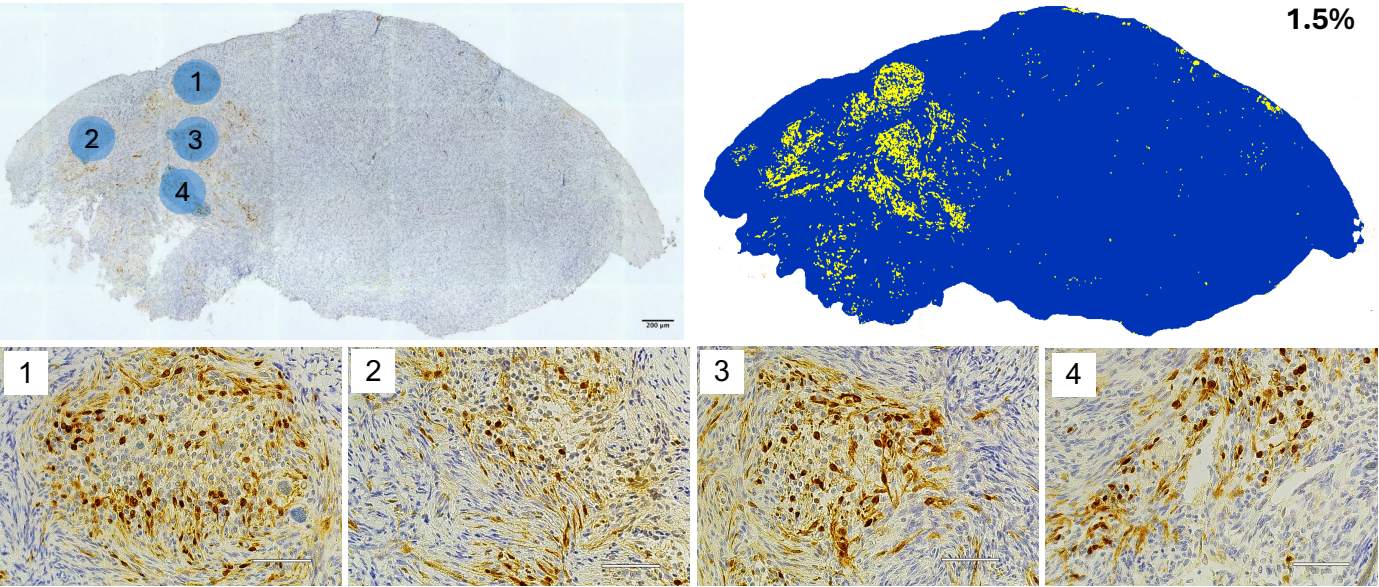
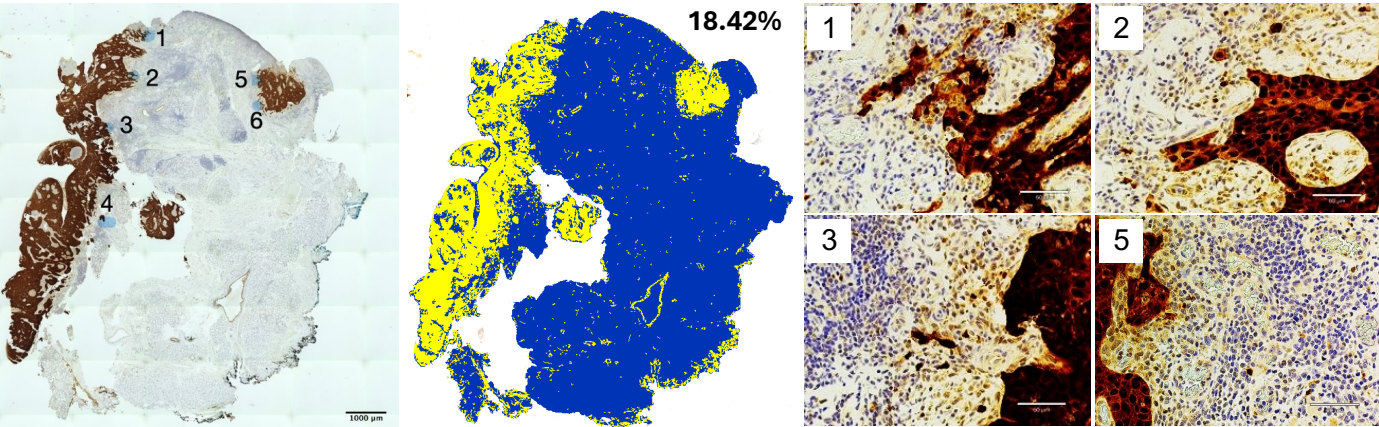


Extended Data Figure 1. Optimization of immunohistochemistry staining for p16 (For Figure 1)

