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★令和6年度（2024年） 卒論3年次学生 「宇都木正悟 君」の研究成果が、「細胞生物学」の国際的専門誌”Cells“に掲載されました!!!

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Article

Local Administration of (−)-Epigallocatechin-3-Gallate as a Local Anesthetic Agent Inhibits the Excitability of Rat Nociceptive Primary Sensory Neurons

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Abstract: While the impact of (−)-epigallocatechin-3-gallate (EGCG) on modulating nociceptive secondary neuron activity has been documented, it is still unknown how EGCG affects the excitability of nociceptive primary neurons in vivo. The objective of the current study was to investigate whether administering EGCG locally in rats reduces the excitability of nociceptive primary trigeminal ganglion (TG) neurons in response to mechanical stimulation in vivo. In anesthetized rats, TG neuronal extracellular single unit recordings were made in response to both non-noxious and noxious mechanical stimuli. Following the administration of EGCG, the mean firing rate of TG neurons to both non-noxious and noxious mechanical stimuli significantly decreased in a dose-dependent manner (1–10 mM), and both the non-noxious and nociceptive mechanical stimuli experienced the maximum suppression of discharge frequency within 5 min. These inhibitory effects lasted for approximately 20 min. These findings suggest that the local injection of EGCG into the peripheral receptive field suppresses the responsiveness of nociceptive primary sensory neurons in the TG, almost equal to that of the local anesthetic, 1% lidocaine. As a result, the local application of EGCG as a local anesthetic could alleviate nociceptive trigeminal pain that does not result in side effects, thereby playing a significant role in pain management.

Keywords: alternative medicine; extracellular single unit recording; lidocaine; (−)-epigallocatechin-3-gallate; trigeminal pain; primary afferent

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ハイライト： 緑茶の成分である「カテキン」はファイトケミカルであり、in vivoで侵害受容性2次ニューロンの興奮性シナプス伝達など神経細胞の興奮性を抑制する可能性は指摘されていたが、侵害受容性1次ニューロンでの効果は不明であった。今回、我々の研究により「カテキン」が侵害受容性1次ニューロンの機械受容チャネル，Na，Kチャネルを修飾することで通常、臨床の場で使用される既存の局所麻酔薬「リドカイン」と同等の麻酔効果が得られるエビデンスが動物実験で明らかとなった。したがってカテキンは副作用のない局所麻酔薬として補完代替医療に応用できる可能性が示唆された。