Glutamate excitotoxicity is involved in stroke-related brain injury and in various neurodegenerations. Sustained elevation of cytosolic calcium, or calcium dysregulation, is the major factor that contributes to neuronal demise following prolonged exposure to excitotoxic glutamate. In my seminar, I will present our recent data about the role of mitochondria and plasmalemmal sodium/calcium exchanger in regulation of cytosolic calcium and cell death in neurons exposed to glutamate.