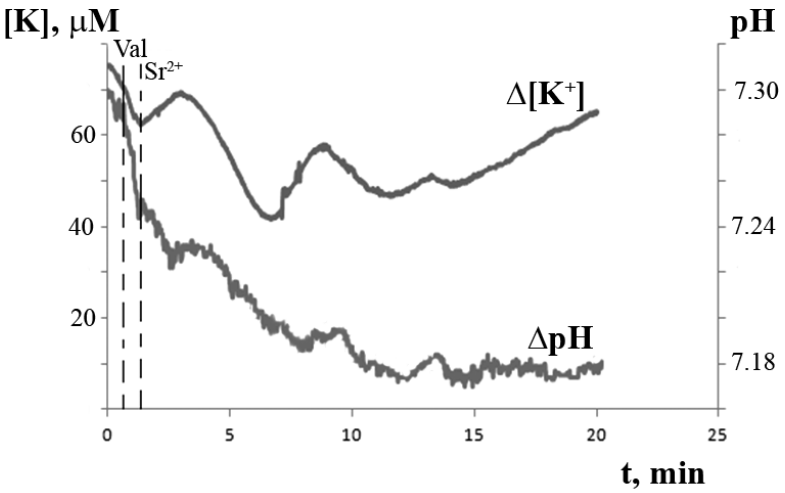


Figure S1. Simultaneous recording of Sr^{2+}/valinomycin-induced oscillations in K^+ fluxes and external pH in the suspension of rat liver mitochondria. The medium contained 20 mM sucrose, 1 mM KCl, 1 μM CsA, 1 μM rotenone, 5 mM succinic acid, 12.5 mM Tris (pH 7.3). Additions: 2 ng valinomycin and 45 nmol $SrCl_2$/mg of protein. Changes in the concentrations of K^+ and H^+ were recorded simultaneously in a 1-ml temperature-controlled cell with constant stirring at 26 C using ion-selective electrodes. The typical traces are presented (n = 5).

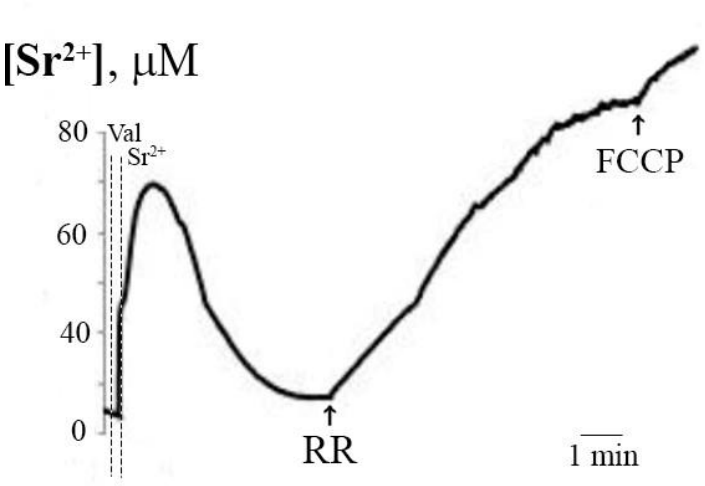


Figure S2. Ruthenium red (RR, 1 μM) prevents the extension of the Sr^{2+}/valinomycin-induced cyclic changes in strontium ion fluxes in rat liver mitochondria. The medium and experimental conditions were the same as in Figure S1. Additions: 2 ng valinomycin and 45 nmol $SrCl_2$/mg of protein. The concentrations of Sr^{2+} ions in the incubation medium were determined with an ion-selective electrode and an electrometrical system Record 4 (Russia). The typical traces are presented (n = 5).

