Increasing vitamin A in post-weaning diets reduces food intake and body weight and modifies gene expression in brains of male rats born to dams fed a high multivitamin diet.


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OBJECTIVE: High multivitamin gestational diets (HV, 10-fold AIN-93G levels) increase body weight (BW) and food intake (FI) in rat offspring weaned to a recommended multivitamin (RV), but not to a HV diet. We hypothesized that high vitamin A (HA) alone, similar to HV, in post-weaning diets would prevent these effects of the HV maternal diet consistent with gene expression in FI and reward pathways.

METHODS: Male offspring from dams fed HV diets were weaned to a high vitamin A (HA, 10-fold AIN-93G levels), HV or RV diet for 29 weeks. BW, FI, expression of genes involved in regulation of FI and reward and global and gene-specific DNA methylation of pro-opiomelanocortin (POMC) in the hypothalamus were measured.

RESULTS: Both HV and HA diets slowed post-weaning weight gain and modified gene expression in offspring compared to offspring fed an RV post-weaning diet. Hypothalamic POMC expression in HA offspring was not different from either HV or RV, and dopamine receptor 1 was 30% (P<.05) higher in HA vs. HV, but not different from RV group. Hippocampal expression of serotonin receptor 1A (40%, P<.01), dopamine receptor 2 (40%, P<.05) and dopamine receptor 5 (70%, P<.0001) was greater in HA vs. RV fed pups and is 40% (P<.01), 50% (P<.05) and 40% (P<.0001) in HA vs. HV pups, respectively. POMC DNA methylation was lower in HA vs. RV offspring (P<.05).

CONCLUSION: We conclude that high vitamin A in post-weaning diets reduces post-weaning weight gain and FI and modifies gene expression in FI and reward pathways.

PMID: 24993918