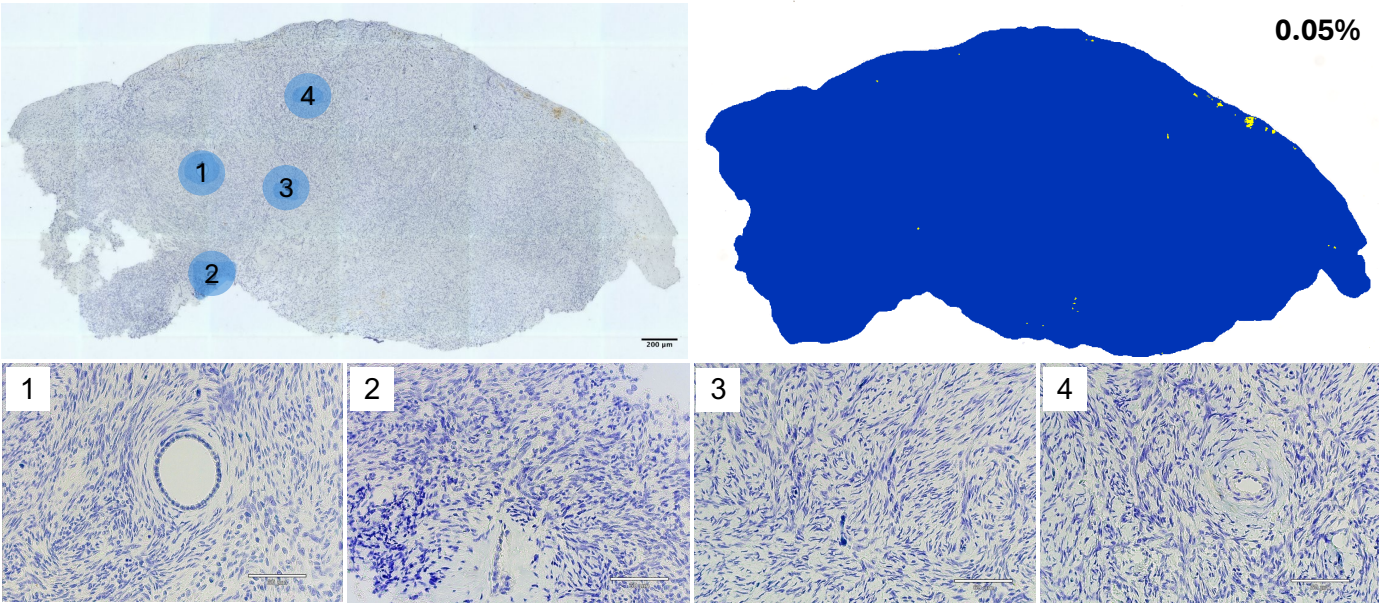
a) Human ovarian tissue piece



b) Positive Control (Cervical Cancer)

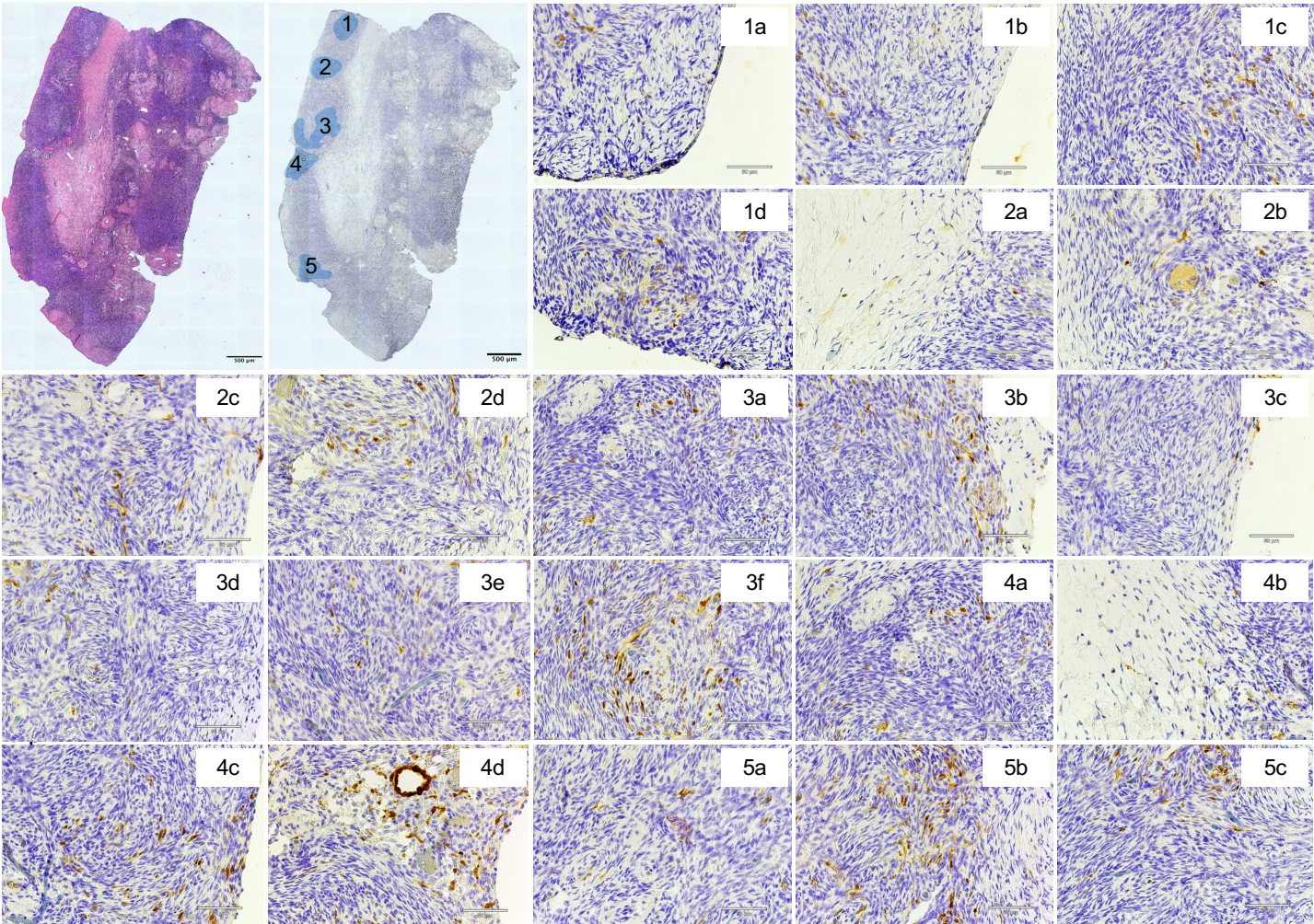


c) Negative Control (Human ovarian tissue piece; no primary antibody)

