**POSTER PRESENTATIONS**

**POSTER 1:** The Kappa Opioid Receptor Levels in Alcohol-Dependent Heavy Drinkers is Associated with Reductions in Drinking and Craving Following Naltrexone

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**Abstract.** Naltrexone is a non-selective opioid receptor antagonist approved for the treatment for alcohol use disorder (AUD) with modest efficacy. We used positron emission tomography (PET) to investigate the role of the kappa opioid receptor (KOR) in the therapeutic effect of naltrexone in alcohol dependent heavy drinkers. *Methods:* Non-treatment seeking heavy drinkers meeting criteria for AUD participated in two alcohol drinking paradigm (ADP) sessions; one before and one after a week of 100 mg/day naltrexone. Subjects also underwent a [11C]-LY2795050 PET scan to measure KOR availability in the amygdala, hippocampus, pallidum, striatum, cingulate, and prefrontal cortex on a separate day prior to starting naltrexone. The primary behavioral outcomes were reduction in number of consumed drinks during ADP1 and ADP2 (drinks), and craving during each ADP quantified via the Alcohol Urge Questionnaire (AUQ) and Yale Craving Scale (YCS). The primary imaging outcome was volume of distribution of [11C]-LY279505 (VT) – a measure of available KOR. Associations between VT were assessed with mixed models for craving and with Lasso regression for drinks. In addition, voxel-wise analysis of the PET data was performed with either craving or drinks as a covariate. *Data:* Forty-eight participants (16F) drinking 47 ± 16 drinks per week per TLFB at intake participated. *Results:* During the second ADP participants consumed fewer drinks (-3.7 ± 4, p < 0.0001) and experienced less craving (YCS: -11 ± 1, p < 0.0001; AUQ: -6 ± 0.6, p < 0.0001). Higher VT in the striatum (p = 0.005), cingulate (p = 0.023) and prefrontal cortex (p = 0.018) was associated with smaller drinks. YCS scores were positively associated with VT in all evaluated brain regions (all p < 0.01). AUQ scores were also positively associated with VT in the hippocampus (p = 0.0007), cingulate (p = 0.007), and prefrontal cortex (p = 0.048). Voxel-wise analysis identified clusters in the bilateral insula, prefrontal, and cingulate cortex associated with drinks (p < 0.0001). *Conclusion:* Higher KOR levels appear to be associated with greater craving during an ADP and less reduction in drinking following a week of treatment with naltrexone.

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**POSTER 2:** Occupancy of the Kappa Opioid Receptor Predicts Reduction in Drinking after Naltrexone

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**Abstract:** Naltrexone is a non-selective opioid receptor antagonist approved for the treatment for alcohol use disorder (AUD) with modest efficacy. The ability to identify predictors of treatment response could improve clinical practice. *Methods:* Non-treatment seeking heavy drinkers meeting criteria for AUD underwent [11C]-LY2795050 PET before and after the week of naltrexone treatment. Occupancy was estimated using volume of distribution of [11C]-LY279505 before and after naltrexone using a Lassen plots. Subjects also participated in alcohol drinking paradigm (ADP) sessions before and after naltrexone week. The primary behavioral outcomes were reduction in number of consumed drinks from ADP1 to ADP2 (drinks) and craving during each ADP. Associations with KOR occupancy were assessed with mixed models for the reported craving levels, and with multivariable regression for the reduction in drinking (ΔDrinks). A logistic regression was performed to evaluate if associated variables could predict a reduction of >50% in drinking from ADP1 to ADP2 (ΔDrinks\_50%). *Data:* Forty-eight participants (16F, 32M) drinking 47 ± 16 drinks per week participated in the study. *Results:* Participants were balanced in FH (41% negative, 59% positive) and smoking status (57% non-, 43% smokers). High occupancy (92 ± 1%) was achieved by the 100 mg naltrexone regimen. No effects of gender nor FH on occupancy were observed. Occupancy was associated with the number of years participants had been drinking (YOD) and this association was significantly different between FH positive and FH negative participants (p = 0.0003). ΔDrinks was associated with FH, YOD, and occupancy (p = 0.032). A logistic regression model including these 3 variables achieved an 84% prediction accuracy for ΔDrinks\_50%. Higher KOR occupancy by naltrexone was associated with higher craving levels during an ADP (p < 0.03). *Conclusion:* The relationship between occupancy and ΔDrinks differed by FH status, which could be underlie our previous finding that only in FH positive individuals a higher naltrexone dose was associated with a larger reduction in drinking (Krishnan-Sarin, 2007). In conclusion, occupancy of KOR by naltrexone measured by PET combined with key demographics could provide valuable predictions of who will respond to naltrexone for the treatment of alcoholism.

