College Obtains Confocal Microscope

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Iowa State University recently acquired a Laser Scanning Confocal Microscope. The microscope is located at 1082 Veterinary Medicine in the Image Analysis facility. Confocal microscopy is an improvement over conventional light and fluorescence microscopy in that a finely focused laser beam that rapidly scans the specimen at a single depth illuminates the specimen. Only a thin plane is illuminated within the object, and objects outside of the plane have little effect on the quality of the image. The result is a crisp, blur-free image. Images from optical sections taken at different depths can be stored in a computer and used to reconstruct a threedimensional image of the entire object.

While the technology is approximately ten years old, there are currently only two high-resolution confocal microscopes in the state of Iowa. The confocal microscope at Iowa State is used for various research projects in the field of veterinary medicine, including cell biology, embryogenesis, and neuroscience.

Dr. Srdija Jeftinija, Professor of Biomedical Sciences at Iowa State, is currently using the confocal microscope in neuroscience research. He notes that while confocal microscopy can be used to view fixed tissue, its benefits are most obvious when viewing changes in living cells. In electron microscopy, the tissue must be processed, and important markers are often lost. Confocal microscopy does not require sectioning of the tissue. Rather, a whole cell can be scanned and subsequently reconstructed.

Confocal microscopy can be used to study not only structure, but also function of the cell. For example, Dr. Jeftinija is currently studying the role of calcium, an important secondary messenger, in intracellular communication. Cells can be loaded with fluorescent dyes that bind calcium. The cells then fluoresce at different wavelengths, and the confocal microscope captures the emitted light. As a result, Jeftinija can monitor changes in intracellular calcium and correlate this information to changes occurring within the cell. In this way, Jeftinija can determine the functional changes of neurons and glial cells in neurodegenerative diseases.

While technology is constantly changing, the benefits of a Confocal Microscopy System will be long-term. The ability to observe structure as well as function of living cells will assist researchers in working on the mechanism of disorders and in the long run, will lead to a better understanding of the pathogenesis of many diseases of veterinary importance.

Julie Schneider is a first-year veterinary student at the Iowa State University College of Veterinary Medicine.