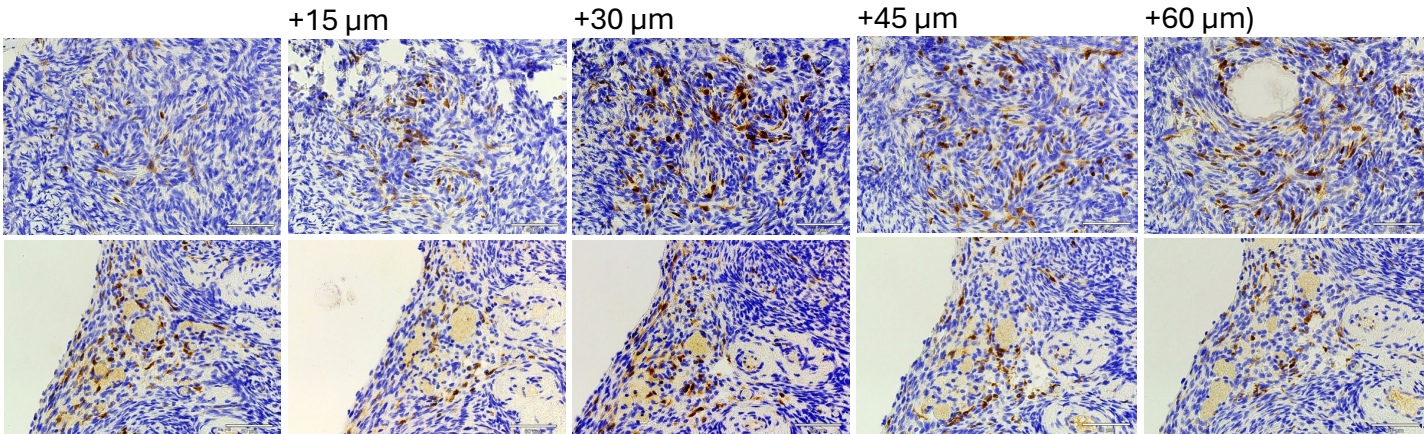


Extended Data Figure 2: Mapping p16 positive clusters in human ovarian tissue pieces (For Figure 1)

a) Mapping all p16 positive clusters across a human ovarian tissue piece

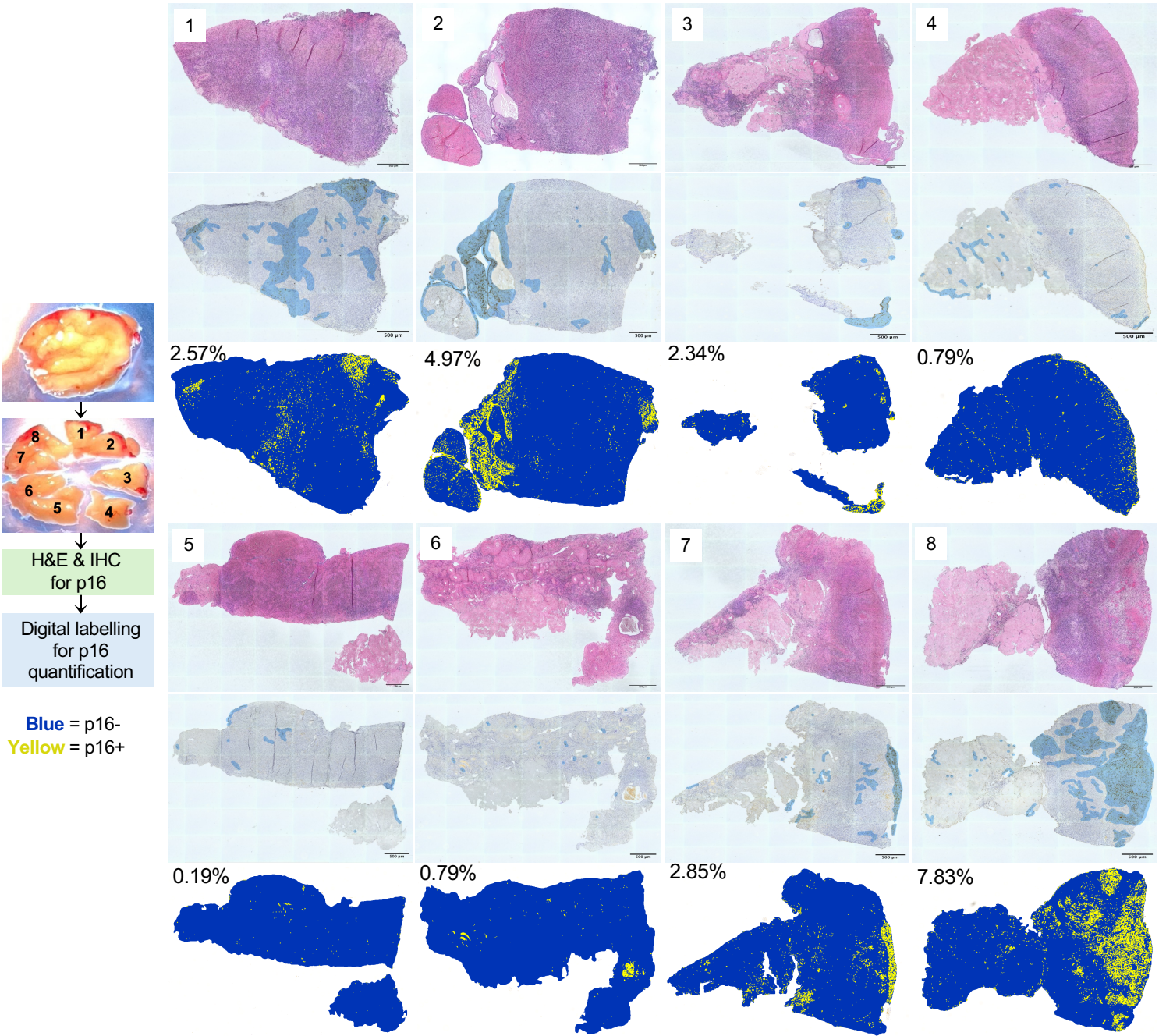


b) Mapping p16 positive clusters across sequential sections (Clusters 3 and 4)