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**POSTER 3:** Disrupted Neural and Autonomic Response to Sustained Stimuli Linked to High Craving in Patients with Alcohol Use Disorder

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**Abstract.** Previous studies have noted neural and autonomic disruption in patients with alcohol use disorder (AUD). However, few have examined these two systems simultaneously. Our study focused on basal/tonic and phasic disruption of the ventromedial prefrontal cortex (vmPFC) and autonomic nervous system (ANS) functioning and its relationship to high craving in AUD patients. We performed both functional magnetic resonance imaging (fMRI) and electrocardiogram (ECG) methods and collected ratings on craving, stress and arousal in 23 AUD patients and 19 light drinkers during sustained exposure to stress (S), alcohol cue (A) and neutral (N) pictures. We analyzed fMRI data with BioImageSuite and AFNI, and processed ECG data through MATLAB and Kubios software for heart rate, low-frequency power (LF) and approximate entropy (ApEn). We found that, at the basal state level, AUD patients exhibit significantly disrupted behavioral and autonomic response prior to and during visual provocation, relative to light drinkers. Across conditions, AUD patients reported higher craving (S: t=3.72, A: t=3.74, N: t=3.44; ps<0.01), exhibited higher overall heart rate (S: t=2.36, A: t=2.18, N: t=2.07; ps<0.05) and displayed higher baseline ApEn (S: t=2.35, A: t=2.49, N: t=2.24; ps<0.05), which is an indicator of autonomic irregularity and disruption. We also observed significant relationships between ANS dysfunction and craving. During the alcohol cue condition, we found that time-related increased craving associated with greater basal heart rate (r=.485, p<0.05) in AUD patients. During the stress condition, craving positively correlated with LF power (r=.473, p<0.05) in AUD patients whereas craving in light drinkers did not. At the basal state level, we observed vmPFC hyperactivity in AUD patients that predicted higher heart rate during stress (p<0.05), relative to light drinkers. Our current study suggests a basal/tonic disruption in neural and autonomic pathways that relates to functional alterations in physiologic and craving response to sustained stress and cue stimuli in AUD patients. In highly susceptible environments involving alcohol, higher craving in AUD patients may result from basal state dysfunction such as autonomic irregularity and vmPFC hyperactivity. Constant exposure to such settings may further increase vulnerability to high craving and aggravate addiction severity in AUD patients.

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**POSTER 4:** Disrupted Neural and Autonomic Response to Sustained Stimuli Linked to High Craving in Patients with Alcohol Use Disorder

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**Abstract.** Alcohol abuse has been traditionally considered a male-oriented problem and as a consequence research on risk factors specific to women has been minimal. However, the sex gap in alcohol abuse is closing rapidly, and both animal and human studies suggest that females are actually more vulnerable to substance use than males. As such, it is important to understand the biological basis of sex differences to develop sex-specific prevention and treatment efforts. Here we examined neurobiological factors underlying poor inhibitory control, a risk factor that we and others have shown is more strongly linked to heavy drinking in women than in men. Methods:Female and male heavy drinkers, matched on demographic and alcohol consumption measures, performed the stop signal task to assess inhibitory control while undergoing fMRI. Women were tested once in the early follicular phase of their menstrual cycle (when estradiol levels are low) and once in the late follicular phase (when estradiol levels peak), and men were tested twice at similar intervals. Blood samples were taken to assess serum levels of estradiol at both sessions. Data and Results:To date 21 women and 11 men have completed the study. Preliminary analyses confirmed low levels of estradiol in the early follicular phase (mean = 48.1 pg/ml), and high levels in the late follicular phase (mean = 201.9 pg/ml). Women showed less brain engagement in the early compared to the late follicular phase in right frontal regions, including the right inferior frontal gyrus, middle frontal gyrus, and supplementary motor area. Further, women had less brain activation compared to men when tested in the early follicular phase, but no sex differences were observed when women were tested in the late follicular phase. Conclusions**:** These data suggest that the inhibitory impairments observed in heavy-drinking women are influenced by menstrual cycle phase. Specifically, they suggest that inhibitory deficits may be exacerbated in the early follicular phase, possibly contributing to increased difficulty controlling alcohol consumption during this time. Identification of such vulnerable periods for problematic alcohol consumption could have important implications for prevention and treatment of alcohol use disorders in women. Research supported by NIAAA grant K01AA024519 (JW).

