Effects of Ethanol-Gasoline Blended Fuels on Learning and Memory.

TE Beasley, WM Oshiro, VC Moser, ME Gilbert, KL McDaniel, PA Evansky, and PJ Bushnell. Toxicity Assessment Division, National Health Effects and Environmental Research Laboratory, Office of Research and Development, US EPA, Research Triangle Park, NC, USA.

The potential toxicity of ethanol-gasoline blended fuels to the developing nervous system is of concern. We previously reported an absence of effect on learning and memory as seen in a trace fear conditioning task and water maze task in offspring of dams exposed prenatally to the vapors of ethanol. However, a high number of anticipatory responses were noted in male offspring that completed a choice reaction time task (CRT). In order to further explore this apparent impairment of response inhibition, we evaluated effects of vapors from a blend of 15% ethanol /gasoline (E15) and 85% ethanol/gasoline using a Differential Reinforcement of Low-rate Response task (DRL). We also evaluated the effects of E15 and E85 on the trace fear conditioning task and water maze task. Pregnant Long-Evans rats were exposed to 0, 3000, 6000, or 9000 ppm E15 or E85 vapors for 6.5 h/day from GD9 to GD20. Male and female offspring (n=10/sex/group/vapor) were trained on the Morris water maze starting on postnatal day (PND) 76. Overall, acquisition of the task and working memory were not affected by E15 or E85. A second set of male and female offspring (n=16/sex/group/vapor) was assessed using a fear conditioning task. There were no differences among dose groups in either cue or context learning. Finally, a third group of male and female offspring (n=8/sex/group/vapor) was assessed using a DRL task. Overall, the results identified no significant dose-related impairments after exposure to E15 or E85, although there was a tendency for inhibitory control impairment in the 9000 E15 male offspring. These results suggest prenatal exposure to ethanol-gasoline blended fuels produce few if any effects on learning and memory. This abstract does not reflect EPA policy.