The sphenopalatine ganglion (SPG) is the main parasympathetic ganglion that is involved in regulating cerebral blood flow. SPG neurons have been implicated in some types of migraine headaches as well as trigeminal neuralgia, but their precise role has yet to be determined. A recent clinical study reported that co-application of buprenorphine with carbamazepine resulted in pain relief from trigeminal neuralgia. In this lecture, I will describe the electrophysiological characterization of acutely isolated rat SPG neurons and the voltage-gated Ca$^{2+}$ channels expressed in this neuron type. Moreover, data will be presented which suggests that mu opioid receptors and muscarinic acetylcholine receptors can, under certain conditions, cross-talk and modulate the signal transduction mechanisms of the other receptor and effect Ca$^{2+}$ channels. The implications of these findings in the clinical setting will be discussed. Finally, in this lecture I will discuss how the findings of this study were used as a springboard for a translational project between a pediatric anesthesiologist and my laboratory to determine whether mu opioid receptors are present in SPG neurons. The collaborative effort seeks to examine whether the local application of opioids to SPG would influence cerebral blood flow.