

**BIOGRAPHICAL SKETCH**

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NAME: Ryan Peter Vetreño

ERA COMMONS USER NAME (credential, e.g., agency login): RVETRENO

POSITION TITLE: Assistant Professor

**EDUCATION/TRAINING** (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
St. Thomas Aquinas College, Sparkill, NY	B.S.	12/2001	Psychology
Radford University, Radford, VA	M.A.	05/2006	Clinical Psychology
Binghamton University – SUNY, Binghamton, NY	Ph.D.	01/2011	Behavioral Neuroscience
University of North Carolina at Chapel Hill, Bowles Center for Alcohol Studies, Chapel Hill, NC	Postdoctoral	01/2016	Pharmacology

**A. Personal Statement**

My training is in psychology, behavioral neuroscience, and pharmacology, with a concentration on long-term alterations to adult neurobiology following adolescent binge ethanol exposure. My research focuses on elucidating the mechanisms underlying basal forebrain pathology associated with adolescent binge drinking. I discovered that AIE treatment increases expression of Toll-like receptors (TLRs), the receptor for advanced glycation end products (RAGE), the cytokine-like TLR/RAGE agonist high-mobility group box 1 (HMGB1), and multiple proinflammatory signaling molecules in the adolescent brain that persist into adulthood. I also discovered that AIE causes persistent reductions of basal forebrain cholinergic neurons that is accompanied by impaired cognition that persists into adulthood. I have replicated these findings in post-mortem human alcoholic tissue samples. The AIE-induced reduction of basal forebrain cholinergic neurons was initially interpreted as indicative of cell death. However, total forebrain neuron numbers do not change and we discovered that the AIE reduction of cholinergic neurons is reversible following the conclusion of AIE suggesting ***persistent epigenetic silencing of the cholinergic phenotype that can be restored***. Indeed, I discovered that AIE increases gene silencing markers (e.g., H3K9me2) at ChAT and TrkA cholinergic gene promoters, and decreases basal forebrain cholinergic neurons, which are both reversible. It is unknown if cholinergic phenotypic silencing is due to proinflammatory signaling. My current research focuses on identifying neuroimmune involvement in epigenetic silencing of cholinergic phenotype as well as contributions of dysfunctional basal forebrain cholinergic system and altered brain functional connectivity in adulthood.

**B. Research Support:**

R01 AG 072894 Vetreño (PI) 9/1/20 – 8/31/25

NIH/NIA

*Adolescent alcohol in 5xFAD mouse model accelerates neuroinflammation and Alzheimer's disease pathology across aging*

Role: PI

U01 AA 020023 Crews (PI) 9/1/20 – 8/31/25

NIH/NIAAA

*Component 5/8 and 7/8 NADIA U01: Effects of adolescent alcohol on adult brain neurocircuitry*

Role: Co-PI

K01 AA 025713 Vetreno (PI)

9/1/18 – 8/31/23

NIH/NIAAA

*HMGB1 and innate immune involvement in adult neuropathology following adolescent alcohol exposure*

Role: PI

R21/R33

Crews, Hendershot (PI)

Pending

NIH/NIAAA

*Translational alcohol response batteries to define mechanisms of tolerance*

Role: Co-investigator

## C. Positions, Scientific Appointments, and Honors

### Positions

- 2018 - Present Assistant Professor, Bowles Center for Alcohol Studies, Department of Psychiatry, University of North Carolina School of Medicine, Chapel Hill, NC  
2016 - 2018 Research Associate, Bowles Center for Alcohol Studies, University of North Carolina School of Medicine, Chapel Hill, NC  
2011 - 2016 Postdoctoral Fellow, Bowles Center for Alcohol Studies, University of North Carolina School of Medicine, Chapel Hill, NC

### Honors

- 2020 Young Investigator Award, NIAAA Meeting “Alcoholism and Stress: A Framework for Future Treatment Strategies”, Volterra, Italy  
2018 ISBRA Young Investigator Travel Award Recipient  
2016 ISBRA/ESBRA Young Investigator Travel Award Recipient  
2014 Gordon Research Conference Travel Award, “Alcohol & the Nervous System”  
2014 Research Society on Alcoholism Memorial Award  
2013 Early Career Investigator Conference Award, Society on Neuroimmune Pharmacology  
2013 NIAAA Trainee Workshop Travel Award  
2012 Society for Neuroscience Early Career Investigator Travel Award  
2012 – 2015 National Institutes of Health Loan Repayment Award, NIAAA (Pediatric)  
2011 NIAAA Trainee Workshop Travel Award  
2011 Distinguished Dissertation Award, Binghamton University  
2006 Graduate Research Thesis Award, Radford University  
2005 Department of Psychology Research Award, Radford University

