The role of preptin in the response of bone tissue to a high-fat diet

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Background

Preptin is derived from pro-IGF II and is a 34-amino acid peptide hormone co-secreted from the pancreas alongside insulin.

Exogenous preptin has demonstrated anabolic effects on bone and improves insulin secretion.

Patients with type 2 diabetes mellitus (T2DM) have a higher fracture incidence and increased concentration of circulating preptin.

The physiological function of preptin has not been established.

Hypothesis

Preptin-deficient mice fed with high-fat diet to induce metabolic dysfunction will have poorer bone health compared to wild-type

Methods

Table 1. Dietary information

Calculated Nutritional Parameters		
	Chow Diet	High-Fat Diet
% Total digestible energy from lipids	14.0%	46.0%
% Total digestible energy from protein	20.7%	20.0%
% Total digestible energy from carbohydrate	65.3%	34.0%

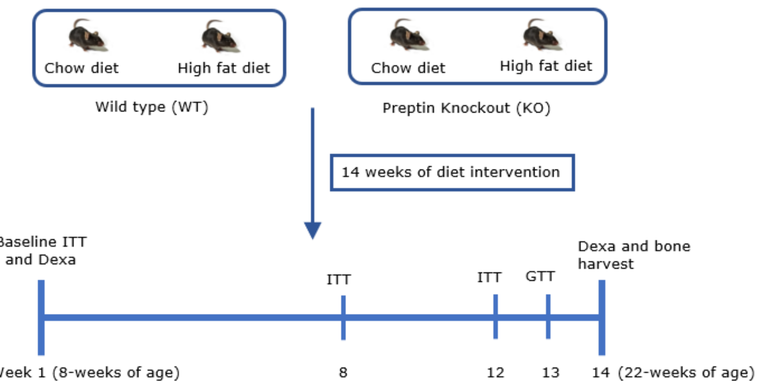

Figure 1. Experimental design

DEXA- Dual-energy x-ray absorptiometry
ITT- Intraperitoneal Insulin tolerance test
GTT- Oral Glucose tolerance test

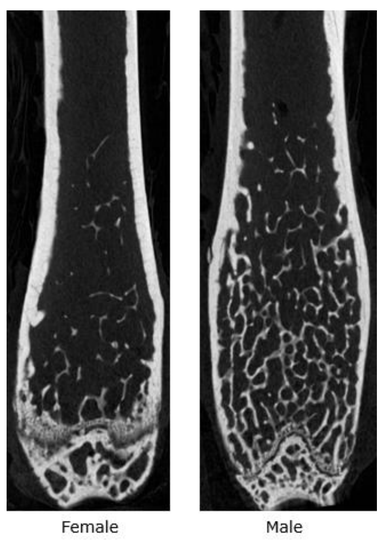

Figure 2. Micro-CT imaging of mice femurs scanned using Bruker Skyscan 1172 at 7μm resolution

