

Title: Effect of the sensory stimulant mustard oil (allyl-isothiocyanate) on visceral organs in vitro.

Introduction: To clarify the effects and site of action of allyl-isothiocyanate (AITC), a stimulant of TRPA1 receptor, by checking motor responses of viscera to it.

Methods: Isolated guinea-pig ileum, trachea and urinary bladder preparations were used. The effects of AITC after pretreatment with capsaicin, TRPV1 antagonist BCTC, as well as autonomic neurotransmitter antagonists were investigated. Mucosa-free strip preparations of the small intestinal longitudinal muscle-myenteric plexus were also tested.

Results: AITC (200 μ M) caused the ileum to contract. AITC still showed contraction after capsaicin desensitization or BCTC. We concluded that AITC-sensitive structures are located on different neurons than the capsaicin-sensitive ones. The P2X receptor antagonist PPADS almost completely blocked the effect of AITC. Strip preparations revealed that AITC still induced effect in the absence of the mucosa. The cholinergic muscarinic receptor antagonist atropine and the Na-channel blocker tetrodotoxin strongly inhibited AITC contraction. In the bladder strip, AITC caused biphasic contraction of which the first, quick response was prevented by capsaicin desensitization. The response to AITC in the trachea was blocked by capsaicin pretreatment.

Conclusion: It is concluded that AITC acts via different receptors than TRPV1 (not even at capsaicin-sensitive sensory neurons) and that submucosal plexus does not play a role in its effect in the ileum. Cholinergic motor-neurons are the final mediators of its effect and mainly via an ATP mediated, P2X receptor mechanism on the intrinsic neurons of the gut. By contrast, part of the effect of AITC in the bladder and trachea are mediated by capsaicin-sensitive neurons.