Effect of Long-term Dietary Vitamin D3 Supplementation on Cognition in Aging Male and Female F344 Rats

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Abstracts will be considered for both poster and platform presentations

Cognitive/Behavioral disorders

Previously, we reported mid-aged F344 male rats on an enhanced, long-term vitamin D supplemental diet (cholecalciferol, VitD3: 10,000 IU/kg chow) showed improved cognition and elevated hippocampal gene expression compared to rats on standard and low VitD3 diets (Latimer et al. 2014). Here, we compared the long-effect effects (6 months) of the enhanced VitD3 diet to the standard AIN-93 diet (1,000 IU VitD3/Kg) on cognition in mid-aged female and male F344 rats. Cognition was determined using the Morris water maze. Animals were trained for 3 days to find a submerged platform followed by a probe trial. Then, animals were trained for 1 day to find a new platform location (spatial reversal) followed by a reversal probe.
There was no difference in pathlength and latency to the platform according to sex or treatment (2-way ANOVA) on training days 1 and 2. On training day 3 pathlength was significantly less in females (18%) and latency increased in VitD3 treated animals (19%). The probe test showed that enhanced VitD3 treatment significantly reduced ($P = 0.01$; ~70%) pathlength and latency to the platform in females but not males. Next, the one day of reversal training indicated no effect of sex or diet. The reversal probe, conducted three days later, indicated that VitD3 treatment significantly reduced pathlength and latency ($P<0.05$; ~60%) in males but not females.
These results strengthen the hypothesis that optimal blood levels of vitamin D are important for healthy brain aging. Furthermore, vitamin D may affect cognitive pathways in a sex specific manner.