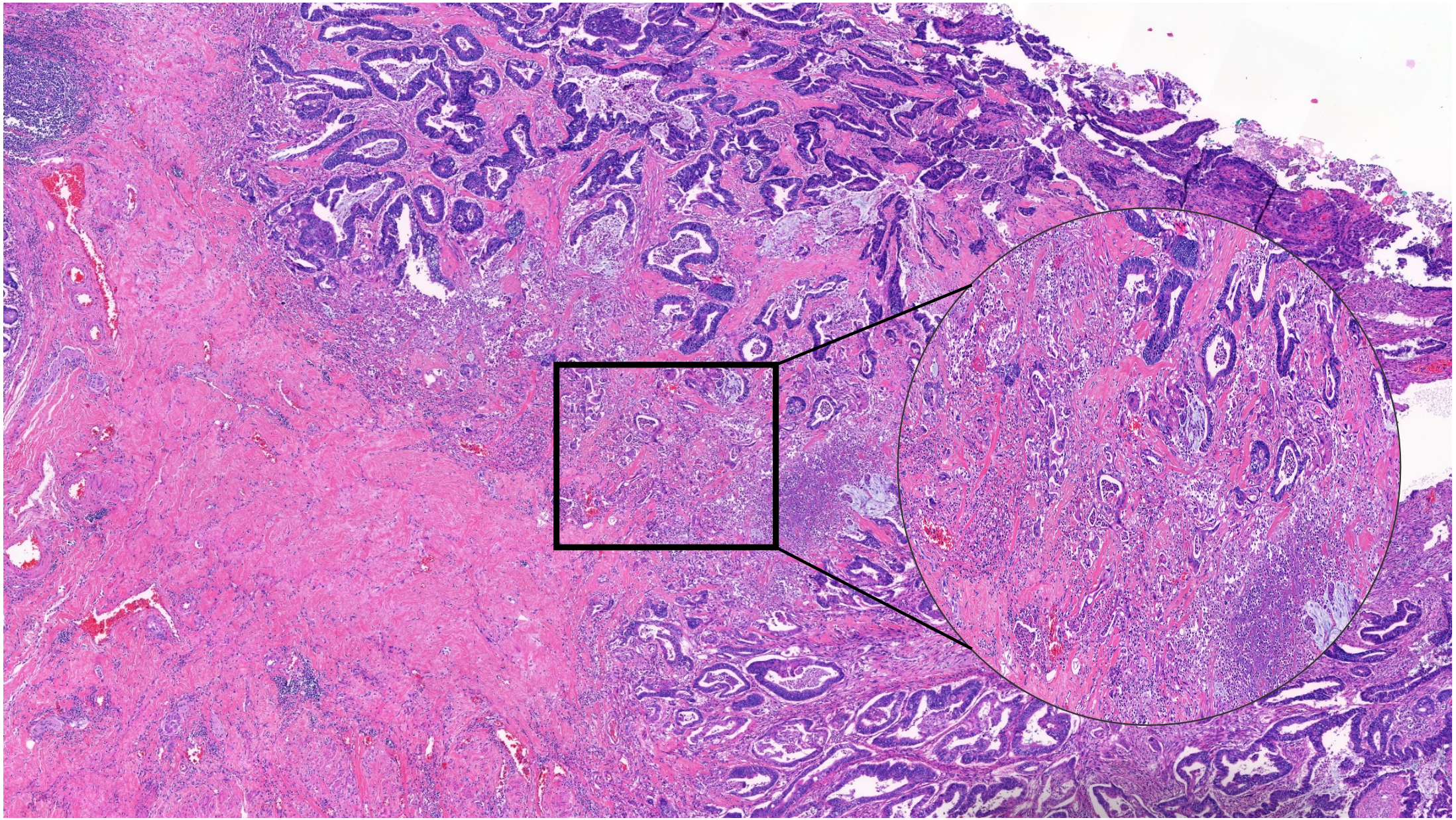

Tissue analysis


diagnosis


prognosis

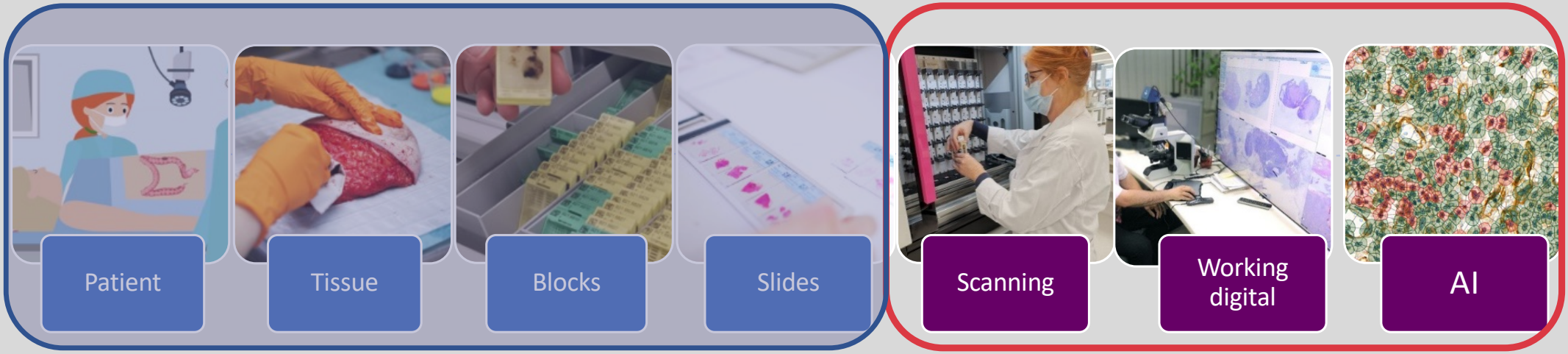

therapy response


disease (biological) processes