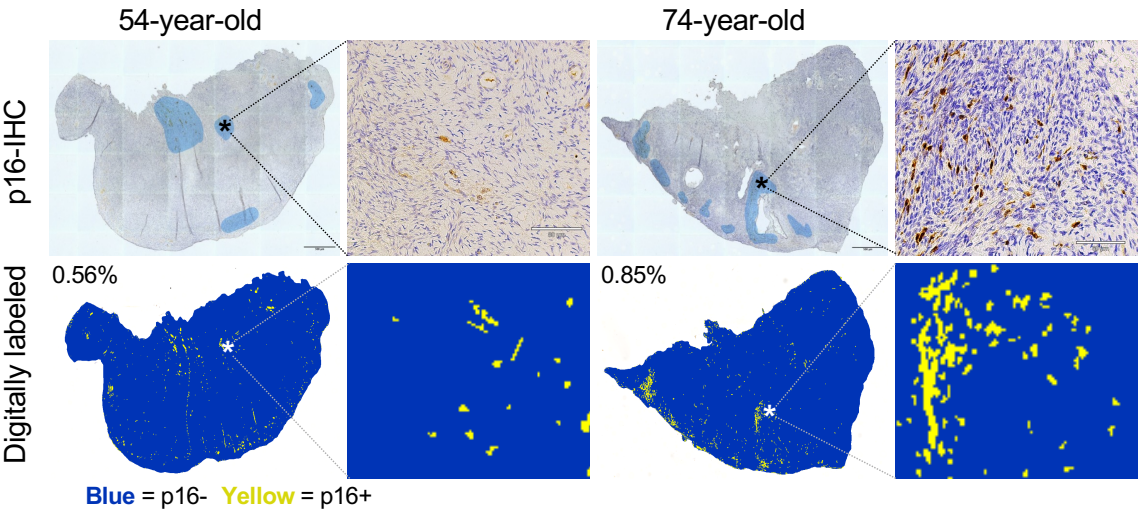


Extended Data Figure 3: Heterogeneity of p16 expression in the postmenopausal human ovary