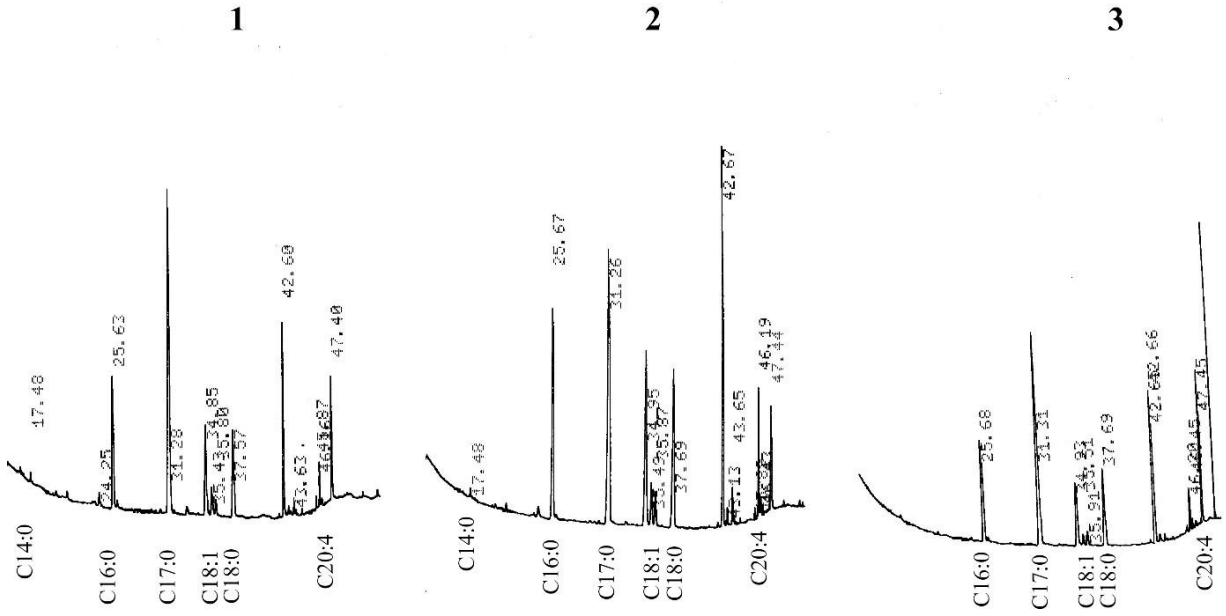


Figure S3. Gas-liquid chromatography profile of FFA methyl esters obtained from rat liver mitochondria before (control, **1**) and after the onset of Sr^{2+}/valinomycin-induced ion oscillations in the absence (0.1% DMSO) (**2**) or presence of 25 μM aristolochic acid (ArA), a phospholipase A2 inhibitor (**3**). Chromatograms were obtained on a glass open tubular column packed with Porapak Q (2mm i.d. x 1m) installed in a Pye-Unicam Model 304 gas chromatograph as described in the Material and Methods section. The typical chromatograms are presented (n = 4).

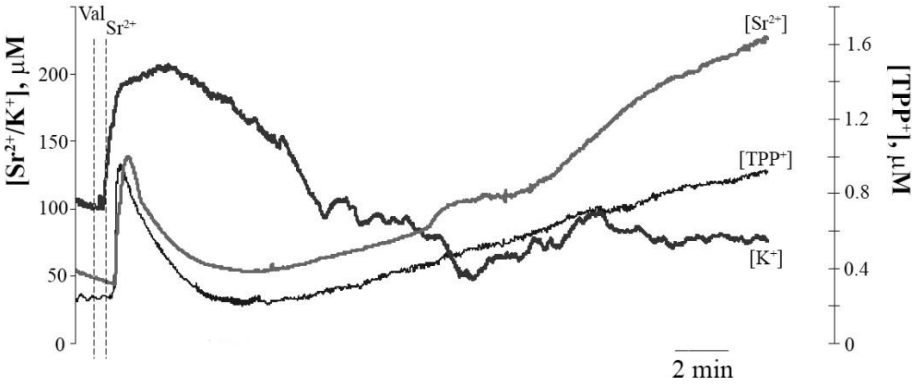


Figure S4. Blocking effect of $AACOCF_3$ (15 μM), a Ca^{2+}-dependent phospholipase A_2 inhibitor, on Sr^{2+}/valinomycin-induced cyclic changes in the fluxes of Sr^{2+}, K^+, and TPP^+ in rat liver mitochondria. The medium and conditions were the same as in Figure S1. Changes in the concentrations of Sr^{2+}, K^+, and TPP^+ ions were recorded simultaneously in a 1-ml temperature-controlled cell using an original multichannel electrometrical system Record 4 (Russia) and ion-sensitive electrodes. Additions: 2 ng valinomycin and 45 nmol $SrCl_2$/mg of protein. The PLA_2 inhibitor were added to the mitochondria 1 min before the addition of Sr^{2+}. The typical traces are presented (n = 5).