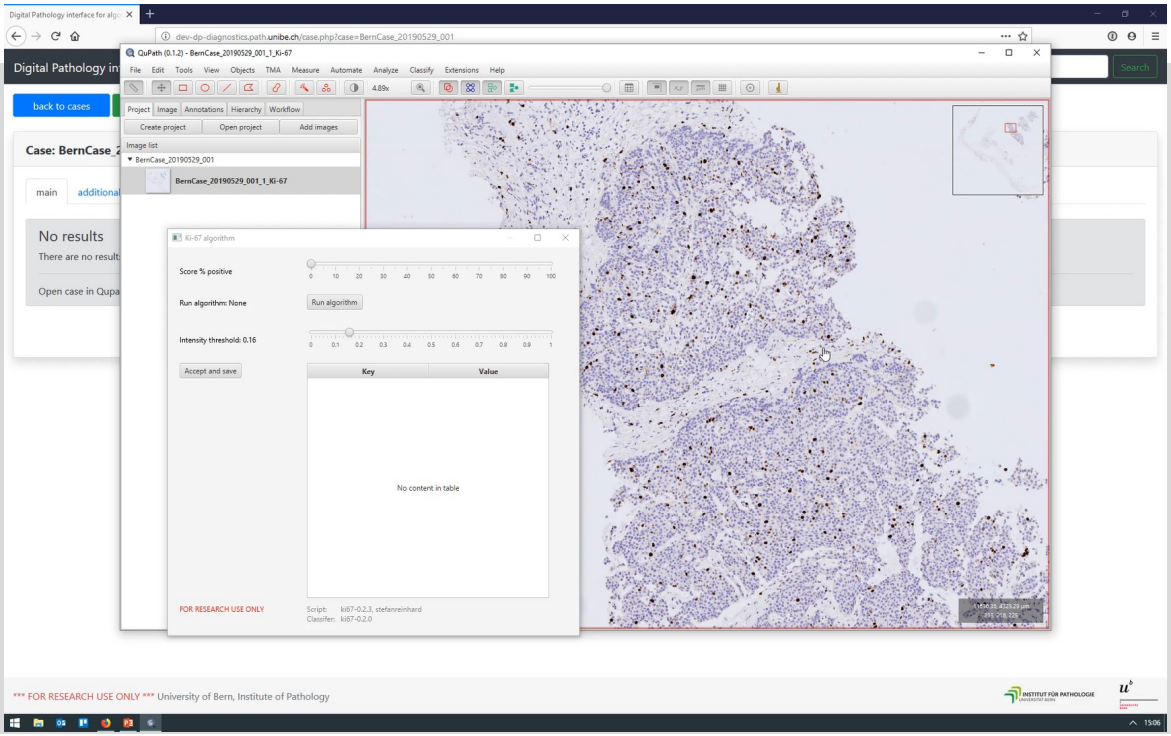
Digital pathology

What is it?



Basic clinical applications

Biomarker quantification

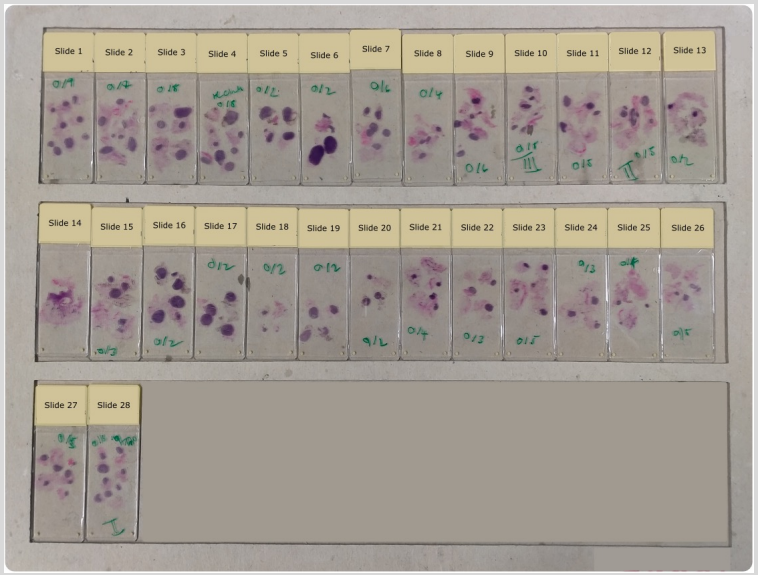


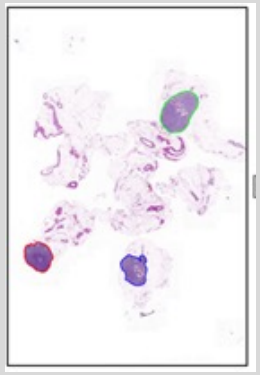
Work by a whole bunch of people: S. Reinhard
and our amazing pathologists T. Rau, B. Dislich, M. Montani, M. Wartenberg, A. Blank

