

RESVERATROL INTAKE DURING PREGNANCY AND LACTATION MODULATES THE LONG-TERM EFFECTS OF MATERNAL NUTRITION ON OFFSPRING

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The authors have nothing to declare

BACKGROUND

- ▶ Poor maternal nutrition during pregnancy and lactation can have detrimental long-term consequences on the energy homeostasis of the offspring.
- ▶ Males and females are known to respond differently to nutritional and metabolic signals during development.
- ▶ Resveratrol exerts antioxidant and anti-obesity actions; however, whether resveratrol can improve the impact of poor maternal nutrition on offspring metabolism remains largely unknown.

AIMS

- 1) To determine if resveratrol intake during pregnancy and lactation modulates the long term effects of maternal nutrition on the metabolism of their offspring.
- 2) To analyze whether the effects of resveratrol are diet and sex dependent.

HYPOTHESIS

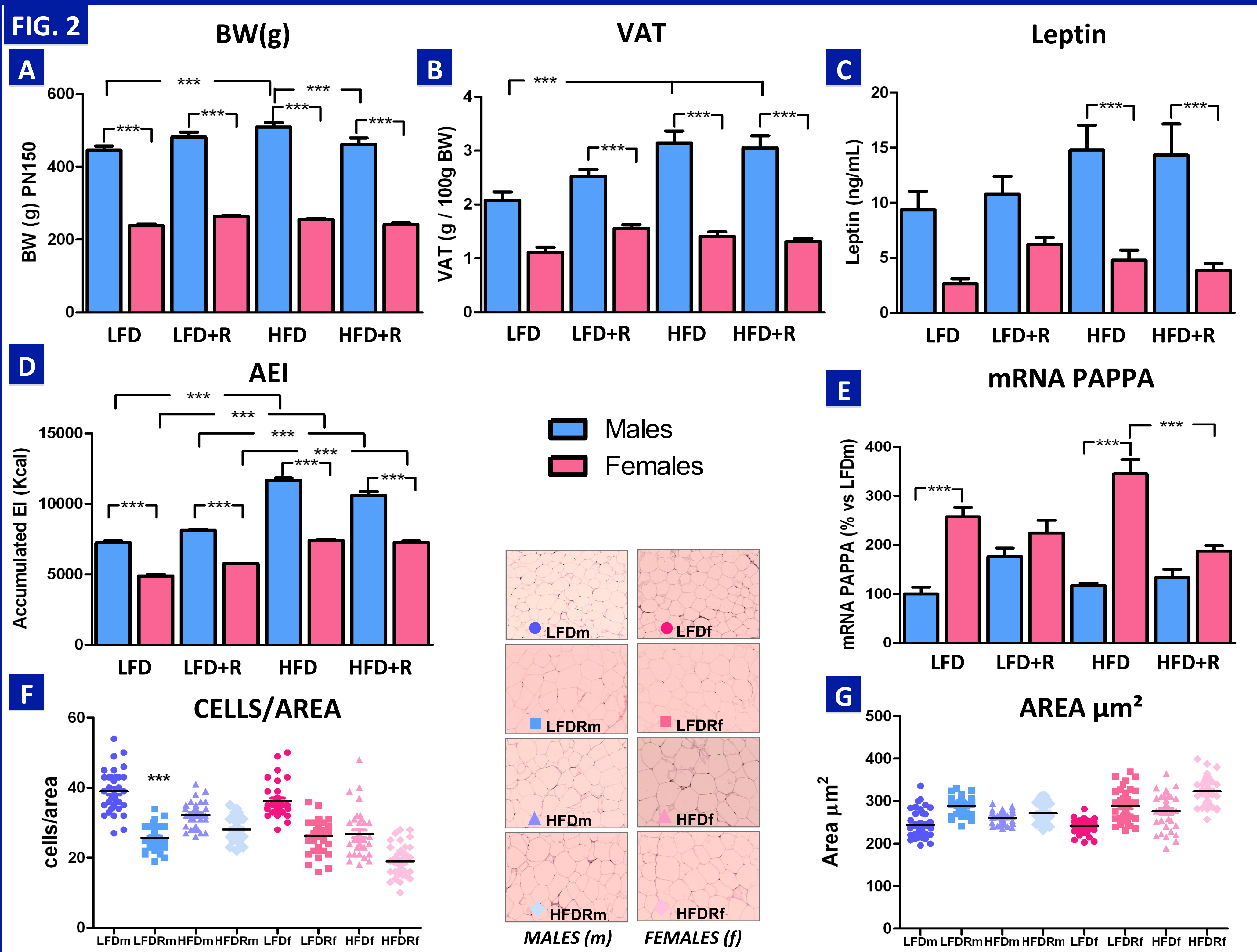
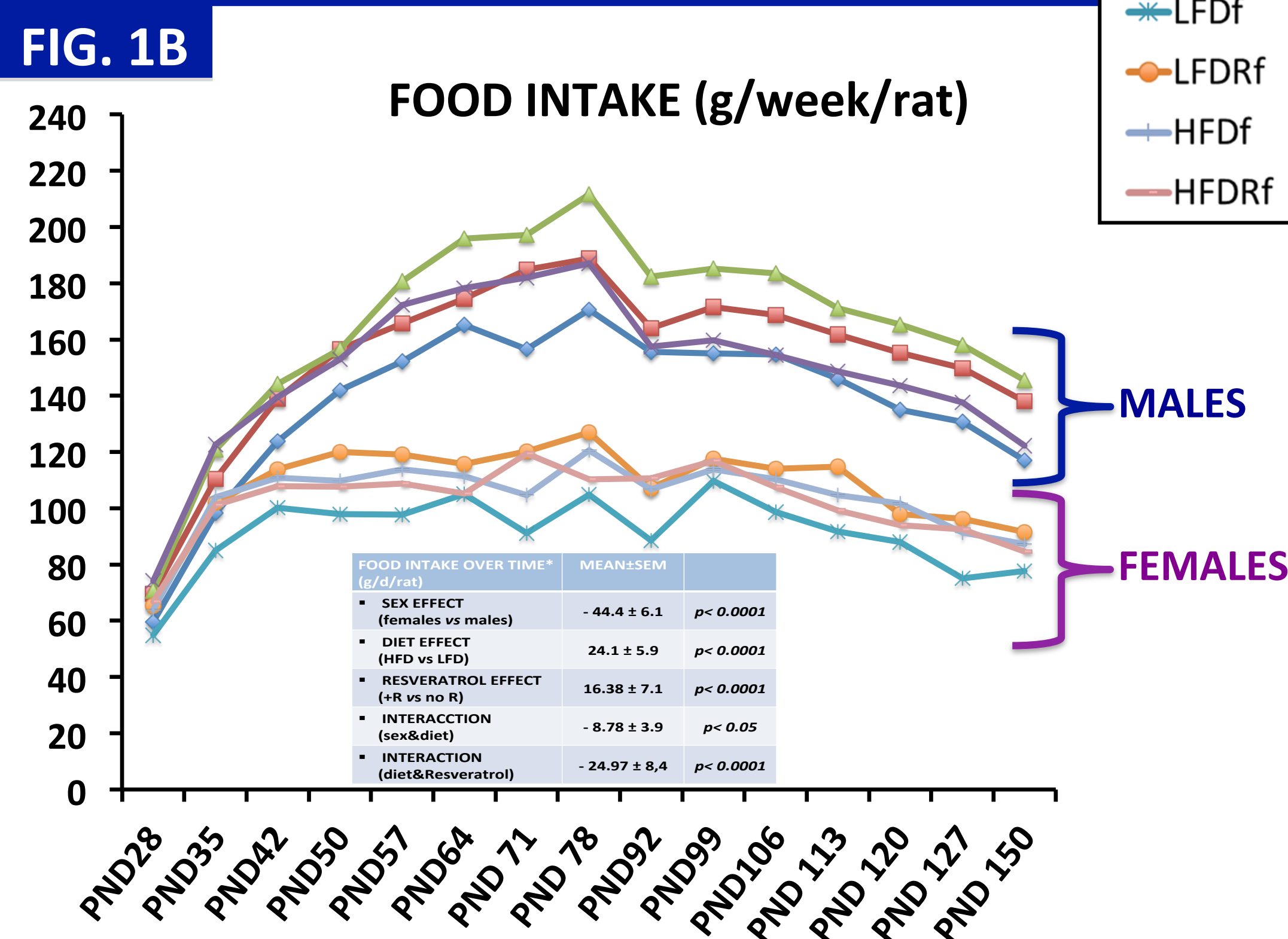
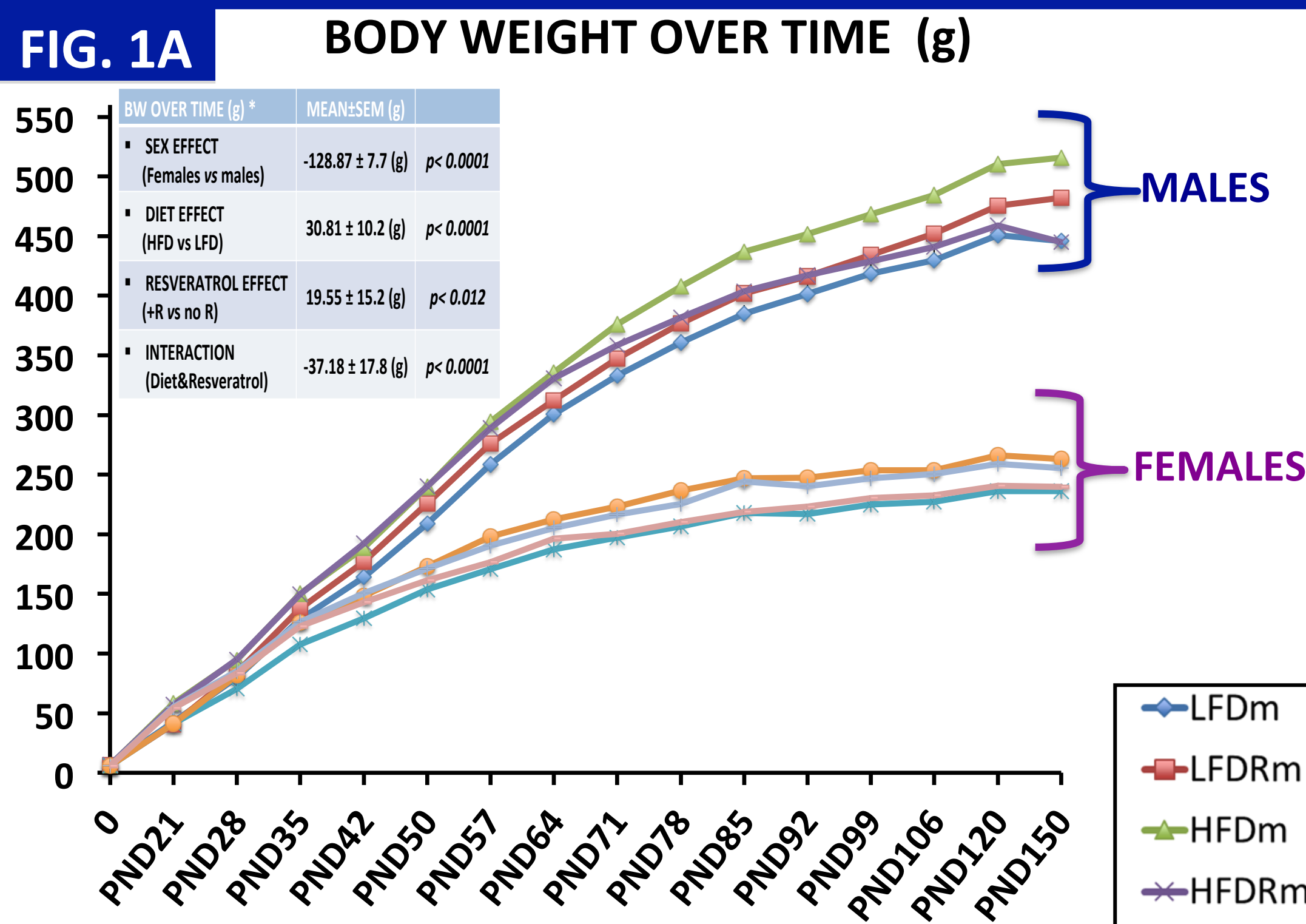
- ▶ We hypothesized that resveratrol would protect the offspring against the harmful effects of maternal high fat diet.

