

The Application of AI-defined Molecular Classifications in Ovarian Cancer

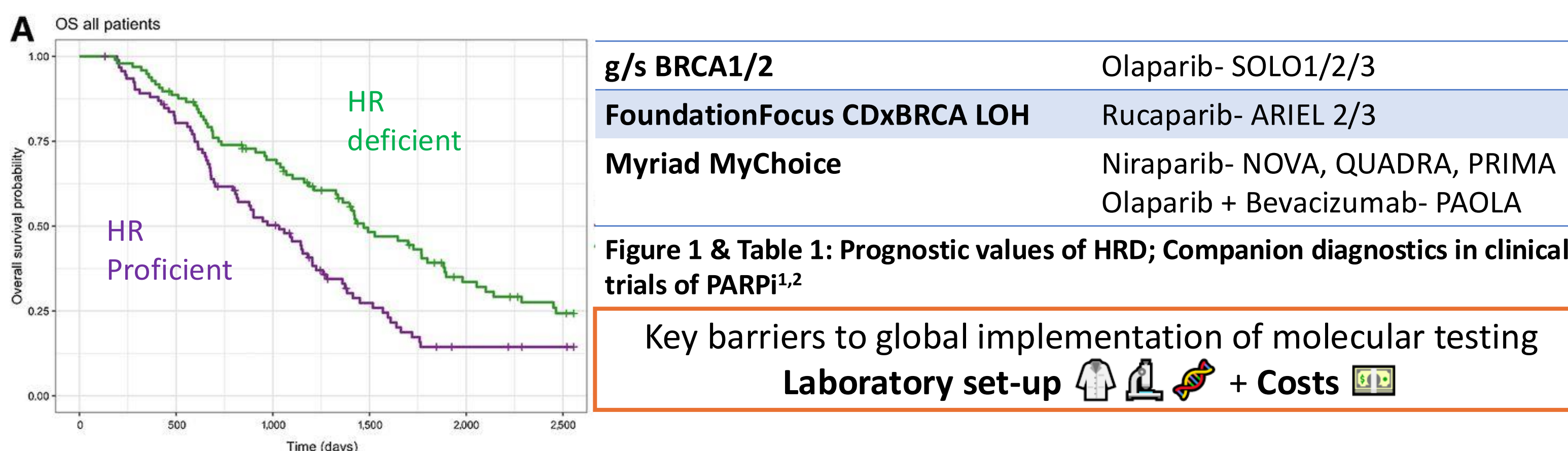
AAIMC-OC Consortium

<https://aaimc-oc.github.io/>



Background

Homologous recombination deficiency (HRD) is prognostic and predictive of Poly-ADP Ribose Polymerase inhibitors (PARPi) response



PARPi has transformed ovarian cancer (OC) survival;
Some are off-patent now (Rucaparib) or in the near future (Olaparib)

