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### Suppression of the excitability of rat nociceptive secondary sensory neurons following local administration of the Phytochemical, (-)-Epigallocatechin-3-gallate

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ABSTRACT

The phytochemical, polyphenolic compound, (-)-epigallocatechin-3-gallate (EGCG), is the main catechin found in green tea. Although a modulatory effect of EGCG on voltage-gated sodium and potassium channels has been reported in excitable tissues, the *in vivo* effect of EGCG on the excitability of nociceptive sensory neurons remains to be determined. Our aim was to investigate whether local administration of EGCG to rats attenuates the excitability of nociceptive spinal trigeminal nucleus caudalis (SpVc) neurons in response to mechanical stimulation *in vivo*. Extracellular single unit recordings were made from SpVc neurons in response to orofacial mechanical stimulation of anesthetized rats. The mean firing frequency of SpVc wide-dynamic range neurons following both non-noxious and noxious mechanical stimuli was significantly inhibited by EGCG in a dose-dependent and reversible manner. The mean magnitude of inhibition by EGCG on SpVc neuronal discharge frequency was similar to that of the local anesthetic, 1% lidocaine. Local injection of half-dose of lidocaine replaced the half-dose of EGCG. These results suggest that local injection of EGCG suppresses the excitability of nociceptive SpVc neurons, possibly via the inhibition of voltage-gated sodium channels and opening of voltage-gated potassium channels in the trigeminal ganglion. Therefore, administration of EGCG as a local anesthetic may provide relief from trigeminal nociceptive pain without side effects.

**ハイライト**： 緑茶の成分である「カテキン」は、in vitroの実験では電位依存性Na-Kチャネルや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が指摘されていましたが、in vivo　では効果が不明でした。今回我々の研究により「カテキン」が通常、臨床の場で使用されるリドカインと同等の麻酔効果が得られ、リドカインの半量をカテキンで代替できるエビデンスが動物実験で明らかとなりました。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ました。