The growth hormone (GH1) gene, performance and post-race rectal temperature during the South African Ironman Triathlons

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Introduction

Some studies have suggested that the ACE gene is associated with endurance performance, including the performance during the 2000 and 2001 South African Ironman Triathlons. Since the mechanism(s) by which the angiotension converting enzyme affects athletic ability is unknown, investigators have proposed that another gene closely linked to the ACE gene encodes for a protein directly involved in determining performance. Both power and endurance athletes are known to take growth hormone (GH) as an ergogenic aid. In addition GH has multiple effects on, amongst other tissues, skeletal muscle and the family of GH genes are closely linked to the ACE gene on chromosome 17q22-24. The primary aim of this study was therefore to determine whether the GH1 Gene is associated with the performance of the fastest finishers of the 2000 and 2001 South African Ironman Triathlons. GH production during exercise has also been shown to affect sweat rate and heat loss. A secondary aim of this study was therefore to investigate whether the GH1 gene was associated with post-race rectal temperature.

Methods

One hundred and fifty five of the fastest male triathletes (Triath) who completed the 2000 and/or 2001 South African Ironman Triathlons and 155 male control subjects (Con) were genotyped for the functional T/A variant at position 1663 within intron 4 of the GH1 gene. Individuals with an AA genotype produce less GH than those with a TT genotype. Post-race rectal temperature and GH1 genotype was also determined in 104 of the fastest finishing triathletes.

Results

There was no significant difference in the genotype (Persons Chi-square=0.152, P=0.927) or allele (Persons Chi-square=0.026, P=0.872) frequencies of this polymorphism within the GH1 gene when the fastest finishing triathletes were compared to the control subjects (Table 1). Seven hundred and one male triathletes completed the triathlons.

Table 1: GH1 A/T polymorphism genotype and allele frequencies within the various South African Ironman triathlete and control groups. Values are expressed as the number of subjects or alleles with the percentage in parentheses.

<table>
<thead>
<tr>
<th>GH1 Genotype</th>
<th>Triath</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA genotype</td>
<td>31 (20.0)</td>
<td>31 (20.0)</td>
</tr>
<tr>
<td>TT genotype</td>
<td>47 (30.3)</td>
<td>50 (32.3)</td>
</tr>
<tr>
<td>TA genotype</td>
<td>77 (49.7)</td>
<td>74 (47.7)</td>
</tr>
<tr>
<td>A allele</td>
<td>139 (44.8)</td>
<td>136 (43.9)</td>
</tr>
<tr>
<td>T allele</td>
<td>171 (55.2)</td>
<td>174 (56.1)</td>
</tr>
</tbody>
</table>

There was however a significant difference in post-race rectal temperatures between the genotype groups of these triathletes (P=0.013) (Figure 1). The post-race rectal temperatures in the triathletes with a TT genotype (37.2 ± 0.8°C, n=29) were significantly lower than those with an AT (37.6 ± 0.6°C, n=50, P=0.044) or AA (37.7 ± 0.8°C, n=25, P=0.017) genotype. There was no significant difference between athletes with a TA or AA genotype (P=0.700). Even when corrected for BMI (P=0.014) or weight (P=0.009) there was still a genotype effect on post-race rectal temperature in these athletes. There were similar environmental conditions during the 2000 and 2001 events (data not shown). In addition there was a high degree of correlation (R=0.515) between the post-race rectal temperatures for the 26 triathletes who completed both events.

Fig. 1: Post-race rectal temperatures of the three triathlete GH1 genotype subgroups of the fastest finishers of either the 2000 and/or 2001 SA Ironman Triathlons. * TT vs TA, P=0.044 and # TT vs AA, P=0.017.

Discussion/Conclusion

The GH1 gene was not associated with the endurance performance of the fastest finishers of the South African Ironman Triathlons. Post-race rectal temperatures were however significantly higher in the fastest finishing athletes who were homozygous for a GH1 genotype associated with lowest GH production.

References