# METABOLIC OUTCOME IN ADOLESCENTS WITH GROWTH HORMONE DEFICIENCY DURING TRANSITION PHASE

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## INTRODUCTION AND OBJECTIVES

**GH deficiency (GHD) in adulthood is associated with detrimental cardiovascular effects.**
**Although data are controversial, adolescents with childhood-onset GHD and reconfirmed GHD may have increased metabolic risk after GH withdrawal at final height.**
**Aim of our study was to compare growth response and metabolic profile in idiopathic childhood-onset GHD adolescents with reconfirmed GHD in comparison to GHD subjects who normalized their GH response at transition phase.**

## METHODS

**In our retrospective observational study we enrolled:**

- **20 subjects (12 M) (age 17.0 ± 1.4 yrs) with reconfirmed GHD at retesting (GH peak<19 ng/ml after GHRH+Arginine).**
- **20 subjects (12 M) (age 16.8 ± 1.0 yrs) with sufficient GH response at retesting (GHS).**

**We evaluated the following outcomes:**

- **Auxology: height (H), weight, height velocity (HV), body mass index (BMI), bone age (BA), waist circumference (WC), hip circumference (HC), waist/hip ratio (WHR), waist/height ratio (WHtR). H, HV and BMI were expressed as standard deviation score (SDS) according to reference standards.**
- **Lipid profile: Total-, HDL- and LDL cholesterol (T-, HDL-, LDL-C), triglycerides, atherogenic index (AI).**
- **Glucose metabolism: glucose, insulin, HOMA index, QUICKI index.**
- **Cardiovascular risk factors: fibrinogen and homocysteine.**

**All the outcomes have been assessed at diagnosis of GHD during childhood, before and after 6 months of GH withdrawal at the attainment of final height.**

## RESULTS

- **At diagnosis (Table 1) patients with reconfirmed GHD were younger than GHS subjects and had lower HSDS, HVSDS, HDL-C and significantly higher levels of AI, fibrinogen and homocysteine.**

- **At the attainment of final height (Table 2) the total gain in HSDS was higher in GHD in comparison to GHS young adults while all other anthropometric and metabolic parameters were comparable between the two groups.**

- **Six months after GH withdrawal (Table 3), GHD patients showed higher BMI SDS, WHtR, T-C, AI, fibrinogen and homocysteine and lower levels of HDL cholesterol, compared to subjects with sufficient GH secretion.**

**Table 1**

| At diagnosis | GHD | GHS | p |
|---|---|---|---|
| Age (yrs) | 7.0 ± 4.4 | 10.6 ± 2.9 | <0.02 |
| H (SDS) | -3.0 ± 1.1 | -2.2 ± 0.8 | <0.03 |
| HV (SDS) | -3.6 ± 1.1 | -2.2 ± 1.5 | =0.007 |
| HDL-C (mg/dl) | 47.6 ± 12.6 | 60.1 ± 15.6 | <0.03 |
| AI | 3.6 ± 1.1 | 2.6 ± 0.9 | <0.02 |
| Fibrinogen (mg/dl) | 300.7 ± 46.6 | 266.3 ± 44.9 | <0.05 |
| Homocysteine (µmol/L) | 11.8 ± 3.9 | 8.8 ± 3.4 | <0.04 |

**Table 2**

| At the attainment of fnal height | GHD | GHS | p |
|---|---|---|---|
| H (SDS) | 2.2 ± 1.6 | 1.2 ± 0.4 | < 0.03 |
| BMI (SDS) | 0.06 ± 1.5 | -0.84 ± 0.9 | n.s. |
| WHtR | 0.45 ± 0.06 | 0.45 ± 0.03 | n.s. |
| T-C (mg/dl) | 144.5 ± 19.2 | 143.5 ± 27.4 | n.s. |
| HDL-C (mg/dl) | 49.3 ± 13..4 | 56.5 ± 11.6 | n.s. |
| AI | 2.9 ± 0.7 | 2.6 ± 0.7 | n.s. |
| Fibrinogen (mg/dl) | 273.8 ± 34.8 | 265.3 ± 33.3 | n.s. |
| Homocysteine (µmol/L) | 10.6 ± 4.6 | 9.4 ± 4.9 | n.s. |

**Table 3**

| 6 months after GH withdrawal | GHD | GHS | p |
|---|---|---|---|
| BMI (SDS) | 0.30 ± 1.5 | -0.67 ± 1.0 | <0.05 |
| WHtR | 0.50 ± 0.06 | 0.45 ± 0.03 | =0.008 |
| T-C (mg/dl) | 157.7 ± 22.3 | 141 ±22.1 | <0.05 |
| HDL-C (mg/dl) | 47.8 ± 8.8 | 55.8 ± 10.3 | <0.03 |
| AI | 3.4 ± 0.5 | 2.6 ± 0.7 | =0.002 |
| Fibrinogen (mg/dl) | 307 ± 45.7 | 272.3 ± 46.1 | <0.05 |
| Homocysteine (µmol/L) | 12.1 ± 4.6 | 9.2 ± 2.9 | <0.04 |

## CONCLUSIONS

- **GH treatment exerts favorable metabolic effects in young adults with GHD.**
- **Discontinuation of GH therapy at attainment of final height in subjects with reconfirmed GHD is associated with the development of metabolic abnormalities already six months after withdrawal; thus underlying the importance of an early GH restart in young adults with reconfirmed GHD.**