**Abstract**

The purpose of this study was to measure and compare the allergen and total protein contents detected in dander derived from mixed breed (mongrel) and breed-specific dogs. Sixty dog dander lots were obtained over a three year period. Thirty lots (50.0%) were derived from mixed breeds, 28 lots (46.7%) were obtained from breed-specific breeds, and two lots (3.3%) were combined. Dander was extracted in 1:10 e.w. in Cinci’s solution for subsequent testing. Total protein content was measured using the Bradford assay, and Can f 1 and albumin contents were measured by ELISA. Non-parametric statistical analysis of the data was performed. The Mann-Whitney test was used to compare the test results obtained for dander derived from mixed and breed-specific dogs. The Spearman-rank correlation coefficient was used to ascertain the association among the parameters tested. A P value ≤0.05 was considered significant.

**Background:**

Mammalian epidermal materials are used to produce allergenic extracts. Among these materials, dander isolated from hair contains a large amount of the major dog allergens, Can f 1. Dander also contains a minor allergen, albumin (Can f 3). The purpose of this study was to determine the allergenic content in dog dander derived from mixed (mongrel) and breed-specific dogs.

**Methods:**

- **Dander lots according to the collector:**
  - Provided by local collectors: 32/60 (53.3%)
  - Provided by a specialized collector: 28/60 (46.7%)
- **Mixed-breed lots were obtained over a three year period. Thirty lots (50.0%) were derived from mixed breeds, 28 lots (46.7%) were obtained from breed-specific breeds, and two lots (3.3%) were combined.**
- **Background and Data:**
  - **Not mixed-breed:** 28/60 (46.7%)
  - **Can f 1 and albumin (Can f 3) levels** were measured by indirect ELISA using alkaline phosphatase as the substrate and the respective antibodies as standards.
- **Total protein content** was measured by the Bradford method, using BSA as the standard.

**Results**

**Can f 1**

- **Can f 1 level distribution**
  - Range of values detected: 7.5-443.6 mg/gram (obtained for the Alsatian breed with the lowest levels of Can f 1) to 2079 mg/gram (for dander derived from a mixed breed)
  - Median: 9.01 mg/gram

- **Can f 1 according to dog breeds**
  - The Can f 1 levels detected in dander derived from mixed-breed (mongrel) dogs was significantly greater than that detected in dander derived from breed-specific dogs, p<0.02 (Figure 1).
  - The Can f 1 levels detected in dander derived from breed-specific dogs did not significantly differ among them.

**Albumin (Can f 3)**

- **Range of values detected:** 9-53 mg/gram
  - Median: 27 mg/gram

- **Albumin levels according to dog breeds**
  - As for Can f 1, the albumin level in dander derived from mixed-breed dogs was significantly greater than that detected in dander derived from breed-specific dogs, p<0.01 (Figure 2).

**Correlation among The Parameters Tested**

- **Not significant for the total lots tested or according to the breed type:**
  - Can f 1 and albumin: total protein content
  - Significant (r=0.372, p≤0.001): Can f 1 – albumin in the total lots tested

**Testing**

- **Can f 1 and albumin (Can f 3) levels** were measured by indirect ELISA using alkaline phosphatase as the substrate and the following antibodies as standards.
- **Total protein content** was measured by the Bradford method, using BSA as the standard.

**Conclusions**

- **A large variation in allergen and protein contents were observed among dander lots.**
- **Dander lots derived from mixed breed dogs contain greater allergen levels than those derived from breed-specific dogs, supporting the role of genetic and/or environmental components in dog allergen production.**
- **Mixed breed dogs may be more suitable than breed-specific dogs for dander production.**
- **While dog breed has been associated with allergen production, no significant differences among dog-specific breeds were observed in this study, perhaps because of sample size limitations.**
- **Additional data should be obtained for further analysis.**

**Table I:** Breed specific lots tested (N=28)

<table>
<thead>
<tr>
<th>Breed</th>
<th>MPN (10^6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spitz</td>
<td>6 (12.4)</td>
</tr>
<tr>
<td>Terrier</td>
<td>9 (18.3)</td>
</tr>
<tr>
<td>Alsatian</td>
<td>11 (21.4)</td>
</tr>
<tr>
<td>Collie</td>
<td>13 (25.0)</td>
</tr>
</tbody>
</table>

**Table II:** Number of lots provided by local collectors and by a specialist collector (N=56)

<table>
<thead>
<tr>
<th>Breed</th>
<th>Mixed-Breed</th>
<th>Breed-Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spitz</td>
<td>9 (18.3)</td>
<td></td>
</tr>
<tr>
<td>Terrier</td>
<td>14 (28.1)</td>
<td></td>
</tr>
<tr>
<td>Alsatian</td>
<td>11 (21.4)</td>
<td></td>
</tr>
<tr>
<td>Collie</td>
<td>13 (25.0)</td>
<td></td>
</tr>
</tbody>
</table>

**Statistical Analysis**

- **Software:** Prism™ software (GraphPad Software Inc., CA, CA).
- **Analysis performed:**
  - Descriptive statistics
  - Kolmogorov-Smirnoff test: to ascertain the normality of the distributions
  - Mann-Whitney test: to compare the values of the different parameters obtained between mixed and specific breeds
  - Spearman-rank correlation coefficient: to evaluate the potential association among the different parameters tested