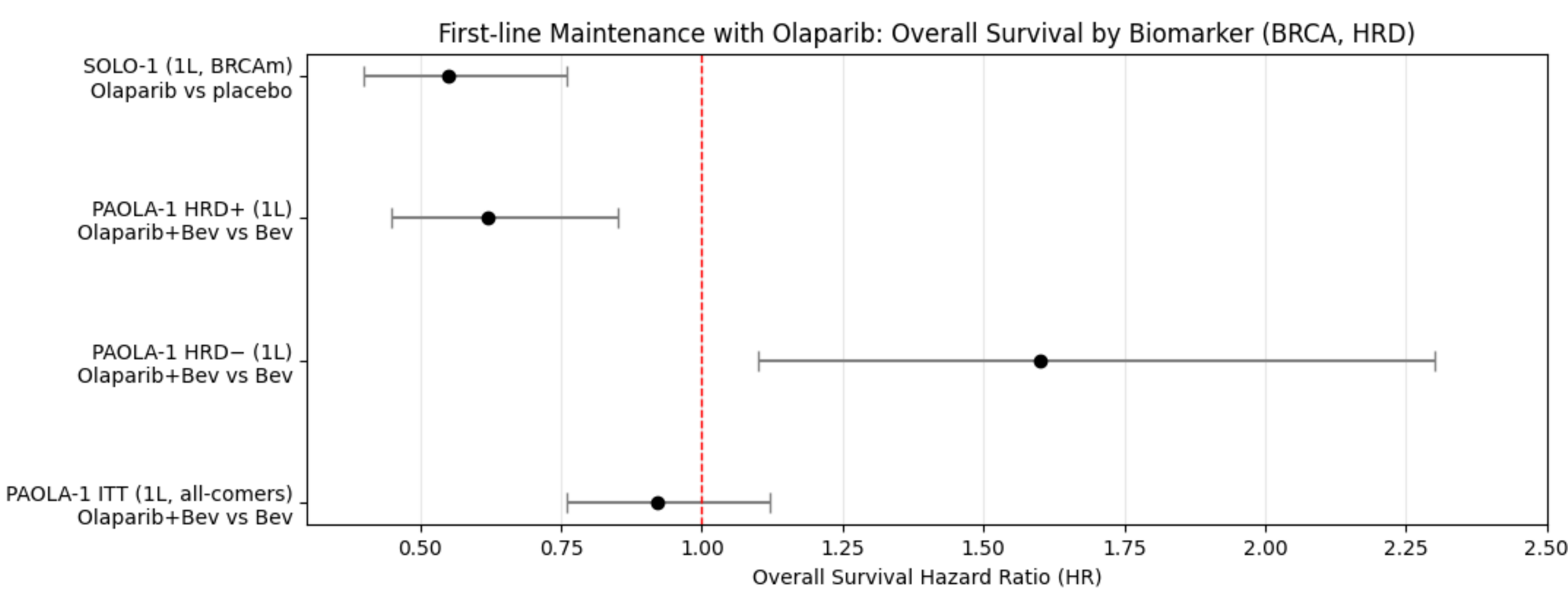


Figure 2: Overall survival by BRCA and HRD status in first-line maintenance with olaparib^{1,2}

AI can determine HRD status from low-cost H&E histopathology slides in optimal laboratory settings

However, these are not tested:

- In real-world multi-centre settings
- In diverse populations + poor resource settings
- On images captured by low-cost imaging devices

No clear plan to implement and complement clinical pathways

Initial Questions

Q1: Can we build at least one AI-defined HRD test with adequate accuracy using an international multi-centre cohort of H&E Whole Slide Images (WSI) for patients without access to molecular testing?

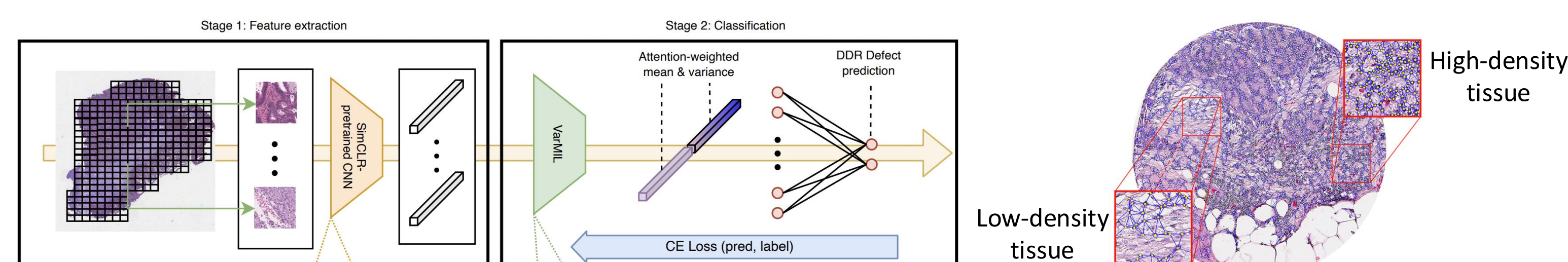


Figure 3: Two methods to develop AI-defined HRD tests: Using foundation models³ and graph neural networks⁴

Q2: Does our AI algorithm(s) give the same results when images captured by low-cost slide scanners are used, compared to paired gold standard WSI?

