# Glutamate in the Glomus Cells of the Cat Carotid Body: Immunocytochemistry and in Vitro Release

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**Abstract**

The identity of the postulated excitatory transmitter released by glomus cells is not known. Since our preliminary work on paraffin sections of the cat carotid body indicated that most glomus cells were intensely immunoreactive to glutamate, we decided to investigate whether glutamate might be such a transmitter, using two approaches. One approach was to make a quantitative immunogold analysis of ultrathin sections to assess the level of glutamate immunoreactivity of glomus cells relative to glia and to afferent axon terminals. The other approach was to measure the potassium-induced release of glutamate from carotid bodies superfused in vitro. We consistently found that glomus cell profiles had 50% more immunogold particles per unit of area than glial cell or axonal profiles. However, the levels of glutamate immunoreactivity of glomus cells were lower than those expected for glutamatergic terminals. We also found that glutamate was not released from in vitro carotid bodies stimulated with high concentrations of potassium. These findings indicate that the oxygen-sensitive glomus cells have a high concentration of glutamate, which is not released by superfusion with high potassium. Thus, glutamate is not the excitatory transmitter released by glomus cells. We speculate that the high concentrations of glutamate might instead be related to the known dependence of the "in vitro" chemosensory activity on metabolic substrates.