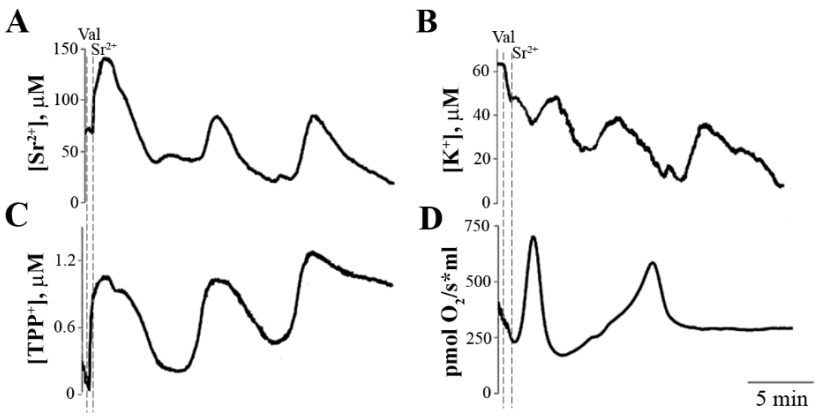
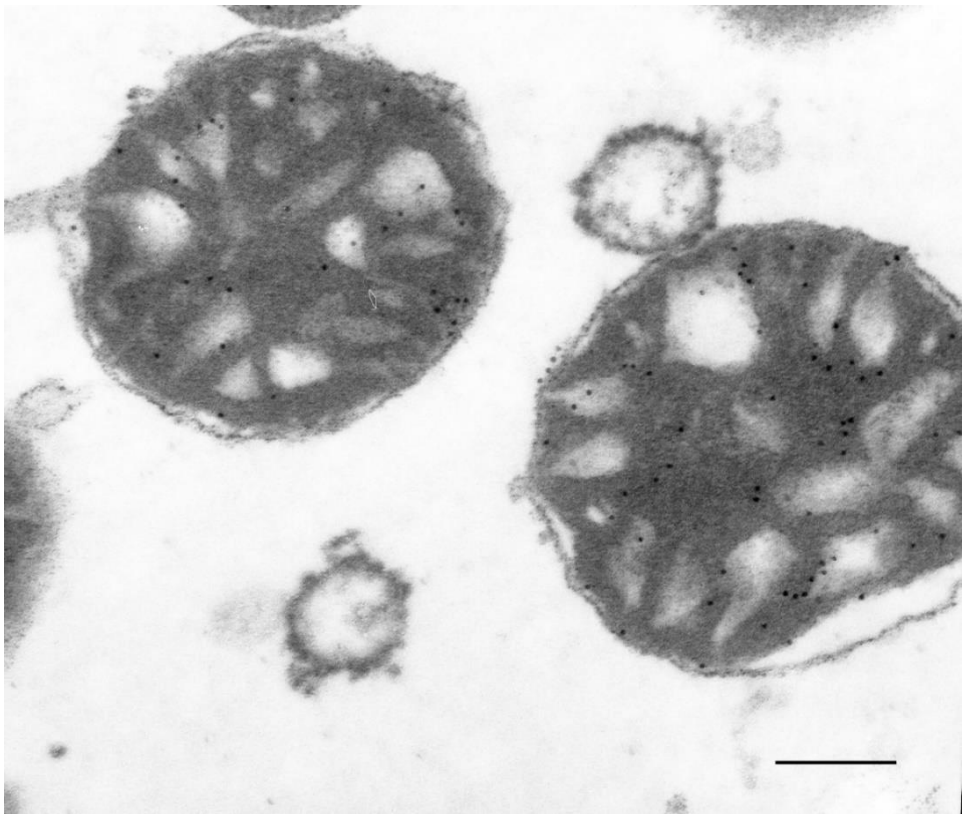
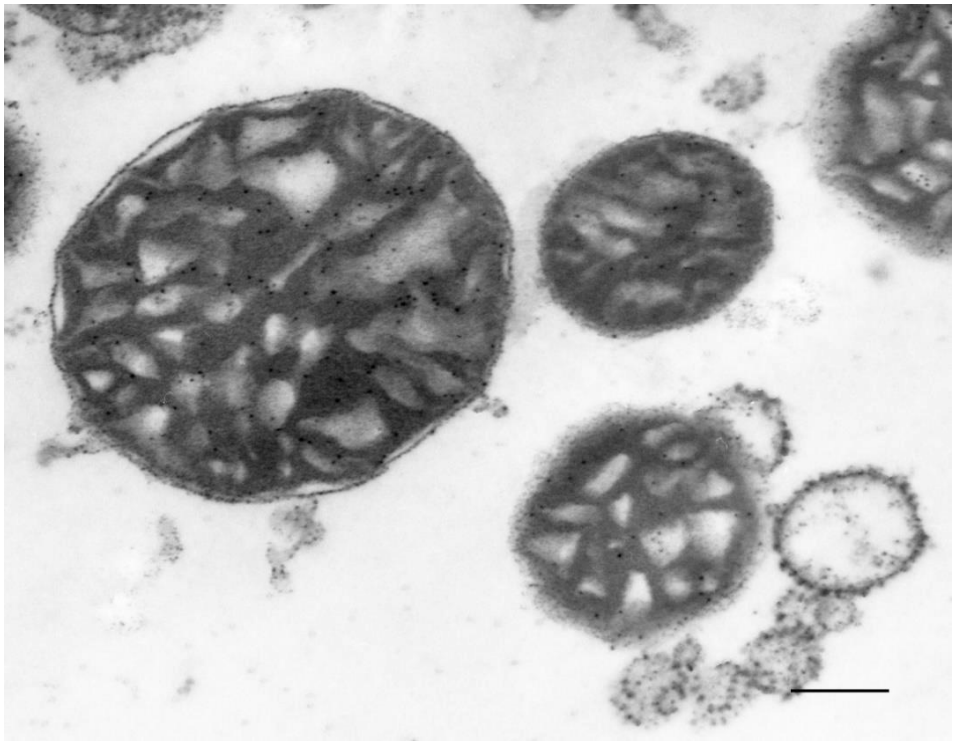


