

주최·주관 대한심장혈관흉부외과학회

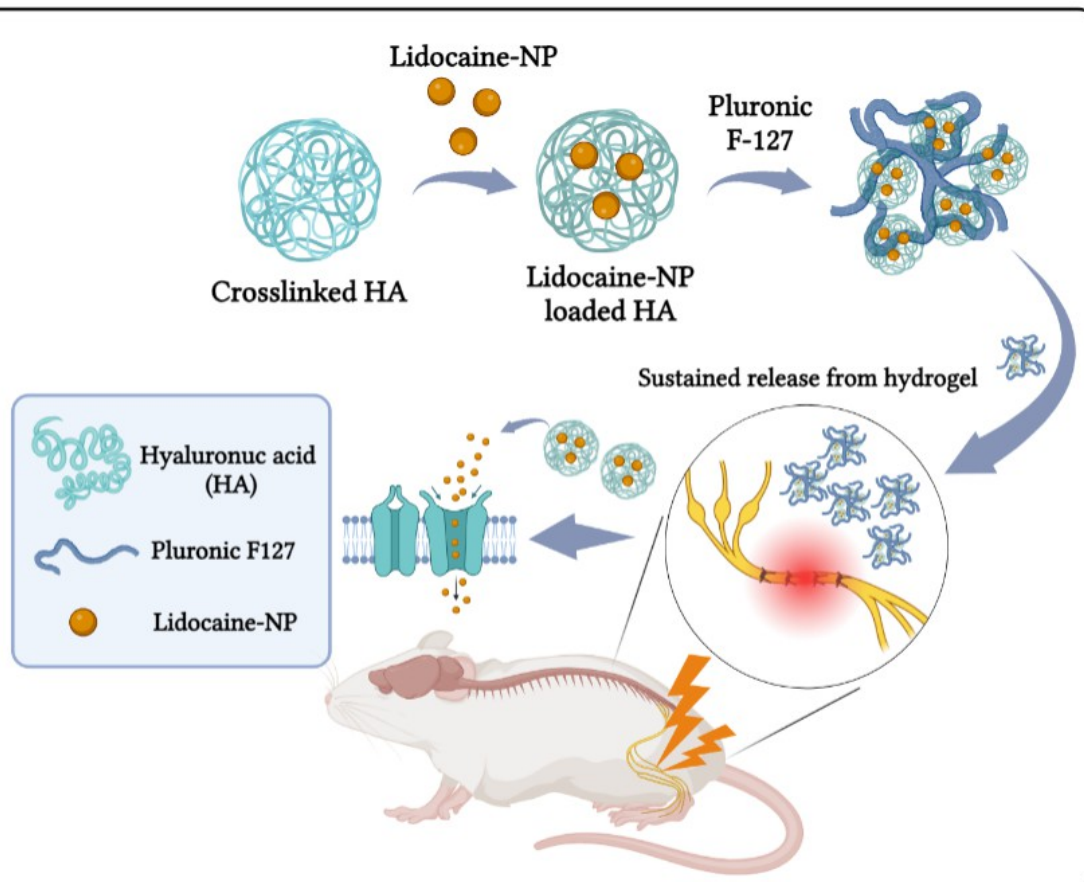
2024 대한심장혈관흉부외과학회 제56차 추계학술대회

2024. 10. 31 (Thu) - 11. 01 (Fri) 여수 엑스포 컨벤션센터



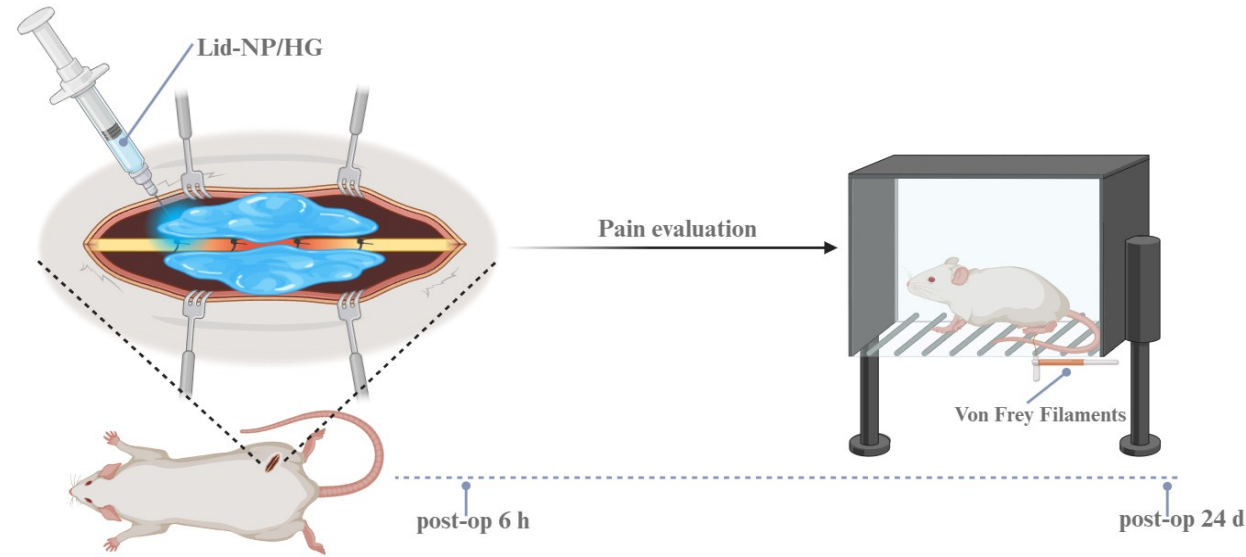
Injectable Thermosensitive Hydrogel for a Sustained Release of Lidocaine Local Anesthetic

Research schematic



- ❖ Post-operative pain management remains among the most common and largely unmet clinical problems.
- ❖ The primary limitation of traditional local anesthetics is their short duration of action following a single injection.
- ❖ **In this study, we developed a thermosensitive hydrogel loaded with lidocaine and assessed the safety of the hydrogel formulation and its effectiveness in providing pain control following injection.**

Method scheme. 1



- To examine the efficacy of the various types of lidocaine delivery formulations, the SD rats were induced with neuropathic pain by the CCI (chronic constriction injury) model.
- Pain evaluation assessed mechanical allodynia by measuring foot withdrawal thresholds in response to mechanical stimuli applied to the hind paw.
- The in vivo toxicity of the lidocaine-loaded hydrogel (Lid-NP/HG) was evaluated through histological changes in the main organs, including the heart, lungs, liver, spleen, kidneys, and muscles and blood tests.

