

Resource Summary Report

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Human Pancreas PACT Optical Clearing and High Resolution 3D Microscopy

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Protocol Information

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Authors: Elizabeth Butterworth, Wesley Dickerson, Vindhya Vijay, Kristina Weitzel, Julia Cooper, Eric W. Atkinson, Jason E. Coleman, Kevin Otto, Martha Campbell Thompson

Group: Human Cell Atlas Method Development Community, Optical Clearing of Tissue, SPARC

Summary: Using traditional histological methods, researchers are hampered in their ability to image whole tissues or organs in large-scale 3D. Histological sections are generally limited to 500 μ m using traditional methods. In addition, light scatters from macromolecules within tissues, particularly lipids, prevents imaging to a depth $>150 \mu$ m with most confocal microscopes. To reduce light scatter and to allow for deep tissue imaging using simple confocal microscopy, various optical clearing methods have been developed that are relevant for rodent and human tissue samples fixed by immersion. Several methods are related and use protein crosslinking with acrylamide and tissue clearing with sodium dodecyl sulfate (SDS). Other optical clearing techniques used various solvents though each modification had various advantages and disadvantages. Here, an optimized passive optical clearing method is described for studies of the human pancreas innervation and specifically for interrogation of the innervation of human islets.

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