

IMPROVING BLOCK PROPERTIES DURING PERIPHERAL NERVE BLOCK BY ELECTRICAL NEUROMODULATION: A CASE SERIES

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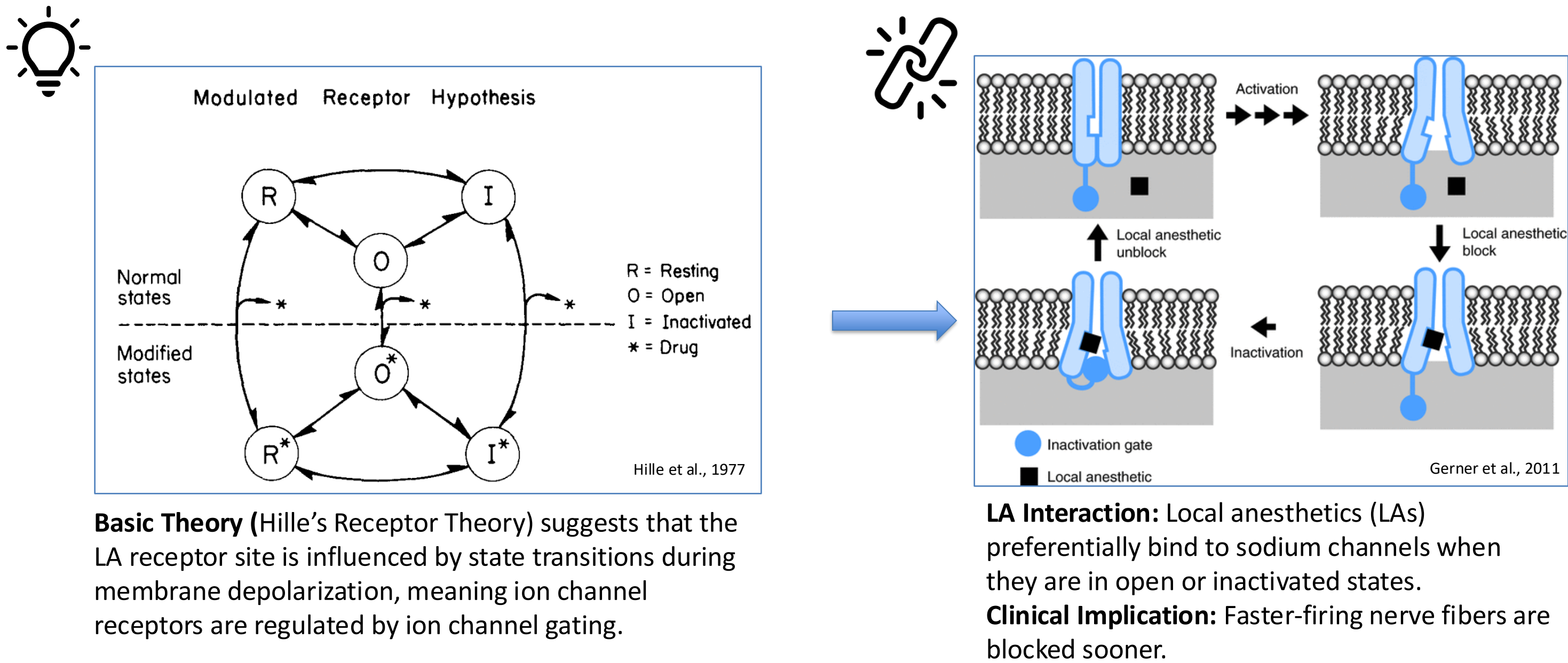


