Poster for Erice
The effect of external pH on the Ca\(^{2+}\):H\(^+\) coupling ratio of the plasma membrane calcium ATPase in snail neurones.

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Snail (Helix aspersa) neurones are large enough for several microelectrodes and regulate the internal calcium by a powerful PMCA. They show no Na:Ca exchanger activity. The extrusion of one Ca\(^{2+}\) ion is normally coupled to the uptake of two H\(^+\) ions. (Thomas 2009 J Physiol. 587; pp 315–327) To explore the effects of both external and internal pH (pH\(_o\) and pH\(_i\)) on this coupling ratio I assessed H\(^+\) uptake by measuring surface pH changes (ΔpH\(_s\)) with pH-sensitive microelectrodes while Ba\(^{2+}\) or Ca\(^{2+}\) loads were extruded. Ru360 or ruthenium red injection showed that injected Ca\(^{2+}\) was partly taken up by mitochondria, but Ca\(^{2+}\) entering through channels was not. I changed external pH using a mixture of three buffers to minimise changes in buffering power. With depolarisation-induced Ca\(^{2+}\) or Ba\(^{2+}\) loads the ΔpH\(_s\) was not changed significantly over the pH range 6.5 to 8.5. With Ca\(^{2+}\) injections into cells with mitochondrial uptake blocked the ΔpH\(_s\) were significantly smaller at pH 8.5 than at 7.5, but this could be explained in part by the slower rate of activity of the PMCA. Low intracellular pH also changed the ΔpH\(_s\) responses to Ca\(^{2+}\) injection, but not significantly. Again this may have been due to reduced pump activity at low pH\(_i\). I conclude that in snail neurones the PMCA coupling ratio is either insensitive or much less sensitive to pH than in the two types of cell previously investigated; red blood cells or barnacle muscle.