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Evaluation of Hydra *vulgaris* as a high-throughput invertebrate model for anti-epilepsy drug

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Abstract

Epilepsy is a central nervous system disorder, which involves spontaneous and repeated seizures. The seizures are triggered by abnormal, irregular excitation in the brain. NMDA receptors, a type of brain glutamate receptor, have been implicated in the development of seizures. Many drug therapies for epilepsy cause various side effects, toxicities and drug interactions. Thus, there is a need to develop new drug regimens, which have minimal side effects. Hydra's nervous system relies on the same transmitters and receptors, (including the NMDA glutamate receptor), as does the human nervous system. Thus, we propose to assess hydra as an invertebrate model for screening new compounds for beneficial activity, including anti-seizure activity.

It is possible to assess the effect of chemicals on hydra's behavior by visually recording the sequence of behaviors of hydra's body and tentacles. This pattern of behaviors has been cataloged into what is referred to as a formal ethogram (a list of discrete behaviors typically employed by a species). The ethogram allows for quantification, and therefore statistical analysis, of characteristic movements.

Hydra will be cultured using the protocol described by Lenhoff (1983). The behavior of the animal will be observed for 20 minutes under the microscope and recorded with an Infinity camera. Six repeated experiments would be performed at each concentration with each applied substance. The ethogram developed by (Flanagan *et al,* 1995) will be used to list and statistically collect the behavioral data. An analysis of variance of the collected data will be performed. A dose response graph will be generated for each drug and will be compared with its negative control including the other applied substances. Final statistical analysis of the dose response graphs produced will be completed by using F-tests for the EC50 of each compound.