SYLLABUS:

Animal models of headache allow us to study mechanism and search for novel therapeutic targets in a way that cannot be done in human subjects [1, 2]. Animal models of migraine have contributed significantly to our understanding of migraine pathophysiology. This lecture will highlight some of the most commonly used animal models of headache and some novel approaches to preclinical studies of headache disorders.

Most of the animal models available have focused on migraine, but there are also useful animal models for other primary headache and facial pain disorder. Some examples include trigeminal autonomic cephalalgia [3], medication overuse headache [4], temporomandibular join disorders [5], and trigeminal neuralgia [6].

Animal models of headache disorders focus on specific aspects of the disease (vascular changes, pain, photophobia, etc). There is no animal model available to provide a complete picture of migraine or other headache disorders [7]. Despite the general description of these animal models as “migraine models”, it is important to recognize that these are models that address different aspects of migraine pathophysiology and not the human disease in its entirety. Most animal models study the nociceptive trigeminovascular system and focus on the pain aspect of the disorder. However, in recent years new animal models have aimed at dissecting the neural basis of other migraine symptoms such as photophobia and phonophobia. Nausea and vomiting remain challenging symptoms to study in rodents because these animals don’t vomit.
The techniques employed in preclinical models of migraine include electrophysiology, immunohistochemistry, biochemistry, imaging, laser Doppler flowmetry, and behavioral assessments. In addition, genetic and pharmacological approaches are employed in combination with the different techniques mentioned.

Due to time constraints, this lecture will not be able to provide an exhaustive review of all animal models of headaches. The attendees are encouraged to read a recent series of review articles that provided a critical summary of the strengths and caveats of current experimental in vivo models of migraine [8-10].

In this lecture we will summarize some representative animal models used in the study of migraine pathophysiology, including genetic models, pharmacological models, models of dural trigeminovascular nociception, and models of spreading depression. Novel approaches to study the affective component of pain and non-pain related symptoms such as photophobia will also be discussed. Finally, we will address sex and age related differences in animal models of migraine [11, 12].
References:


