SPECIAL ISSUE: GENDER & ALCOHOL

Introduction to the Special Issue of Alcohol and Alcoholism on Sex/Gender Differences in Responses to Alcohol

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This special issue provides new findings highlighting the influence of sex/gender on responses to alcohol, including both short- and long-term consequences across the lifespan.

The Office of Research on Women's Health was established nearly 20 years ago within the Office of the Director, National Institutes of Health, to improve awareness of the need to represent women in NIH-sponsored research. 'ORWH works in partnership with the NIH institutes and centers to ensure that women's health research is part of the scientific framework at NIH and throughout the scientific community' (ORWH site, NIH.gov). There remains a global need to be aware of how one’s sex or gender can impact health and disease. When bringing gender into the discussion, it is important to recognize that there are multiple perspectives—including societal and environmental contexts and influences versus innate biological contributions to what encompasses being a woman and female rather than a man and male.

We have long been aware of the differences between men and women in drinking patterns and risk for harm from excessive alcohol consumption. It was more than 30 years ago that Ashley and coworkers first reported the telescoping phenomenon—where alcoholic women present with more severe pathophysiological consequences in a shorter timeframe than men (Ashley et al., 1977). The recent SAMSHA survey results (2007) found that patterns of drinking and risk for alcohol abuse have remained relatively consistent over recent years: overall 10% more males than females aged 12 and older are drinkers, although this rate is equivalent (16%) from age 12–17. Younger females (aged 12–20) reported lower levels of binge and heavy drinking than males. This separation in drinking patterns by gender appears consistent across cultures (Wilsnack and Wilsnack, 2003). For many years, women in the United States have presented with approximately half the prevalence for alcohol abuse and alcoholism than men during adulthood, 7–10% versus 18–20%, respectively (10th Special Report to the Congress on Alcohol Health, 2000).

While it is clear that both environmental and biological factors contribute to these gender differences in drinking and its consequences, the precise roles and interplay between influences remain understudied. Clinical and preclinical studies have shown that stress impacts drinking and responses to alcohol differentially between males and female. There is evidence for differences in pharmacokinetics of alcohol absorption and distribution between males and females, as well as differences in the sensitivity of key brain neurotransmitter systems and interactions between ovarian steroids and alcohol in the brain.

The set of papers comprising this special edition on gender/sex differences in alcohol effects extend previous investigations to further emphasize that sex does matter when addressing problems with alcohol.

Findings presented in this special issue of Alcohol and Alcoholism demonstrate that sex differences in alcohol effects are highly diverse in nature, both behavioral and physiological. Effects are influenced, at least in part, by developmental age, and may be, independent of the acute hormonal milieu. Data collected by examination of sex differences in responses to alcohol employing rodent subjects provide the intriguing suggestion that males and females display different profiles of sensitivity to acute effects of alcohol such as sedation (Lallemand et al.) and aversion (Vetter-O’Hagen et al.) that are dependent upon developmental age. The authors discuss the relevance of these findings to drinking patterns in adolescence and adulthood. Further, Kelly et al. provide findings indicating that perinatal alcohol exposure in male and female rodents produces protracted sex differences in social recognition learning and recall. Hormonal status clearly influences many of the effects of acute and prolonged alcohol exposure, particularly with regard to sensory gating and alcohol withdrawal, as demonstrated by Reilly et al. Additionally, sex differences observed in many of neuroadaptive responses to prolonged alcohol exposure were shown to likely be independent of activation effects of reproductive hormones in female rodents (Reilly et al.) and may reflect hormone-independent, innate sex differences in neurotransmitter signaling in response to alcohol exposure (Butler et al.).

Data collected in the study of human subjects demonstrate the existence of consistent and significant sex differences in acute and protracted effects of alcohol use, including those that may impact alcohol craving during abstinence, brain injury and behavioral impairment. Fox et al. provide novel data demonstrating enhanced stress responses in newly abstinent female, as opposed to male, alcohol-dependent participants in a brief session of guided stress imagery. The implications of this sex differences for the risk of relapse to alcohol intake and treatment outcome are discussed. Findings from the animal literature suggesting the existence of sex differences in behavioral impairment under the influence of alcohol are confirmed in a series of elegant studies reported by Miller et al. In a...
sample of male and female adults with similar drinking habits, acute alcohol intoxication, yielding similar blood alcohol concentrations, produced significantly greater impairment of simulated driving and subjective effects of ‘feeling’ alcohol in females. Ridge et al. examined post-mortem brain tissue of healthy control subjects and alcohol-dependent men and women to demonstrate sex differences in the expression of NR1 subunits of N-methyl-D-aspartate receptors, particularly in the superior frontal cortex of alcohol-dependent persons with cirrhotic liver disease. Further, they demonstrate that μ-opiate and 5-HT1B receptor genotypes differently modulate NR subunit mRNA expression in alcohol-dependent male and female brain, cellular effects that will impact brain function and, therefore, behaviors.

These investigations on how gender/sex impacts responses to alcohol bridge between pre-clinical and clinical emphasis to improve our understanding of how gender, including both innate physiological processes as well as societal and environmental influences, modulates problem alcohol use and recovery. In summary, the data provided in these articles support the multifaceted nature of alcohol problems and show that sex/gender can interact with genetics, brain sexual dimorphism, the hormonal milieu, the environment and/or social influences to moderate outcomes. These new findings build on an increasing body of literature suggesting that optimal approaches to treatment of alcohol problems or alcoholism should consider gender.

We wish to thank all authors and reviewers who contributed to this Special Issue for their excellent work. We also want to thank the Editors in Chief, Philippe De Witte and Jonathan Chick for their support of our proposal for this Special Issue to help increase awareness about sex/gender and alcohol interactions.

REFERENCES