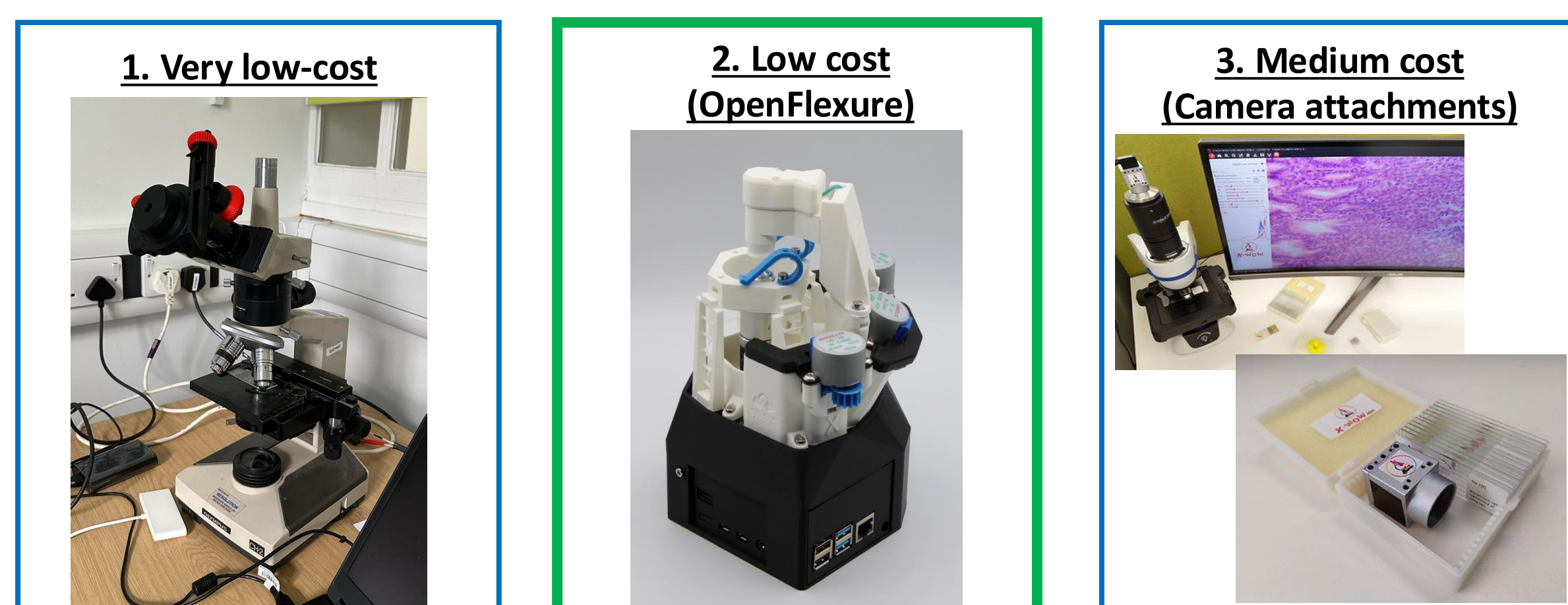


Figure 4: Low-cost imaging techniques- 1) Mobile phone adjunct; 2) OpenFlexure Microscope⁵; 3) Camera attachments

Q3: Can we apply AI algorithms on images collated in poor-resource settings using a federated learning platform?

