**Behavioural phenotyping of SV2A lox/lox mice: Motor and anxiety-like features**

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**Background:** Epilepsy is one of the most common neurological disorders (Alexopoulos, 2004). Current antepileptic drugs, such as Levetiracetam (Keppra®) or Brivaracetam, mainly target the trans-membrane Synaptic Vesicle Protein 2A (Hamann et al., 2008). Studies on homozygous SV2A KO mice phenotype, prove the mice to suffer severe seizures and die within 3 weeks (Crowder et al., 1999), establishing a link between this protein and the epilepsy. In 2009, the availability of heterozygous SV2A (+/-) mice as research tool enabled shedding light on the role of protein SV2A, revealing no motor differences but anxiety-like features in these mice compared with the WT (Lamberty et al., 2009), and a pro-epileptic phenotype (Crowder et al., 1999; Kaminski et al., 2008). Recently, a floxed SV2A mouse model has been produced with the Cre/loxP recombination system, this model allows invalidating the protein in CA3 hippocampal region, not followed by epileptic seizures (Menten-Dedoyart et al., 2016).

**Objectives**: Perform a first behavioural phenotyping of SV2A lox/lox mice.

**Methodology**: Two experiments were conducted in parallel to evaluate the effect of 3 different genotypes in the phenotype: WT (Grik4-/-, SV2A lox/lox), HZ (Grik4 +/-, SV2A lox/+) and cKO (Grik4 +/-, SV2A lox/lox) in male (n = 42) and female (n = 33) separately . Mice were housed individually along the experiment, with standard food and water ad libitum. After an acclimatization period of 2 weeks, anxiety-like features as well as exploration abilities were evaluated in an elevated plus-maze (EPM) single session of 5 minutes). 3 days later, spontaneous locomotor activity and habituation to the environment were measured during 1 hour, 3 consecutive days, in the activity chambers (ACT).

**Results:** One-way ANOVA in EPM datapresented no significant differences between groups, either in males or in females. A significant difference was found, between time spent in close arms vs open arms (p<0.01; η2p = 0.738 males; η2p = 0.805 females). Mixed between-within subjects ANOVA in ACT reflected no significant differences between groups in both sexes, regarding spontaneous locomotor activity and acclimatization to the activity chamber (p>0.05). Statistical significant differences were found between the 3 days (p<0.01; η2p = 0.716 males; η2p = 0.663 females).

**Conclusion:** Results indicate that a decrease in the hippocampal expresion of SV2A protein does not lead to major behavioral changes. Regarding locomotor activity, the results found in heterozygous SV2A (+/-) mice are in line with (Lamberty et al., 2009), however, our mice did not present anxiety-like features, being necessary a global decrease in brain SV2A levels and not only a partial loss in a restricted region of the brain. Further analyses increasing the number of mice per group, will allow us to intensify our power value from 50-60% (females-males) up to 80%, with large effect size and a signification of p<0.05. An additional test to evaluate the spatial memory may help us better understand the effect a specific reduction in SV2A hippocampal expression has on the phenotype of mice.