

# **Glucose Suppression Test for Growth Hormone**

#### **Principle**

Acromegaly in adults and gigantism in children are relatively rare diseases that are caused by persistent growth hormone (GH) hypersecretion. The estimated prevalence of acromegaly in adults is 60 cases per million with 3-4 new cases per million per year. In gigantism in children, the disease is diagnosed prior to epiphyseal fusion, leading to excessive tall stature. After completion of growth, the clinical symptoms become more similar to those in acromegalic adults like coarse facial features, acral changes, hyperhydrosis, headaches and visceromegaly. GH secretion is part of the counter-regulatory defence against hypoglycaemia and physiological GH secretion is inhibited by hyperglycaemia. In acromegaly, GH secretion is autonomous and does not suppress and may paradoxically rise with hyperglycaemia.

### **Indication**

• This test is used to investigate clinical suspicion of acromegaly or gigantism. Baseline GH values cannot be used to exclude acromegaly since elevated GH may occur with stress and low values are seen in up to 8% of acromegalic patients who are subsequently identified by the failure of GH to suppress during a GTT.

#### **Precautions**

• This test is unnecessary in diabetics who have already shown GH suppression in the presence of hyperglycaemia.

#### Side Effects

Some subjects feel nauseated and may have vaso-vagal symptoms during this test.

#### **Preparation**

- The diet over the preceding 3 days should contain adequate carbohydrate (approx. 60% of calories).
- The patient should be fasted overnight for 10 to 14 hours (water only allowed) and should rest throughout the test.
- Physical exercise is not allowed in the morning prior to and/or during the test.
- The test should be performed in the morning.

#### **Protocol**

- Prepare the glucose load as ONE of the following:
  - POLYCAL® (Nutricia Clinical) liquid. POLYCAL contains 0.66g anhydrous glucose per mL (or 1.51 mL contains 1g anhydrous glucose). The dose of POLYCAL must be adjusted for the weight of the child at a dose of 2.64 mL POLYCAL/kg body weight (to a maximum of 113 mL POLYCAL, equivalent to a 75g glucose load). Add water to make up to a volume of 200 mL.

## OR

- Glucose tolerance test (Rapilose) Solution: Contains 75g anhydrous glucose in 300 mL. For children weighing less than 43kg, the dose is 7 mL (1.75g anhydrous glucose)/kg body weight. The total dose should not exceed 75g anhydrous glucose. If the volume is less than 200 mL, add water to make up to 200 mL.
- Insert a reliable cannula and take a basal blood sample for glucose, growth hormone, IGF1 and IGF-BP3 (t = 0).
- The child should drink the glucose load over a period of about 5 min.
- Take further blood samples for glucose and growth hormone 30, 60, 90 and 120 post administration of the glucose drink.

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#### **Time Points:**

Time post glucose drink (min)	Procedure	Blood Sample	
0	_	Growth hormone, glucose, IGF1 and IGF-BP3	
30	-	Growth hormone, glucose	
60	-	Growth hormone, glucose	
90	-	Growth hormone, glucose	
120	-	Growth hormone, glucose	
150	1	Growth hormone, glucose	

**Samples** 

**Growth Hormone** 1.2 mL clotted blood (white top)

Glucose 1.2 mL fluoride oxalate tube (yellow top)

IGF1 + IGF-BP3 1.2 mL clotted blood (white top)

#### Interpretation

- Normal subjects are likely to exhibit suppression of GH to < 0.5 μg/L during the test, but the results should be interpreted in conjunction with IGF-1 results.
- High basal levels which fail to suppress, sometimes with a paradoxical rise in GH levels is characteristic of GH hypersecretion.
- A paradoxical rise in GH may occur during the OGTT during normal adolescence.
- GH may fail to suppress due to chronic renal failure, liver failure, active hepatitis, anorexia nervosa, malnutrition, hyperthyroidism, diabetes and adolescence.
- Basal IGF-BP3 levels may be a useful adjunct. Patients with untreated acromegaly consistently have significantly raised random serum IGF-1 and IGFBP-3 levels, showing no overlap with normal individuals.

## References

1. Freda P.U. (2009) Monitoring of acromegaly: what should be performed when GH and IGF-1 levels are discrepant? *Clin Endocinol* **71**: 166 – 170

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