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**POSTER 5:** Risky Drinkers Show Biased Habit-Like Learning for Alcohol Cues

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**Abstract.** Addiction is broadly characterized as a disorder of learning and memory, in which users form strong habitual associations between drug cues and drug use behaviors, thus driving maladaptive drug taking. This suggests that individuals with addiction (e.g., patients with alcohol use disorder [AUD]) would show enhanced habit learning relative to social drinkers. However, laboratory findings have been inconsistent, and it remains unclear whether non-dependent individuals who engage in risky drinking behavior would show differences in learning. We developed a novel task in which cues (alcohol and neutral object images) are probabilistically associated with simple motor sequences, associations that recruit similar neural circuitry to habit formation. Non-dependent high-risk drinkers (meeting NIAAA criteria for binge and/or heavy drinking, N = 16), non-dependent low-risk drinkers (N = 36), and treatment-seeking AUD participants (N = 35) completed the experiment. Overall, participants successfully learned the associations (main effect of block: *F*(1,926) = 127.57, *p* < .001) and responded differently for alcohol and neutral objects (main effect of cue: *F*(1,926) = 6.62, *p* = .01). Crucially, drinking status was associated with differences in both learning (controlling for age and IQ: group [AUD, high-risk, low-risk] x block x cue: *F*(2,926) = 9.54, *p* = .002) and the speed of the correct motor sequence (group x cue: initiating sequence - *F*(2,926) = 11.25, *p* < .001; completing sequence – *F*(2,926) = 16.56, *p* < .001). High-risk drinkers were quicker to learn associations with alcohol cues (Block 1, alc v neut: *t*(15) = 2.13, *p* = .05), a bias that differed from both AUD (cue x group: est = .17 [.06], *p* = .006) and low-risk participants (est = .14 [.06], *p* = .02). By the end of learning, high-risk drinkers were faster to initiate correct sequences for alcohol cues (*t*(15) = -1.79, *p* = .09), whereas low-risk drinkers showed the opposite (*t*(35) = 2.24, *p* = .031; cue x group: est = 231.26 [99.27], *p* = .02). Together, these results demonstrate that risky drinking behavior is associated with differences in habit-like learning, particularly for alcohol cues. Planned analyses for a follow-up neuroimaging study will be discussed.

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**POSTER 6:** Greater Hippocampal Activation during Memory Retrieval in Women: Impact of Depression and Risk for Alcohol Use Disorder

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**Abstract.** Major depressive disorder (MDD) is a debilitating condition that interferes with daily functioning, and which occurs at a markedly higher rate in women relative to men. Evidence of memory deficits, along with structural and functional alterations inhippocampus, have also been reported in MDD, which likely contribute to the multifaceted impact of this condition. This study aimed to examine the intersection between depression and risk for an alcohol use disorder in women using a virtual translation of the Morris Water Task (MWT), a classic probe of hippocampal-mediated spatial memory function. Multiband blood oxygen level dependent (BOLD) functional magnetic resonance imaging (fMRI) data were acquired during performance of the MWT in a sample of 22 women, across a clinical spectrum of depressed mood, from no depression to current MDD, and stratified into no/low (n=16) and some risk (n=6) groups using the Alcohol Use Disorders Identification Test (AUDIT). fMRI data were analyzed using FSL. While depression scores on the Beck Depression Inventory (BDI) were not significantly different between groups, women in the alcohol risk group reported significantly higher anhedonic depression on the Mood and Anxiety Symptom Questionnaire (MASQ, p=.032) and lower self-efficacy measured using the NIH Toolbox Emotion Measures (p=.05) relative to the no/low risk group. In an fMRI contrast comparing BOLD activation during memory retrieval relative to motor control, significantly greater hippocampal activation was observed in the alcohol risk group (p=.022) relative to the no risk group. This hippocampal hyperactivation was observed in the absence of any MWT performance differences between groups. Greater hippocampal activation during a spatial memory task may reflect neural compensation, i.e., greater utilization of neuronal resources, in those at risk, to perform at levels equivalent to the no/low risk group. It was surprising that depressive symptoms and self-efficacy did not further impact hippocampal differences beyond risk for alcohol misuse. However, these preliminary findings emphasize the importance of characterizing drinking behavior within the context of depression, which may in turn help inform prevention and treatment strategies in co-occurring disorders, in order to help to alleviate suffering from this debilitating condition. Funding Source: NARSAD Young Investigator Grant (Sneider)