a) p16 expression in the postmenopausal human ovary is heterogeneous

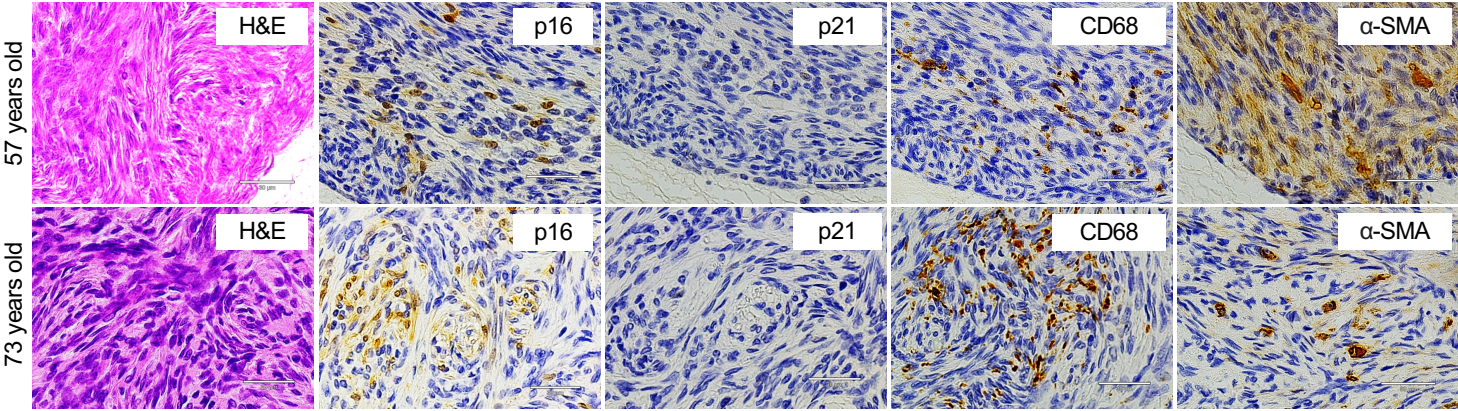


b) p16 expression evaluated across different ages

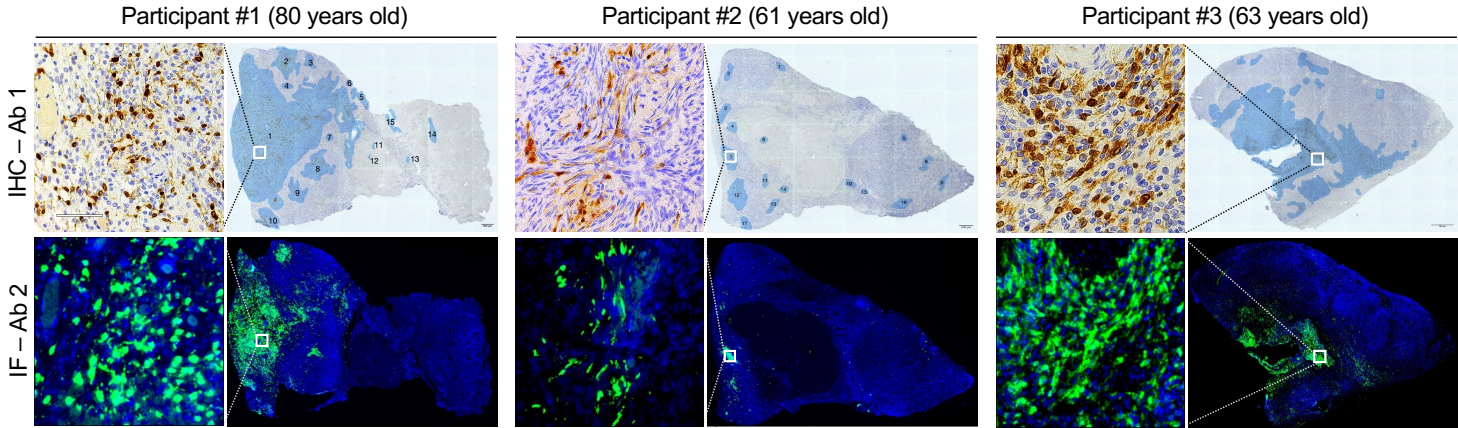


Extended Data Figure 4: Characterization of p16-positive cells and their niche

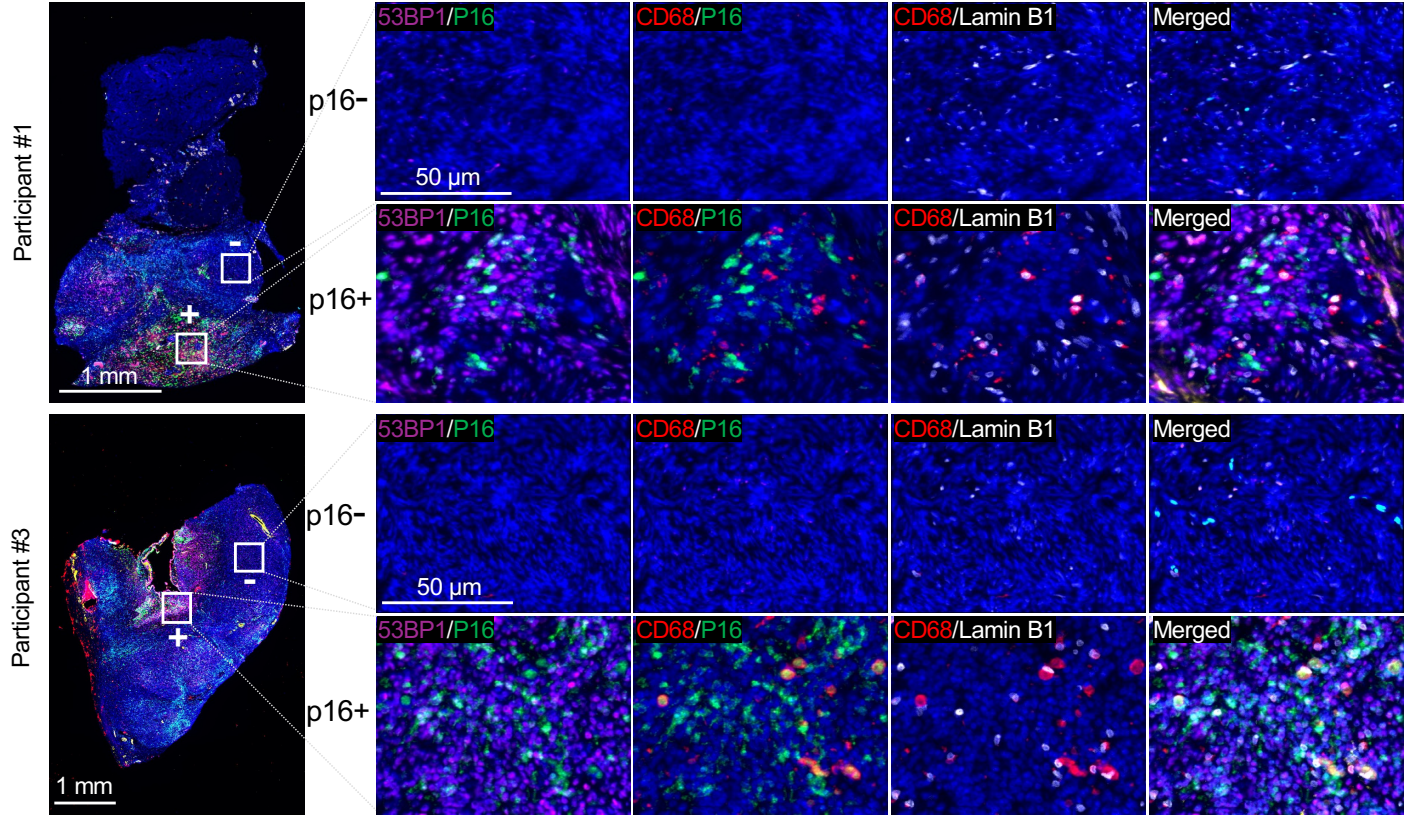
a) Histological characterization of p16-positive regions



