Association of the ACTN3 and ACE Polymorphisms in Japanese Judo Athletes

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Introduction

Many previous studies have reported positive associations between genetic polymorphisms and athletic performance. The alpha-actinin 3 (ACTN3) R/X and angiotensin-converting enzyme (ACE) I/D genotypes have been suggested to influence variations in skeletal muscle function. This study aimed to investigate whether polymorphisms in ACTN3 and ACE are associated with the athletic status of Japanese judo athletes.

Methods

- **Subjects**
  - All subjects belonging to Japan top-level university
  - Including 9 S-rank (top-level of international tournaments) player

**Table 1. Subject characteristic**

<table>
<thead>
<tr>
<th>Weight class</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>121</td>
</tr>
<tr>
<td>Light class 60kg, 66kg</td>
<td>32</td>
</tr>
<tr>
<td>Middle class 73kg, 81kg, 90kg</td>
<td>52</td>
</tr>
<tr>
<td>Heavy class 100kg, 100kg+</td>
<td>37</td>
</tr>
</tbody>
</table>

**Genotype**

- DNA was extracted from their saliva (QiAamp DNA MiniKit)
- Using PCR-RFLP(DdeI) or PCR method

**Results**

**Fig. 1 Genotype and allele frequency in Japanese controls**

A: Polymorphism of alpha-actinin3 gene (Kikuchi et al, 2012)
B: Polymorphism of angiotensin converting enzyme (Kikuchi et al, 2012)

**Fig. 2 Genotype frequency in judo athletes and controls**

A: Polymorphism of ACTN3 in Spanish (Rodriguez-Romo G et al, 2013)
B: Polymorphism of ACTN3 in Polish and Lithuania (Cieszczyk R, 2010)

**Fig. 3 Detection of genotype(A: ACTN3 gene, B: ACE gene)**

**Fig. 4 Genotype and allele frequency of ACTN3 polymorphism**

Figure 4 indicate genotype and allele frequency of ACTN3 polymorphism in all judo player.
Table 2 show that many international top-level athletes possessed both R and X alleles.

**Fig. 5 Genotype and allele frequency of ACE polymorphism**

Figure 5 indicate genotype and allele frequency of ACE polymorphism in all judo player.
Table 3 show that international athletes were homozygous for I or D allele.

**Table 2. Frequency of ACTN3 genotype**

<table>
<thead>
<tr>
<th>Rank</th>
<th>RR</th>
<th>RX</th>
<th>XX</th>
<th>R allele</th>
<th>X allele</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-rank player (n=9)</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>77.8%</td>
<td>11.1%</td>
</tr>
<tr>
<td>The others (n=112)</td>
<td>25</td>
<td>48</td>
<td>39</td>
<td>42.3%</td>
<td>34.8%</td>
</tr>
</tbody>
</table>

**Table 3. Frequency of ACE genotype**

<table>
<thead>
<tr>
<th>Rank</th>
<th>II</th>
<th>ID</th>
<th>DD</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-rank player (n=9)</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>The others (n=112)</td>
<td>38</td>
<td>46</td>
<td>28</td>
</tr>
</tbody>
</table>

**Conclusion**

Our data suggest that the polymorphisms of ACTN3 and/or ACE genes may be associated with the athletic status of Japanese judo athletes.

**Acknowledgement**

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**Reference**