ImmunoCAP
Nut Components
Nut allergies are increasing

Nuts have become popular nutritional snacks.

In parallel, the number of nut allergic patients is increasing.
Nut allergies differ from person to person . . .

Find out which nuts your patient can or cannot eat!
and from nut to nut

- Nuts contain different allergen components.
- The components belong to different protein families,
- where some are clinically more important than others.
Nut allergens

- Nuts contain several allergenic molecules, some are clinically more important than others.
- The molecules belong to different protein families with varying degree of stability and homology.
- The clinical consequences of being sensitized to them therefore differ.
Some components may cause severe systemic reactions while others are linked to tolerance.
Some components may cause allergy due to cross-reactivity while others do not.
<table>
<thead>
<tr>
<th>Nut</th>
<th>Profilin</th>
<th>PR-10 protein</th>
<th>LTP</th>
<th>Storage Proteins</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEANUT</td>
<td>Profilin</td>
<td>Ara h 8</td>
<td>Ara h 9</td>
<td>Ara h 1, Ara h 2, Ara h 3</td>
</tr>
<tr>
<td>HAZEL NUT</td>
<td>Profilin</td>
<td>Cor a 1</td>
<td>Cor a 8</td>
<td>Cor a 9, Cor a 14</td>
</tr>
<tr>
<td>WALNUT</td>
<td>Profilin</td>
<td></td>
<td>Jug r 3</td>
<td>Jug r 1</td>
</tr>
<tr>
<td>BRAZIL NUT</td>
<td>Profilin</td>
<td></td>
<td></td>
<td>Ber e 1</td>
</tr>
<tr>
<td>CASHEW NUT</td>
<td>Profilin</td>
<td></td>
<td></td>
<td>Ana o 3</td>
</tr>
</tbody>
</table>
Storage proteins

- A family of proteins abundant in nuts, seeds and legumes.

- Relatively species specific. Cross-reactivity is usually limited to botanically closely related species such as walnut-pecan or cashew–pistachio.

- Stable to both heat and digestion, and can therefore cross the gastrointestinal mucosa intact and cause systemic reactions.
Lipid Transfer Proteins (LTP)

- A family of proteins present in plant foods, tree and weed pollen.
- Food LTPs are found in various fruits, nuts and vegetables.
- The degree of cross-reactivity within this family varies.
- Stable to heat and digestion, and can therefore give rise to systemic reactions.
PR-10 proteins*

- A family of proteins found in tree pollen and foods from plant origin.
- The major birch pollen allergen Bet v 1 is a PR-10 protein.
- The degree of cross-reactivity within this family varies.
- PR-10 proteins are heat and digestion labile.
- IgE antibodies to food PR-10 primarily result in local clinical reactions.

*Pathogenesis-related Group 10
Profilins

- A family of proteins found in species from the plant kingdom, like pollen, plant food or latex.
- Profilins show extensive IgE cross-reactivity.
- Profilin sensitization is common among grass pollen allergic patients.
- Profilins are heat and digestion labile.
- IgE antibodies to profilin primarily result in no or local clinical reactions.
Increasing risk of systemic reactions

Profilin → PR-10 protein → LTP → Storage Proteins

PEANUT
Profilin → Ara h 8 → Ara h 9 → Ara h 1, Ara h 2, Ara h 3

HAZEL NUT
Profilin → Cor a 1 → Cor a 8 → Cor a 9, Cor a 14

WALNUT
Profilin → Jug r 3 → Jug r 1

BRAZIL NUT
Profilin → Ber e 1

CASHEW NUT
Profilin → Ana o 3
### Increasing homology and cross-reactivity

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</table>
Find out which component your patient is sensitized to.

