Lamprey is a lower vertebrate with robust recovery ability following injuries to the central nervous system (CNS). This characteristic is limited in higher vertebrate such as human. Thus, lampreys are often used as a research model for CNS injury experiments. Many systems in the human body are highly organized, for example, the trigeminal system receives sensory information from different parts of the face (upper teeth and gums, etc.) and project motor outputs to specific jaw muscles during chewing. The trigeminal system also exists in lamprey. Even though lamprey can regenerate and restore to its normal functions following nerve injury (i.e. spinal cord injury) it is not known whether the regenerated nerve have grown back to the proper location leading to normal behavioral functions. Thus, the present study attempt to answer this question by first establishing the presence of the trigeminal nerve organization and whether this organization is restored following complete lesion of the trigeminal nerve. Fluorescent dyes were used to identify the organization of the trigeminal system in normal and trigeminal nerve lesioned animals.

Following lesion to the trigeminal nerves, the physical integrity of the nerves was restored. The restoration of the trigeminal system organization was most evident in animal with longer recovery time. This suggests that there are guidance cues in the environment that guide the regenerating nerve to the proper location. Further investigation of this molecular guidance factors will provide insight into methods to improve and direct regenerating nerve following neural injury in higher vertebrate, such as human.