Adipose mTORC2 is essential for sensory innervation in white adipose tissue and whole-body energy homeostasis

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Adipose tissue, via sympathetic and possibly sensory neurons, communicates with the central nervous system (CNS) to mediate energy homeostasis. In contrast to the sympathetic nervous system, the morphology, role and regulation of the sensory nervous system in adipose tissue are poorly characterized.; Taking advantage of recent progress in whole-mount three-dimensional imaging, we identified a network of calcitonin gene-related protein (CGRP)-positive sensory neurons in murine white adipose tissue (WAT). We found that adipose mammalian target of rapamycin complex 2 (mTORC2), a major component of the insulin signaling pathway, is required for arborization of sensory, but not of sympathetic neurons. Time course experiments revealed that adipose mTORC2 is required for maintenance of sensory neurons. Furthermore, loss of sensory innervation in WAT coincided with systemic insulin resistance. Finally, we established that neuronal protein growth-associated protein 43 (GAP43) is a marker for sensory neurons in adipose tissue.; Our findings indicate that adipose mTORC2 is necessary for sensory innervation in WAT. In addition, our results also suggest that WAT may affect whole-body energy homeostasis via sensory neurons.
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