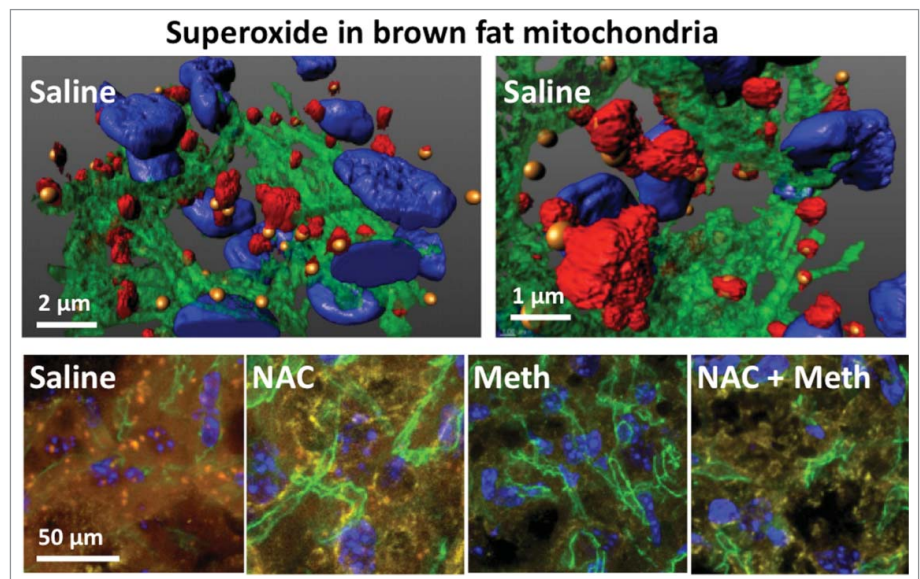


In vivo effects of methamphetamine on brown fat reactive oxygen species and mitochondria

Nikki Bortell, Julia A Najera, Manuel Sanchez-Alavez, and Maria Cecilia Garibaldi Marcondes*
Molecular and Cellular Neuroscience Department; The Scripps Research Institute; La Jolla, CA USA

Methamphetamine (commonly known as Meth) is a highly addictive drug of abuse, which causes a potentially lethal increase in core body temperature, or hyperthermia. We have recently found that Meth-induced hyperthermia has a significant participation of the thermogenic brown adipose tissue,¹ and can be prevented by a pretreatment with the antioxidant N-acetyl cysteine.¹ For this publication, we labeled reactive oxygen species, such as superoxide, in vivo, by injecting C57Bl/6 mice with dihydroethidium; we then harvested and processed interscapular brown adipose tissue (for methods, see ref. 1). Reactive oxygen species were visualized in brown fat and found to be largely associated with mitochondria (Slide 1). In the slide, dihydroethidium-labeled superoxide is seen as red; the mitochondrial marker TOMM20 is seen as yellow; the cytoskeleton F-actin marker Phalloidin Alexa488 is seen as green; and the DNA marker DAPI is seen in blue. Meth depleted superoxide in brown-fat mitochondria, in correlation with the loss of TOMM20-labeled mitochondria. These changes were detectable in brown fat as early as 15 minutes after the injection of the drug, with a peak at



Slide 1. In brown fat, superoxide (red) is co-localized with the mitochondria marker TOMM20 (yellow). Meth and N-acetyl cysteine (NAC) affect this relationship.

1 hour following injection, which is seen in Slide 1. The N-acetyl cysteine pretreatment prevented the loss of TOMM20 induced by Meth, but did not restore the Meth-depleted superoxide storages in mitochondria. Overall, this slide shows that Meth impacts the mitochondrial storages of superoxide, as well as mitochondrial integrity, in brown adipose tissue. The functional importance of these observations remains to be established and requires further studies.

Teaching Slide

A PDF of this Teaching Slide can be downloaded from the publisher's website.

References

1. Sanchez-Alavez MB, et al. *Temperature* 2014; 1:227-41; PMID: 26346736; <http://dx.doi.org/10.4161/23328940.2014.984556>

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*Correspondence to: Maria Cecilia Garibaldi Marcondes; Email: cmarcond@scripps.edu

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