Lack of correlation between cholinergic-induced changes in chemosensory activity and dopamine release from the cat carotid body in vitro

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Abstract

We studied the effects of nicotine, acetylcholine (ACh) and dopamine (DA) on the frequency of chemosensory discharges ($f_x$) and catecholamine (CA) efflux in the cat carotid body superfused in vitro. CA efflux was measured by changes in CA concentration ($\Delta$CA) determined by chronoamperometry with nafionated carbon-fiber microelectrodes inserted in the carotid body, while $f_x$ was recorded simultaneously from the carotid (sinus) nerve. Nicotine (10–20 μg) and ACh (>100 μg) increased $f_x$ in all carotid bodies ($n=16$), but produced a delayed $\Delta$CA (~0.65 μM) in only half of them. Eserine potentiated ACh-evoked increases in $f_x$ and CA effluxes. Nicotine and ACh-induced $\Delta$CA were rapidly reduced upon repeated administration. While $f_x$ increases evoked by low doses of nicotine or ACh were reduced or abolished by prior administration of exogenous DA (>100 μg), CA effluxes were enhanced and hastened. Thus, cholinergic-induced changes in $f_x$ are dissociated from CA efflux.