METHODS

- ▶ Pregnant Wistar rats were randomly assigned to a low-fat diet (LFD: 3.8 Kcal/g, 10.2% from fat) or a high fat diet (HFD: 5.1 Kcal/g, 61.6% from fat). Half of each group also received resveratrol (+R) in their drinking water (50 mg/L) during pregnancy and lactation (2.0-2.5 mg/Kg/day).
- ▶ At birth, pups from mothers of the same treatment group were arranged into litters of 8 pups (4 males and 4 females). Offspring were weaned onto standard chow on postnatal day (PND) 21. Body weight (BW), food (FI), energy intake (EI; Kcal) and accumulated EI (AEI) were measured weekly until PND 150 when the rats were killed.
- ▶ At sacrifice, fat pads were weighed. Serum leptin and insulin levels were measured by ELISA. Relative mRNA levels in VAT were determined by qPCR. Histomorphometric analysis from H&E-stained histological sections was conducted using image processing software (Adiposoft-ImageJ).

RESULTS

- ▶ Maternal R modulated BW and FI over time in a sex and diet dependent manner, increasing the BW in pups from LFD mother and decreasing it in those from HFD dams. R increased FI in offspring from LFD mothers (Figs. 1 A & B).
- ▶ On PND150, males offspring from HFD mothers weighed more and had more VAT than those from LFD. Maternal resveratrol (R) decreased the BW of males from HFD mothers and tended to increase it in offspring from LFD dams, such that BW of males from LFDR dams were similar to that of males from HFD mothers (Figs. 2A & B). Offspring from HFD dams had higher AEI than those from LFD dams; with maternal R tending to decrease it in males from HFD dams and increase it in pups from LFD mothers (Fig. 2D). Serum leptin levels paralleled the changes in BW with the effects of R not reaching statistical significance (Fig. 2C), although it tended to increase leptin levels in female offspring from LFD dams and to decrease it in offspring from HFD mothers. Pregnancy associated plasma protein A (PAPP-A) expression in VAT, involved in adipose metabolism, was higher in females than in males with R decreasing its expression in females from HFD dams and increasing it in males from LFD (2E). Histomorphometric analysis showed that R decreased the number of adipocytes/area in the offspring from LFD mothers, reaching statistical significance only in males (Figs. 2 F & G).



CONCLUSION

The effect of resveratrol during pregnancy and lactation on long-term metabolism in the offspring depends on the type of diet ingested by the mother and the offspring's sex.

