

Description of Additional Supplementary Files

File name: *Supplementary Data 1*

Description: *RNA sequencing of spatially-defined meningioma samples according to ADC values. P-values are Bonferroni corrected and two-sided.*

File name: *Supplementary Data 2*

Description: *ADC and CNV characteristics of spatially-defined meningioma samples analyzed by histopathology.*

File name: *Supplementary Data 3*

Description: *In vitro meningioma and organoid single cell RNA sequencing cluster marker genes. P-values are Bonferroni corrected and two-sided.*

File name: *Supplementary Data 4*

Description: *Differentially expressed genes among in vitro conditions compared to in vivo gene expression stratified by ADC level. P-values are Bonferroni corrected and two-sided.*

File name: *Supplementary Data 5*

Description: *In vitro meningioma and organoid single cell RNA sequencing cluster gene ontologies.*

File name: *Supplementary Data 6*

Description: *CNV totals and random forest classification of spatially-defined meningioma samples.*

File name: *Supplementary Movie 1*

Description: *3D co-culture of M10G WHO grade I meningioma cells with human cerebral organoids.*

File name: *Supplementary Movie 2*

Description: *3D co-culture of M13C brain-invasive WHO grade III meningioma cells with human cerebral organoids.*