Results

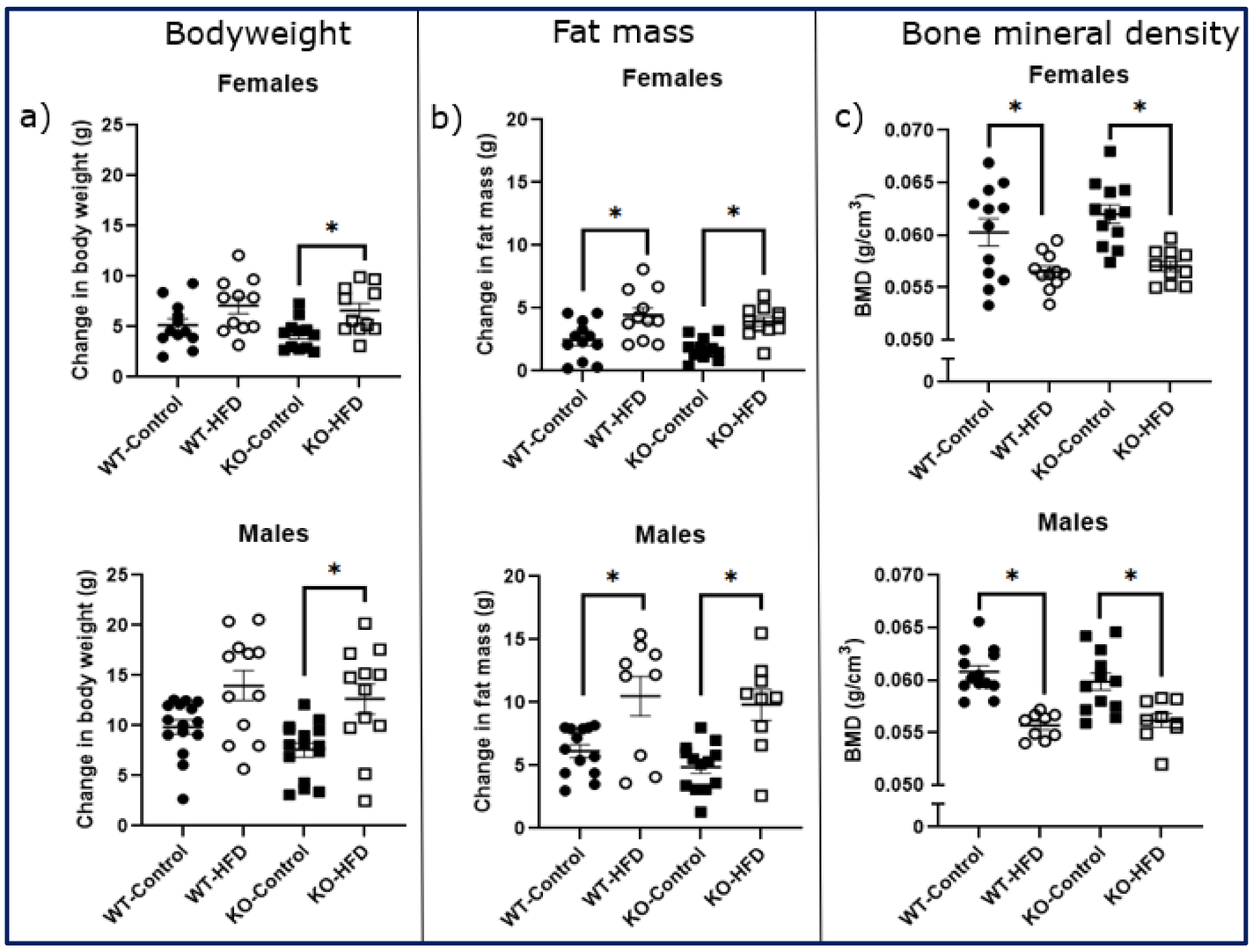

Figure 3. HFD increased bodyweight and fat mass in both sexes and genotypes. Bone mineral density was decreased following HFD. Preptin deficiency had minimal effects on weight and fat gain in response to HFD.

Trabecular bone parameters

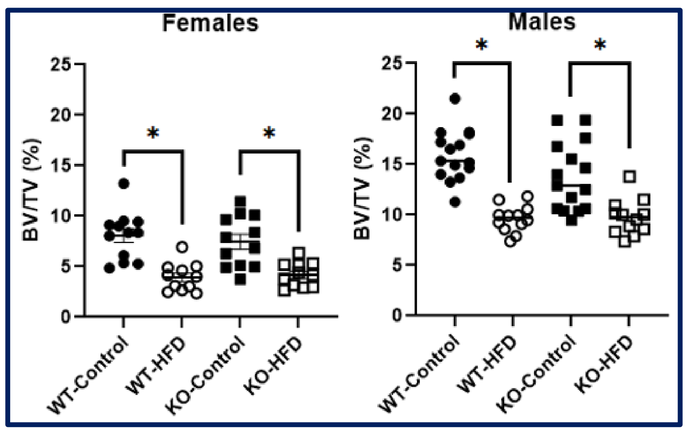

Figure 4. Bone volume fraction was decreased for both genotypes after 14-weeks of HFD

