A Mechanistic Evaluation of the Nociceptive Desensitization Induced by Repetitive Administration of Topical Local Anaesthetic Lidocaine/Prilocaine in a Model of Histaminergic and Non-histaminergic Itch

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Danmarks Grundforskningsfond Danish National Research Foundation

Introduction

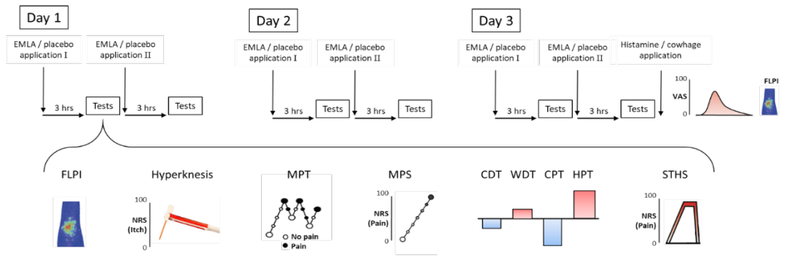
- Itch is a common symptom in many cutaneous, neuropathic and systemic conditions, and chronic itch may seriously affect quality of life (1,2).
- Itch is signaled as either a histaminergic or a non-histaminergic pruriceptive transmission (1).
- Up to now, there exist several treatments on chronic itch, and except for antihistamines that may effectively reduce histaminergic itch, their efficacy is often low (2).
- One of the treatments consists in the application of local anesthetics (LAs); in particular it was demonstrate an antipruritic effect of eutectic mixture of lidocaine 2.5% and prilocaine 2.5% (EMLA cream) (3).

Aim

The aim of this study was to investigate if repeated application of a topical anesthetic mixture of lidocaine and prilocaine is an effective treatment of histaminergic and non-histaminergic itch induced by histamine and cowhage respectively.

Methods

A total of 24 subjects were enrolled. For three consecutive days EMLA and vehicle cream were topically applied for 2x3 hours on two areas on each forearm. After each application, the creams were removed and tests were performed. The third day all the interventions were repeated followed by the application of histamine or cowhage, 9 minutes of VAS scale measurement and superficial blood perfusion (SBP) measurement.



MPT mechanical pain threshold, MPS mechanical pain sensitivity, CDT cold detection threshold, WDT warmth detection threshold, CPT cold pain threshold, HPT heat pain threshold, STHS supra-threshold heat sensitivity.

Results

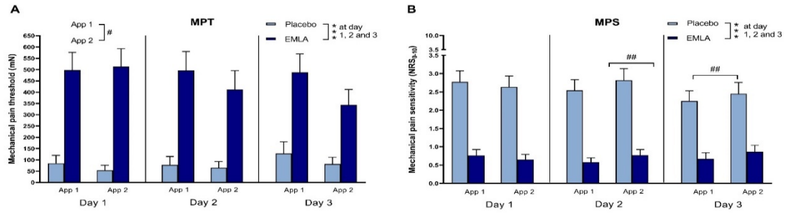


Fig 1: Mechanical sensitivity
(A) Mechanical Pain Threshold and (B) Mechanical Pain Sensitivity

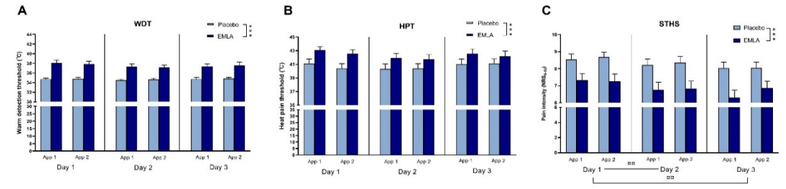


Fig 2: Thermal sensitivity
(A) Warm Detection Threshold, (B) Heat Pain Threshold and (C) Supra-threshold Heat Sensitivity

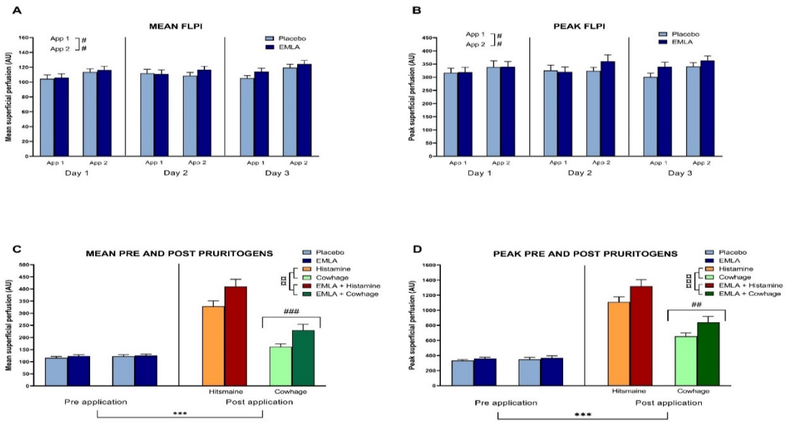


Fig 3: Superficial blood perfusion
(A) Mean SBP, (B) Peak SBP, (C) Mean SBP Pre and Post Pruritogens and (D) Peak SBP Pre and Post Pruritogens

Results (cont.)

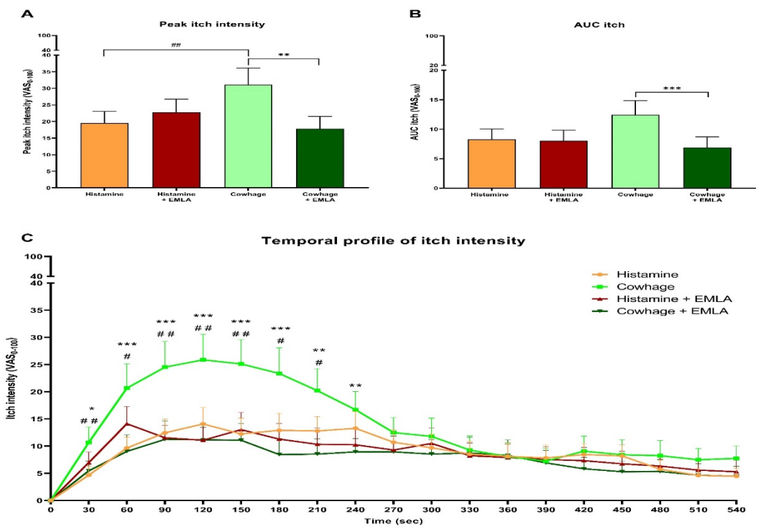


Fig 4: Itch sensitivity
(A) Peak Itch Intensity, (B) Area Under Curve Itch (C) Temporal Profile of Itch Intensity

Conclusions

Repetitive EMLA applications effectively reduced both mechanical and thermal pain thresholds. EMLA effectively reduced the cowhage-induced PAR2-4 mediated itch intensity but not the histamine-evoked itch. This highlights additional differences between histaminergic and non-histaminergic itch pathways.

References

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Poster ID: 1037210

This study was supported by the Danish National Research Foundation (DNRF121)

IASP 2021 VIRTUAL WORLD CONGRESS ON PAIN
9-11 June • 16-18 June 2021