Abstract

In order to test the hypothesis that carotid body (CB) chemoreception depends on the functions of anion channels and HCO$_3^-$/Cl$^-$ exchangers, we studied the effects of the anion channel blocker anthracene-9-carboxylic acid (9-ANC), the carbonic anhydrase inhibitor methazolamide, and the HCO$_3^-$/Cl$^-$ exchanger blocker 4,4-diisothiocyanoatostilbene-2,2'-disulfonic acid (DIDS) on the chemosensory discharges of cat CB, perfused–superfused in vitro at 36.5±0.5°C, with a modified Tyrode solution. The chemosensory responses to hypoxia (P$_{O_2}$≈50 Torr), hypercapnia (P$_{CO_2}$≈60 Torr, pH=7.10), nicotine (2–4 nmol) and NaCN (20–40 nmol) were recorded. 9-ANC (2 mM) and DIDS (10 μM) decreased the chemosensory baseline activity, and eliminated the initial peak responses to hypercapnia and hypoxia and increased the time to achieve it. Methazolamide (0.13 mM) did not alter the effect of 9-ANC. The steady state responses to hypoxia and hypercapnia were not diminished after 9-ANC but DIDS lowered the responses. Responses to NaCN effects were all diminished but those to nicotine were not affected. The results suggest that the functions of anion channels and HCO$_3^-$/Cl$^-$ exchangers are important for the resting dischargers and for the fast responses to hypoxia and hypercapnia.