

Effect of dietary control on pubertal onset and immunoreactivity of Kisspeptin and Neurokinin B in female offspring rats fed high fat diet during perinatal period

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OBJECTIVES

Background: Nutrition is an important factor to regulate reproductive function. Some studies showed that high fat diet (HFD) may influence to puberty onset and irregular estrous cycles in the female rats. However, underlying regulation mechanism of nutrition on pubertal maturation and reproductive function is not well-known. Kisspeptin and neurokinin B (NKB) are an essential factor for regulation of pubertal development.

Objective: This study aimed to evaluate the pubertal development, the immunoreactivity (IR) of Kisspeptin/kiss1r and NKB/neurokinin 3r in female offspring rats fed HFD during perinatal period, and the IR of Kisspeptin/kiss1r and NKB/neurokinin 3r after change to normal diet (ND) in female offspring fed a HFD.

METHODS

1. Animal and diet

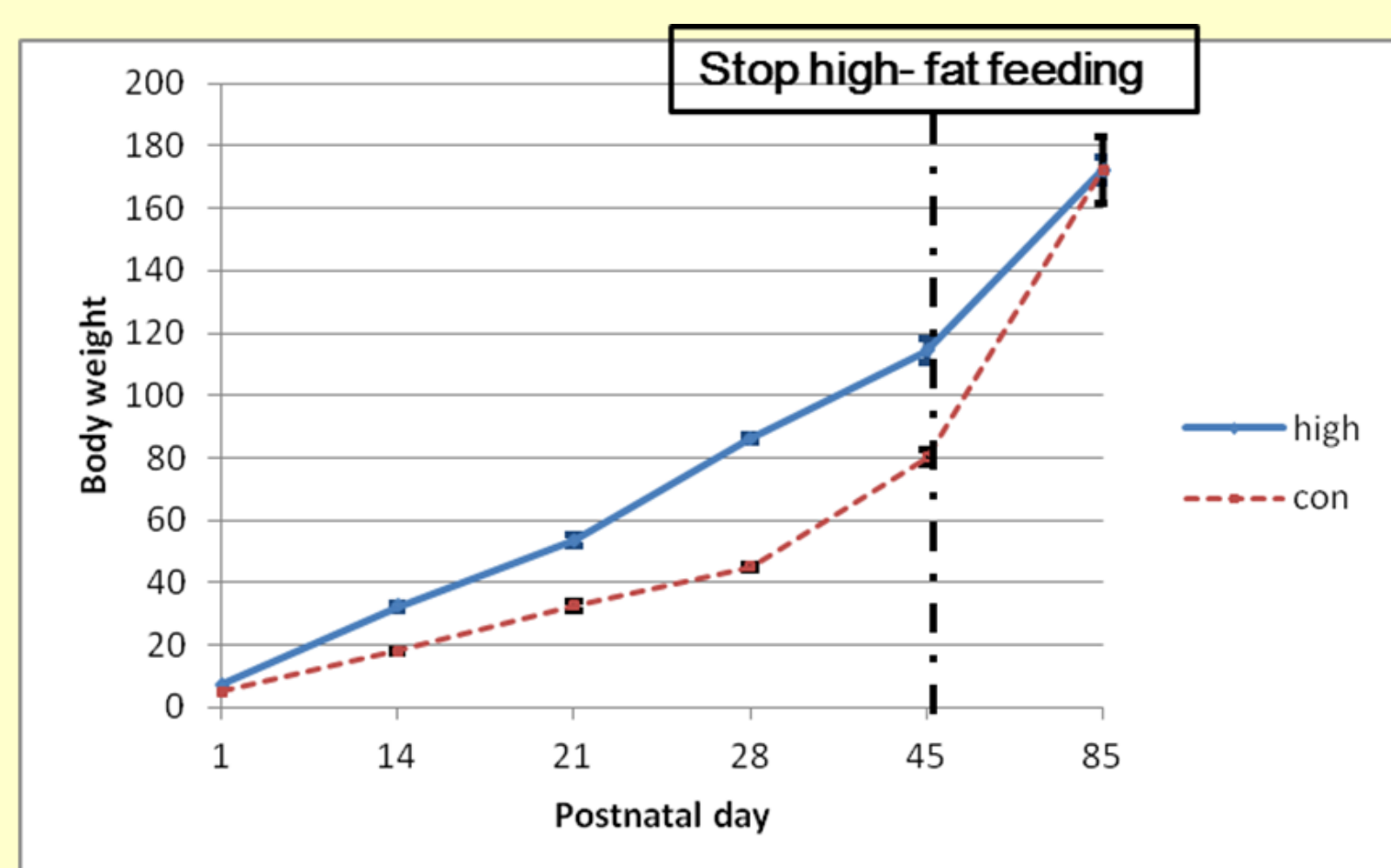
After mating, pregnant Sprague Dawley rats were divided into two groups. One group rats (n=11) were fed the normal diet until parturition. The other group rats (n=22) were fed the high-fat diet containing 60% energy until parturition. Pup born from high-fat diet rats were exposed to high-fat diet until postnatal 45 days. From postnatal 45 days, the offspring, which had been exposed to high-fat diet, were fed normal diet to postnatal 85 days.