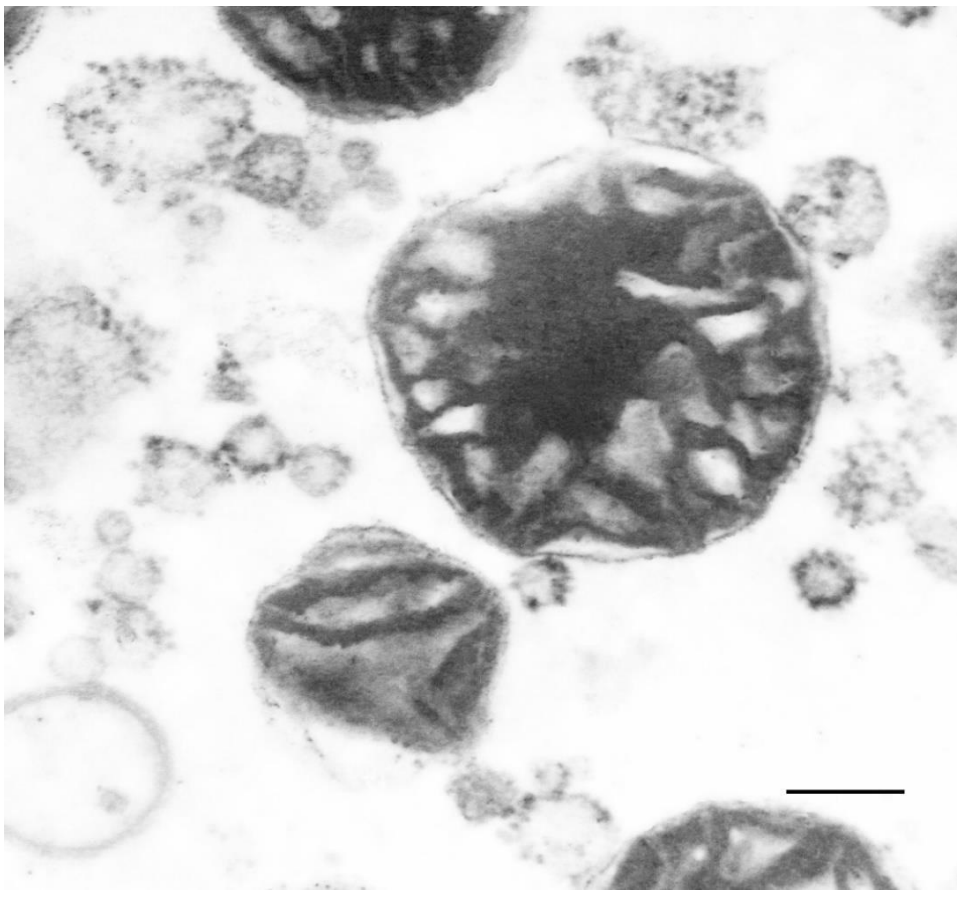
Figure S5. The Ca^{2+}-independent phospholipase A_2 inhibitor $PACOCF_3$ (20 μM) has no effect on Sr^{2+}/valinomycin-induced cyclic changes in the fluxes of Sr^{2+} (A), K^+ (B), TPP^+ (C), and the respiration rate (D) of rat liver mitochondria. The medium and conditions were the same as in Figure S1. Additions: 2 ng valinomycin and 45 nmol $SrCl_2$/mg of protein. The PLA_2 inhibitor was added to the mitochondria 1 min before the addition of Sr^{2+}. The typical traces are presented (n = 5).



(a)



(b)



(c)

Figure S6. Typical immunoelectron micrographs of isolated rat liver mitochondria treated with antibodies against the group IV cytosolic phospholipase A2 (**a**, **b**) or 0.1 M PBS buffer (**c**) in the

presence of 10-nm colloidal gold labeled antibodies: (**a, b**) Mitochondria were incubated with specific antibodies against the group IV Ca^{2+}(Sr^{2+})-dependent cPLA2 (Santa Cruz Biotechnology, USA) and secondary antibodies labeled with colloidal gold with a particle size of 10 nm (Sigma-Aldrich, St. Louis, MO, USA). Black granules are the binding sites for the antibodies and the protein; (**c**) Control; mitochondria were incubated in 0.1 M PBS buffer instead of anti-cPLA2 antibody. Scale bar, 0.25 μm.