Is there a role for biogenic amine receptors in mediating trace amine-induced vascular contraction?

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Abstract

Background and Purposes: Substantial evidence indicates trace amines can induce vasoconstriction independently of noradrenaline release. However, the mechanism underlying noradrenaline-independent vasoconstrictor responses to trace amines has not yet been established. This study evaluates the role of trace amine-associated receptor 1 (TAAR1) and other biogenic amine receptors in mediating trace amine-induced vasoconstriction. Experimental Approach: Vasoconstrictor responses to β-PEA and the TAAR1-selective agonist, RO5256390 were assessed in vitro in endothelium-denuded aortic rings and third-order mesenteric arteries of male Sprague Dawley rats. Key Results: β-PEA and RO5256390 induced concentration-dependent vasoconstriction of aortic rings but not third-order mesenteric arteries. Vasoconstrictor responses in aortic rings were insensitive to antagonists of 5-HT and dopamine. The murine-selective TAAR1 antagonist, EPPTB, had no effect on either β-PEA or RO5256390-induced vasoconstriction. The α1-adrenoceptor antagonist, prazosin, and the α2-adrenoceptor antagonist, yohimbine, induced a small but significant shift of the β-PEA concentration response curve that could not be ascribed to blockade of α1- or α2-adrenoceptors. Conclusion and Implications: Vasoconstrictor responses to trace amines are not mediated by classical biogenic amine neurotransmitter receptors. Although β-PEA vasoconstrictor responses were insensitive to ETTP, it has low affinity for rat TAAR1. Therefore, we propose that TAAR1 remains the most likely candidate receptor mediating vasoconstrictor responses to trace amines and that prazosin and yohimbine have some affinity for TAAR1.

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