

March 1999 (Volume 40, Number 3)

## **"Uncaging" Using Optical Fibers to Deliver UV Light Directly to the Sample**

*Vladimir Parpura, Philip G. Haydon*

Laboratory of Cellular Signaling, Department of Zoology and Genetics, Iowa State University, Ames, IA, USA

Photolysis or "uncaging" of caged compounds represents a significant tool in cell biology and chemistry. It provides a means for quantitative control of compound delivery with temporal and spatial resolution while observing their consequences for cellular signaling. We discuss the use of ultraviolet-transmitting optical fibers to directly deliver UV energy to the sample, combined with a nitrogen pulsed laser as a source of UV light. In this approach the size of the photolysis area is regulated by the exit aperture of the fiber tip which is controlled by pulling the optical fibers to desirable diameters. A diode (red) laser that is also coupled to the optical fiber aids the location of UV energy delivery through the fiber. We used this method to quantitatively uncage norepinephrine and calcium. The major advantage of this photolysis approach is its independence of microscope objectives and traditional optical pathways. Because the optical pathway of the microscope needs no modification to accommodate this photolysis system, integration with other experimental methods, such as electrochemistry, electrophysiology, confocal microscopy, and wide-field epifluorescence microscopy, is relatively simple.

Key words: astrocytes; calcium; noradrenaline; norepinephrine; photolysis; receptors, adrenergic; second messenger systems; ultraviolet rays