

# CHANGES IN RECEPTOR FUNCTION BY OXIDATIVE STRESS IN GUINEA PIG TRACHEAL SMOOTH MUSCLE

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## SUMMARY

We studied the effects of hydrogen peroxide, hypochlorous acid and ozone on muscarinic and  $\beta$ -adrenergic receptor responses in guinea pig tracheal tissue. Pretreatment of the tracheal strips with hydrogen peroxide (up to 10 mM) did not affect the muscarinic or  $\beta$ -adrenergic receptor responses after stimulation with methacholine or (-)-isoprenaline respectively.

In contrast to hydrogen peroxide, hypochlorous acid (1 mM and 10 mM) decreased the maximal contraction and the pD<sub>2</sub>-value after stimulation with the muscarinic agonist methacholine. Comparable effects were observed after stimulation with the  $\beta$ -adrenoceptor agonist (-)-isoprenaline but the  $\beta$ -adrenoceptor response seemed to be more susceptible to hypochlorous acid treatment than the muscarinic response. In other words, hypochlorous acid changes the balance between muscarinic and  $\beta$ -adrenergic receptor responses of guinea pig tracheal strips in favour of the muscarinic receptor responses.

*In vivo* exposure of the guinea pigs to 3 ppm ozone for two hours resulted in a hyperreactivity (increase in maximal contraction) after stimulation of the muscarinic receptor with methacholine. No effects were observed in the pD<sub>2</sub>-value. The  $\beta$ -adrenergic receptor response was also affected after ozone exposure. No effects were seen in the maximal (-)-isoprenaline induced relaxation but there was an increase (hypersensitivity) in the pD<sub>2</sub>-value.

Our data suggest that oxidative stress modulates receptor responses. Moreover, the type of oxidant seems to differentially affect various receptor responses. This may be of importance to further understand the influence of an oxidative effect (either directly via ozone or through inflammation) in lung tissue.

**Key words:** guinea pig, tracheal smooth muscle function, hypochlorous acid, hydrogen peroxide, ozone

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