

**Supplementary Figure 1 – pH-dependence of the reactivation time course of heterologously expressed ASIC currents.**

Currents were recorded at a holding potential of -50 mV from COS cells transfected with ASIC1a (A), ASIC2a (B) and ASIC1a+2a in a 2:1 transfection ratio (C), activated by pH drops from various resting pH values to pH 5.0. The current amplitude was expressed as a ratio of the amplitude of the control current ( $I/I_{\text{control}}$ ) and plotted as mean  $\pm$  sem (n ranging from A: 3 to 12, B: 3 to 23, C: 3 to 19) as a function of the time interval (s) between the end of the control pH drop and the onset of the next pH drop. Data were fitted as a one phase exponential following the equation  $Y = Y_{\text{max}}*(1-\exp(-k*t))$ , with half reactivation time  $T_{0.5} = 0.69/k$ . For ASIC1a (A) ○: pH 9.0,  $T_{0.5} = 3.01$  s; ●: pH 7.4,  $T_{0.5} = 11.05$  s; △: pH 7.2,  $T_{0.5} = 23.43$  s; for ASIC2a (B) ○: pH 9.0,  $T_{0.5} = 0.03$  s; ●: pH 7.4,  $T_{0.5} = 0.92$  s; ▽: pH 7.3,  $T_{0.5} = 1.35$  s; ▲: pH 6.9,  $T_{0.5} = 3.81$  s; ■: pH 6.6,  $T_{0.5} = 10.46$  s; ◇: pH 6.0,  $T_{0.5} = 152.8$  s; for ASIC1a+2a (C) ●: pH 7.4,  $T_{0.5} = 0.50$  s; ▽: pH 7.3,  $T_{0.5} = 0.63$  s; ▲: pH 6.9,  $T_{0.5} = 7.61$  s; ■: pH 6.6,  $T_{0.5} = 18.08$  s. Insets: enlargements on the first 10 seconds.

**Supplementary Figure 2 – In situ hybridization experiments with sense and antisense probes for ASIC1a and ASIC2a in mouse adult spinal cord.**

In situ hybridization with antisense probes for ASIC1a (top left) and ASIC2a (bottom left) and the sense probe (top and bottom right) on adult spinal cord sections, detected using DAB without any counter-staining. For each experiments, a hemi-spinal cord is shown (scale bar = 200  $\mu\text{m}$ ) along with three enlargements (scale bar = 50  $\mu\text{m}$ ) localized by black boxes on the corresponding hemi-spinal cord. Orientation of the slices and position of 1-9 laminae are figured on a drawing (c) of the spinal cord at the lumbar 5 level (adapted from Paxinos and Watson (1986)).

**Supplementary Figure 3 – Validation of the specificity of ASIC2a antibody by immunocyto-labelling (A) and immunohisto-labelling (B)**

**A. The ASIC2a rabbit polyclonal antibody specifically recognizes the channel protein in COS transfected cells.** Cells expressing myc-tagged ASIC2a were detected with the anti-myc antibody (upper left panel, green) and were double labelled with the specific anti-ASIC2a antibody (upper right panel, red). The high degree of colocalization (lower panel, yellow) confirmed the specificity of this ASIC2a antibody *in vitro*. Non-transfected cells were barely visible by their weak background fluorescence with the anti-myc antibody and did not exhibit immunoreactivity (lower panel, arrows). *Method:* Immunocytochemical experiments were done on COS-7 cells transiently transfected by the DEAE-dextran method with rat myc-ASIC2a cDNA (NH<sub>2</sub>-terminal myc tag). Cells were incubated together with the rabbit primary antibody against ASIC2a (1:100, Alomone) and with the mouse anti-c-myc antibody 9E10 (1:200; Santa Cruz Biotechnology) followed by the secondary antibodies goat anti-rabbit Texas Red (1:400; Jackson ImmunoResearch Laboratories) and goat anti-mouse FluoProbe 488 (1:200) (Interchim). Pictures were taken using an Axioplan 2 microscope (Carl Zeiss). **B. The ASIC2a rabbit polyclonal antibody specifically labels neurons expressing the ASIC2a mRNA in mouse adult spinal cord.** Immunohisto-labelling of ASIC2a (green) was performed on the same adult spinal cord section than *in situ* hybridization for ASIC2a detected by immunofluorescence (red), and the merged images are shown (yellow). Colocalization was observed throughout all spinal laminane, and is illustrated here in lamina 9.