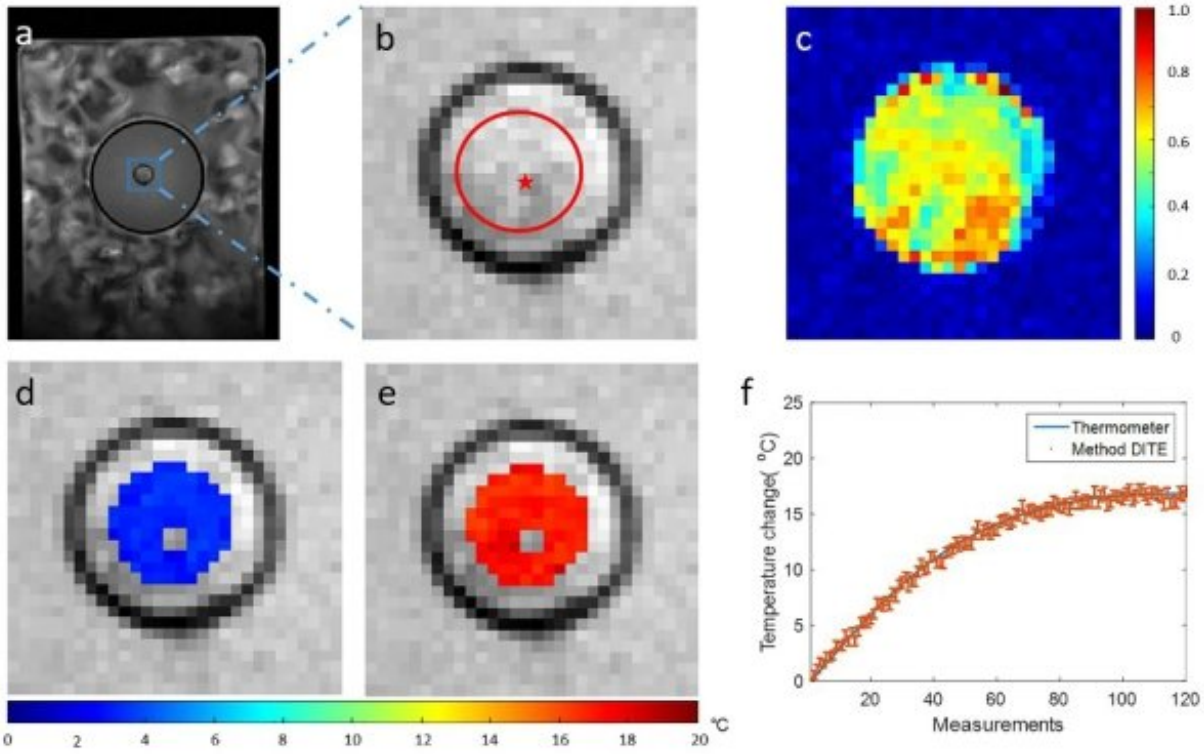
New method improves temperature imaging accuracy in fat-containing tissues

September 21 2018



The performance of the proposed DITE method in the ex vivo BAT heating experiment. Credit: SIAT

A research team led by Prof. Zheng Hairong from the Shenzhen Institutes of Advanced Technology (SIAT) of the Chinese Academy of Sciences developed a dual-step iterative temperature estimation (DITE)

method for fat-referenced PRFS temperature imaging in fat-containing tissues. Magnetic resonance thermometry (MRT) is the only imaging technique that noninvasively provides temperature distribution in vivo. The water proton resonance frequency shift (PRFS)-based method is the most popular choice for MR temperature monitoring in aqueous tissues.

In mammals, there are two types of adipose (i.e., fat-containing) tissue: white adipose tissue (WAT) and brown adipose tissue (BAT). "WAT stores excess energy as triacylglycerol, whereas BAT burns fat to dissipate energy in the form of heat after activation and is now considered to be the next potential therapeutic target for metabolic syndrome," said Zheng.

The proposed DITE method achieved accurate and precise temperature estimation compared with the results measured by the fluorescent thermometer, a common method and the golden standard of measuring temperature. The average mean error, standard deviation, and root mean squared error were -0.08°C, 0.46°C and 0.56°C, respectively, within the region of interest (ROI) around the thermometer in the ex vivo BAT using a water bath experiment. The method can provide a potential imaging tool for the characterization of brown adipose tissue in vivo.

Prof. Zheng said, "In the future, we will apply this method to monitor the temperature in BAT in vivo and characterize BAT activity using this temperature imaging technique."

By modulating BAT activity, this study provides crucial insight relevant to the treatment of metabolic diseases such as diabetes, obesity, and non-alcoholic fatty liver disease.

More information: Chuanli Cheng et al, Dual-step iterative temperature estimation method for accurate and precise fat-referenced PRFS temperature imaging, *Magnetic Resonance in Medicine* (2018).

Medical Xpress

DOI: 10.1002/mrm.27396

Provided by Chinese Academy of Sciences

Citation: New method improves temperature imaging accuracy in fat-containing tissues (2018, September 21) retrieved 3 May 2024 from https://medicalxpress.com/news/2018-09-method-temperature-imaging-accuracy-fat-containing.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.