**Table S2.** Diagnostic features revealed from label-free SRS imaging versus H&E staining of human brain tumors.

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| --- | --- | --- |
| **Pathological features** | **Label-free SRS** | **H&E staining** |
| Cell nuclei size and morphology | √ | √ |
| Cell density  | √ | √ |
| Necrosis | √ | √ |
| Vascular proliferation | √ | √ |
| Red blood cells | √ | √ |
| White matter and gray matter | √ | Challenging |
| Total lipids (myelin sheath or lipid droplets) | √ | Not assessable |
| Total proteins | √ | Not assessable |
| Collagen | √ | Non-specific |
| SRS can image both fresh tissue and frozen sections; H&E staining can only work with tissue sections.  |