

Abstract

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Chemotherapy-evoked neuropathic pain: Abnormal spontaneous discharge in A-fiber and C-fiber primary afferent neurons and its suppression by acetyl-L-carnitine.

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BACKGROUND: Cancer patients treated with antimitotic drugs in the taxane and vinca alkaloid classes sometimes develop a chronic painful peripheral neuropathy whose cause is not understood. In animal models of painful peripheral neuropathy due to nerve trauma or diabetes there is obvious axonal degeneration accompanied by an abnormal incidence of spontaneous discharge in A-fiber and C-fiber nociceptors. But animals with paclitaxel- and vincristine-evoked neuropathic pain do not have axonal degeneration at the level of the peripheral nerve.

OBJECTIVE AND METHODS: However, recent data show that they do have a partial degeneration of the primary afferent neurons' terminal arbors in the epidermis. It is not clear as to whether this relatively minor degeneration is accompanied by abnormal spontaneous discharge. We surveyed primary afferent axonal activity in the sural nerve of rats with the paclitaxel- and vincristine-evoked pain syndromes at the time of peak pain severity.

RESULTS: Compared to vehicle-injected controls, we find a significant increase in spontaneously discharging A-fibers and C-fibers. Moreover, we show that prophylactic treatment with acetyl-L-carnitine (ALC), which blocks the development of the paclitaxel-evoked pain, causes a significant decrease (ca. 50%) in the incidence of A-fibers and C-fibers with spontaneous discharge.

CONCLUSION: These results suggest that abnormal spontaneous afferent discharge is likely to be a factor in the pathogenesis of chemotherapy-evoked painful peripheral neuropathy, and that the therapeutic effects of ALC may be due to the suppression of this discharge.

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