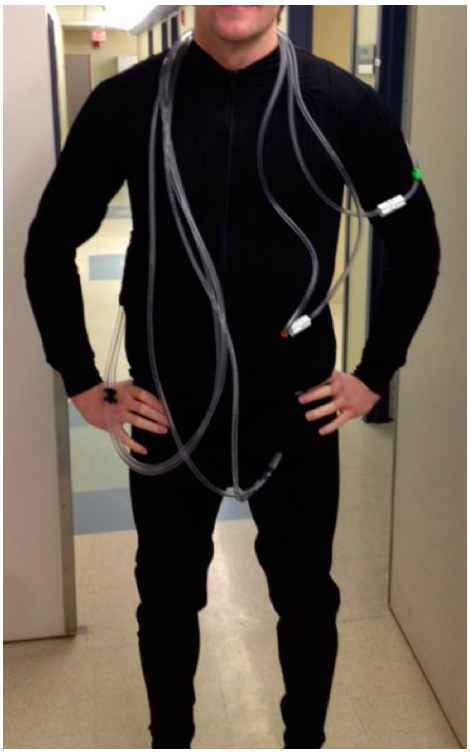
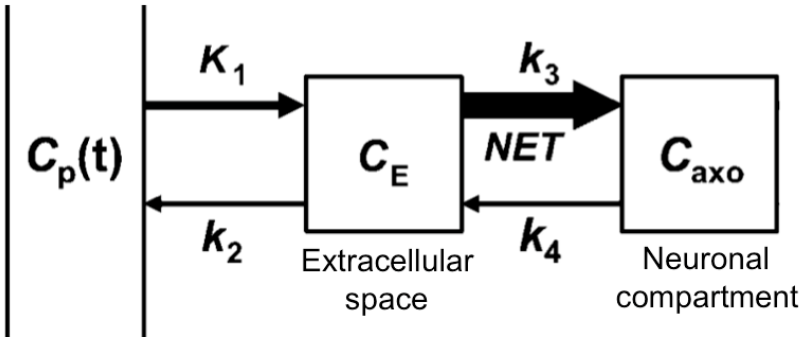
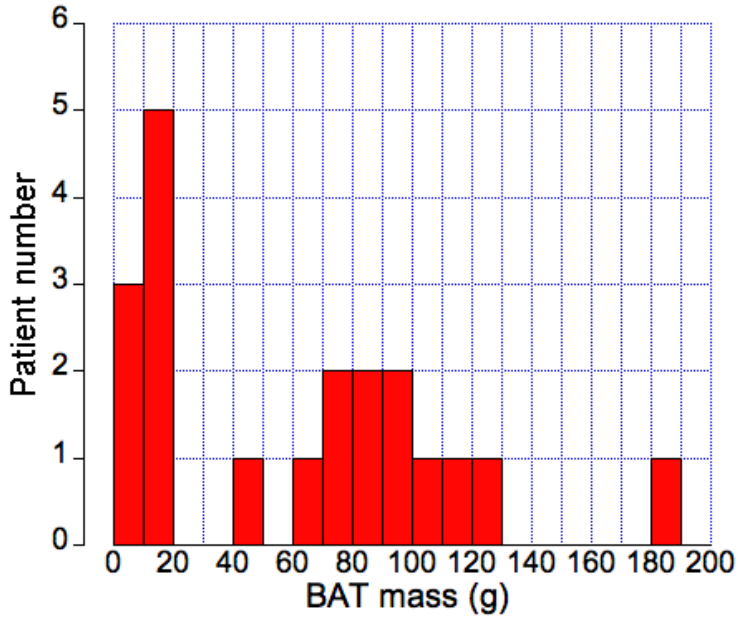


Supplemental Figure 1. Garment used for cold exposure. Subject dressed in the tube suit covering the arms to the wrists, the legs to the ankles and the torso. Plastic tubes were connected to a pump with two water reservoirs, both of which were temperature controlled. The water temperature in the reservoirs was kept constant at 31-34 ^{o}C and 15–17 ^{o}C, respectively.



Supplemental Figure 2. Kinetic model for HED. Arrow thicknesses indicate relative magnitudes of the rate constants. Cp represents HED tracer concentration in plasma, CE represents tracer concentration in extracellular space and Caxo represents tracer concentration in the neuronal axoplasm.



Supplemental Figure 3. Histogram showing the distribution of cold-activated BAT mass in all subjects studied. The graph indicates that a bimodal distribution with two distinct peaks at 10-20g and 80-90g. Based on the data, we have stratified subjects into 2 groups according to their cold-activated BAT mass. A High-BAT group with BAT mass greater than 20g and a Low-BAT group with BAT mass less than 20g.

Supplemental Experimental Procedures.

Study population

Stature was measured to the nearest cm and weight was measured to the nearest 0.5 kg, following standard procedures of Lohman et al. (*1*). The body mass index (BMI) was calculated as weight/height^2 (kg/m^2). Percent body fatness (%) was calculated based on the Durnin and Womersley (*2*) equations from the sum of skinfold measurements at the biceps, triceps, subscapular and suprailiac sites using Lange calipers. The lean body mass (LBM; kg) was subsequently calculated as body weight less fat mass and WAT mass was calculated as body weight multiplied with the body fat percentage.

Cold exposure approach

Mild cold exposure was applied using a specialized whole-body garment, which incorporates a network of small-diameter plastic tubing (Allen Vangard, Inc., Ottawa, CA) (**Supplemental Fig. 1**). The garment incorporates a network of small-diameter plastic tubing through which temperature-controlled neutral (31-34°C) or cold water (15-17°C) was circulated from two separate water reservoirs. Skin temperature was monitored using a GaAs crystal sensor located at the tip of an optical fiber cable (OpSense, Inc., Quebec City, CA), which allows accurate measurement to within 0.1°C. This approach relies on the temperature dependence of the energy band gap of a GaAs semiconductor crystal; the GaAs sensor is opaque for wavelengths below the bandgap and transparent for wavelengths above the energy band gap. The sensor was taped to the skin at the location of the left rib cage. This location was selected on the basis of proximity to important anatomical features (close to the pulmonary blood vessels which are possibly the most representative sites for core body temperature) and the ability to consistently place the sensors based on the anatomical landmark. Previous studies (*3,4*) have shown a strong correlation (R^2 = 0.70) between this location and core body temperature.

Definition of BAT mass

ROIs representing supraclavicular BAT as well as subcutaneous and visceral WAT were defined in CT images based on the density of adipose tissue (−250 to −50 Hounsfield

units, HU). BAT was considered as activated if there were areas of tissue that were more than 5 mm in diameter and had a minimal standard uptake value (SUV, defined as tracer concentration in MBq/cc normalized to injected activity (MBq) per weight (g)) of FDG of at least 2.0. This cutoff represented more than 2 SD above the maximal SUV seen in typical depots of white adipose tissue. In case that no voxels survived the masking operation (no BAT activation), a volume of ~10 cm^3 (1.5 x 1.5 x 4.0 cm^3 ROI) was selected at a typical location of supraclavicular BAT. The final BAT ROI was chosen at the location of the largest contiguous group of voxels that survived the masking operation.

References

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