MNI-glutamate

Peak absorption is at 340 nm, quantum yield 0.085 and release following a light pulse has half-time 200 ns. MNI-glutamate shows no interference with glutamate receptors or transporters at mM concentration but interferes with synaptic activation of GABA-A receptors with IC50 0.5 mM. Release of glutamate is stoichiometric with cage consumption during progressive photolysis. One photon photolysis gives about 35% conversion with a 1 ms flashlamp pulse in a typical set-up. With laser photolysis, full conversion in a 1 µm laser spot at 405 nm requires 200 nJ.µm -2 at the focus, a 0.1 ms exposure at 2 mW. At 355 nm this requires about 20 µJ.µm -2 ; however with an upright microscope 355 nm light is subject to substantial losses in the bath solution at concentrations >300 µM.

Two photon photolysis

The efficiency of two-photon photolysis of MNI-glutamate is low, the TP photolysis cross-section is measured as 0.02-0.06 GM (10-50 cm4.s /photon) at 730 nm. For 5 mW, average power and usual TiS laser beam parameters at 730 nm, the two-photon conversion of MNI-glutamate in an excitation volume formed by a 0.9 NA objective is calculated as requiring cage concentrations of 10 mM to generate 100 µM free glutamate. Exposures longer than 200 µs generate glutamate in a volume larger than the excitation volume.

References


