β-Adrenoceptor Agonists Suppress Murine IgE Mediated Anaphylaxis

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Introduction

IgE mediated anaphylaxis is a common adverse reaction to many foods, medications and environmental factors. Although anaphylaxis is treated with the β-adrenergic receptor agonist, epinephrine, β-adrenergic agonists have not been used to prophylax against the development of anaphylaxis.

Aims

We assessed the ability of pretreatment with several different drugs to decrease the severity of IgE-mediated anaphylaxis in mice by measuring the drop in core temperature following challenge with αIgE monoclonal antibody (mAb). We also assessed their ability to inhibit mast cell degranulation, as detected by increased serum mouse mast cell protease 1 (MMCP1) concentration.

Methods

Groups of 4-6 female BALB/c mice were administered the experimental drug 10, 30 or 60 minutes before i.v. challenge with 20 µg of anti-mouse IgE mAb. Rectal temperatures were recorded prior to and for 1 hour following anti-IgE mAb injection. Serum MMCP-1 levels were measured with a commercial ELISA kit.

Results

Control groups developed temperature drop of 6.24 ± 0.431 °C. Of the nine drugs tested, the β-adrenoreceptor agonists Indacaterol (2.5 mg/kg) and Formoterol (40 ug/kg) were most effective at suppressing anti-IgE mAb-induced hypothermia (average maximum temperature drops of 1.4 ± 0.133 and 3.5 ± 0.250 °C respectively). Pretreatment with the antihistamine Triprolidine (200 ug) reduced the temperature drop to 2.7 ± 0.265°C, while a combination of Indacaterol and Triprolidine reduced the temperature drop to 0.3 ± 0.171 °C.

Summary/Conclusions

The β-adrenoreceptor agonists Indacaterol and Formoterol both attenuate IgE-mediated anaphylaxis. The combination of Indacaterol and Triprolidine was the most effective treatment used and nearly completely eliminated hypothermia. A similar combination may be useful for suppressing anaphylaxis in humans during drug desensitization.

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