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Towards Quantitative Mapping of Organ-Wide Molecular and Anatomical Patterns with Whole Mount Imaging

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Advancements in tissue clearing approach with volumetric imaging has greatly facilitated high-throughput spatial profiling of organ-level cellular distributions and interactions [1-2]. To meet versatile and challenging applications, we have engineered and optimized tissue clearing protocols through iterations (iDISCO, iDISCO+, and AdipoClear) to enable facile and robust whole mount labeling and imaging, while preserving tissue morphology for reliable histo-anatomical analysis [3-5]. We have improved upon i) tissue delipidation and tissue refractive index matching to achieve homogeneous optical clearing for optimal volumetric imaging; ii) compatibility with diverse tissue type and size; iii) reliable and quantitative molecular labeling, with dedicated efforts on curating compatible monoclonal antibodies to ensure reproducibility and scalability. These improvements enable easy and reliable translation of traditional histological assays from sections to whole-mount tissues while maintaining or even improving sensitivity and coverage for quantitative analysis in broad applications.

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