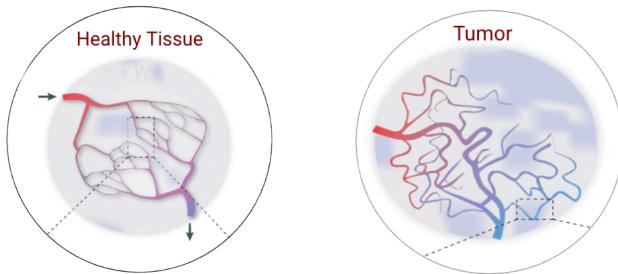
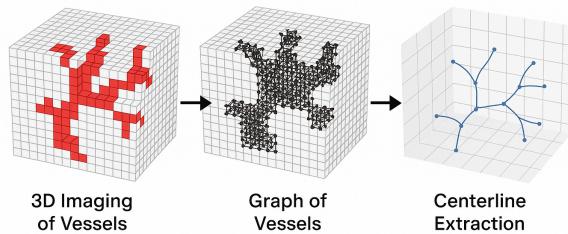


The team partnered with the Karczmar Lab, a UChicago breast imaging group, to explore whether early changes in breast-tumor vasculature could help predict which patients will achieve a pathologic complete response (pCR), meaning no cancer is found at surgery. pCR is strongly linked to improved long-term outcomes, but it can only be confirmed after therapy is completed. Earlier predictions would allow clinicians to personalize care. They could escalate treatment for patients who need it and safely reduce intensity for those likely to respond well.



*Healthy tissue maintains organized blood flow, whereas tumor vasculature exhibits chaotic pathways.*

Because blood vessels begin to change as soon as therapy starts, the team focused on capturing the structure of the vascular network surrounding the tumor. They transformed 3D MRI vessels into simplified graph-like representations, making it possible to measure features such as vessel width, curvature, length, and branching.



*Transforming 3D MRI Scans into Graph Representations*

Across experiments, simple measurements of vessel shape, such as how wide, or curved the vessels were, consistently emerged as the strongest predictors. A model using only these features scored about 0.69 on a 0 to 1 scale, better than models that relied only on standard tumor measurements. While results are preliminary and require further validation, the findings suggest that vascular shape carries meaningful information about treatment response and may help enable earlier, more personalized cancer care.