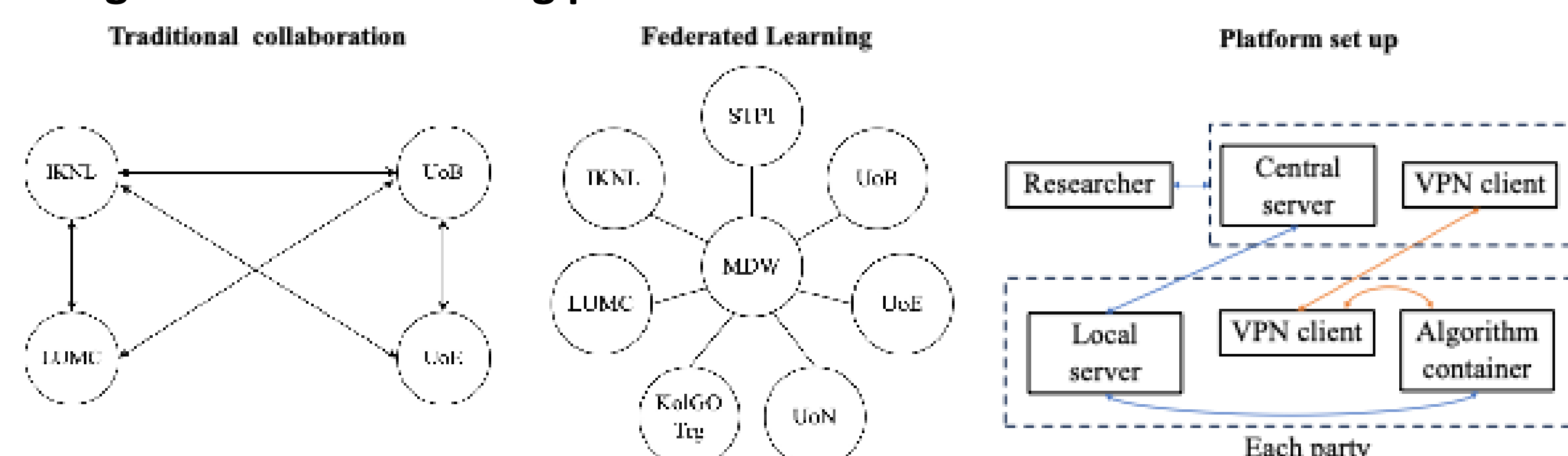


Figure 5: Schematic comparison between traditional data transfer versus federated learning⁶

References

1. Ewing, Ailith, et al. *Clinical Cancer Research* 27.11 (2021): 3201-3214
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3. Schirris Y, et al. *Med Image Anal.* 2022 Jul;79:102464.
4. R. Nakhli et al. 2023 IEEE/CVF ICCV, Paris, France, 2023, pp. 21006-21016, doi: 10.1109/ICCV51070.2023.01926.
5. OpenFlexure Project: <https://openflexure.org/>
6. van Soest J, et al. *Stud Health Technol Inform.* 2025 May 15;327:258-262.

Collaborators

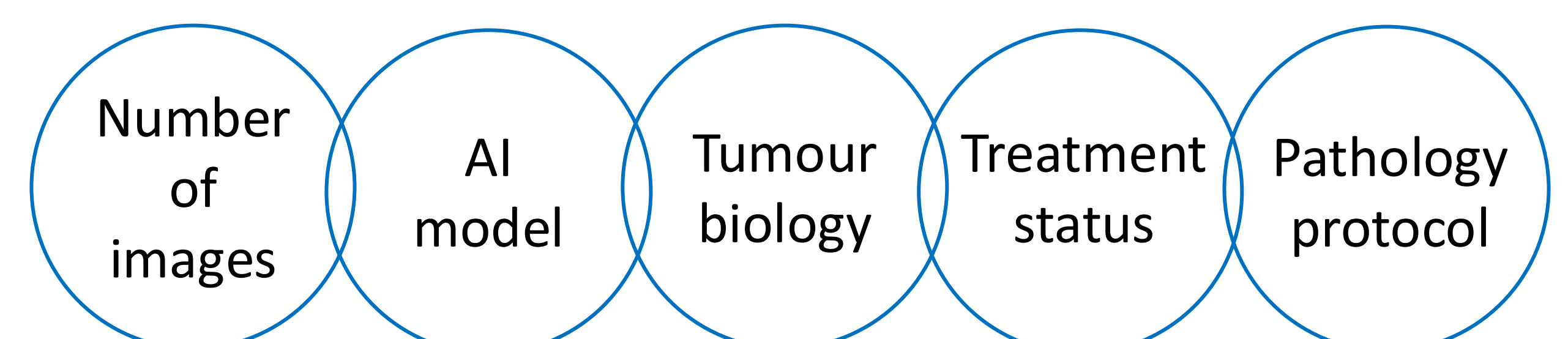
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Progress to date