b) Validation of p16 staining with two different antibodies

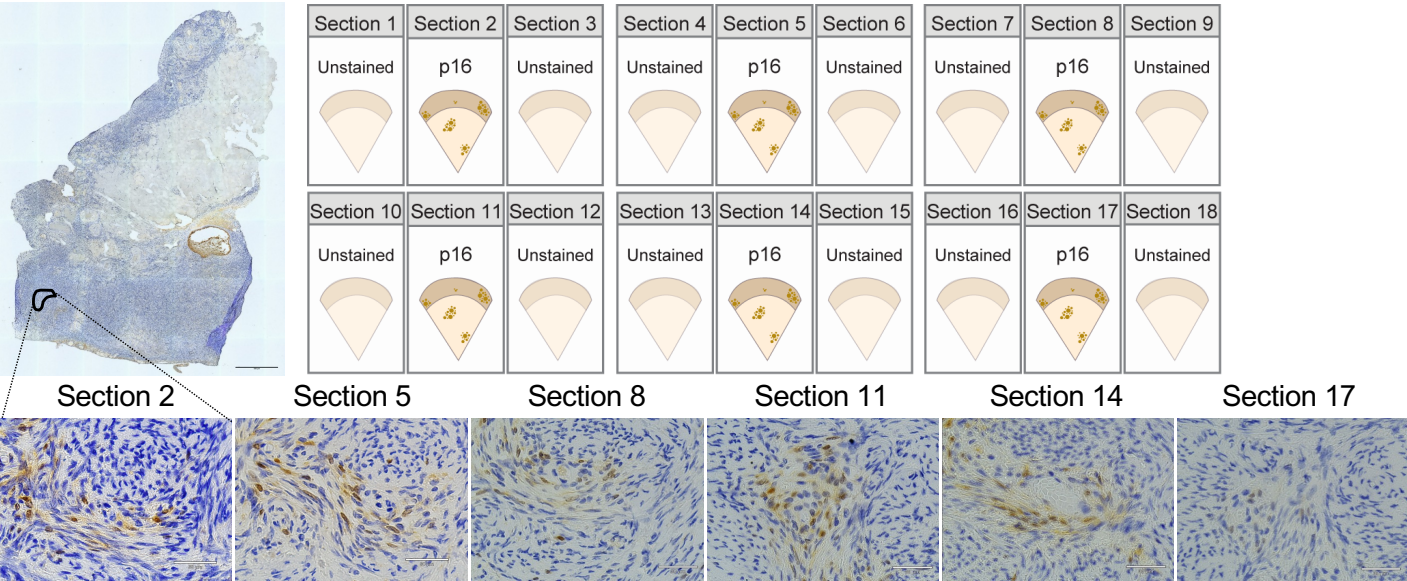


c) Examples of p16+ senescence-associated marker co-staining

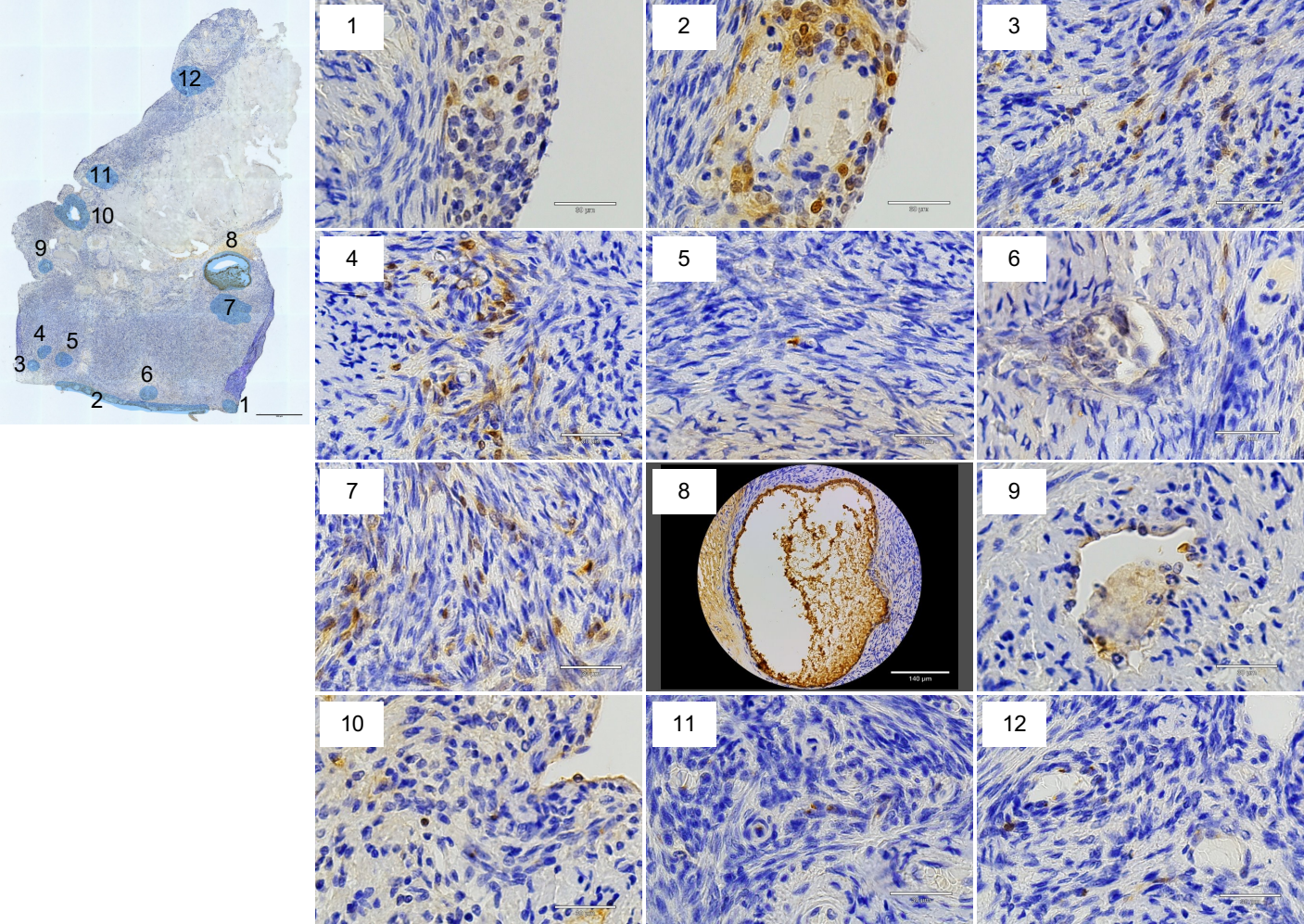


Extended Data Figure 5: Mapping p16 positive clusters for the DSP participant

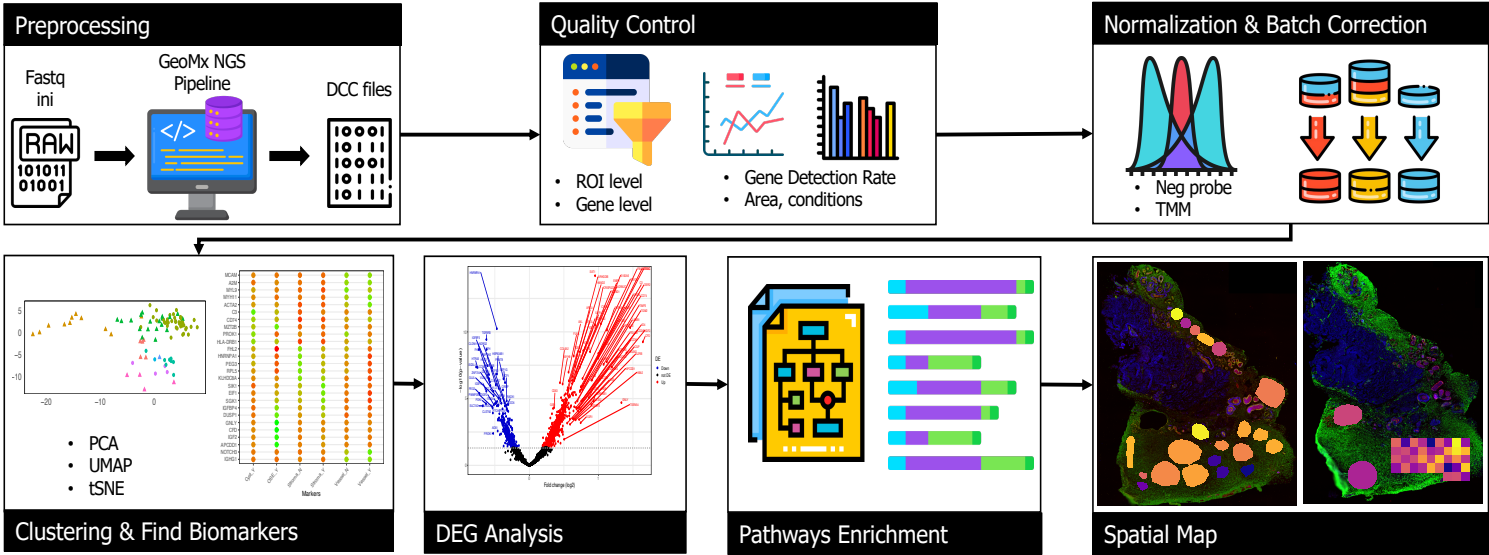
a) p16+ clusters persist across several sequential tissue sections



