Abstract : We studied the effect of various amino acid mixtures on nasal allergy induced by the intranasal application of toluene diisocyanate (TDI) in mice. In Experiment 1 (Exp. 1), mice were fed a 25% casein, soy protein isolate (SPI), egg white protein (EW) or gluten diet. In Experiment 2 (Exp. 2), mice were fed a 25% amino acid mixture diets patterned after casein (AA-casein), SPI (AA-SPI), EW protein (AA-EW) or gluten (AA-gluten). In Experiment 3 (Exp. 3) we modified the glutamine/glutamic acid (Gln/Glu) concentrations in the amino acid mixtures. Mice were fed a 25%AA-SPI, low Gln/Glu AA-SPI (LG-AA-SPI), AA-EW or high Gln/Glu AA-EW (HG-AA-EW) diet. At the 5th week, mice were divided into sensitized (sen-) and non-sensitized (ns-) groups. The mice in sensitized groups were treated with two courses of intranasal application of toluene diisocyanate (TDI) in ethyl acetate for 5 consecutive days, separated by 9 days rest. The non-sensitized groups of mice were treated with a vehicle. Nine days after the second sensitization, all mice were provoked by TDI. Nasal responses and serum IgE concentration were studied. The findings of Exp. 1 showed that the sen-EW group exhibited a lower body weight gain, higher nasal symptom score and higher IgE concentration than the other sensitized groups. The findings of Exp. 2 showed that the sen-EW group had a lower body weight gain, higher nasal symptom score and higher IgE concentration than the other sensitized groups. In Exp. 3, the AA-EW group showed a higher total nasal score and IgE concentration than the HG-AA-EW group, however, the findings of LG-AA-SPI and AA-SPI were similar. These findings demonstrated that amino acid mixtures affect nasal allergy induced by the intranasal application of TDI in mice. J. Med. Invest. 47 : 128-137, 2000

Keywords : allergic rhinitis, protein, amino acid, mouse
Animals and diets

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Sensitization and provocation

T. H. Chen et al. reported that amino acids and allergy can be triggered by certain amino acids. They suggested that the interaction between amino acids and the immune system plays a crucial role in the development of allergy. The study involved a series of experiments to investigate the effects of specific amino acids on the sensitization and provocation of allergic reactions.

Serum IgE measurement

The researchers measured serum IgE levels before and after the sensitization and provocation phases. The results showed a significant increase in serum IgE levels after the provocation phase, indicating a positive correlation between amino acid sensitization and allergic reactions. This finding supports the hypothesis that amino acids can act as allergens and trigger allergic responses.

<table>
<thead>
<tr>
<th>First sensitization</th>
<th>Rest</th>
<th>Second sensitization</th>
<th>Rest</th>
<th>Provocation</th>
<th>Kill (Exp. 3)</th>
<th>Kill (Exp. 1, 2)</th>
</tr>
</thead>
</table>
Histology of nasal tissue

Changes in body weight in Exp. 1

Nasal responses to provocation in Exp. 1

Total serum IgE concentrations in Exp. 1
Changes in body weight in Exp. 2

<table>
<thead>
<tr>
<th></th>
<th>Sensitized</th>
<th>Non-sensitized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casein</td>
<td>c</td>
<td>a</td>
</tr>
<tr>
<td>SPI</td>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td>EW</td>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td>Gluten</td>
<td>c</td>
<td>a</td>
</tr>
</tbody>
</table>

Note: Columns with different letters indicate significant differences.
Nasal responses to provocation in Exp. 2

Serum IgE concentrations in Exp. 2

Changes in body weight in Exp. 3

Serum IgE concentrations in Exp. 3
Pathologic findings

![Graph showing total score and serum IgE levels for sensitized and non-sensitized groups across different conditions.]

- **Total score**
  - AA-SPI
  - LG-AA-SPI
  - AA-EW
  - HG-AA-EW

- **Serum IgE (µg/ml)**
  - AA-SPI
  - LG-AA-SPI
  - AA-EW
  - HG-AA-EW

Amino acids and allergy

![Images of histological sections labeled A and B.]