

Definition of an exercise intensity threshold in a challenge test to diagnose food-dependent exercise-induced anaphylaxis

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Food-dependent exercise-induced anaphylaxis (FDEIA) is an IgE-mediated hypersensitivity requiring both intake of food and consecutive exercise to

In order to confirm food-dependent exercise-induced anaphylaxis by provocation, a critical exercise intensity limit has to be exceeded.

induce symptoms of anaphylaxis.

Vigorous exercise in this case facilitates allergen absorption from the gastrointestinal tract. When food intake and exercise are exposed independently, patients will not experience allergic symptoms (1).

We report on a 46-year-old woman with allergic rhinoconjunctivitis and a 3-year history of anaphylaxis during physical exercise after having taken a meal containing cakes and sugar. This patient had experienced four episodes with angioedema, urticaria, diarrhoea, vomiting, dyspnoea and cardiovascular collapse after ingesting desserts with sugar glaze and consecutive running. Skin prick test results were negative for powdered sugar; however, the results were positive for wheat and spelt flour, corn bran, hazel, alder, birch and grass. Detection of specific IgE antibodies by Immuno-CAP (Phadia, Freiburg, Germany) revealed a raised total IgE of 1037 IU/ml, and specific IgE class 4 to hazelnut, hazel, alder, birch and crab and

class 3 to ω 5-Gliadin. Provocation tests were performed with a combination of intake of powdered sugar and wheat sandwich and exercise. However, first provocation tests with 20 min of unstandardized bicycle ergometer exercise failed to induce any symptoms, as has been reported in the literature (2).

Thus, a defined supervised treadmill exercise in the sports medicine outpatient clinic was performed. On day 1, the maximal exercise intensity for the patient was identified by beginning a treadmill at a speed of 4 km/h and increasing the speed by 2 km/h for every 3 min. After 15 min and at a speed of 12 km/h, the maximal exercise intensity was reached with a heart rate of 170/min, a subjective Borg score of 17 (out of 20) and a maximal lactate level of 9.2 mmol/l. On day 2, directly after ingestion of a nutty wheat pastry containing ω 5-Gliadin, the same procedure was followed. When a submaximal exercise intensity at a lactate level of 3.9 mmol/l was reached, the exercise was continued at a speed of 10 km/h until symptoms occurred. After 18 min and 3500 m (patient's heart rate 159/min), the patient reported pruritus and urticaria on her neck, décolleté and arms (Fig. 1). The test was stopped and

after intravenous administration of 125 mg methylprednisolone and 4 mg of dimetindene, the patient's condition normalized. Serum mast cell tryptase levels were measured during and after the challenge test. Tryptase increased from a baseline value of 7.25 μ g/l (normal range < 11.4 μ g/l) to 13.1 μ g/l and 27.2 μ g/l, at 40 and 120 min after the test, respectively. The provocation test and the increase of tryptase levels confirmed the diagnosis of wheat-dependent exercise-induced anaphylaxis and a participation of mast cells in the pathogenesis (3).

This case shows that a submaximal intensity exercise test was needed in the diagnosis of FDEIA to induce symptoms. Provocation tests in FDEIA have frequently been reported to remain negative (4) and tryptase levels often fail to increase during the test (5). Considering the fact that intestinal permeability and therefore allergen absorption are more pronounced during longer and tougher exercise (6), we conclude that the outcome of an exercise challenge test to diagnose FDEIA is substantially influenced by the test intensity and the test application. Further research on the exercise intensity to elicit symptoms in



Figure 1. Wheals and erythema spreading from the patient's neck to the décolleté.

different patients with FDEIA appears to be necessary.

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