Bone age maturation during three years of growth hormone therapy in patients with idiopathic growth hormone deficiency: the results of LG Growth Study

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INTRODUCTION
- GH and IGF-I are traditionally considered as potent stimulators of bone growth.
- After GH treatment in children with GH deficiency (GHD), increased serum level of IGF-I or GH itself can stimulate growth plate and results in progression of bone age (BA), however, its progression rate has been reported various.

The purpose of this study
- To investigate the progression of BA in children with idiopathic GHD (iGHD) and idiopathic short stature (ISS) during the first three years of GH treatment based on a LG Growth Study
- To compare the progression rate of BA relative to chronologic age (CA) between iGHD and ISS and to find their associated factors

SUBJECTS & METHODS
- iGHD diagnostic criteria
  1. height percentile below 3rd
  2. peak GH levels < 10 μg/L in two stimulation tests
  3. the BA delay compared to the CA
  4. normal brain MRI
- ISS diagnostic criteria
  1. height percentile below 3rd
  2. normal GH responses in two stimulation tests
  3. no identifiable diseases related to short stature
- Inclusion criteria in this study
  1. prepubertal status at baseline
  2. GH treatment for at least 3 years
  3. at least one BA obtained per year during follow-up period

RESULTS

Table 1. Baseline characteristics of subjects

<table>
<thead>
<tr>
<th></th>
<th>iGHD (n=79)</th>
<th>ISS (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (M:F)</td>
<td>48:31</td>
<td>8:6</td>
</tr>
<tr>
<td>Age</td>
<td>7.77±2.77</td>
<td>8.14±2.97</td>
</tr>
<tr>
<td>Ht z-score</td>
<td>-2.45±0.66</td>
<td>-2.60±0.62</td>
</tr>
<tr>
<td>BMI z-score</td>
<td>-0.24±1.07</td>
<td>-0.28±0.93</td>
</tr>
<tr>
<td>BA-CA</td>
<td>-1.96±0.96</td>
<td>-2.04±1.25</td>
</tr>
</tbody>
</table>

Figure 1. Mean values of BA-CA changes during 3 years of GH treatment in subjects with iGHD and ISS

Table 2. Serial changes of parameters during 3 years of GH treatment (iGHD (n=79), ISS (n=14))

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>1YR</th>
<th>2YR</th>
<th>3YR</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA-CA</td>
<td></td>
<td>-2.25</td>
<td>-2.00</td>
<td>-1.75</td>
</tr>
</tbody>
</table>
| Ht, Wt, and BMI-z score, BA, BA-CA

Baseline
- Statistics by SPSS software (version 21.0, IBM)
- Data expression: mean±SD
- Serial changes of parameters: ANOVA
- Associated factors of BA-CA at 3 year GH Tx: t-test, Pearson’s correlation, logistic regression analysis
- P-value <0.05: significant

SUMMARY & CONCLUSION
- The BA maturation was accelerated relative to the progression of CA during 3 years of GH treatment in children with iGHD.
- The BA acceleration rate at 1 year GH treatment affected to the BA-CA at 3 year GH treatment.
- In conclusion, the progression rate of BA during GH treatment is significant although clinically acceptable, therefore, this factor must be considered when efficacy of GH treatment is evaluated.