Nature Reviews Endocrinology | Published online 16 Jun 2017; doi:10.1038/nrendo.2017.79

ADIPOSE TISSUE

Crosstalk between adipocytes and neurons

> This pathway … might also have major implications for control of whole body metabolic homeostasis

New research suggests that reduced synthesis of fatty acids in white adipocytes stimulates neuronal signalling that enhances browning of white adipose tissue (WAT).

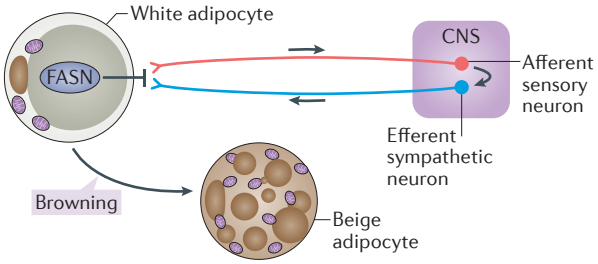
The biosynthesis of fatty acids, termed *de novo* lipogenesis (DNL), is reduced in adipose tissue from obese rodents and is very carefully controlled in mice and humans. In addition, the DNL pathway in adipose tissue seems to be involved in controlling systemic metabolism. "Dysregulation of this pathway might be linked to metabolic dysfunctions in metabolic diseases such as obesity," speculates corresponding author Michael Czech.

To test their hypothesis, Czech and colleagues created a tamoxifen-inducible adipose-specific fatty acid synthase (FASN; the final enzyme in the DNL pathway) knockout mouse line (iAdFASNKO), which enabled them to delete FASN in adipocytes, and thus inhibit DNL, in the adipose tissue of adult mice.

An immunohistochemistry analysis revealed that levels of UCP1 were increased in the inguinal WAT (iWAT) of tamoxifen-treated iAdFASNKO mice, which suggests that browning of iWAT might be induced by inhibition of DNL. As activation of the sympathetic nervous system is known to be involved in browning of iWAT, Czech and co-workers analysed the effects of FASN deletion on levels of neuronal tyrosine hydroxylase and neuropeptide Y in iWAT; levels of both were increased in tamoxifen-treated iAdFASNKO mice. "Taken together, our study demonstrates that DNL, a key pathway of lipid metabolism in adipocytes, might be somehow coupled to modulation of adipose sympathetic tone, which in turn controls major adipose tissue functions, including expansion of beige cells," says Czech. "This pathway of adipocyte–neuron crosstalk might also have major implications for control of whole body metabolic homeostasis."

Czech notes that signals from the adipose DNL pathway that activate innervation of sympathetic neurons within WAT are still unknown. "The identification of such signals will be the focus of future experiments," concludes Czech.

Claire Greenhill



Proposed model showing how deletion of FASN in white adipocytes might enhance adipose browning through neuronal circuit regulation. CNS, central nervous system.

ORIGINAL ARTICLE Guilherme, A. *et al.* Adipocyte lipid synthesis coupled to neuronal control of thermogenic programming. *Mol Met.* http://dx.doi.org/10.1016/j.molmet.2017.05.012 (2017)

© 2017 Macmillan Publishers Limited, part of Springer Nature. All rights reserved.