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**POSTER 7:** Greater Hippocampal Activation during Virtual Morris Water Task Prospectively Predicts Substance Use Initiation by Age 15.5

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**Abstract.** Early age of onset of alcohol and other substance use is considered one of the most important risk factors in the later development of an alcohol use disorder (AUD). While much recent research has examined age of onset together with other risk factors for AUD, little is known about the neurobiological markers predictive of early use itself. Additionally, research on neurobiological markers of substance use risk has focused largely on the prefrontal cortex and mesolimbic systems for their roles in inhibitory control and in reward-seeking, respectively. However, recent models have highlighted the relevance of hippocampal function (especially developmentally) in determining substance use risk, given its role in both emotion regulation and in adaptive learning. The purpose of the current study was to examine hippocampal activation as it prospectively relates to earlier substance use initiation. This longitudinal study enrolled 13-14-year-old healthy, drug- and alcohol-naïve adolescents for a baseline visit, during which multiband blood oxygen level dependent (BOLD) functional magnetic resonance imaging (fMRI) data were acquired while participants performed a virtual translation of the classic Morris Water Task (vMWT), which tests spatial memory retrieval. Participants were then followed for 3 years via quarterly substance use assessments and stratified into those who initiated use before age 15.5 (n=8) and those who did not (n=19). Those who initiated substance use by age 15.5 showed significantly greater hippocampal activation during memory retrieval on the vMWT at baseline than those who did not initiate by this age (p=0.03). No significant differences in activation were found for any prefrontal cortex regions examined (middle frontal gyrus, anterior cingulate cortex, and frontal medial cortex). These results suggest inefficient hippocampal function may be a risk factor for early substance use. The findings shed light on neurobiological patterns that predict and, importantly, predate use (allowing these patterns to be distinguished from consequences of early initiation on brain development), and help to identify specific neurobiological vulnerabilities predictive of later risky behavior during adolescence. Funding Sources: R01 AA022493 and K24 AA025977 (Silveri); F31 AA025844 (Oot)

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**POSTER 8:** Experimental Alcohol Exposure Predicts Cerebral Metabolites on the Descending Limb in Healthy Adults: A Preliminary H MRS Study

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**Abstract:** Chronic exposure to alcohol induces neuroadaptation and allostasis, but mechanisms are not well understood. Neuroimaging studies have used magnetic resonance spectroscopy (MRS) to identify cerebral metabolite changes under acute alcohol in healthy individuals. However, previous experimental studies have focused solely on ascending or peak blood alcohol concentration. This pilot study used MRS to gain insight into neurometabolic activity on the descending limb of acute alcohol in healthy moderate drinkers. We predicted changes in choline, myo-inositol, glutathione, and the summed peak of glutamate and glutamine (Glx) on the descending limb. Method:Participants completed an MRI scan prior to receiving a moderate alcohol dose (.60 g/kg). A second MRI was collected approximately 4.5 hours after alcohol consumption. Cerebral metabolites were assessed using single voxel spectroscopy in the thalamus and frontal white matter. Metabolite concentrations were referenced to creatine (Cr). Breath alcohol concentration area under the curve, a measure of cumulative alcohol exposure during the session, was used to predict changes in neurometabolites from pre-alcohol baseline to descending limb. Results:The sample (N=13) was 26.4+2.8 years of age (mean + standard deviation) and 62% female. Participants consumed an average of 3.3+1.8 drinks per week. Breath alcohol peaked at .070+.008% 60 minutes after alcohol consumption and was 0.025+.011% at the second MRI. On the descending limb, relative to baseline, we found significant increases in levels of choline/Cr, Glx/Cr, and glutathione/Cr in the thalamus and Glx/Cr in frontal white matter (*p\_’s\_*<0.05). Myo-inositol did not change significantly in either voxel. Breath alcohol area under the curve was a significant predictor of all metabolite increases (*p\_’s\_*<0.045). Conclusion:This MRS study is the first to report increased levels of choline, Glx, and glutathione on the descending limb of alcohol. Metabolite increases were predicted by a cumulative measure of acute alcohol exposure, supporting the notion that they were alcohol-induced. Findings suggest heightened glutamatergic activity, cellular membrane turnover, and antioxidant activity in the brain during alcohol clearance in healthy moderate drinkers. In the context of chronic drinking, these neurometabolic changes may contribute to alcohol-induced neuroadaptation and allostasis.

