Supporting Information

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Apyrase Alters the Electrophysiological Properties of Microglial Cells

To investigate the effect of apyrase and high extracellular [K^+] on the electrical properties of microglial cells, we recorded their current response to brief voltage steps away from the resting potential. Under control conditions, microglial cells showed small time-independent currents with a slight outward rectification when stepping from −124 to +56 mV, indicating the absence of any voltage-gated ion channels and reflecting their high membrane resistance (Fig. S1). Application of 100 U/mL apyrase triggered the activation of an inwardly rectifying conductance in microglial cells which required K^+ as the main intracellular cation and was blocked by Cs^+ (Fig. S1 *A* and *C*). The apyrase-evoked inward K^+ current was mimicked when applying (in the absence of apyrase) a concentration of potassium (raised by 20 mM) equivalent to that present in the solution containing apyrase, and was sensitive to 100 μM Ba^{2+}, a selective blocker of inwardly rectifying K^+ channels (Fig. S1 *B* and *D*). Thus, the high [K^+] content in the apyrase preparation triggers the activation of an inwardly rectifying K^+ conductance in microglia, which has recently been identified as being mediated mainly by $K_{ir}2.1$ (78), the conductance of which increases when external [K^+] rises (79). Dialyzing the K^+ out of the apyrase abolished these effects of apyrase (Fig. S2).

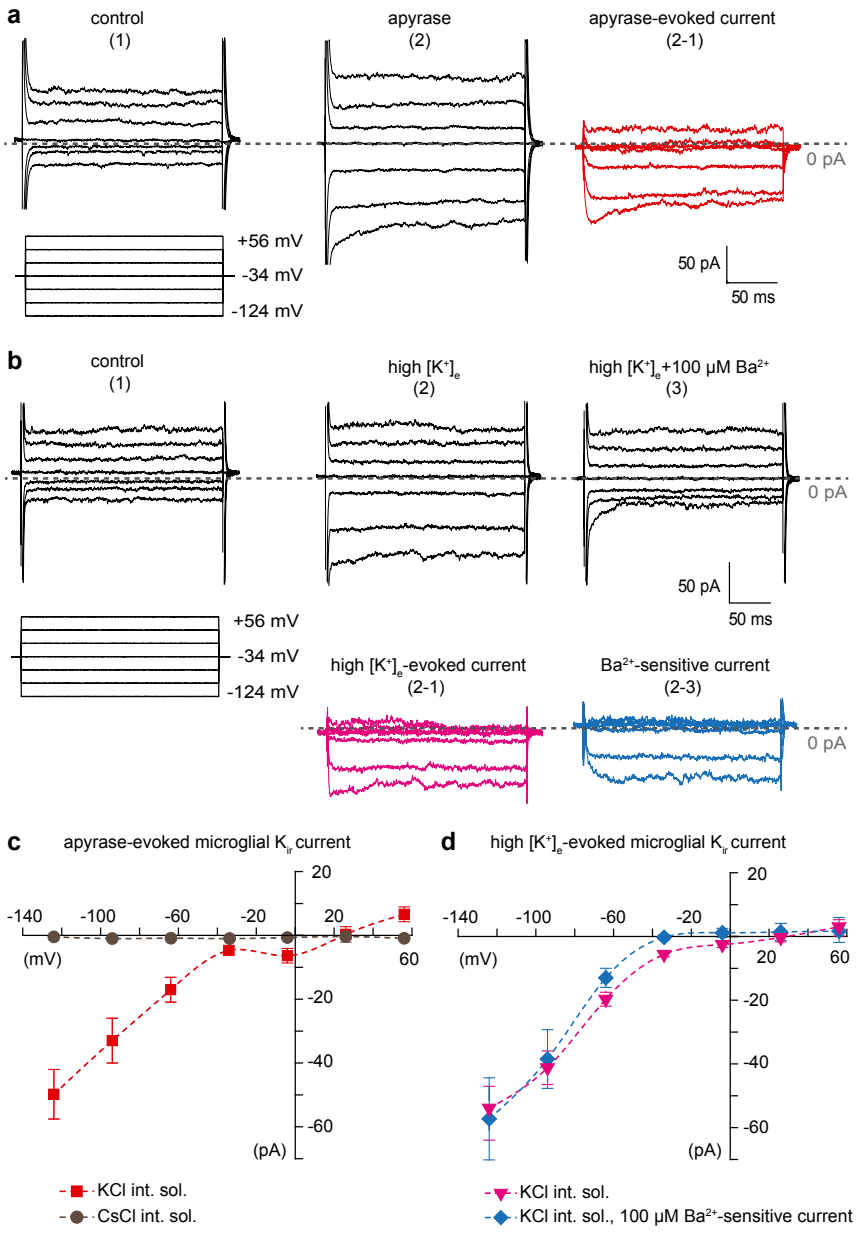

Fig. S1. Effect of apyrase on electrical properties of microglia. (*A*) Current responses of a single microglial cell to voltage steps in 30-mV increments away from a holding potential of −34 mV, in control solution (*Left*) and with nondialyzed apyrase added (*Middle*), which decreases the input resistance, especially at negative voltages. (*A*, *Right*) The apyrase-evoked current obtained by subtraction of the *Left* from the *Middle* traces. Dashed line indicates zero current level. (*B*) Current responses in normal solution (*Left*), in 22.5 mM K^+-containing solution (high $[K^+]_e$) (*Middle*; K^+-evoked current is shown underneath), and in 22.5 mM K^+ solution with 100 μM Ba^{2+} added to block inward rectifier channels (*Right*; Ba^{2+}-suppressed current is shown underneath). (*C*) Voltage dependence of the mean apyrase-evoked current as in *A*, when recorded with K^+ or Cs^+ as the main pipette cation. (*D*) Mean current evoked by high $[K^+]_e$ as in *B*, superimposed on the mean Ba^{2+}-blocked current recorded in 22.5 mM K^+. Data are presented as mean ± SEM.

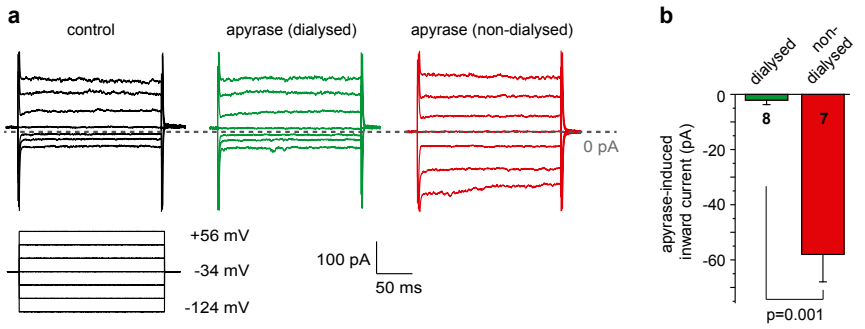

Fig. S2. Dialyzing apyrase retains microglial electrical properties. (*A*) Current responses of microglia to 30-mV voltage steps from a holding potential of −34 mV show that undialyzed apyrase (100 U/mL; Sigma; A7646) increases the membrane conductance, while dialyzed apyrase does not. Dashed line indicates zero current level. (*B*) Dialysis abolishes the inward current evoked by adding 100 U/mL apyrase (Sigma; A7646). Data are presented as mean ± SEM.