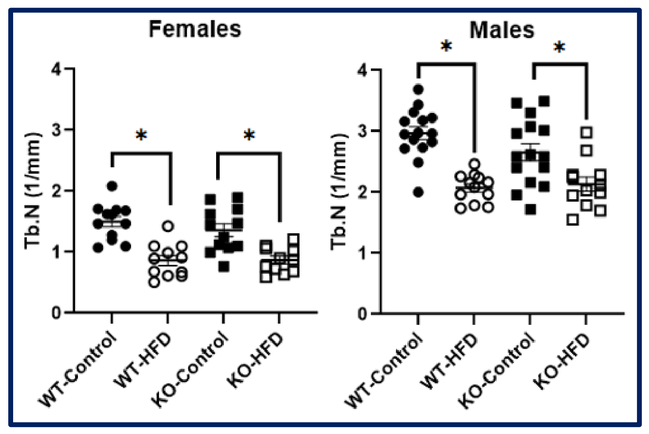

Figure 5. Trabecular number in both genotypes and sexes was decreased after 14-weeks of HFD

Cortical bone parameters

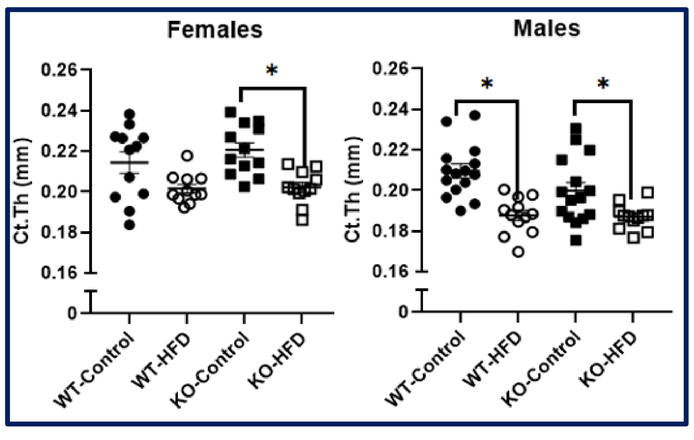

Figure 6. Decrease in cortical thickness in KO of both sexes and WT males after 14-weeks of HFD

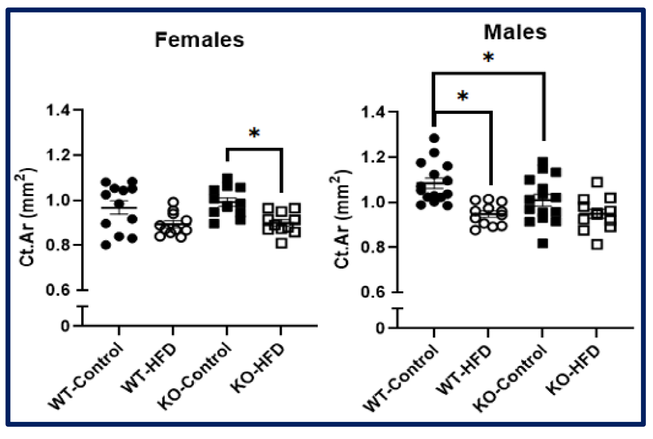

Figure 7. Cortical bone area of females KO and males WT had significant decrease after 14-weeks of diet intervention. Preptin KO in males had lower cortical bone area than WT.

Conclusions

A high fat diet resulted in increased fat mass and decreased trabecular and cortical bone in both female and male mice.

Preptin deficiency did not clearly change the response of bone tissue to a high fat diet.

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