HUMAN BROWN ADIPOSE TISSUE ACTIVITY ASSESSED VIA POSITRON EMISSION TOMOGRAPHY/COMPUTED TOMOGRAPHY IS INVERSELY ASSOCIATED WITH ENVIRONMENTAL TEMPERATURE

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Introduction: Cold exposure increases brown adipose tissue (BAT) activity, which may lead to increased resting energy expenditure (REE) with beneficial effects on body composition [1]. However, evidence on the impact of normal daily living environmental temperature (Tenv) on BAT activity is limited. In this study, we examined the impact of Tenv on BAT activity of healthy men. **Method:** Twenty-two healthy men [age (years):36.68±5.22, body mass index (BMI):29.29±6 (kg/m2)] were assessed for: (i) Tenv, recorded via a wireless temperature sensor which was carried by the participants for one week prior to BAT measurements, and (ii) BAT activity, via ^{18}F-flurodeoxyglucose Positron Emission Tomography/Computed Tomography (^{18}F-FDG:PET/CT) examination, following a REE measurement and a 2-hour mild cooling protocol (temperature: 16.7±0.55°C; humidity: 49.02±11.08%), based on recent guidelines [2, 3]. Body composition was assessed via Dual energy x-ray absorptiometry (DEXA) prior to the ^{18}F-FDG:PET/CT scans. **Results:** Ten out of the 22 participants displayed no BAT activity [i.e., standard uptake value (SUV) equal to background], while 12 participants revealed BAT activity (SUV corrected via DEXA lean body mass [2] = 2.85±0.78). Individuals who displayed BAT activity showed reduced Tenv, age, BMI, and fat mass, as well as increased REE compared to individuals who did not display BAT activity, yet these differences did not reach statistical significance (P>0.05). However, small to moderate Cohen's *d* effect sizes were detected between the two groups (Tenv: *d*=0.29; age: *d*=0.80; BMI: *d*=0.38; REE: *d*=0.27). Within the group who displayed BAT activity (n=12), BAT activity was inversely correlated with Tenv (r=-0.62, P=0.03). Linear regression analysis confirmed the association (R^2=0.39, P=0.03), while Cohen's f^2 effect size analysis revealed a moderate effect size (f^2=0.64) between BAT activity and Tenv. We also found a strong positive correlation between BAT activity and REE (r=0.62, P=0.05), which was further confirmed by Linear regression analysis (R^2=0.39, P=0.05) and a Cohen's small effect size (f^2=0.22). Finally, we found no relationship between BAT activity with BMI, lean body mass and fat mass of the participants (P>0.05). **Conclusion:** In healthy individuals who display BAT activity following a mild cooling protocol, BAT activation is inversely associated with Tenv and positively with REE. This indicates that the Tenv humans are exposed to during daily living may affect body weight management. Nevertheless, the current evidence should be treated with

caution, given that the Tenv, REE and fat mass characteristics were not significantly different between individuals who did or did not display BAT activity.

References

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