Ara h 1  Ara h 2  Ara h 8
Ara h 9  Ara h 3
Testing step by step

Step 1: Patient history
Step 2: ImmunoCAP whole allergen test
Step 3: ImmunoCAP allergen component test
Peanut (f13)

- **Ara h 1 + Ara h 2 + Ara h 3**
  - (f422) (f423) (f424)
  - Storage proteins
  - Stable to heat and digestion
  - Associated with severe reactions

- **Ara h 9 (f427)**
  - Lipid transfer protein (LTP)
  - Stable to heat and digestion
  - Associated with both severe and local reactions
  - Associated with allergy to peach and peach related fruits

- **Ara h 8 (f352)**
  - PR-10 Protein
  - Labile to heat and digestion
  - Associated with local reactions
  - Associated with allergy to birch and birch related tree pollens
Cor a 1 (f428)
- PR-10 protein
- Labile to heat and digestion
- Associated with local reactions

Lipid transfer protein (LTP)
- Stable to heat and digestion
- Associated with local as well as systemic reactions

Hazelnut (f17)
- Storage proteins
- Stable to heat and digestion
- Highly abundant in hazelnut
- Associated with severe reactions

Cor a 8 (f425)
- PR-10 protein
- Labile to heat and digestion
- Associated with local reactions

Cor a 9 (f440) + Cor a 14 (f439)
- PR-10 protein
- Labile to heat and digestion
- Associated with local reactions
Walnut (f256)

Jug r 1 (f441)
- Storage protein (2S albumin)
- Heat and digestion stable
- Highly abundant in walnut
- Associated with systemic reactions

Jug r 3 (f442)
- Lipid transfer protein (LTP)
- Heat and digestion stable
- Associated with local as well as systemic reactions
Brazil nut (f18)

Ber e 1 (f354)

- Storage protein (2S albumin)
- Heat and digestion stable
- Highly abundant in brazil nut
- Associated with systemic reactions
Cashew nut (f202)

Ana o 3 (f443)

- Storage protein (2S albumin)
- Heat and digestion stable
- Highly abundant in cashew nut
- Associated with systemic reactions
Can component testing tell two different stories?

Caroline and Emma, 16 years old
Similar patient histories and SPT...

- Rhinitis and conjunctivitis during pollen season.
- Nasal obstruction, itchy eyes and oral local reaction after peanut intake.

<table>
<thead>
<tr>
<th></th>
<th>Caroline</th>
<th>Emma</th>
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</thead>
<tbody>
<tr>
<td>SPT results: Peanut +4</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Diagnosis: Peanut allergy</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Treatment: Peanut avoidance</td>
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</table>
**Similar ImmunoCAP**

<table>
<thead>
<tr>
<th>Peanut</th>
<th>Caroline</th>
<th>Emma</th>
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<tbody>
<tr>
<td>f13 (kU_A/l)</td>
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<td>28</td>
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...but different component IgE profiles

<table>
<thead>
<tr>
<th></th>
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<th>PR-10 protein</th>
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<tbody>
<tr>
<td><strong>Ara h 6</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Caroline</td>
<td>33</td>
<td>Emma</td>
<td></td>
<td></td>
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<tr>
<td><strong>Ara h 9</strong></td>
<td>PR-10</td>
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<tr>
<td>Caroline</td>
<td>&lt;0.1</td>
<td>Emma</td>
<td></td>
<td></td>
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<tr>
<td><strong>Ara h 1</strong></td>
<td>LTP</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Ara h 2</strong></td>
<td>Storage</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>~0.4</td>
<td>Emma</td>
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Emma needs to avoid peanuts. Caroline doesn't.

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<th>Caroline</th>
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<tbody>
<tr>
<td>Diagnosis</td>
<td>Peanut allergy</td>
<td>No peanut allergy</td>
</tr>
<tr>
<td>Treatment</td>
<td>Dietary restriction</td>
<td>No dietary restriction</td>
</tr>
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</table>
ImmunoCAP Nut Components help you assess the clinical risk of reactions
ImmunoCAP Nut Components help you differentiate between primary allergies and allergy due to cross-reactivity.
ImmunoCAP Nut Components help you give relevant advice and define the optimal treatment.
Find out more with ImmunoCAP Nut Components

- Help you to assess the clinical risk of reactions by precise quantitative measurement of IgE antibodies.
- Help you differentiate between primary allergies and allergy due to cross-reactivity.
- Helps you give relevant advice and define the optimal treatment.
- Helps you improve the patient's well-being and quality of life.
Find out more with ImmunoCAP Nut Components