

Figure S1. Corporal and interscapular temperature under basal and cold conditions.

Rectal temperature, quantification of brown adipose tissue (BAT) interscapular temperature and representative infrared thermal images under 23 °C (**A**) and 4 °C (**B**) conditions in WT and Oprk1^{-/-} animals subjected to ovariectomy. T-test or Mann-Whitney test were performed to compared WT and Oprk1^{-/-} groups.

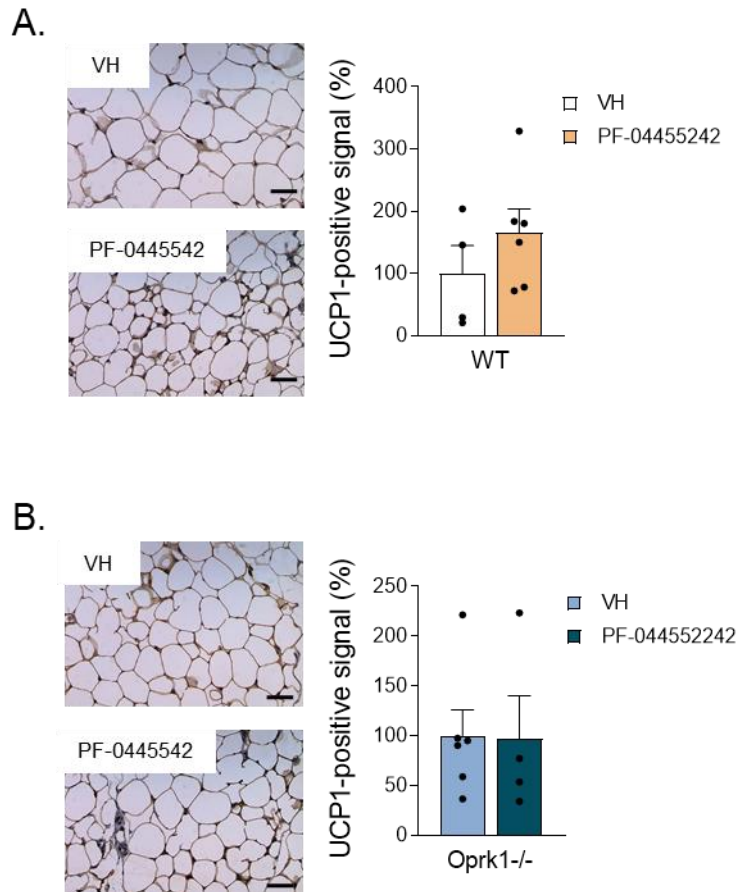
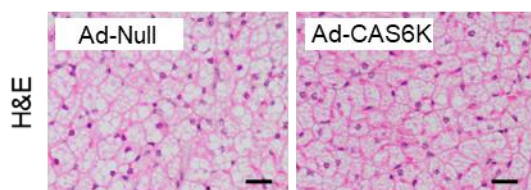
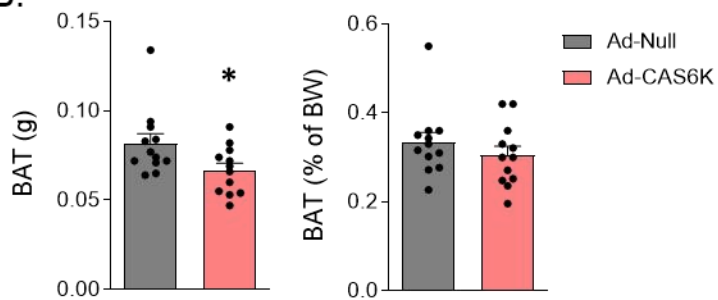


Figure S2. Effect of the central *k*-OR blockade on gonadal WAT browning. UCP1 (uncoupling protein 1) immunohistochemistry in gWAT (gonadal white adipose tissue) in both WT (**A**) and Oprk1^{-/-} mice (**B**) after antagonizing *k*-OR with PF-0445542. Scale bar: 20μm. Values are expressed as mean ± SEM (n=5-6 *per* group). T-test or Mann-Whitney test were performed for comparisons between the two groups: vehicle (VH) *vs* PF-0445542.