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**POSTER 9:** In Vivo Imaging of 11β-HSD1 with [18F]AS2471907 in Trauma-Exposed Individuals and in AUD: Implications for Stress and Alcohol Use

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**Abstract.** Stress is a potent activator of the HPA axis, and the amount of glucocorticoids (e.g., cortisol, cortisone) present in the brain is dependent on the enzyme 11β-HSD1. 11β-HSD1 catalyzes the conversion of cortisone to cortisol and amplifies the action of glucocorticoids in the brain. High brain glucocorticoid levels, driven by 11β-HSD1 and induced by stress, may contribute to problem alcohol use. We used PET imaging with the 11β-HSD1 specific radioligand [18F]AS2471907 to assess 11β-HSD1 expression in subjects with history of trauma exposure and alcohol use. Methods: This study included 18 trauma-exposed individuals (n=11 men, n=7 women), with or without posttraumatic stress disorder (PTSD; n=1 risky drinker, n=1 with severe AUD). Participants received 95±13 MBq [18F]AS2471907 as a bolus injection and were imaged for 180-240 minutes on the High-Resolution Research Tomograph. 11β-HSD1 levels were estimated as [18F]AS2471907 volume of distribution (*V*T), an equilibrium ratio of tissue-to-plasma [18F]AS2471907 radioactivity concentration. Individuals were required to be overnight abstinent from drinking. Levels of 11β-HSD1 were correlated with stress measures (i.e., childhood trauma, mood, anxiety, depression) and alcohol use. Preliminary data using this methodology have also been collected for individuals with AUD (n=5) versus healthy controls (n=12). Results: Exploratory analyses found a positive association of 11β-HSD1 levels in the caudate, cerebellum, anterior cingulate, hippocampus, insula, putamen, temporal cortex, ventromedial prefrontal cortex (PFC), and whole brain with childhood physical abuse (p=0.01-0.03). For alcohol-related outcomes, preliminary analyses found positive associations of 11β-HSD1 levels in the caudate with drinks per week (p=0.02; mean=11.04, SD=30.94) and average drinks per drinking day (p=0.04; mean=2.50, SD=4.65) during the month prior to study participation. Regarding AUD, current data are highly preliminary but suggest that 11β-HSD1 levels may be elevated in amygdala, hippocampus, ventromedial PFC, and caudate in AUD individuals compared to healthy controls. Conclusions: These preliminary findings suggest a role for 11β-HSD1 in early stress exposure and alcohol use. This work is also consistent with findings that early life stress alters caudate volume and work demonstrating increased drug craving-related caudate activity. Consideration of 11β-HSD1 inhibitors as a target for stress-related disorders or alcohol use may be a relevant future pharmacotherapeutic avenue.