b) Annotating p16+ clusters within a tissue section for GeoMx ROI selection

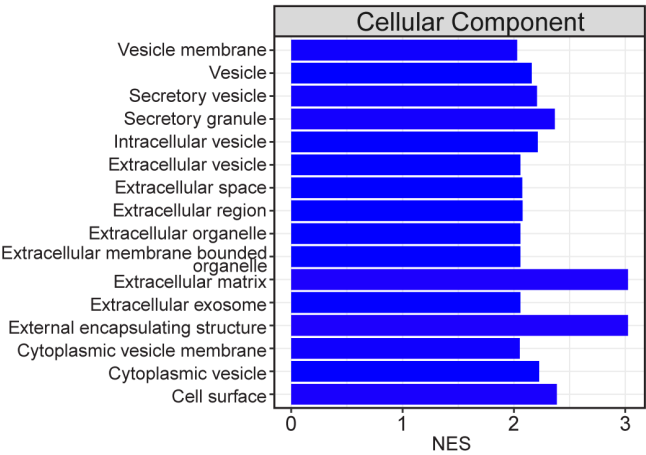


Extended Data Figure 6: Spatial transcriptomic data analysis pipeline

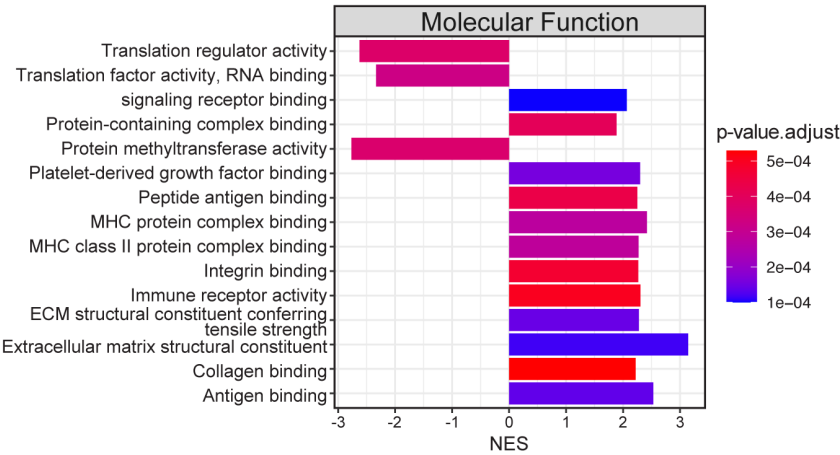


Extended Data Figure 7: p16 positive cellular component and molecular function analysis