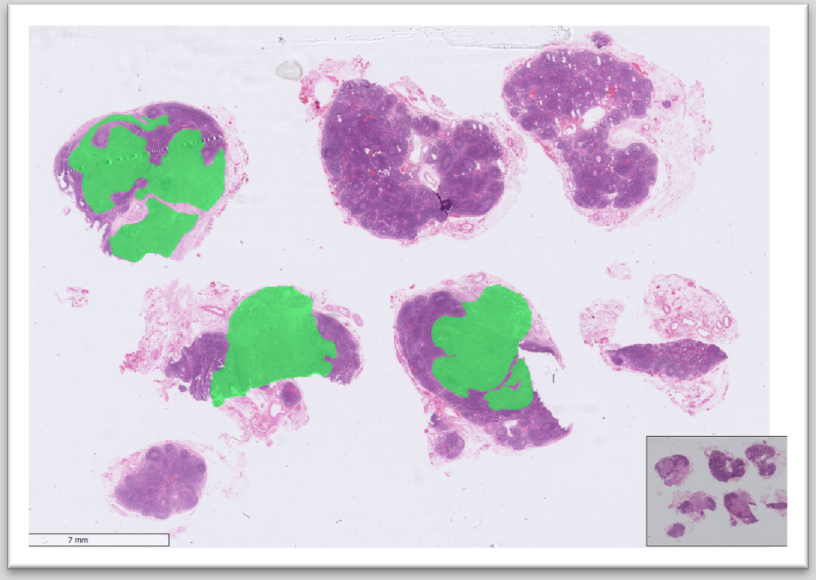
Basic clinical applications

Tumor cell detection in lymph nodes

1 patient = 88 LNs to analyse





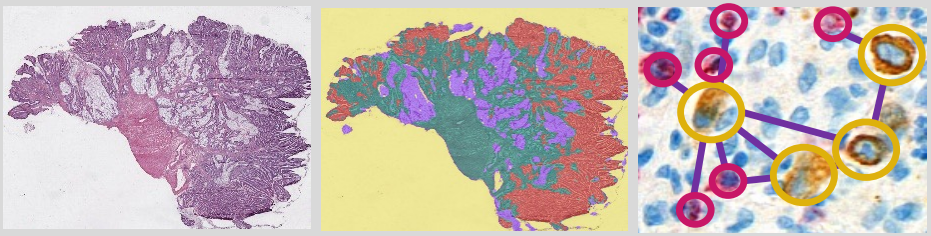


Advanced clinical applications

Outcome predictions

- Novel prognostic factors/survival
- Genotype (mutation) prediction
- Response prediction

Unsupervised multi-class detection problems «self-rule to adapt»



Mucin detection as predictor of molecular background using weakly supervised segmentation

