INFLUENCE OF A WEIGHT REDUCTION PROGRAM BASED ON A COMBINATION OF DIET AND EXERCISE THERAPY FOR OBESE CHILDREN ON SERUM GHRELIN, GH, AND IGF-1 LEVELS
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INTRODUCTION
Ghrelin, an endogenous ligand for the growth hormone (GH) secretagogue receptor, has been reported to induce a GH-releasing, orexigenic effect on weight gain, and adipogenic actions. It is, therefore, thought that ghrelin links the regulatory systems for growth and energy balance. Although previous studies indicate that ghrelin is downregulated in human obesity. Moreover, previous studies say that weight loss increases circulating levels of ghrelin in obese adults and children. The mechanism leading to an increase in circulating ghrelin levels during weight loss is still unclear. So, we examined 25 obese children undergoing a 3-month inpatient weight reduction program for obese children based on a combination of diet and exercise therapy and evaluated the change in the serum ghrelin, GH, and IGF-1 levels.

METHODS
The subjects consisted of 25 children with moderate to severe simple obesity [17 boys, 8 girls; mean age 9.9±1.3 years, percent overweight (% overweight) 52.1±13.6%]. The diet was comprised of 50% carbohydrates, 20% protein, and 30% fat (1360~1960kcal/day). Obese children performed aerobic and resistant exercise every day. Height, weight, percent body fat (% BF), fat mass, fat-free mass (FFM), serum ghrelin, GH, and insulin-like growth factor I (IGF-1) were measured before and after weight reduction.

RESULTS / CONCLUSION
After therapy, body weight, % BF and fat mass had all significantly decreased (p<0.001), while height and FFM had both significantly increased (p<0.001; p<0.05, respectively). There were no correlations between pre-therapy serum ghrelin and any of the following: initial height, weight, % overweight, % BF, fat mass, FFM, GH, or IGF-1. However, after therapy, serum ghrelin levels were negatively correlated with body weight (rs=-0.544, p<0.01). Serum ghrelin levels increased significantly from pre- to post-therapy (113.9±30.7 to 129.6±42.9fmol/ml, p<0.05), but GH and IGF-1 were unchanged (3.37±5.82 to 1.43±1.69ng/ml; 157.6±84.2 to 170.0±75.9ng/ml, respectively). The rate of change in ghrelin levels was negatively correlated with the rate of change in the % overweight (rs=-0.412, p<0.05). These findings suggest that long-term weight reduction based on a combination of diet and exercise therapy lessens the severity of obesity and increases serum ghrelin levels without affecting a change in GH or IGF-1 in obese children.

REFERENCES
Keywords: Children, Endocrinology, Obesity

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