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Research report

Local administration of resveratrol inhibits excitability of nociceptive wide-dynamic range neurons in rat trigeminal spinal nucleus caudalis



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ABSTRACT

Although we recently reported that intravenous administration of resveratrol suppresses trigeminal nociception, the precise peripheral effect of resveratrol on nociceptive and non-nociceptive mechanical stimulation-induced trigeminal neuron activity *in vivo* remains to be determined. The aim of the present study was to investigate whether local subcutaneous administration of resveratrol attenuates mechanical stimulation-induced excitability of trigeminal spinal nucleus caudalis (SpVc) neuron activity in rats, *in vivo*. Extracellular single-unit recordings were made of SpVc wide-dynamic range (WDR) neuron activity in response to orofacial mechanical stimulation in pentobarbital-anesthetized rats. Neurons responded to non-noxious and noxious mechanical stimulation applied to the orofacial skin. Local subcutaneous administration of resveratrol (1–10 mM) into the orofacial skin dose dependently and significantly reduced the mean number of SpVc WDR neurons firing in response to both non-noxious and noxious mechanical stimuli, with the maximal inhibition of discharge frequency in response to both stimuli being seen within 5 min. These inhibitory effects were no longer evident after approximately 20 min. The mean magnitude of inhibition by resveratrol (10 mM) of SpVc neuron discharge frequency was almost equal to that of the local anesthetic 1% lidocaine (37 mM). These results suggest that local injection of resveratrol into the peripheral receptive field suppresses the excitability of SpVc neurons, possibly via inhibition of Na⁺ channels in the nociceptive nerve terminals of trigeminal ganglion neurons. Therefore, local subcutaneous administration of resveratrol may provide relief of trigeminal nociceptive pain, without side effects, thus contributing to the suite of complementary and alternative medicines used as local anesthetic agents.

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