OpenSRH: optimizing brain tumor surgery using intraoperative stimulated Raman histology
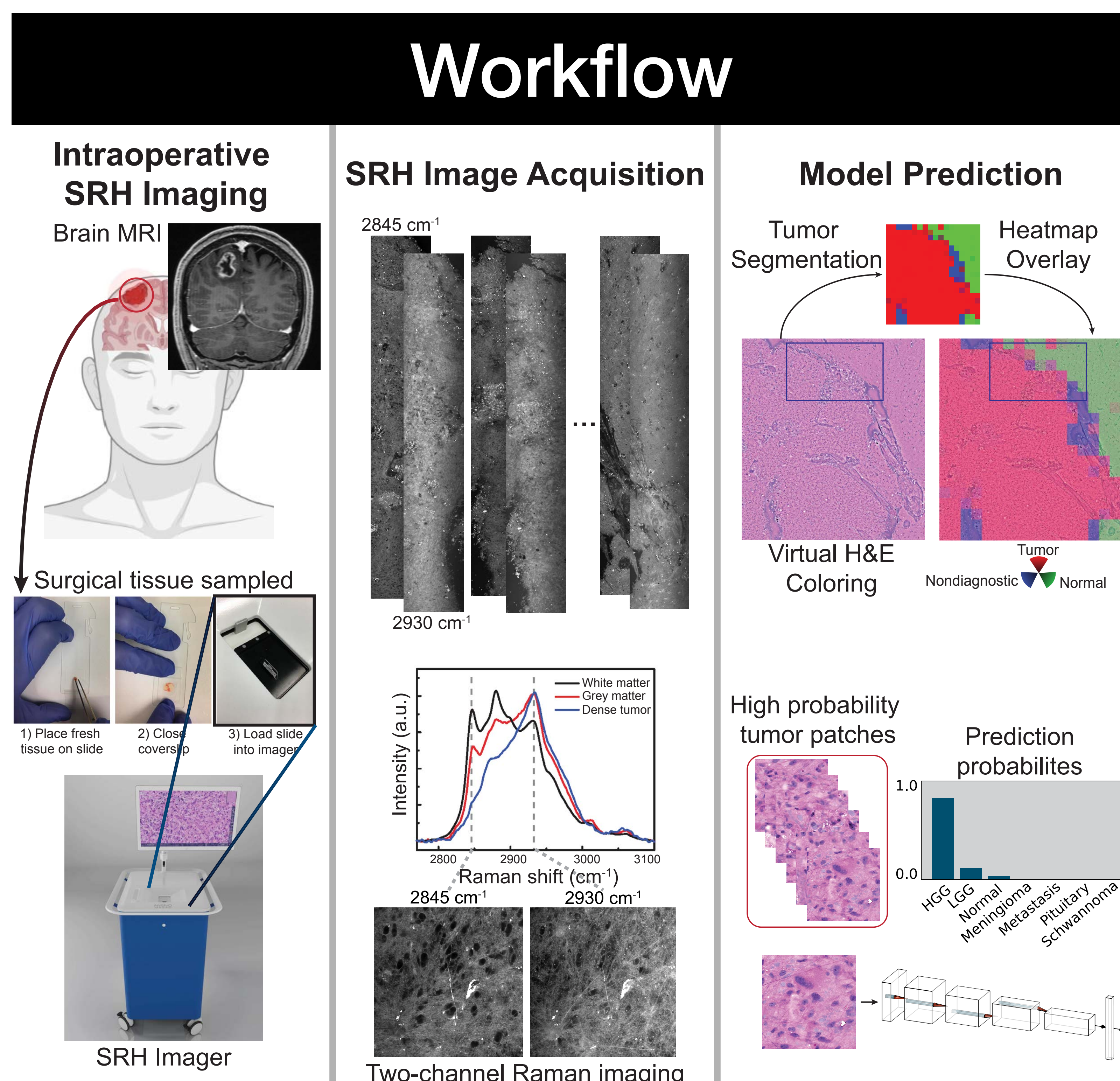
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Workflow

Intraoperative SRH Imaging — Brain MRI, Surgical tissue sampled, 1) Place fresh tissue on slide, 2) Close coverslip, 3) Load slide into imager, SRH Imager

SRH Image Acquisition — 2845 cm⁻¹, 2930 cm⁻¹, Two-channel Raman imaging

Model Prediction — Tumor Segmentation, Heatmap Overlay, Virtual H&E Coloring, Tumor, Nondiagnostic, Normal, High probability tumor patches, Prediction probabilites

OpenSRH is the first and only publicly available **stimulated Raman histology (SRH)** dataset and classification benchmark of the most common brain tumor types. We hope OpenSRH will promote translational AI research within the field of precision oncology and optimize the surgical management of human cancers.