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**POSTER 10:** Association between Impulsivity and Neural Activation to Alcohol Cues in Heavy Drinkers

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**Abstract.** Impulsivity is a multifaceted construct. Convergent preclinical and clinical evidence indicates that impulsivity is both a risk factor for and a consequence of alcohol use and misuse. Moreover, frontostriatal circuits have been linked to both impulsivity and addiction-related behaviors, including neural response to alcohol cues. The present study aimed to extend the literature on impulsivity and neural alcohol cue-reactivity by examining associations between two measures of impulsivity, behavioral via the delay discounting task and self-reported via the UPPS-P, and brain response to alcohol taste cues. Methods: Non-treatment-seeking heavy drinkers (n=55; 32M/23F; age = 34.00±11.99) completed an fMRI alcohol taste cue-reactivity paradigm. They also completed two impulsivity questionnaires: (1) the monetary choice questionnaire (MCQ), a behavioral impulsivity measure where participants were asked to make a series of choices between smaller, sooner rewards and larger, later rewards; and (2) the UPPS-P Impulsive Behavior Scale, a self-report measure which assess five impulsivity factors: negative urgency, lack of premeditation, lack of perseverance, sensation seeking, and positive urgency. General linear models were run in FSL to identify associations between neural alcohol taste cue-reactivity and behavioral and self-reported impulsivity. Age, gender, and smoking status were included as nuisance covariates. Results: Sensation seeking was positively associated with brain activation to alcohol taste cues in the caudate, thalamus, insula, and cingulate (Z>2.3, p<0.05, corrected). Delay discounting scores were negatively associated with alcohol taste cue-reactivity in the posterior cingulate, precuneus, occipital cortex, and middle frontal gyrus (Z>2.3, p<0.05, corrected). There were no significant associations between the other self-reported impulsivity sub-scales and brain activation to alcohol taste cues. Conclusions: This study highlights the multifaceted nature of impulsivity. Self-reported sensation seeking was positively associated with alcohol taste cue-elicited activation in frontostriatal regions, such that individuals who reported higher sensation seeking displayed greater neural response to alcohol taste cues. Conversely, delay discounting was negatively associated with alcohol taste cue-elicited activation in frontoparietal regions, such that individuals who reported greater discounting had less neural response to alcohol taste cues. Together these results indicate that sensation seeking is associated with reward responsivity, while delay discounting is associated with recruitment of self-control circuitry.

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**POSTER 11:** Impact of Binge Drinking on Salience and Executive Network Activation during Emotional Response Inhibition in College Freshmen

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**Abstract.** The transition to college is associated with an increase in heavy episodic alcohol use, or binge drinking, during a time when the prefrontal cortex and prefrontal-limbic circuitry continue to mature. Traits associated with this immaturity, including impulsivity in emotional contexts, may contribute to risky and heavy episodic alcohol consumption. Methods: Functional magnetic resonance imaging (fMRI) was used to assess brain network activation during a task that required participants to ignore background images with positive, negative, or neutral emotional valence while performing an inhibitory control task (Go-NoGo). Data: Subjects were 49 college freshmen (18-20 years) who engaged in a range of drinking behavior (past three months’ binge episodes range = 0-20, mean = 3.8, total drinks consumed range = 0-104, mean = 31.1). To disentangle activation of networks implicated in inhibitory control during negative emotion, network template spatial maps derived from Human Connectome Project data were regressed against the full set of brain activation maps for Negative NoGo > Neutral NoGo contrast, generating estimates of the impact of negative emotional stimuli during response inhibition on the strength of activation of each associated network. Subjects’ network loadings generated for the salience network and central executive networks were examined relative to alcohol use and task performance. Results: Activation strength in the salience network was negatively associated with binges in the past three months (p=.032) and with reduced NoGo trial accuracy on negative (p=.001) and neutral (p=.042) trials. Activation of the right frontoparietal central executive network also was significantly negatively associated with binge episodes (p=.003) and AUDIT total score (p=.001). Conclusions: These findings suggest that in emerging adults with heavier recent binge drinking, processing of negative emotional images interferes more with engagement of inhibitory control neurocircuitry than in emerging adults who do not binge drink often. This pattern of altered frontal lobe activation associated with binge drinking may serve as an early marker of risk for future self-regulation deficits that could increase problematic alcohol use. These findings underscore the importance of understanding the impact of emotion on cognitive control and associated brain network function in binge drinking behaviors among emerging adult college students. Funding sources: K01 AA022392 (PI: Cohen-Gilbert), R21 AA024565 (PI: Nickerson) and R01 AA018153 (PI: Silveri)

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**POSTER 12:** When Only Alcohol Will Do: Understanding Neural Predictors of Relapse in Veterans with AUD

