

## **Multi-scale investigation of brain machinery with correlative microscopy**

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Thanks to their flexibility, optical techniques are the key to explore brain structure and function and unravel the complexity of this intricate network. However, a single imaging technique can reveal only a small part of this machinery due to its inherent multi-level organization. To obtain a more comprehensive view of brain functionality, complementary approaches have been combined. For instance, dynamic information on the structural plasticity of neuronal networks have been contextualized in a wider framework by combining two-photon and light-sheet microscopy. In addition, synaptic features are revealed on previously in vivo imaged samples by correlative light-electron microscopy. Finally, a multi-scale optical microscopy approach that exploits two-photon structural imaging, wide-field functional microscopy and optogenetics allowed unraveling the diverse aspects of cortical plasticity triggered by robotic rehabilitation after stroke. These combined approaches revealed important features of brain machinery by providing bridges between specific spatiotemporal scales.