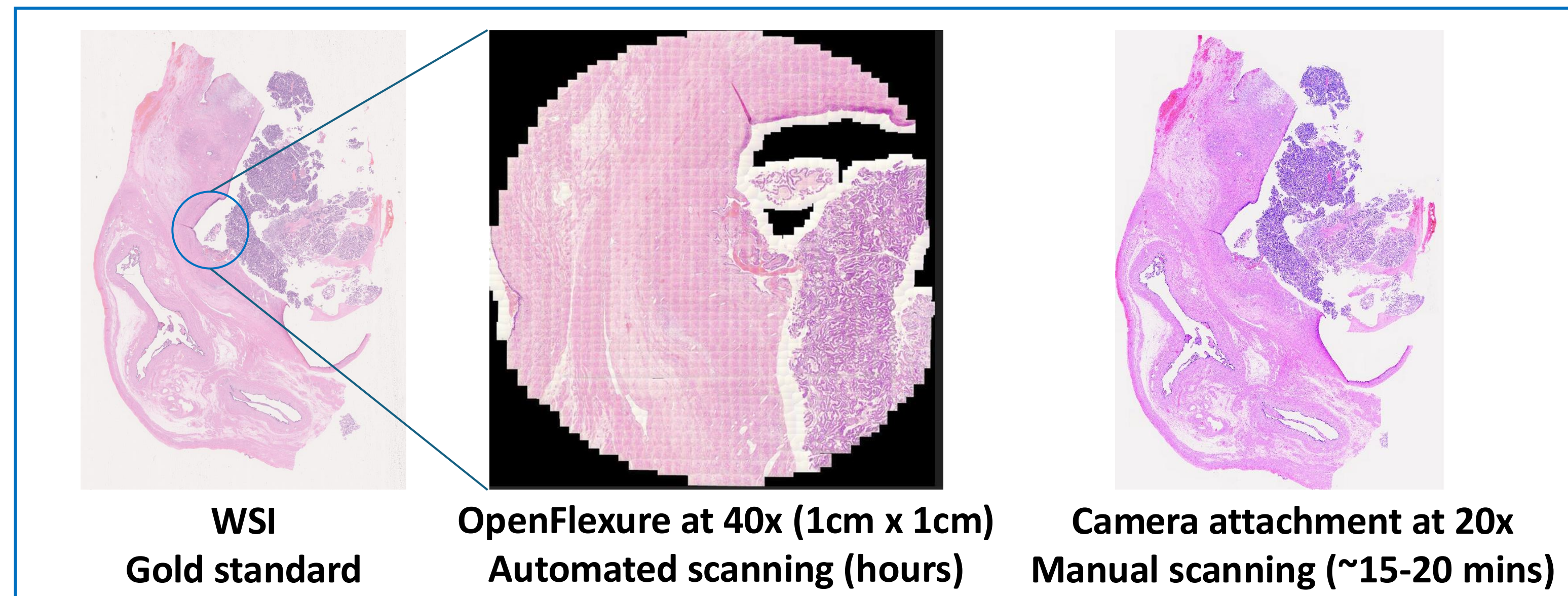
Q1: Collaboration and federated learning contract set-up (Month 1 – 15)

- Known challenge (IP and commercialization) > algorithms to be made open-source

Q1: Data harmonisation and AI developing (Month 16 – ongoing)



Q2: Optimisation of low-cost imaging techniques (Month 13 – ongoing)



Q3: Ethical approval and research licenses in low-and-middle-income-country sites (Kenya and India; Month 1 – ongoing)



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Next steps

Improving the AI algorithm(s)

- Increase the number of WSI and slides with linked clinical information
- Establishing a biological control (e.g. microsatellite instability)
- Different AI approaches

Experimenting and expanding our federated learning infrastructure

- Can we train AI algorithms in LMICs with cloud-based infrastructures?

Public and patient involvement and engagement

- What are the pre-requisite of acceptance? What are the compromise between costs and accuracy?

Partners for clinical validation of the results algorithms

References and contact

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