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**Abstract.** Augmenting our understanding of the brain circuit mechanisms underlying alcohol use disorders (AUD) to predict relapse is a critical step toward improving AUD outcomes for Veterans who suffer from this destructive disorder. The hijack theory of addiction suggests that following chronic substance use, individuals will demonstrate blunted response to conventional reward and preferential response to their drug of choice. To explore mechanisms underlying AUD outcomes, we examine the impact of demographic, social, psychiatric and neural characteristics associated with relapse in Veterans with AUD. A total of 84 treatment seeking Veterans (14 females; mean age=46 years) with AUD were enrolled in the study and completed 6 months of outcome follow-ups. Participants completed demographic and symptom questionnaires, psychodiagnostic interview, computerized and standard neuropsychological testing, and a 2-hour neuroimaging session, including fMRI tasks of reward and cue reactivity. Participants were contacted vis phone call at 1, 3, and 6 months following participant in the study to determine treatment outcome. T-tests and chi-squared were used to understand difference between relapsers and abstainers. Logistic’ regressions were employed to predict risk of relapse versus abstinence. Results revealed that 68% of participant consumed an alcoholic beverage, or relapsed, within 6 months following participation. Smoking status, symptoms of anhedonia, days since last drink, and race were related to relapse status. In addition, differential BOLD signal was detected in medial frontal and bilateral inferior frontal regions during the reward and cue tasks. Specifically, relapsers had blunted activation to monetary rewards (gain vs no gain) compared with abstainers. Conversely, relapsers demonstrated heightened activation to alcohol cues (alcohol vs neutral) compared with abstainers. Demographics, social and psychiatric symptoms classified 77% of the sample into treatment outcome groups. When neuroimaging metrics where added to the model, classification increased to 85%. Identification of predictors of relapse in Veterans with AUD is critical in improving treatment outcomes for those at highest risk. Modifiable risk factors were identified, and adding neuroimaging response increased classification ability by 8%. Future studies are needed to replicate these findings in a larger sample and clinical trials are needed to understand which interventions will help those most likely to relapse.

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**POSTER 13:** Multi-Modal MRI Data Fusion Reveals Interactions between Sex and Alcohol Use Disorder in Brain Structure Related to Social Processing

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**Abstract**. Prior neuroimaging investigations of brain structure in individuals with alcohol use disorder (AUD) suggest that men with AUD have greater alterations in brain structure than women, although findings are equivocal. The present study aims to assess sex differences in gray and white matter structural architecture in individuals with AUD via data fusion of multi-modal magnetic resonance imaging (MRI) data. Methods and Data: Human Connectome Project data from participants with AUD (N=129, 63F/66M) and matched controls (N=125, 67F/58M) were examined in this study. Indices of white matter integrity, e.g. fractional anisotropy, mean diffusivity, and tensor mode, were calculated from diffusion images (using FSL). Gray matter density (GM; FSLVBM), cortical thickness (CT; Freesurfer), and pial surface area (PSA; Freesurfer) were calculated from T1 images. All six features were included in a linked independent component analysis to identify 50 multi-modal spatial patterns and their participant-level strengths (loadings). Three components associated with AUD diagnosis (uncorrected) were subsequently assessed for AUD x Sex interactions using PALM non-parametric permutation testing (p<0.05, corrected for family structure). Results: Two multi-modal components showed a significant interaction, with AUD men having the highest loadings on both patterns, and AUD women showing a weaker effect in the same direction. The first component (interaction p=0.009) reflected greater GM and PSA among anterior temporal, ventral prefrontal, insula, hippocampus, and angular gyrus, reduced GM in fusiform and temporo-occipital areas, and reduced integrity of inferior fronto-occipital fasciculus (IFOF). The second component (p=0.01) reflected greater GM and PSA among lateral orbitofrontal and temporal regions, reduced GM in ventromedial striatum and regions overlapping with dorsal attention network, reduced CT in ventral insula and dorsal anterior cingulate, and reduced integrity of cingulum and IFOF. Both components were associated with age of first alcohol use and impulsivity (p<0.05, uncorrected). Conclusions: Participants with AUD show alterations in structural architecture of spatially distributed brain regions previously shown to support social processing, with greater effects in AUD men. Associations of these effects with drinking age of onset suggest observed effects may be related to sex differences in brain development co-occurring with onset of alcohol drinking. Further work will investigate associations between these patterns and social function/social cognition. Support: NIAAA R21 AA024565 and NIHM K00 MH119603.