## D. Contributions to Science

1. Adolescent binge drinking is a risk factor for development of AUD later in life. I discovered that adolescent intermittent ethanol (AIE), which models human adolescent binge drinking, induces proinflammatory neuroimmune signaling molecules throughout the adolescent brain that persist into adulthood. This discovery is of particular import to health as neuroimmune induction in the brain is associated with most, if not all, neurodegenerative disorders. Further, I discovered upregulation of neuroimmune markers in post-mortem human AUD brain that contribute to neurodegeneration.
  - a. Macht, V., **Vetreno, R.P.**, Elchert, N., & Crews, F.T. (2021). Galantamine prevents and reverses neuroimmune induction and loss of adult hippocampal neurogenesis following adolescent alcohol exposure. *J Neuroinflammation*, PMID: 34530858.
  - b. **Vetreno, R.P.**, Qin, L., Coleman, L.G., & Crews, F.T. (2021). Increased Toll-like receptor-MyD88-NFkB-proinflammatory neuroimmune signaling in the orbitofrontal cortex of human alcohol use disorder. *ACER*, PMID: 34415075.
  - c. Qin, L., Zou, J., Barnett, A., **Vetreno, R.P.**, Crews, F.T., & Coleman, L.G. (2021). TRAIL mediates neuronal death in AUD: A link between neuroinflammation and neurodegeneration. *Int J Mol Sci*, PMID: 33806288.
  - d. Liu, W., **Vetreno, R.P.**, & Crews, F.T. (2020). Increased TNF-death receptor signaling, caspase activation and neuroimmune-like degeneration in human alcoholic hippocampus and following adolescent rat intermittent ethanol exposure. *Mol Psychiatry*, PMID: 32139808.

2. Adolescent binge ethanol exposure and proinflammatory neuroimmune signaling drive loss of basal forebrain cholinergic neurons and hippocampal neurogenesis. I discovered that blockade of neuroimmune signaling can prevent adolescent binge ethanol-induced loss of basal forebrain cholinergic neurons and hippocampal neurogenesis. Further, I discovered a loss of basal forebrain cholinergic neuron markers in the post-mortem human AUD brain. I recently discovered that the AIE-induced loss of basal forebrain cholinergic neuron markers involves epigenetic silencing of cholinergic genes, resulting in a loss of the cholinergic phenotype, and not cell death, that can be recovered later in life. These discoveries identified a novel neuroplastic process of reversible loss of neuronal phenotype.
- a. Crews, F.T., Fisher, R., Deason, C., & **Vetreno, R.P.** (2021). Loss of basal forebrain cholinergic neurons following adolescent binge ethanol exposure: Recovery with the cholinesterase inhibitor galantamine. *Front Behav Neurosci*, PMID: 33716687.
  - b. Macht, V., **Vetreno, R.P.**, Elchert, N., & Crews, F.T. (2021). Galantamine prevents and reverses neuroimmune induction and loss of adult hippocampal neurogenesis following adolescent alcohol exposure. *J Neuroinflammation*, PMID: 34530858.
  - c. **Vetreno, R.P.**, Bohnsack, J.P., Kusumo, H., Liu, W., Pandey, S.C., & Crews, F.T. (2020). Neuroimmune and epigenetic involvement in adolescent binge ethanol-induced loss of basal forebrain cholinergic neurons: Restoration with voluntary exercise. *Addict Biol*, PMID: 30779268.
  - d. **Vetreno, R.P.** & Crews, F.T. (2018). Adolescent binge ethanol-induced loss of basal forebrain cholinergic neurons and neuroimmune activation are prevented by exercise and indomethacin. *PLoS One*, PMID: 30296276.
3. Adolescence is a critical period of brain refinement as well as a time of experimentation with drugs of abuse, including alcohol, that could impact maturation. We discovered that adolescent intermittent ethanol (AIE), which models human binge drinking, leads to persistent alterations in cortical thickness, loss of hippocampal neurogenesis, and diminished serotonergic phenotype markers as well as other neuropathology that persists well into adulthood. These effects are accompanied by impaired behavioral flexibility, diminished object recognition memory, and increased anxiety-like behaviors in adulthood. Together, these data reveal that adolescent binge drinking alters brain development that persists into adulthood.
- a. Liu, W., Rohlman, A.R., **Vetreno, R.P.**, & Crews, F.T. (2021). Expression of oligodendrocyte and oligoprogenitor cell proteins in frontal cortical white and gray matter: Impact of adolescent development and ethanol exposure. *Front Pharmacol*, PMID: 34025418.
  - b. Amodeo, L.R., Liu, W., Wills, D.N., **Vetreno, R.P.**, Crews, F.T., & Ehlers, C.L. (2020). Adolescent alcohol exposure reduces Orexin-A/Hypocretin-1 in the anterior hypothalamus. *Alcohol*, PMID: 32619610.
  - c. **Vetreno, R.P.**, Massey, V., & Crews, F.T. (2019). Long-lasting microbial dysbiosis and altered enteric neurotransmitters in adult rats following adolescent binge ethanol exposure. *Addict Biol*, PMID: 31880056.
  - d. **Vetreno, R.P.**, Patel, Y., Patel, U., Walter, T.J., & Crews, F.T. (2017). Adolescent intermittent ethanol reduces adult serotonin expression in the raphe nucleus and upregulates innate immunity that is prevented by exercise. *Brain Behav Immun*, PMID: 27647531.

**Complete List of Published Work in My Bibliography:**

<https://www.ncbi.nlm.nih.gov/myncbi/ryan.vetreno.1/bibliography/public/>