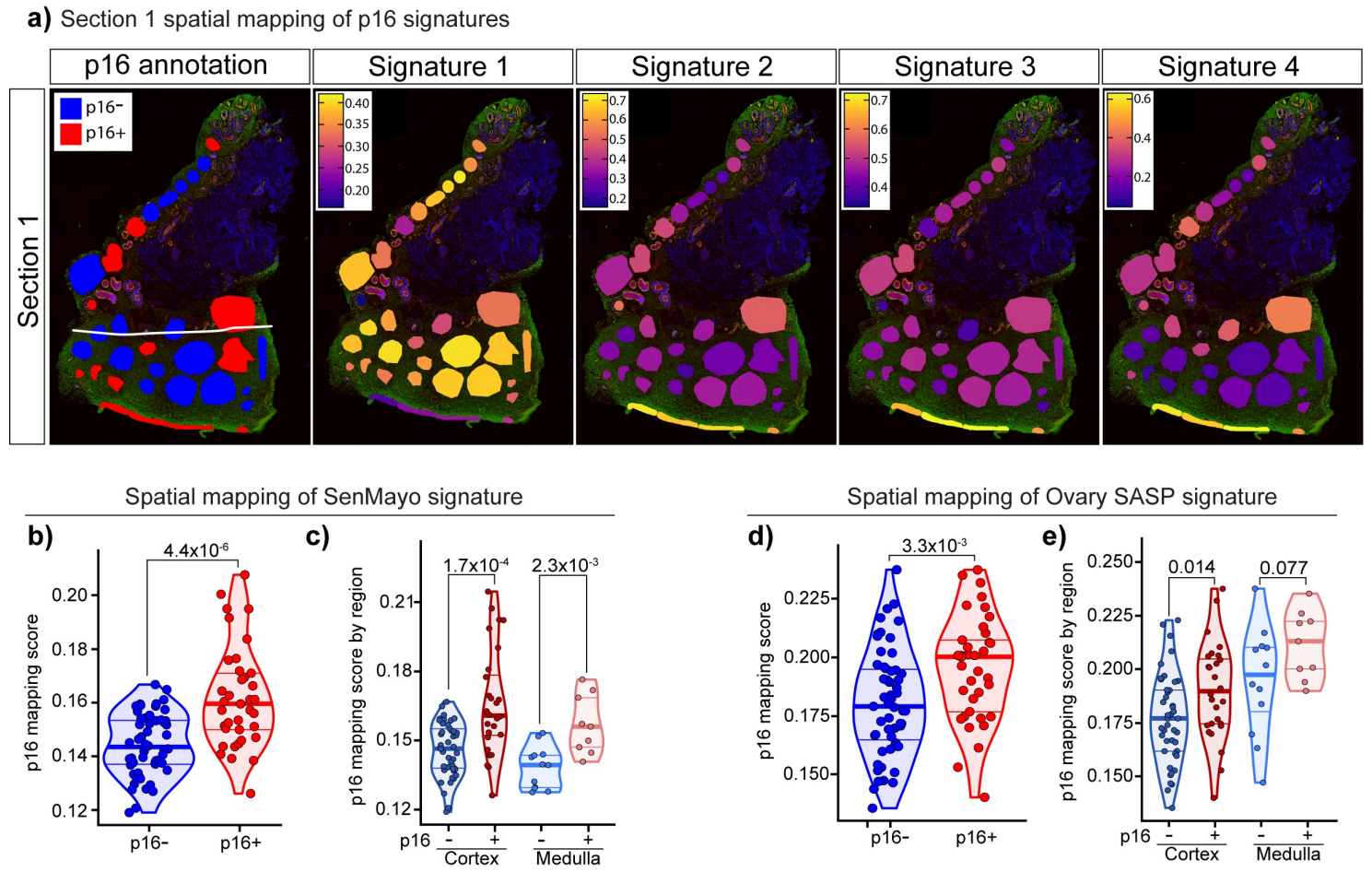
a) p16+ vs. p16- Cellular component



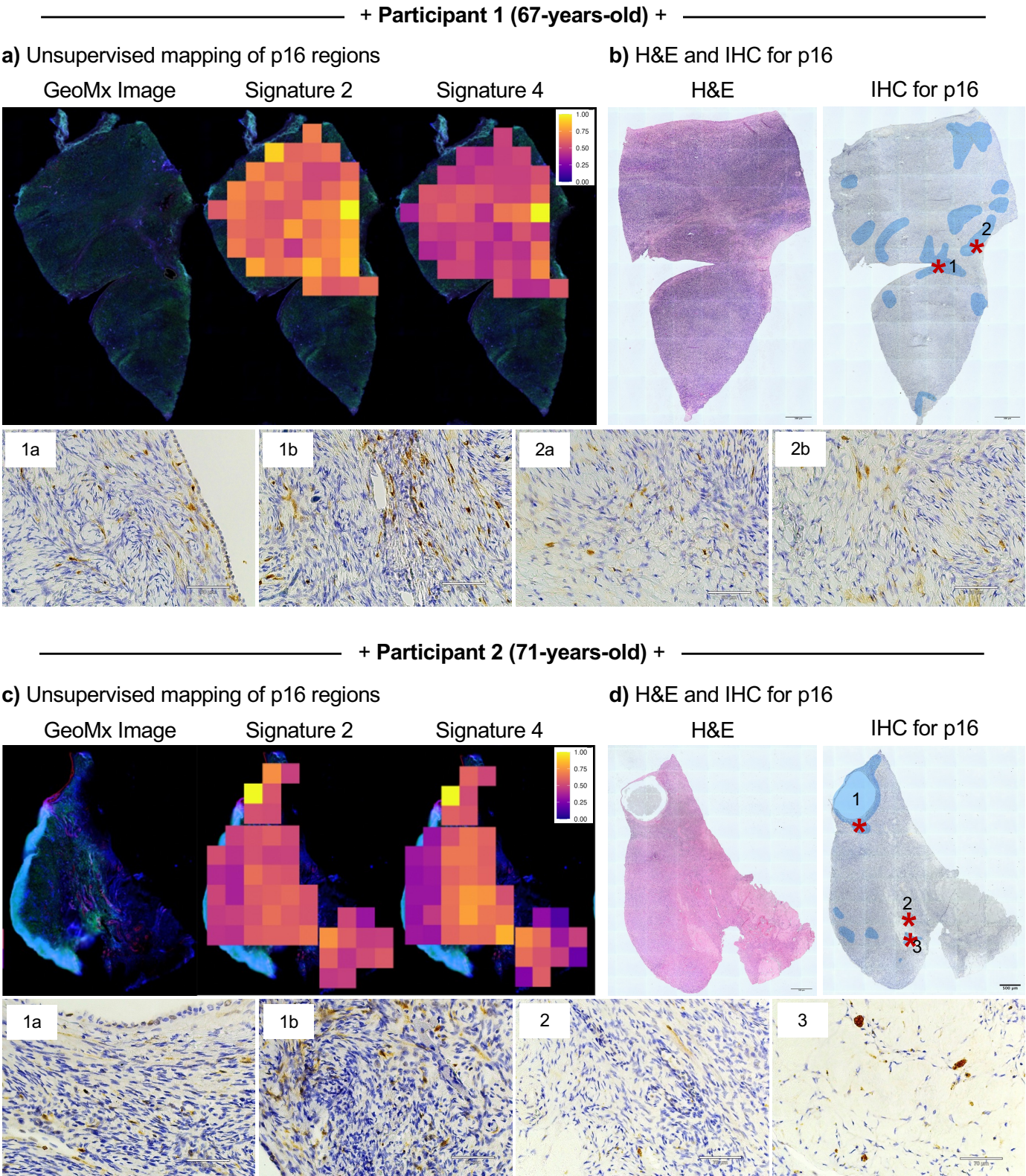
b) p16+ vs. p16- Molecular function



Extended Data Figure 9: Evaluation of senescence-associated signatures for spatial mapping of p16 positive regions. (For figure 5)



Extended Data Figure 10: Validating the precision of different p16 signatures to map p16 positive regions in native tissue (For Figure 5)



Extended Data Figure 11: Histological quantification of collagen deposition in postmenopausal ovaries using picosirius red (For Figure 6)

