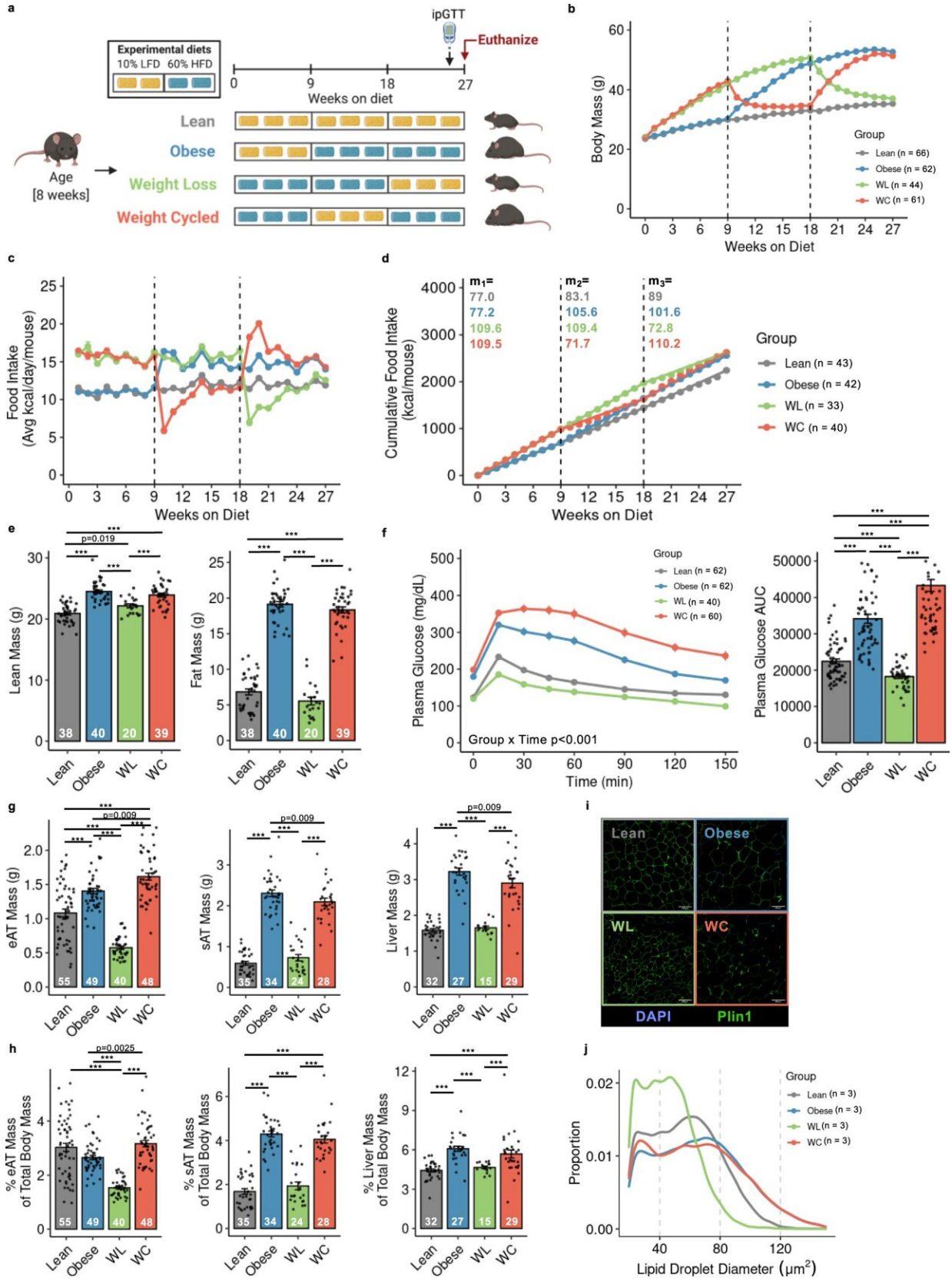
Weight cycling increases diabetes risk

July 20 2022, by Emily Overway


a
ipGTT
Euthanize
Experimental diets
10% LFD 60% HFD
0 9 18 27
Weeks on diet
Lean
Obese
Weight Loss
Weight Cycled
Age
[8 weeks]
b
Body Mass (g)
Weeks on Diet
Group
Lean (n = 66)
Obese (n = 62)
WL (n = 44)
WC (n = 61)
c
Food Intake
(Avg kcal/day/mouse)
Weeks on Diet
d
Cumulative Food Intake
(kcal/mouse)
m1= 77.0 77.2 109.6 109.5
m2= 83.1 105.6 109.4 71.7
m3= 89 101.6 72.8 110.2
Weeks on Diet
Group
Lean (n = 43)
Obese (n = 42)
WL (n = 33)
WC (n = 40)
e
Lean Mass (g)
Fat Mass (g)
p=0.019
Lean Obese WL WC
f
Plasma Glucose (mg/dL)
Group
Lean (n = 62)
Obese (n = 62)
WL (n = 40)
WC (n = 60)
Group x Time p<0.001
Time (min)
Plasma Glucose AUC
g
eAT Mass (g)
sAT Mass (g)
Liver Mass (g)
p=0.009
i
Lean
Obese
WL
WC
DAPI
Plin1
h
% eAT Mass of Total Body Mass
% sAT Mass of Total Body Mass
% Liver Mass of Total Body Mass
p=0.0025
j
Proportion
Group
Lean (n = 3)
Obese (n = 3)
WL (n = 3)
WC (n = 3)
Lipid Droplet Diameter (μm²)

Mouse models of lean, obese, weight loss (WL), and weight cycling (WC). a Schematic of dietary approaches to generate WL and WC mice using 10% low fat diet (LFD) and 60% high fat diet (HFD). b Body mass over time measured weekly with diet switch indicated by dashed lines. c Food intake over time measured weekly. d Cumulative food intake measured throughout the duration of the studies with slope (m) for each 9-week segment indicated. e Lean and fat mass measured by nuclear magnetic resonance. f Blood glucose during an intraperitoneal glucose tolerance test (ipGTT) dosed at 1.5 g dextrose/kg lean mass one week prior to the end of the study and area under the curve (AUC) for ipGTT. g Tissue mass for epididymal adipose tissue (eAT), subcutaneous adipose tissue (sAT), and liver and h tissue mass as percentage of body mass at sacrifice. i Representative imaging of Perilipin-1 (Plin1) and 4′,6-diamidino-2-phenylindole (DAPI) immunofluorescence for lipid droplet size. (j) Distribution of lipid droplet size. For diet groups, gray = lean, blue = obese, green = WL, orange = WC. Pairwise two-tailed Student's t-tests with Bonferroni correction for multiple comparisons were used to compare groups for body composition, tissue mass, and ipGTT AUC and two-way ANOVA was used to compare groups for ipGTT; significant p values shown or ***p_{adj}