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**POSTER 14:** Alcohol Use and Responses to Anti-drinking Messages among Emerging Adults: an fMRI Study

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**Abstract.** Among youth, most alcohol is consumed by binge drinking, and two out of three young adults report binge drinking in the past month. Some will transition out of risky drinking behavior, while others will maintain/exacerbate use into adulthood. Public health campaigns depicting the negative consequences of drinking have shown some efficacy at reducing this behavior. However, substance use in dependent individuals is governed by automatic/habitual responses to drug cues rather than the consequences. Here we studied how young adults who binge drink (≥1 day past month) responded to messages about the health and social consequences of drinking in an online study (N=100, 50F, 23±1.7yr.) and a separate fMRI study (N=19, 12F, 20.8±1.9yr.). In the online study, intent to binge drink decreased pre- to post-task (p<.001). Youth who rated antidrinking messages as more effective showed a greater reduction in intent to binge drink (p=.026). Reduction in intent to binge drink was maintained at one month follow up (p<.001). Finally, past month drinking frequency was reduced at one month (p<.001), and was related to the reduction in intent to binge drink from pre-task to one month (p=.001). In the fMRI study, young adults first completed a drinking cue-reactivity task (i.e., alcohol-related images) and then completed a task in which the drinking cues were paired with antidrinking messages (simultaneous audio/text). Intent to binge drink decreased pre- to post-fMRI (p=.002). Activity in the ventral striatum –a brain region implicated in reward processing –decreased between drinking cues and cues paired with antidrinking messages (p=.034). This decrease was less pronounced in young adults who had reported higher past month drinking quantity (p=.017; controlling for sex/gender, p=.02). Reduction in intent to binge drink was maintained at one month follow up (p=.001), and there was a reduction in past month drinking quantity at one month (p=.037). Finally, young adults who showed greater activity in the medial prefrontal cortex in response to antidrinking messages –a brain region implicated in processing message self-relevance –reported a greater reduction in drinking frequency at one month (p=.049). These findings may help to differentiate who is at risk for continued heavy drinking as adults and may inform interventions to reduce drinking among young adults.

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**POSTER 15:** NEURAL RESPONSES TO MULTISENSORY ALCOHOL CUES IN HEAVY-DRINKING SMOKERS

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**Abstract.** Approximately 80% of individuals with an alcohol use disorder (AUD) are also cigarette smokers, and despite previous research on functional magnetic resonance imaging (fMRI) cue-reactivity, the behavioral and neural responses to alcohol cues in heavy-drinking smokers have not been investigated. The goal of this pilot study was to examine the effects of visual and olfactory alcohol cues on blood-oxygen-level-dependent (BOLD) activity in heavy-drinkers during fMRI scan. Methods: Heavy-drinking smokers (*n* = 10) participated in the alcohol fMRI cue-reactivity task. We implemented an alcohol cue-reactivity task, where participants, after being exposed to alcohol and neutral cues (visual and olfactory), rated their craving for alcohol and cigarettes with visual analog scales. Independent samples *t-*tests were implemented to compare alcohol and cigarette craving during alcohol and neutral cues. Further, whole-brain and region of interest (ROI) analyses were done to compare BOLD responses to alcohol and neutral cues. Lastly, correlation analysis was done on activation in ROIs and baseline craving and drinking and smoking behaviors. Results: Our behavioral results showed that participants had higher alcohol craving during alcohol cues compared to neutral cues (*p* < .05). Further, our whole-brain analysis revealed significant activation in the right lingual gyrus (*p* < .005). The ROI analysis showed significant activation in the right orbitofrontal cortex (OFC) (*p* < .05) when comparing alcohol to neutral cues. Correlation analysis indicated that there was a positive association with baseline alcohol craving and activation in the right ventral striatum (VS) (*p* < .05) and the left anterior cingulate cortex (ACC) (*p* < .05). There were also positive associations with total alcohol drink in the ninety days prior to the experiment and activation in the right VS (*p* < 0.0001), left VS (*p* <.01) and left ACC (*p* < .0001). Conclusions: We have provided preliminary evidence that there are distinct behavioral and neural patterns in response to alcohol cues in heavy-drinking smokers.

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