

**Fig. 1 Murine gastric organoid culture. a** DIC images of murine gastric organoids in Day 1，Day 3，Day 5，and Day 7.**b** Immunofluorescent images of H+, K+ - ATPase in Day 1，Day 3，Day 5，and Day 7.**c** Immunofluorescent images of ezrin in Day 1，Day 3，Day 5，and Day 7.**d** Western blotting results of the changes of protein markers in murine gastric organoids.



**Fig. 2 Ethanol impaired gastric organoids. a** Trypan blue staining results of gastric organoids injured by EtOH with different concentrations (Bars= 200 μm). **b** Statistics of live cell photographs of gastric organoids impaired by EtOH. \*\**p*< 0.01.**c** Immunofluorescent images of gastric organoids at 0 min and 60 min after being injured by 50% EtOH by microinjection. **d** Western blot results of 6% EtOH-induced impairment to murine gastric organoids. \*\**p* <0.01.



**Fig. 3 Ethanol-induced gastric organoids impairment was caused by calcium-dependent calpain activation. a** Immunofluorescence of ezrin and F-actin in murine gastric organoids impaired by time gradient of 6% ethanol (bars= 50 μm).**b** Immunofluorescence of ezrin and H+, K+-ATPase in murine gastric organoids with 6% ethanol by time gradient (bars = 50 μm).**c** Western blotting and statistical analysis of murine gastric organoids of CaCl2 group, 6% ethanol group, E64 group and BAPTA group. **d** Western blotting and statistical analysis of murine gastric organoids of CaCl2 group, 6% ethanol group, EGTA group and BAPTA group. \*\*\**p*<0.001.



**Fig. 4 Ethanol-mediated calcium ion impairment on the localization of ezrin, H+, K+-ATPase and F-actin in murine organoids. a** Immunofluorescence staining of ezrin, actin and DAPI in murine gastric organoids with ethanol-mediated calcium ion impairment (bars = 50 μm). **b** Immunofluorescence staining of ezrin, H+, K+-ATPase and DAPI in murine gastric organoids with ethanol-mediated calcium ion impairment (bars = 50 μm).



**Fig. 5 Western blot results of ethanol-mediated calcium ion impairment in human gastric organoids.** \* *p* <0.05