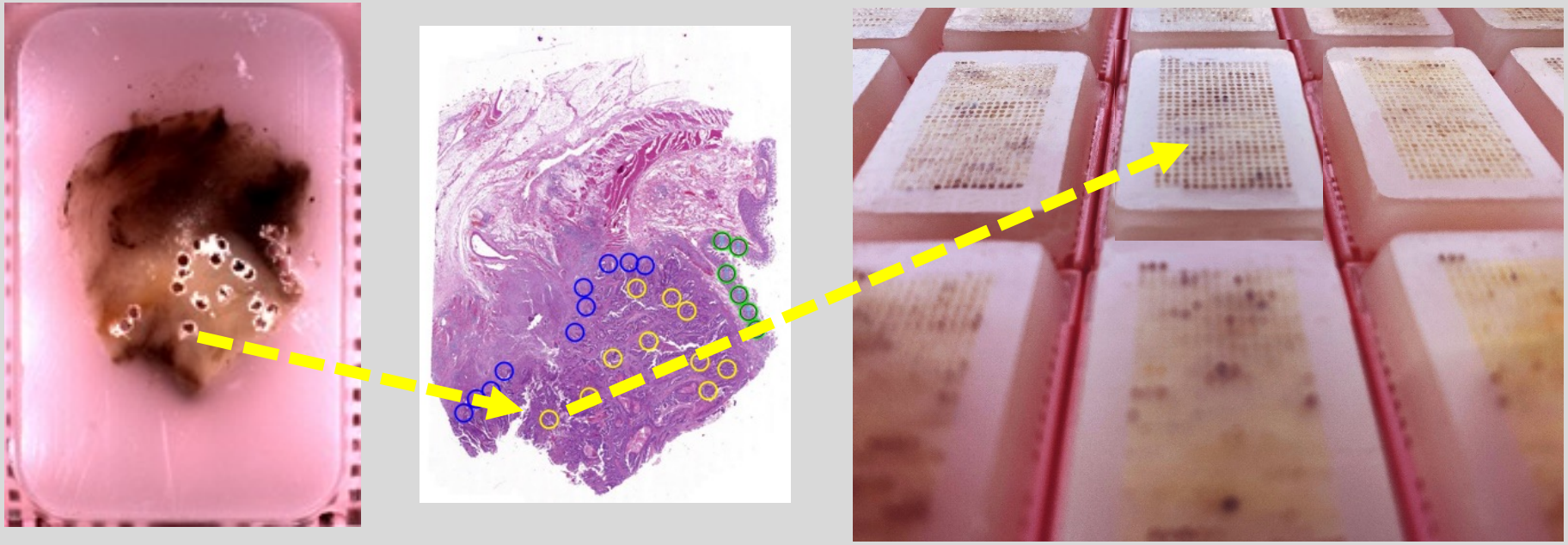
Graph approaches

Diagnostic archives as a source of images

20 years worth of potential in each archive

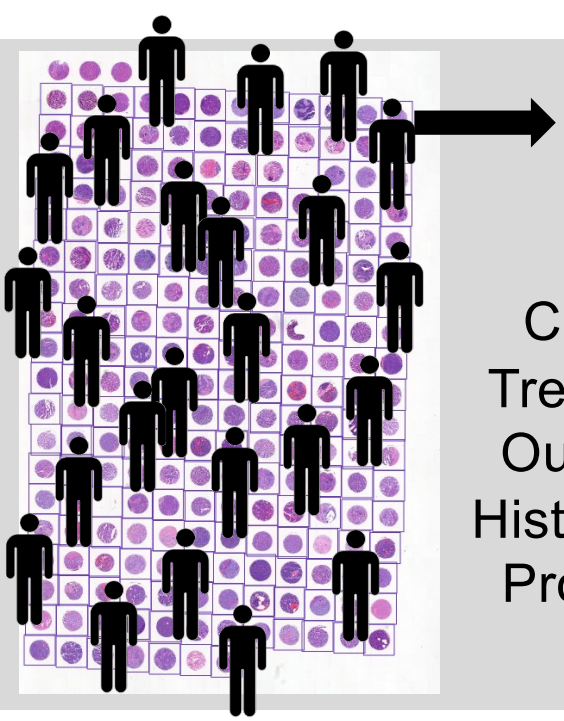
next-generation Tissue Microarrays archives

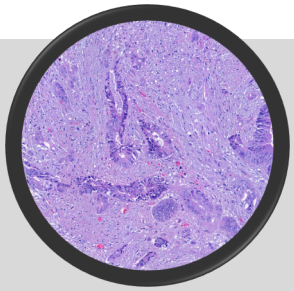
Collections of patient tissues and images