Data Statistics

Number of patches and slides per patient
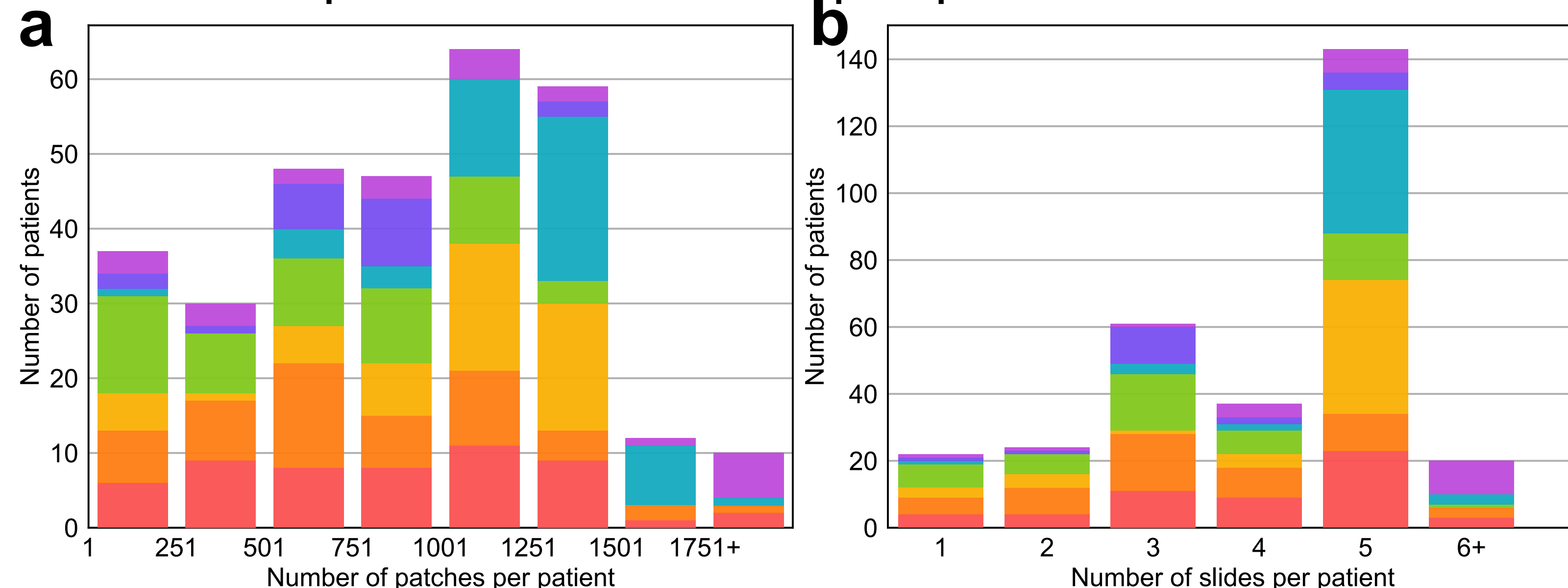
Number of patients, slides, and patches in each class

HGG, LGG, Meningioma, Metastasis, Pituitary adenoma, Schwannoma, Normal

Glial Tissue/Gliomas — Normal brain, Low grade glioma, High grade glioma

Extra-axial tumors — Schwannoma, Meningioma, Pituitary adenoma

Metastatic tumors — Adenocarcinoma, Melanoma, Small cell carcinoma

Classification Benchmarks

Backbone	Init	Patch			Patient		
		ACC	MCA	MAP	ACC	MCA	MAP
ResNet	Random	84.4	83.8	89.6	90.0	91.4	87.1
ResNet	ImageNet	86.5	85.6	91.3	88.9	90.5	84.8
ViT	Random	77.2	76.8	82.4	84.4	86.2	81.3
ViT	ImageNet	83.7	82.7	88.9	88.9	90.5	84.3

Representation Learning

Linear evaluation results

Backbone	Methods	Patch			Patient		
		ACC	MCA	MAP	ACC	MCA	MAP
ResNet	ImageNet	68.3	67.9	72.9	78.9	93.3	81.9
ResNet	SimCLR	79.1	78.9	84.2	83.9	86.1	92.4
ResNet	SupCon	87.5	86.8	91.5	90.0	91.4	94.6
ViT	ImageNet	71.8	71.1	77.1	90.0	96.7	91.4
ViT	SimCLR	76.8	76.3	82.5	80.0	83.0	92.3
ViT	SupCon	81.4	80.2	85.6	87.8	89.4	94.0

ImageNet, SimCLR, SupCon

ResNet, ViT

HGG, LGG, Meningioma, Metastasis, Pituitary adenoma, Schwannoma, Normal