

Propofol Modulates Calcium Signalling in Human Liver Sinusoidal Endothelial Cells: Implications for Mechanotransduction in Liver Surgery

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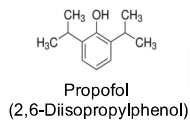
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INTRODUCTION

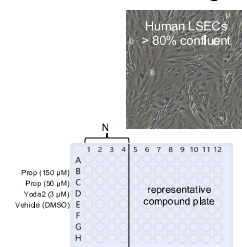
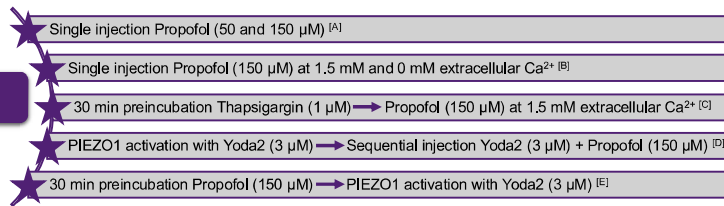
Propofol-based total intravenous anaesthesia is increasingly used in liver surgery and transplantation due to its potential to reduce hepatic ischemia–reperfusion injury and oxidative stress [1,2]. However, the underlying cellular mechanisms remain unclear. Recent studies[3] suggest propofol inhibits the mechanosensitive PIEZO1 channel, though its effects on native PIEZO1 are unknown. As PIEZO1 plays key roles in liver sinusoidal endothelial cell (LSEC) function and liver regeneration, we investigated whether propofol modulates PIEZO1-mediated Ca²⁺ signaling in human LSECs.

METHODS

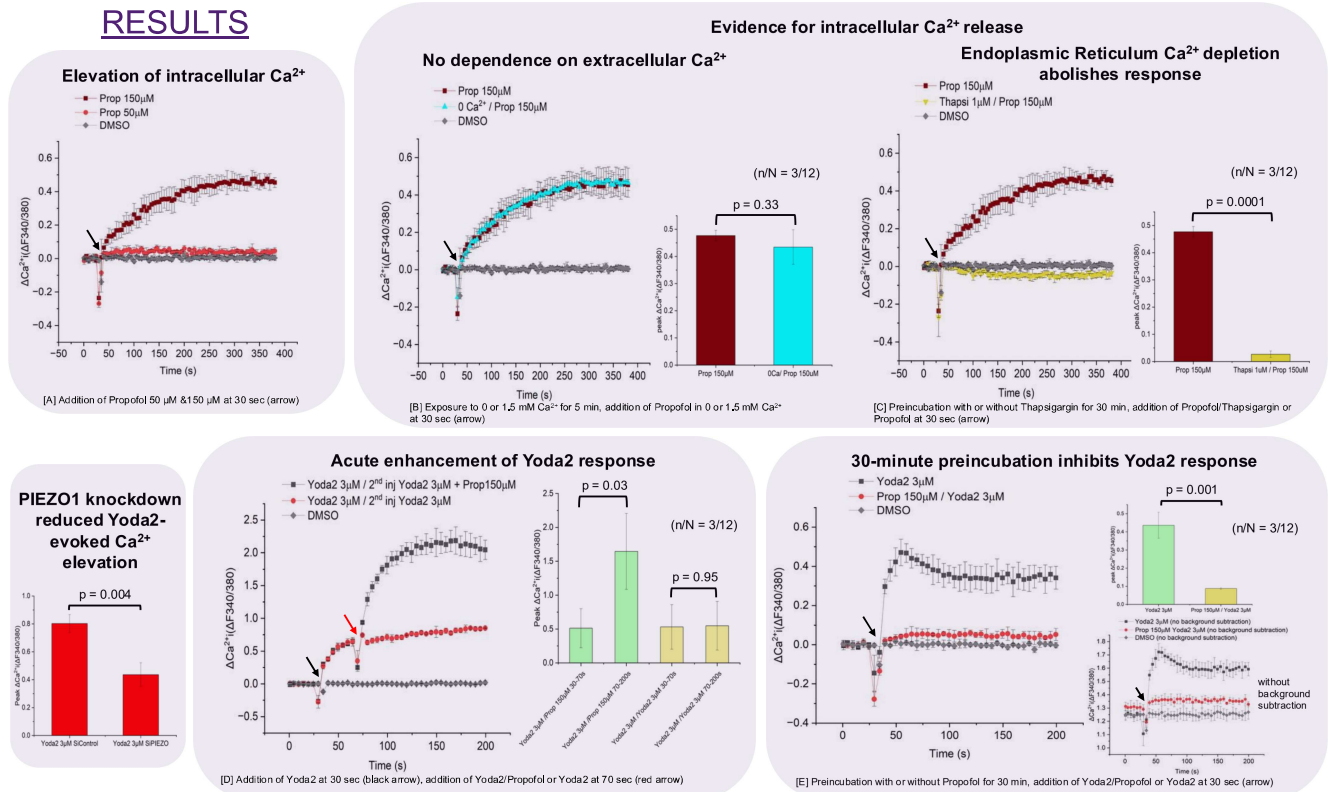
Primary human LSECs were studied using real-time intracellular Ca²⁺ measurements (FlexStation III) with exposure to Propofol and site of action investigated. Interactions with effects of PIEZO1 agonist Yoda2 were assessed using direct activation or pre-incubation and sequential protocols (double injections).



Protocols



RESULTS



CONCLUSIONS

Propofol has strong modulatory effects on Ca²⁺ signaling in human LSECs and PIEZO1 deletion confirmed Yoda2 specificity for PIEZO1 channels. The data indicate intracellular Ca²⁺ release and dual modulation of PIEZO1 channels (inhibition and enhancement), potentially mediated by endoplasmic reticulum mediated mechanisms, that warrants further investigation. Together these findings highlight important modulatory effects of Propofol on hepatic vasculature that involve PIEZO1 and could be relevant in liver surgery.

References:

1. J. Matsumi et al. Protective effect of propofol compared with sevoflurane on liver function after hepatectomy with Pringle maneuver: A randomized clinical trial. *PLoS One*. [2023]
2. C. Feng et al. A meta-analysis and systematic review of propofol on liver ischemia-reperfusion injury protection during hepatocellular carcinoma anesthesia surgery. *Ann Palliat Med*. [2021]
3. D. Yu et al. Propofol inhibits Piezo mechanosensitive channels. *Biophys J*. [2025]