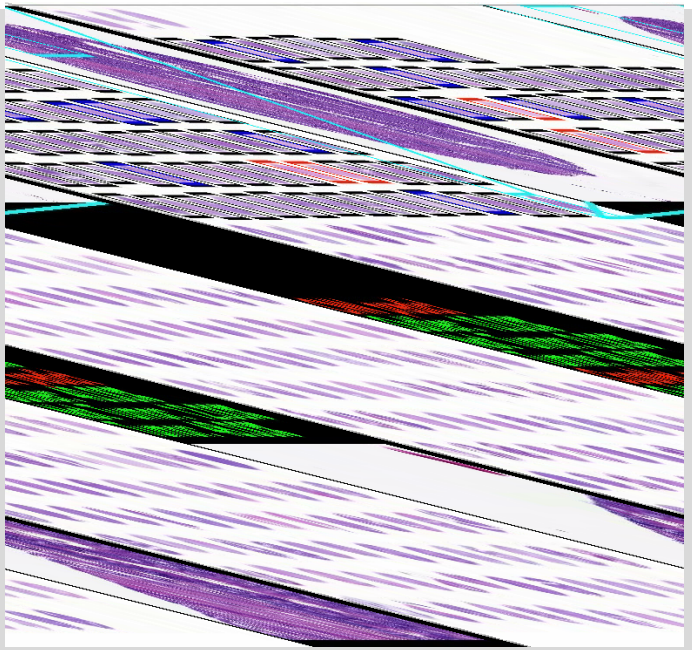
Individual image archive

Corresponding to samples, cases, patients, cohorts



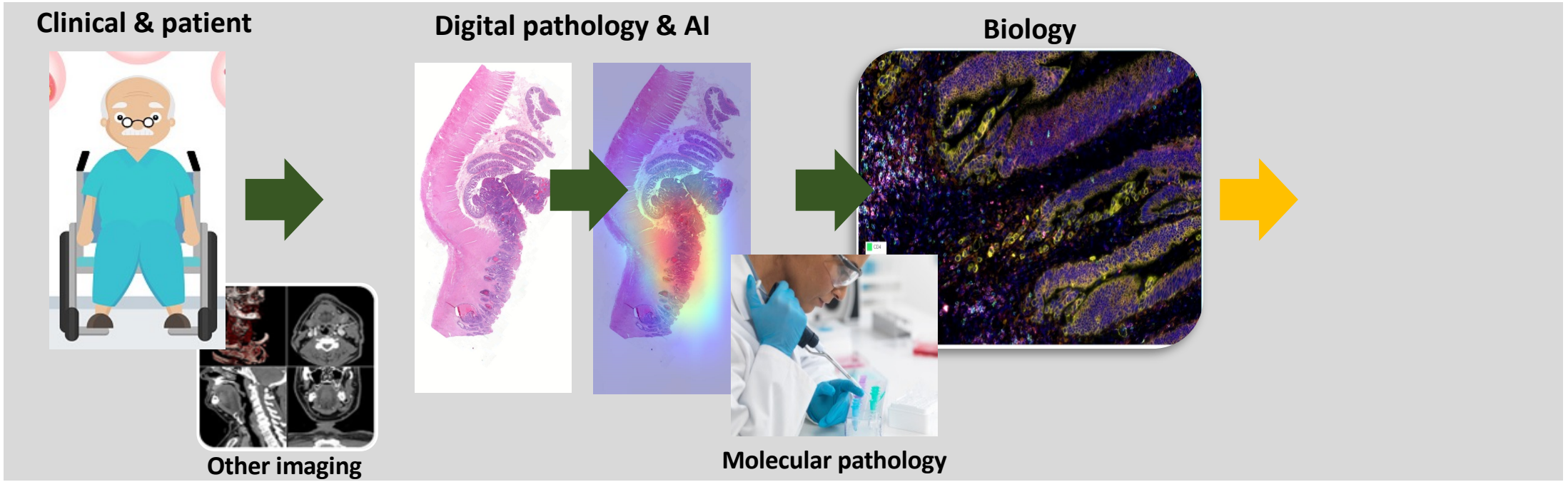


Clinical variables
Treatment variables
Outcome/follow-up
Histological variables
Protein expression



Integrative approach

Multi-modal models to improve decisions



Where are digital pathology archives in all of this?

Conclusion

- Massive and «untouched» archives of millions of (potential) images
- Morphology to inform the data science to inform the biology
- Combining imaging modalities will be hugely powerful
- **Caveat: annotations/ labels only to certain degree**
- **Synoptic /structured reporting urgent**

Vielen Dank

für Ihre Aufmerksamkeit

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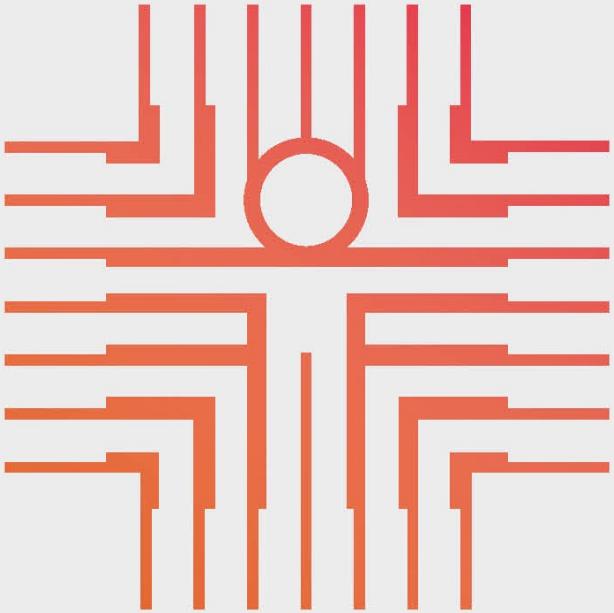
V. Kölzer, Unispital Zürich



Swiss Consortium for Digital Pathology

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