Abstract

The motivation to consume alcohol is complex; however, physical dependence has long been implicated in alcohol reinforcement and alcoholism. The research presented here was conducted to examine the role of alcohol dependence in voluntary alcohol consumption and preference, the validity of the Lieber-DeCarli (LD) liquid diet as a procedure to induce dependence, and the effect of alcohol administration on dopamine and endocannabinoids. While the LD diet has been used extensively to induce alcohol toxicity and teratogenic effects, there has not been research that has examined its use in the development of dependence and alcohol reinforcement. This research utilized varying periods of chronic alcohol administration in three cohorts of C57 mice followed by two-bottle choice procedures to examine the role of dependence in alcohol consumption. Chronic oral intake of the alcohol containing LD diet produced moderate symptoms of physical dependence and increased motivation to consume alcohol. In all three cohorts, there were indications of greater alcohol intake or preference in mice that consumed the alcohol diet compared to the control diet. These differences were greatest in the cohort receiving chronic alcohol for 30 days in comparison to 21 and 52 days. Following behavioral data collection, analyses were performed to explore the role of dopamine and endocannabinoid brain systems in dependent mice. While significant differences were not found in the endocannabinoids, AEA or 2AG, there was a trend toward significance with experimental animals exhibiting lower levels of dopamine. These data indicate the value of chronically administering alcohol orally via a liquid diet. Utilizing equicaloric alcohol and non-alcohol LD diets permitted nutritional maintenance and caloric control while evaluating the effects chronic alcohol administration. Overall, animals in the experimental groups preferred alcohol to water on more occasions than the control animals. These findings confirm the role of dependence in
motivating alcohol drinking and the validity of LD diet as a model for inducing alcohol dependence. Application of these methods will enhance our understanding of the role of dependence in alcohol drinking and in the development of novel treatments for alcohol use disorder.