The Spine Research lab is a 1400 square foot neurophysiology and histology laboratory devoted to neural trauma and pain research and has been in existence since 1992. The Laboratory is directed by Professor John Cavanaugh.

**Funding:** The lab has received more than $5 million in funding. Funding agencies include the National Institutes of Health, the U.S. Centers for Disease Control, the National Highway Traffic Safety Administration, Orthopaedic Research and Education Foundation, the Arthritis Foundation and the Aircast Foundation.


**LOW BACK PAIN STUDIES**

The total indirect cost of musculoskeletal disorders is $50-100 billion annually, with $20 billion in workers compensation costs. The low back being the most frequent body part injured in the workplace. The Spine lab is studying the mechanisms by which nerve roots are irritated by a herniated disc as well as the effect of muscle fatigue on low back injury. We are investigating alternative treatment strategies to treat these injuries.

**WHIPLASH STUDIES**

The prevalence of chronic neck pain is approximately 14%. In the United States neck sprains are the most serious injuries reported by 40% of insurance claimants. The Spine Lab is studying the effect of strain and strain rate in facet joints on the discharge of pain fibers and other neurons in these joints. We are also investigating the response of the muscles to facet strain and how this may lead to muscle spasm.

**BRAIN INJURY AND NEURAL TRAUMA**

In the US, an estimated 50,000-75,000 deaths are caused by traumatic brain injury (TBI) annually, with another 6 million individuals suffering neurobehavioral sequelae and functional loss. Significant efforts are underway to understand the mechanisms of TBI to prevent such injury.

Our lab is studying the ability of newer MRI imaging modalities such as Diffusion Tensor Imaging to diagnose diffuse axonal injury (DAI) in the brain. DAI is a common injury in patients suffering severe TBI but is also very difficult to diagnose. We are also working with our finite element modeling group to study the effect of stress and strain in brain white matter on DAI. We have already characterized the effects of stress and strain on nerve conduction and axonal injury in spinal nerves.
RESEARCH PERSONNEL

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EQUIPMENT

Histology equipment includes Wild-Leitz microscope, Leica MZ8 Stereomicroscope with SPOT digital camera, Reichert-Jung rotary microtome, Reichert Jung ultracut microtome, Leica CM3050-Cryostat. Neurophysiology equipment includes storage oscilloscopes, two seven channel analog data recorders, AM Systems preamplifiers, two 16 channel, 12 bit A/D converters with chart recorder, histogram, and spike discrimination software, BIOPAC MP-30, and Bortec customized 16-channel amplifier for EMG recording. Materials testing equipment includes Parker-Hannifin actuator, 3200 ELF Endura-TEC materials testing machine and high speed digital video cameras.