2. Puberty onset was assessed by vaginal opening (VO). From postnatal 25 days, VO was observed daily.

3. Immunohistochemistry of offspring brain was performed with Kisspeptin /kiss1r and NKB/neurokinin 3r antibody at P45 and P85.

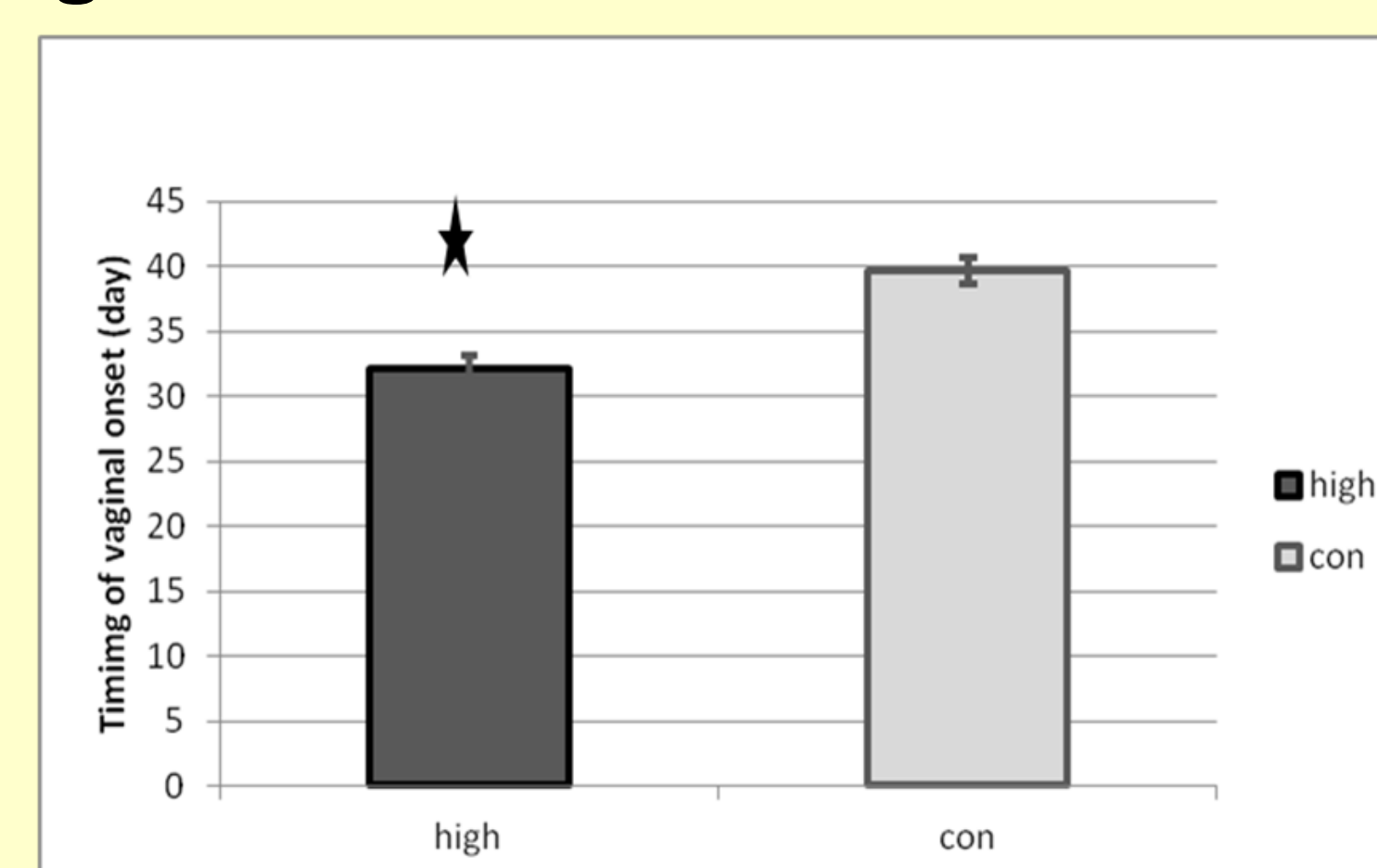
RESULTS

Fig. 1.



