# Supporting Information

**Tresguerres et al. 10.1073/pnas.0911790107**

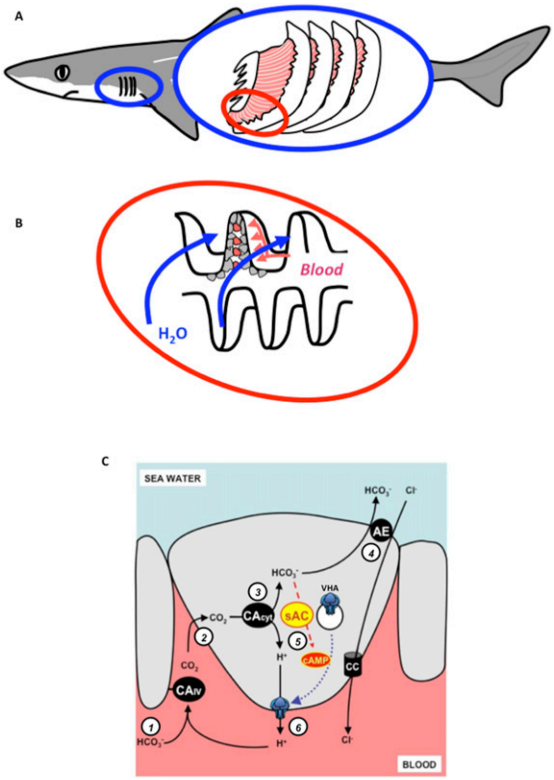


**Fig. S1.** Dogfish gill and VHA translocation in response to blood alkalosis. (*A*) Dogfish have four branchial arches (plus one hemibranch, not drawn) at each side. (*B*) Each gill has several filaments with finger-like protrusions (lamellae). Blood and seawater flow in a countercurrent fashion. (*C*) Subset of cells in the gill epithelium is VHA-rich, $H^+$-absorbing, and $HCO_3^-$-secreting. (1) During increased blood $HCO_3^-$ and pH, $HCO_3^-$ in blood is dehydrated into $CO_2$ by extracellular CA ($CA_{IV}$) (1). (2) $CO_2$ enters the VHA-rich cells. (3) Once inside, $CO_2$ is hydrated back into $H^+$ and $HCO_3^-$ by intracellular CA ($CA_{cyt}$) (2, 3). (4) $HCO_3^-$ is secreted to seawater in exchange for chloride, probably via a Pendrin-like anion exchanger (4). (5) Elevated intracellular $HCO_3^-$ activates sAC to generate cAMP, which triggers the microtubule-dependent translocation of VHA (blue icon) containing cytoplasmic vesicles to the basolateral membrane. (6) Basolateral VHA re-absorbs $H^+$ into the blood to counteract the original alkalosis (5–7). The positive current is probably neutralized by a transepithelial chloride conductance (CC).

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2. Tresguerres M, Parks SK, Wood CM, Goss GG (2007) V-$H^+$-ATPase translocation during blood alkalosis in dogfish gills: Interaction with carbonic anhydrase and involvement in the postfeeding alkaline tide. *Am J Physiol* 292:R2012–R2019.
3. Perry SF, Gilmour KM (2006) Acid-base balance and $CO_2$ excretion in fish: unanswered questions and emerging models. *Respir Physiol Neurobiol* 154:199–215.
4. Piermarini PM, Verlander JW, Royaux IE, Evans DH (2002) Pendrin immunoreactivity in the gill epithelium of a euryhaline elasmobranch. *Am J Physiol* 283:R983–R992.
5. Tresguerres M, Katoh F, Fenton H, Jasinska E, Goss GG (2005) Regulation of branchial V-H(+)-ATPase, Na(+)/K(+)-ATPase and NHE2 in response to acid and base infusions in the Pacific spiny dogfish (*Squalus acanthias*). *J Exp Biol* 208:345–354.
6. Tresguerres M, Parks SK, Katoh F, Goss GG (2006) Microtubule-dependent relocation of branchial V-$H^+$-ATPase to the basolateral membrane in the Pacific spiny dogfish (*Squalus acanthias*): A role in base secretion. *J Exp Biol* 209:599–609.
7. Tresguerres M, Parks SK, Wood CM, Goss GG (2007) V-$H^+$-ATPase translocation during blood alkalosis in dogfish gills: Interaction with carbonic anhydrase and involvement in the postfeeding alkaline tide. *Am J Physiol* 292:R2012–R2019.

**Table S1. Summary of the statistics used in Table 1**

| Variable | Treatment effect | Time effect | Interaction effect | Additional test |
|---|---|---|---|---|
| pH | S | S | NS | Tukey–Kramer planned test |
| $[HCO_3^-]$ | S | S | S | Bonferroni's posttest |
| $PCO_2$ | NS | S | NS | None |

All variables were initially analyzed using repeated-measures two-way ANOVA. NS, no statistical significant differences found ($P \geq 0.05$); S, statistical significant differences found ($P < 0.05$).