

Neuropathological changes in the rat brain cortex in vitro: effects of kainic acid and of ion substitutions

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The ionic mechanisms that may contribute to the neurotoxicity of kainic acid, were studied in a system of rat thin neocortical slices superfused in vitro. Slices superfused for 3 h under control conditions showed an essentially normal aspect when studied by light microscopy. Presence of 30 μ M kainate in the superfusion fluid induced neuronal swelling, nuclear condensation and signs of necrosis in some cells, while other neurons, especially in deeper layers, appeared dark and condensed, with microvacuolation. The neuropil presented numerous profiles of swollen dendrites. When the slices were superfused with chloride-free medium, a large number of pyknotic neurons was seen. This was further enhanced by 30 μ M kainate, which produced no swelling in this medium. These effects of Cl-free medium were almost entirely prevented in Cl-free medium without calcium and with 0.1 mM of EGTA. Sodium-free medium induced a marked neuronal swelling that was not much changed by kainate. When calcium in an