ORTHODROMIC AND ANTIDROMIC SPIKE PROROGATION AND DISSIMILAR EXPRESSION OF ATP-GATED AND CAPSAICIN-SENSITIVE CHANNELS IN TRIGEMINAL SENSORY FIBERS IN MENINGES

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Migraine is a common neurological disorder characterized by a strong headache which mechanisms remains unclear. The peripheral axons of the trigeminal nerve in dura mater play an important role in the development of migraine pain. These axons are primarily designed to generate and propagate action potentials (AP) from the periphery to the brainstem. However, a number of studies have shown the peripheral release of CGRP, a key migraine mediator, in response to stimulation of the trigeminal ganglion. These data indicate an important role of both orthodromic and antidromic propagation of excitation in these fibers. To study these issues we studied generation of AP in the peripheral versus central branches of the trigeminal nerve in hemiskull preparation isolated from P35 rats. The aim was to characterize the nociceptive traffic and expression of ATP-gated P2X and capsaicin-activated TRPV1receptors in different parts of the sensory axons. We found that the baseline frequency of APs in the proximal nerve was 0.23 ± 0.05 s-1 (n=10), whereas, in distal part, it was significantly higher (0.79 ± 0.22 s-1, n=7, $P<0.05$) consistent the main function of the former to propagate nociceptive signals to the brainstem. Application of ATP (100 μM) significantly increased the frequency of APs in the distal axon to 1.98 ± 0.79 s-1 (n=7, $P>0.05$). In contrast, there was no significant action of ATP on the proximal part (0.79 ± 0.26 s-1, n=10, $P>0.05$). Capsaicin was effective in both parts of the nerve (increase in distal part to 6.41 ± 1.08 s-1, n=10, $P<0.05$ and to 2.21 ± 0.47 s-1 in proximal part, n=9, $P<0.05$). These results suggest a bidirectional generation and propagation of APs and the asymmetric distribution of P2X3 and TRPV1 channels along the axons. These data advance our knowledge on information processing in these structures important for understanding the neurochemical mechanisms of migraine related trigeminal pain.