f416 rTri a 19; Omega-5 Gliadin

rTri a 19 from wheat (*Triticum aestivum*)

The source material of ImmunoCAP™ Allergen f416 is a recombinant produced peptide of approximately 27 kDa representing the immuno-dominant part of ω-5 gliadin.

Allergen Description

The major proteins in wheat vary in proportion according to the type of wheat and this variability is one reason why reactions to different wheat products are not consistent.

Wheat proteins can be classified into different groups e.g. albumins, globulins and glutens. The albumins, which are not similar to egg or milk albumins, are water-soluble. The globulins are salt-soluble but water-insoluble. The glutens are composed of gliadins and glutenins which are insoluble in salt- and water-solutions.

Gliadins are ethanol soluble proteins with molecular weights in the range of 30-70 kDa. They are classified into α-, β-, γ-, and ω-gliadins according to electrophoretic mobility.

The ω-gliadins are further classified as slowly-migrating ω-1 and ω-2, ω-3 and fast-migrating ω-4 and ω-5.

Tri a 19 (ω-5 gliadin), a plant storage protein and a component of the fast ω-gliadin fraction, is a major allergen among water/salt-insoluble proteins (1-16).

Potential Cross-Reactivity

IgE antibodies to fast ω-gliadin cross-reacts with γ-gliadin and slow ω-gliadin (2). Further studies have reported that γ-70 and γ-35 secalins in rye and γ-3 hordein in barley cross-react with ω-5 gliadin, suggesting that rye and barley may elicit symptoms in patients sensitized to ω-5 gliadin.

In immunoblotting, anti-ω-5 gliadin antibodies bound to 70 kDa and 32 kDa proteins in rye and to a 34-kDa protein in barley, but not to any proteins in oats. The cross-reactive proteins were identified as rye γ-70 secalin, rye γ-35 secalin and barley γ-3 hordein, respectively.

In ELISA studies, 21/23 (91%) patients with Wheat-Dependent Exercise-Induced Anaphylaxis (WDEIA) showed IgE antibodies to purified γ-70 secalin, 19/23 (83%) to γ-35 secalin and 21/23 (91%) to γ-3 hordein. Skin prick testing gave positive reactions to γ-70 secalin in 10/15 (67%) patients, to γ-35 secalin in 3/15 (20%) patients and to γ-3 hordein in 7/15 (47%) patients (3).

Clinical Experience

ω-5 gliadin has been reported as a major allergen in WDEIA (1-14). Although the mechanism is not fully understood, a study reports that ω-5 gliadin-derived peptides are cross-linked by tissue transglutaminase (tTG), which causes a marked increase in IgE antibody binding both *in vitro* and *in vivo*. Activation of tTG in the intestinal mucosa during exercise in patients with WDEIA may lead to the formation of large allergen complexes capable of eliciting anaphylactic reactions (9).

In addition, ω-5 gliadin has been shown to be a major allergen in children with immediate allergy to ingested wheat. After oral wheat challenge 40 children with suspected wheat allergy presented atopic dermatitis and/or gastrointestinal and/or respiratory symptoms. Nineteen children (48%) had immediate reactions and 8 children (20%) had delayed hypersensitivity symptoms. Sixteen (84%) of those with immediate symptoms had IgE antibodies to ω-5 gliadin whereas none of the children with delayed or negative challenge test results had IgE to ω-5 gliadin. Moreover, in children with wheat induced anaphylaxis ω-5 gliadin seems to be a major sensitizing allergen (15).

Possible Clinical Utility

Identify patients at risk of developing severe immediate reactions to wheat.

Identify patients at risk of developing anaphylaxis to wheat in relation to exercise (WDEIA).

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