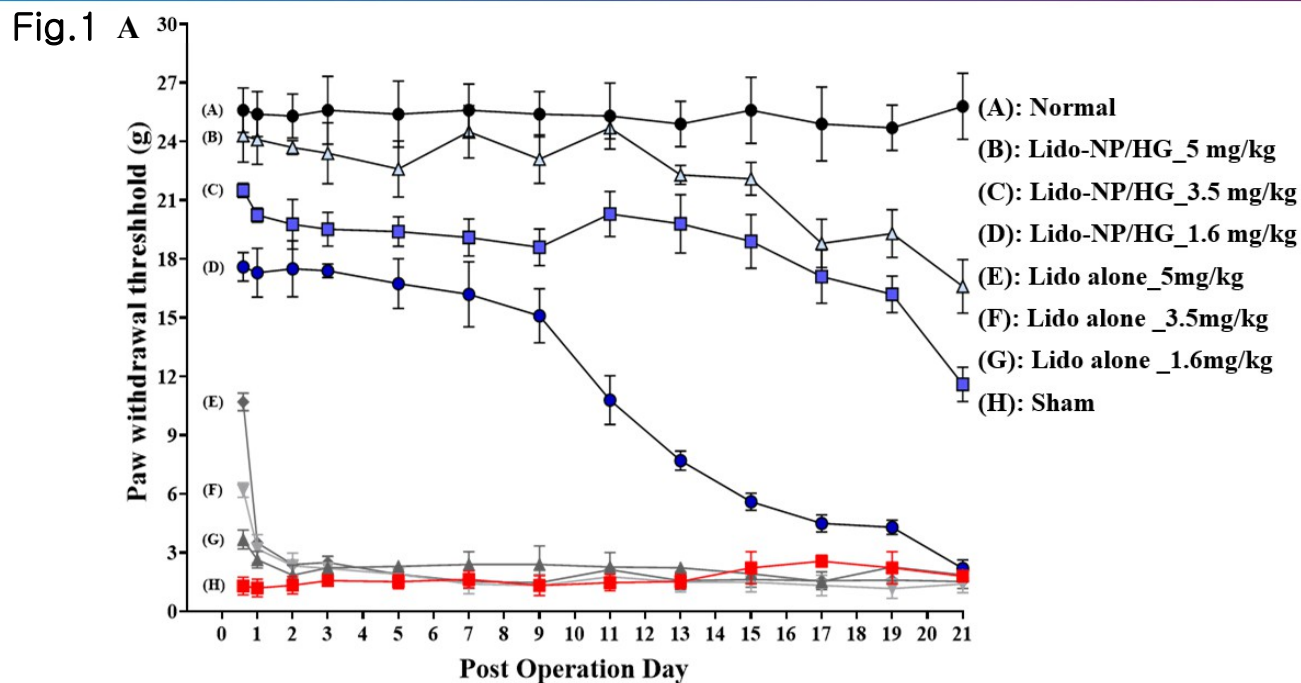
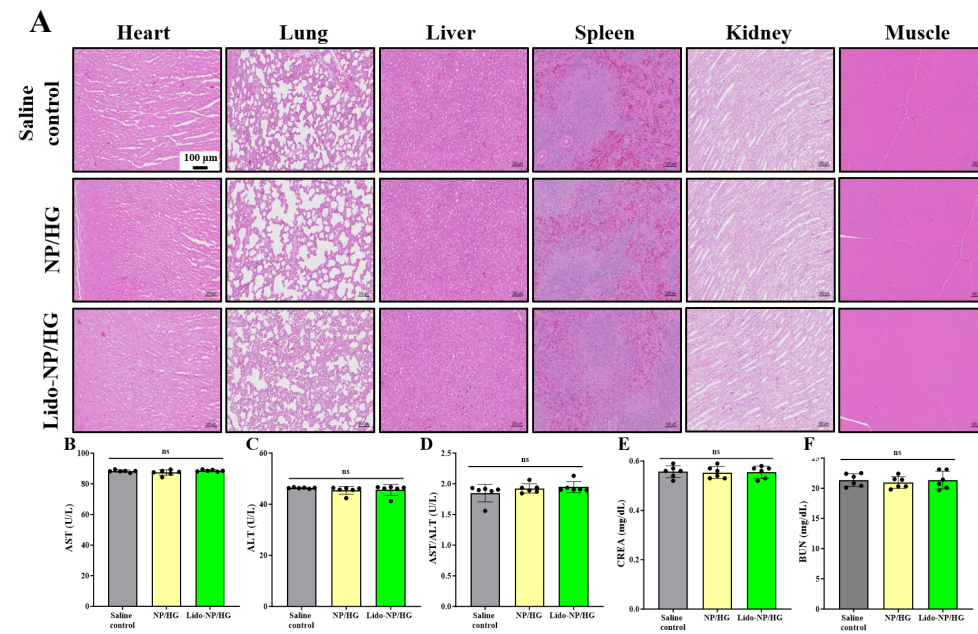


Fig.2



- ❖ In the pain model, the group injected with lidocaine-loaded hydrogel at the nerve periphery exhibited prolonged pain control compared to the group injected with lidocaine solution alone (Fig.1 A).
- ❖ The hematoxylin and eosin (H&E) staining images of major organ (heart, lung, liver, spleen, kidney, muscle) revealed no pathological differences among the saline, NP/HG, and Lido-NP/HG injection groups (Fig. 2A).
- ❖ There were no significant differences in the levels of Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), Creatinine (CREA), and Blood Urea Nitrogen (BUN) between the saline, NP/HG, and Lido-NP/HG groups, indicating that the Lido-NP/HG formulation does not cause systemic side effects (Fig. 2B-E).

- ❖ we developed a thermosensitive hydrogel loaded with lidocaine, which undergoes gelation in response to body temperature, allowing it to be easily injected in its liquid state before solidifying at the injection site.
- ❖ **This characteristic facilitates prolonged residence at the pain site and enables sustained, controlled release of lidocaine.**
- ❖ Lidocaine-loaded hydrogel formulation were confirmed to be safe following *in vivo* injection, showing no significant effects on major organs. Blood biochemical analysis, which assessed systemic side effects, revealed no significant differences after hydrogel injection.