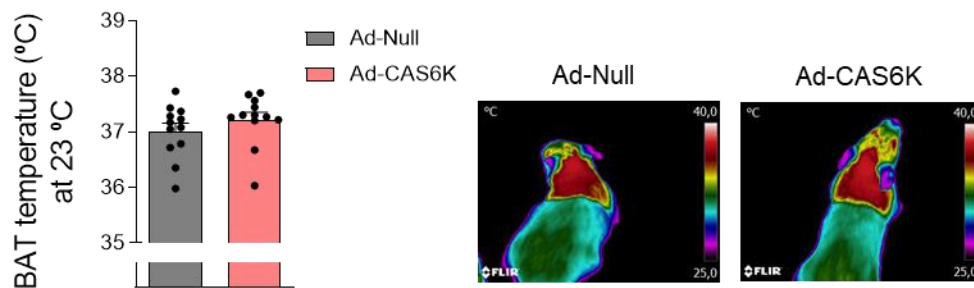
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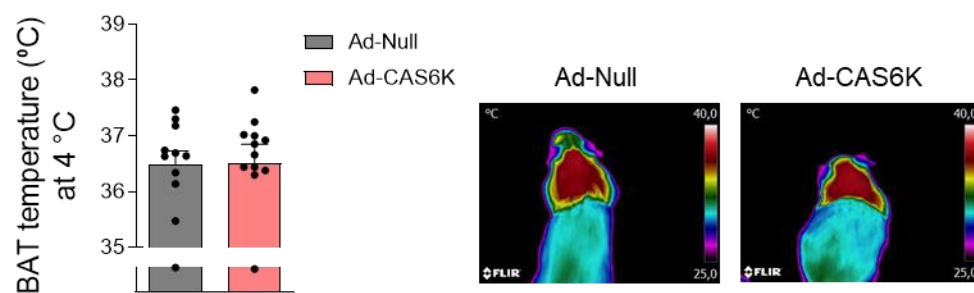
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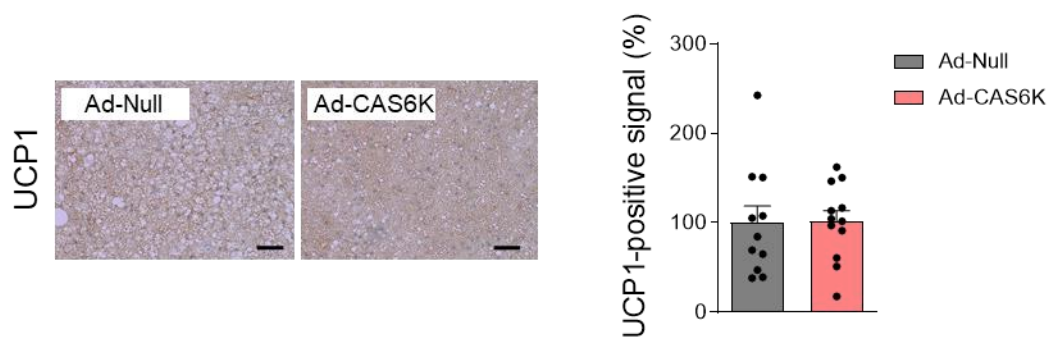
C.



D.



E.



F.

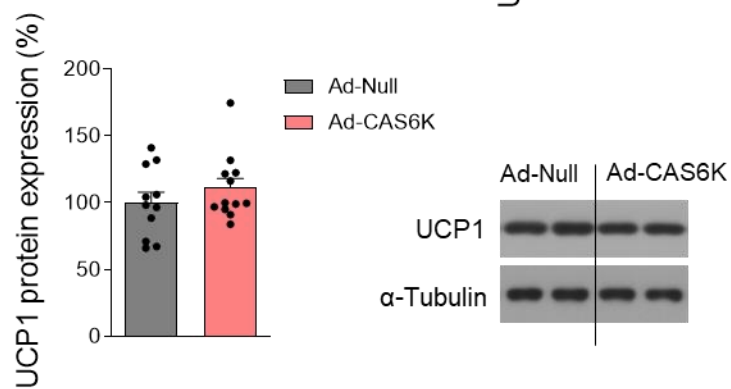


Figure S3. Effects on BAT (brown adipose tissue) thermogenesis after MBH (medio-basal hypothalamus) activation of p70S6K in OVX (ovariectomized) mice. (A) Hematoxylin-eosin staining of BAT. Scale bar: 20 μ m. (B) BAT weight expressed in grams or as percentage of BW. (C–D). Representative infrared thermal images and quantification of BAT interscapular temperature (BAT) under basal (C) and cold conditions (D). (E-F) UCP1 protein levels in BAT determined by (E) immunohistochemistry (scale bar: 50 μ m) and (F) western blotting. Representative blots are shown. Black line indicates cropped images. Values are expressed as mean \pm SEM (n = 12 per group). T-test or Mann-Whitney analyses were used to evaluate statistical differences between Null and CAS6K mice.