Central nervous system integration of sensory inputs is critical for orchestrating physiological responses to stress. The focus of my doctoral research was investigating the physiological consequences of sensory stimulation to begin to answer the question of how the body integrates information about stress, pain and other sensory inputs. Conscious, chronically instrumented rabbits were used to minimize the influence of anesthesia and surgery. Two studies explored the role of the midbrain periaqueductal gray in modulating the cardiovascular response to hemorrhage and sensory stimulation. Other studies describe the assessment and use of a model of visceral pain, colorectal distension, to quantify the effect of concurrent stress and pain on the cardiovascular and respiratory response to blood loss. The results from these studies provide insight into 1) a central nervous system site for integration of multiple sensory inputs; and 2) potential sex differences in the response to concurrent stress, pain and hemorrhage.