

The Color of Fat: Brown, Beige, and White

Shingo Kajimura, Ph.D.

Associate Professor,
University of California, San Francisco

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Our lab aims to understand and harness the regulatory circuitry of thermogenesis and energy metabolism, with a particular emphasis on thermogenic adipose cells. Humans and mice possess two forms of thermogenic fat cells: brown adipocytes and beige adipocytes. While brown and beige fat share many morphological and biochemical properties, such as multi-locular lipids, enriched mitochondria, and expression of uncoupling protein 1 (UCP1), recent studies suggest distinct characteristics of the two cell types. For instance, brown adipocytes and beige adipocytes arise from distinct developmental lineages. Brown adipose cell fate is determined during embryonic stages, whereas beige adipocytes postnatally emerge within white adipose tissue (WAT) in response to certain external cues, such as chronic cold exposure, exercise, and long-term treatment with PPAR γ agonists (often referred to as the "browning" of WAT). More recently, we also learned transcriptional and functional differences between brown fat and beige fat. The recent advance regarding the beige fat biology will be discussed.