Title: **Co**m**p**ulsive **E**thanol **In**take in **Stress** Vulnerable Individuals: Coping Gone Awry? (**COPE IN STRESS**)

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Marked individual variability to develop alcohol use disorder (AUD) exists as an outcome of complex interactions between alcohol drinking, stressful experiences in adolescence affecting gut microbiome and inflammatory cytokines, leading to self-medication coping strategy. Adolescent vulnerability of higher risk to develop AUD stems from the still 'under-construction' prefrontal cortex (PFC) which is unable to provide effective top-down inhibition to subcortical regions triggering risk-taking behaviors. Exposure to stress during this key neurodevelopmental period impairs emotional regulation forming a fertile ground to develop maladaptive coping strategies contributing to developing AUD.

The present research plan, will investigate the interaction between adolescent stress exposure that impairs emotional regulation and the biobehavioral basis of alcohol drinking to cope which could permeate the development of compulsive alcohol seeking and taking, characteristic of AUD. Post adolescent stress exposure in Wistar rats, a ***multilevel machine learning analysis implementing an innovative stepwise nested PCA dimension reduction*** of several behavioural tests to identify stress-vulnerable (SV) rats will be performed. The differences in the gut microbiome, blood inflammatory markers and inherent genetic vulnerabilities contributing to stress response and coping drinking behaviour variability leading to higher risk of AUD will be investigated.

In summary, the present proposal provides the opportunity to ***integrate latest state of the art preclinical research with data analytics and machine learning tools*** to decipher the individual variability in the ability to respond to chronic stressful situation contributing to AUD utilizing a transdisciplinary approach currently under-utilized in the field of fundamental neuroscience.

Expected qualifications and experience:

1. MSc, Biology/Biotechnology/Biochemistry/Biological Sciences/Life Sciences/Biomedical Sciences
2. Basic Programming skills preferably in python would be an additional plus
3. Major in Neuroscience is an additional plus
4. Wet lab experience is necessary
5. Interested in integrating machine learning and data analytic techniques with fundamental neuroscience

Skills to be gained:

1. Designing longitudinal long-term preclinical experiments and implementing state of the art behavioral research.
2. Integrating novel machine learning and data analytic techniques to address fundamental questions in the risk of developing neuropsychiatric disorders.
3. Understanding and implementing biostatistical analysis

4. Preclinical cerebral micro-surgeries
5. Collaborating with experts from other scientific specialties to develop the necessary skill to work within a team of diverse expertise.
6. Elaborate sophisticated poster and oral presentations
7. Scientific writing and manuscript development to communicate the results