- On postnatal 45 days, the mean body weight of high-fat diet rats (114.36 ± 17.27 g) significantly increased compared to that of normal diet rats (80.20 ± 7.53 g) ($p < 0.05$).
- On postnatal 85 days, the mean body weight of rats which stopped high-fat diet was similar with that of normal diet rats.

Fig. 2.



- The age of VO in high-fat diet rats was 32.09 ± 5.25 days (mean \pm SEM), which was earlier than the age of VO in normal diet rats (39.70 ± 3.09) ($p < 0.05$).

At 45 days

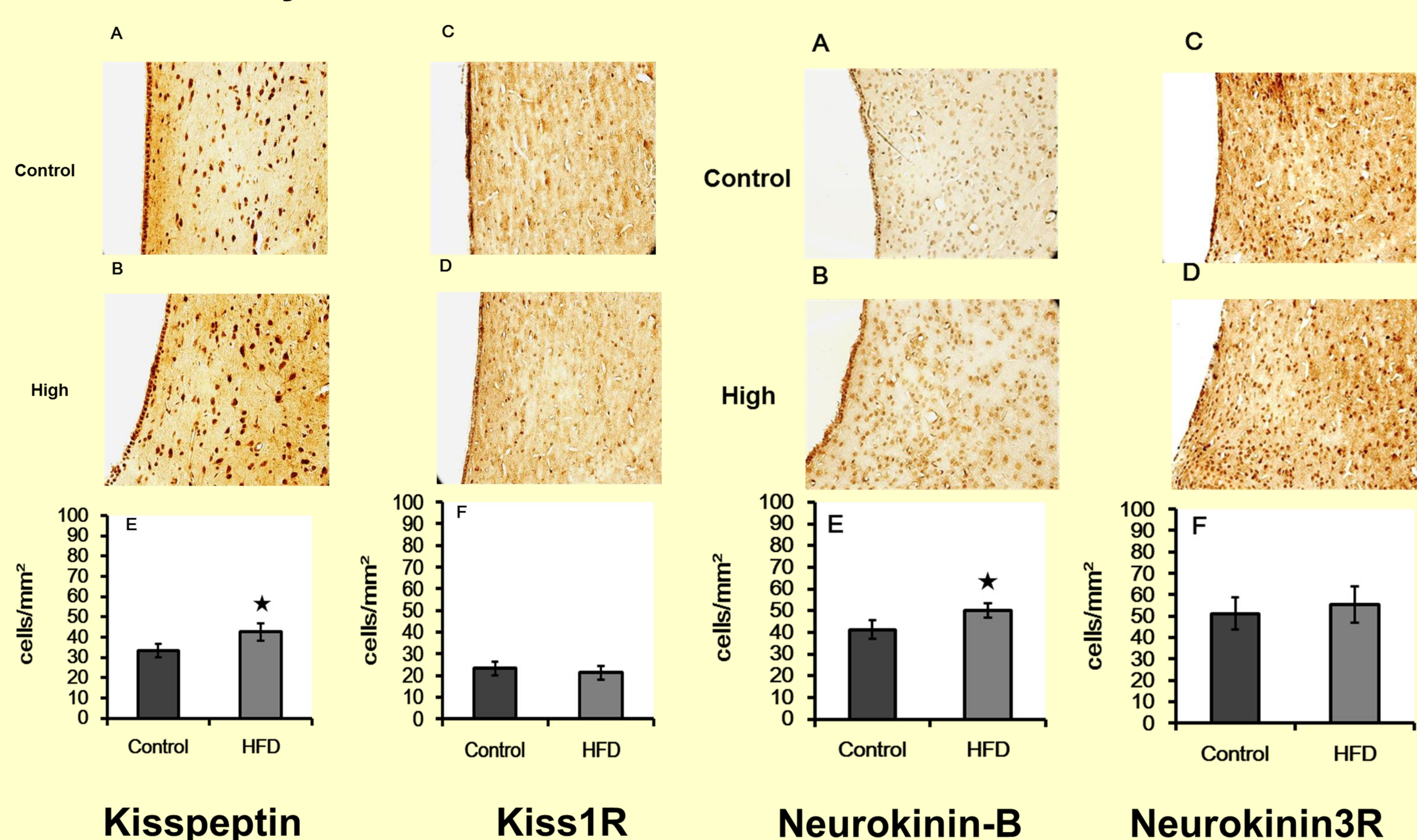


Fig. 3. On postnatal 45 days, the density of kisspeptin and neurokinin B-immunoreactivity cells in hypothalamic arcuate nucleus of high-fat diet rats was different from the normal diet rats ($p < 0.05$). The density of kiss1r and neurokinin3r (NK3R)-immunoreactivity cells in hypothalamic arcuate nucleus of high-fat diet rats was not different from the normal diet rats.

