Ratio of False Positive Results of Growth Hormone Stimulation Tests (Arginine and Insulin)

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Abstract. We studied the false positive ratios of arginine and insulin tests in short children. Totally, the false positive ratio was about 22%. There was no statistical difference in the false positive ratios between arginine tests and insulin tests. It did not seem that the false positive ratio was influenced by height or IGF-I levels.

Key words: false positive results, arginine and insulin tests, IGF-I, height

It is well known that there are false positive and negative results of GH stimulation tests [1-7]. For example, the false positive results of arginine and insulin tests were reported to be 20-30% in normal short children [2-7]. After the development of a sensitive GH assay such as IRMA, the ratio of false positive results of GH stimulation tests remains to be clarified. We studied the false positive ratio of insulin and arginine tests.

Subjects

Subjects were 32 control children (CC: height > mean - 2 SD, -0.99 ± 1.28 SD) and 127 normal short children (NS: height < mean - 2 SD, -3.32 ± 0.86 SD). In normal short children, at least one of the GH peaks of

GH stimulation tests was over 10 ng/ml.

Method

(1) GH was measured by RIA (Eiken Kit) and IRMA (Eiken Kit). The results were evaluated after all RIA GH levels were calculated into IRMA GH levels according to our hospital's relation between RIA and IRMA GH assay ($\text{IRMA GH} = 0.88 \times \text{RIA GH} - 1.39$). IGF-I was measured by RIA with or without acid ethanol extraction. Similarly, all the IGF-I levels without the extraction were calculated into those with the extraction.

(2) Insulin and arginine tests were done as follows (Table 1): arginine infusion (0.5 g/kg for 30 min), followed by insulin injection (0.1 U/kg one IV injection) two and half hours after starting the arginine infusion. Blood was taken 0, 30, 60, 90, 120, 150 min after arginine infusion and 0, 15, 30, 45, 60, 90, 120 min after insulin injection.

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Table 1. Arginine and Insulin tests.
(Insulin is injected 2.5hr after starting arginine infusion)

Table 2. False positive ratio of arginine (Arg.) and insulin (Ins.) tests in CC and NS

CC	Arg.	29%(n=28)
	Ins.	19%(n=32)
	Arg. & Ins.	23%(n=60)
NS	Arg.	25%(n=126)
	Ins.	19%(n=127)
	Arg. & Ins.	22%(n=253)

(3) All the data were shown as mean $\pm$ SD, and statistical analysis was done by chi-square test.

Results

(1) On the presumption that GH secretion status was normal if any one of the GH peaks among the GH stimulation tests was over 10 ng/ml, the false positive ratios of these two tests (GH peaks < 10 ng/ml by IRMA assay) were 23% and 22% in CC and NS, respectively (Table 2). There was no statistical difference in the ratio of the false positive results between CC and NS. The false positive ratios of our arginine and insulin tests in total subjects were 25% (n=154) and 19% (n=159), respectively. There was no statistical difference between the false positive ratio of the arginine test and that of the insulin test.

(2) When we divided the subjects into three

age groups, namely the group at the age of 1-4 years, that at the age of 5-9 years and that at the age of 10-15 years, the false positive ratios of these three groups were 12% (n=68), 20% (n=108), and 30% (n=147), respectively. There was no statistical difference of the false positive ratios among any two out of the three age groups.

(3) When we divided the patients with NS into two groups based upon their IGF-I levels, namely the group with normal IGF-I levels (> 5 th percentile of normal control children [8]) and that with low IGF-I levels (< 5 th percentile), the false positive ratios of these two groups were 18% (n=77) and 25% (n=36), respectively. There was no statistical difference of the false positive ratio between these two groups.

(4) When we divided the patients with NS into two height groups, namely the group with heights ranging from mean -2 SD to mean -4 SD and the group with heights under mean -4 SD, the false positive ratios of these two groups were 21% (n=199) and 21% (n=52), respectively. There was no statistical difference of the false positive ratio between these two height groups or between either height group and CC group.

Discussion

There have been several classical reports about the false positive ratios of traditional GH stimulation tests [1-7]. They are usually 20-30%, which is quite similar to our results of arginine and insulin tests.

Although the false positive ratios in CC and NS did not significantly change with age, there was a tendency for the false positive ratio to increase with age. This difference with age may be because we did not "prime" for older patients. However, even at younger ages, the false positive ratios were not so low (12% and 20%).

We have reported the weak relation between IGF-I and height [9] in normal and short children. IGF-I is well known to be

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mainly regulated by GH and height was reported to correlate with GH secretion status [10]. However, our false positive ratios of arginine and insulin were not dependent upon IGF-I levels or heights in short children. Thus, the false positive ratios of arginine and insulin tests in our study did not seem to reflect the difference of IGF-I levels or heights (difference of GH secretion status) among our subjects but just reflected the limitations of our arginine and insulin tests themselves.

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