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Super-Resolution Microscopy Made Simple

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Expansion Microscopy (ExM) provides a new paradigm for super-resolution microscopy in which fixed biological specimens may be infused with a swellable polymer and then expanded with low distortion in order to allow features closer than the diffraction limit of light (~250 nm) to become resolvable in the expanded state even on conventional microscopes (Chen, Tillberg & Boyden, Science 2015 [1]). I will highlight four contributions my group has made to this field including: 1) probe-linking chemistry that simplifies the ExM procedure and makes it compatible with conventional antibodies and fluorescent proteins [2]; 2) diversifying the range of specimens that can be studied by ExM including flies and tissue from mouse or human kidney [3-4]; 3) the combination of ExM with optically-based super-resolution microscopy for the study of the cytoskeleton of the widespread intestinal parasite *Giardia lamblia* [5]; 4) novel, inexpensive chemical stains that are fluorescent analogs of traditional histology stains (e.g., hematoxylin and eosin, H&E) and that are bright, easily implemented, reveal general physiology in cells and tissues, and may be easily combined with immunostaining or in situ hybridization of nucleic acids [6-7].

References:

[1] F. Chen, P.W. Tillberg, E.S. Boyden, Science **347** (2015), p. 543.
[2] T.J. Chozinski, et al. Nat. Methods **13** (2016), p. 485.
[3] N. Jiang et al., Mol. Biol. Cell 29 (2018), p. 1413.
[4] T.J. Chozinski et al., Sci. Rep. **8** (2018), No. 10396.
[5] Halpern, A. R., et al., ACS Nano **11** (2017), p. 12677.
[6] C. Mao et al. Sci. Adv., **6**, eaba4542
[7] M.Y. Lee et al. Nat. Protoc., (2022, in press).