At 85 days

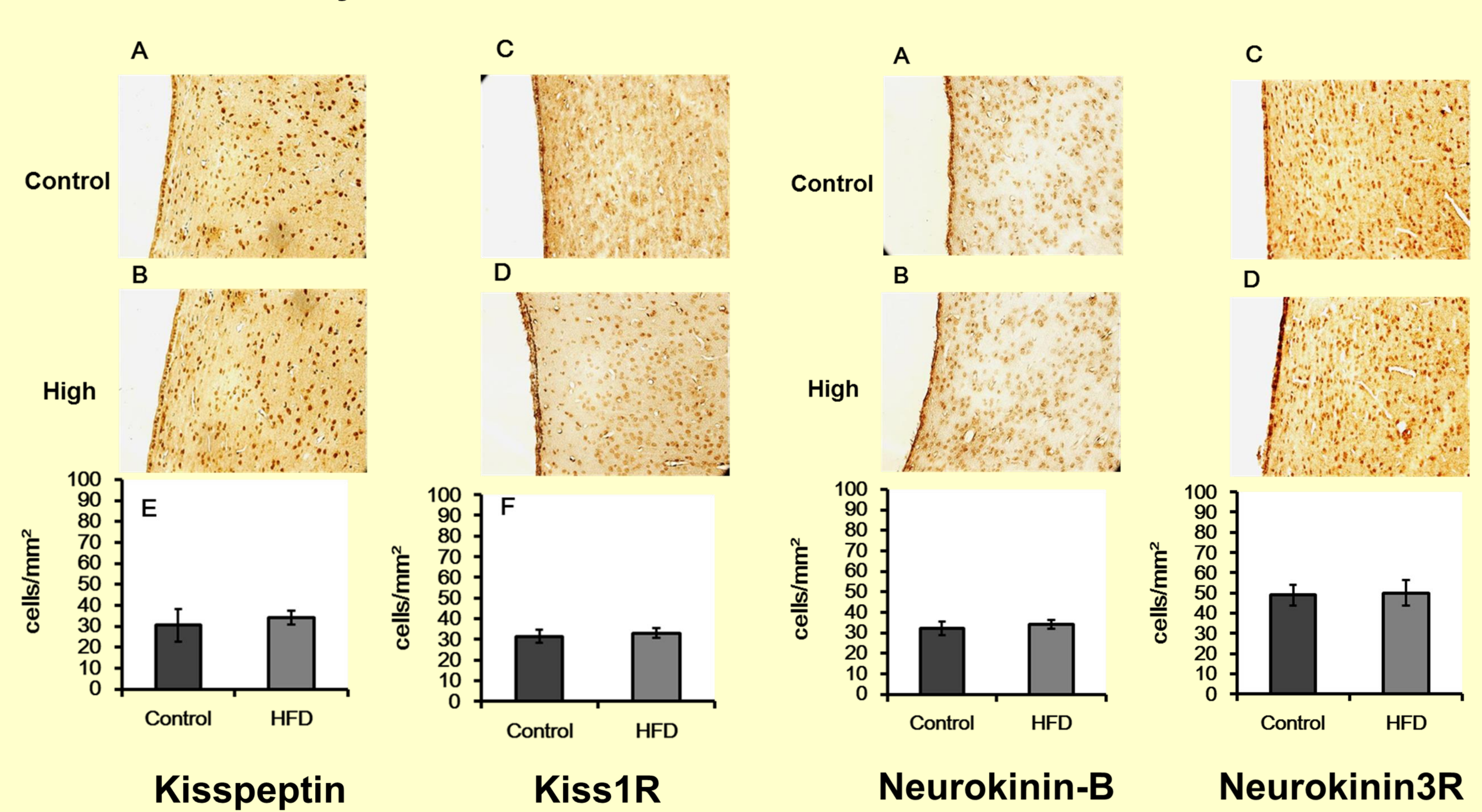


Fig. 4. On postnatal 85 days, the density of kisspeptin/kiss1r and neurokinin B/NK3R-immunoreactivity cells in hypothalamic arcuate nucleus of high-fat diet rats was not different from the normal diet rats.

CONCLUSIONS

These data suggest that HFD during the perinatal period has altered pubertal onset, and IR of Kisspeptin and NKB in female offspring rats. These effects may be reversible by dietary control.

References

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