INTRODUCTION

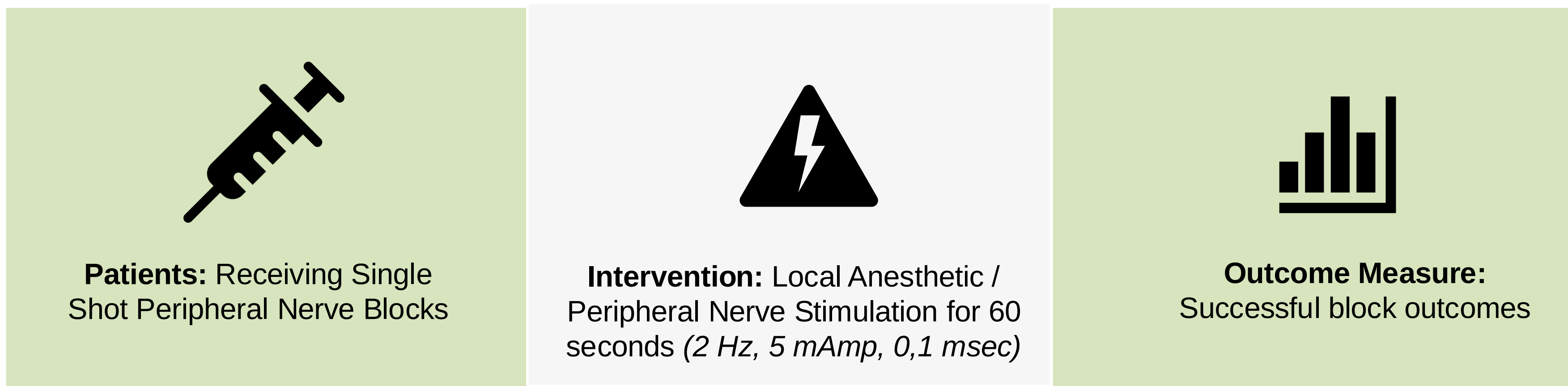
- Peripheral nerve stimulation (PNS) during nerve blocks may improve onset, duration, and efficacy by optimizing sodium channel states for better local anesthetic (LA) binding, based on the Hille Modulated Receptor Theory (Hille et al., 1977).
- Traditional methods rely on muscle contractions to induce neural activity, which can be inconsistent and unreliable (Stevens et al., 1996).
- Local anesthetic resistance remains an underrecognized challenge in regional anesthesia, potentially leading to failed blocks and inadequate pain control.
- Direct nerve stimulation provides a more controlled and precise way to enhance nerve blockade without depending on muscle responses and may help overcome LA resistance by promoting more effective sodium channel modulation.
- This case series determines the impact of PNS-assisted peripheral nerve blocks (PNB) on block quality, pain management, and their potential role in mitigating LA resistance.

MECHANISMS OF PERIPHERAL NEUROMODULATION

Voltage-Gated Sodium Channel Modulation: Leveraging The Hille Modulated Receptor Theory



CASE OVERVIEW



PATIENT DEMOGRAPHICS AND OUTCOMES

	Gender	Age	Resistance to LA	Nerve block (Single Shot)	Onset (Motor and Sensory)	Duration of block	Average Pain Scores (rest-activity) POD1	Oral opioid use POD1	Oral opioid use POD2
Case 1	M	31	No	Infraclavicular	1 min	18h	0-0/10	No	No
Case 2	F	49	Yes	Popliteal + saphenous	5 min	15h	0-0/10	No	No
Case 3	F	44	No	Popliteal + saphenous	5 min	15h	1-1/10	No	No
Case 4	M	72	Yes	Popliteal + saphenous	5 min	12h	6-8/10	No	Yes
Case 5	M	35	Yes	Infraclavicular	5 min	18h	6-6/10	No	No
Case 6	F	26	Yes	Supraclavicular	4 min	18h	3-4/10	No	No
Case 7	F	72	Yes	Supraclavicular	4 min	20h	0-0/10	No	No

CASE CONCLUSION

The average onset for both sensory and motor blocks was 4.2 minutes, lasting approximately 15.6 hours. Most patients experienced minimal postoperative pain, with only one requiring opioids (a chronic pain patient on preoperative opioids). Five patients resistant to LAs had similar block profiles, including timely onset, good surgical block, and prolonged analgesia.

This promising hybrid system of increasing the stimulating current during PNS may improve block quality, especially in patients resistant to LAs, probably by enhancing the blockade through modulation of sodium channel states. This approach could improve PNB outcomes while potentially influencing central pain pathways for enhanced neural blockade and pain management.

IN PRACTICE

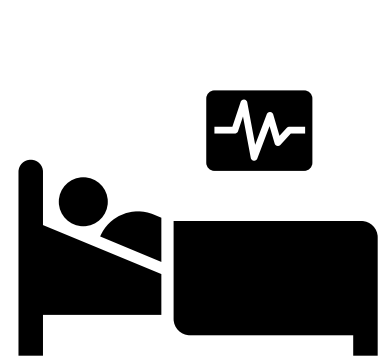


Gadsen et al., 2021

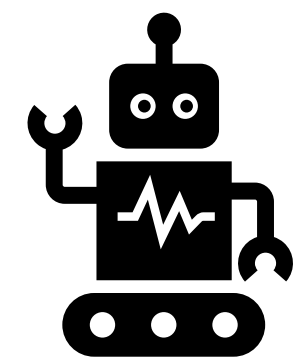


Pascarella et al., 2021

FUTURE DIRECTIONS



PATIENT-SPECIFIC
TAILORED CARE



AI-DRIVEN
ALGORITHMS



PREDICTIVE PAIN
TRAJECTORIES

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