



# GROWTH HORMONE THERAPY IN TURNER SYNDROME

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## BACKGROUND

- ❖ Turner syndrome (TS) is one of the most common causes of short stature in females. Adult height of patients with TS is 20cm shorter than in general population.
- ❖ Growth hormone (GH) therapy improves height outcome in girls with TS; results depend on age at diagnosis, duration of therapy and doses of GH.

## OBJECTIVES

- ❖ The primary objective of this study was to evaluate growth during the first 4 years of GH treatment in patients with TS
- ❖ The secondary objectives of this study include:
  - registering the incidence and severity of adverse events
  - occurrence of malignancies during treatment

## METHODS

- ❖ The study enrolled eight prepubertal girls with TS (fig.1)
- ❖ Age at baseline varied between 4ys and 14.4ys (mean 11.54ys) (fig.2,6)
- ❖ All of them were treated with a mean dose of GH = 0.037mg/kg/d and followed for at least 4 years (mean 5.2ys)
- ❖ We register the following parameters at baseline and every 6 months:
  - height and height SDS
  - weight
  - height velocity (HV)
  - X-ray of non-dominant hand and wrist for bone age
  - IGF-1 values
  - fasting plasma glucose +/- oral glucose tolerance tests
- ❖ All adverse events were registered at every visit



Figure 1. Patient with TS

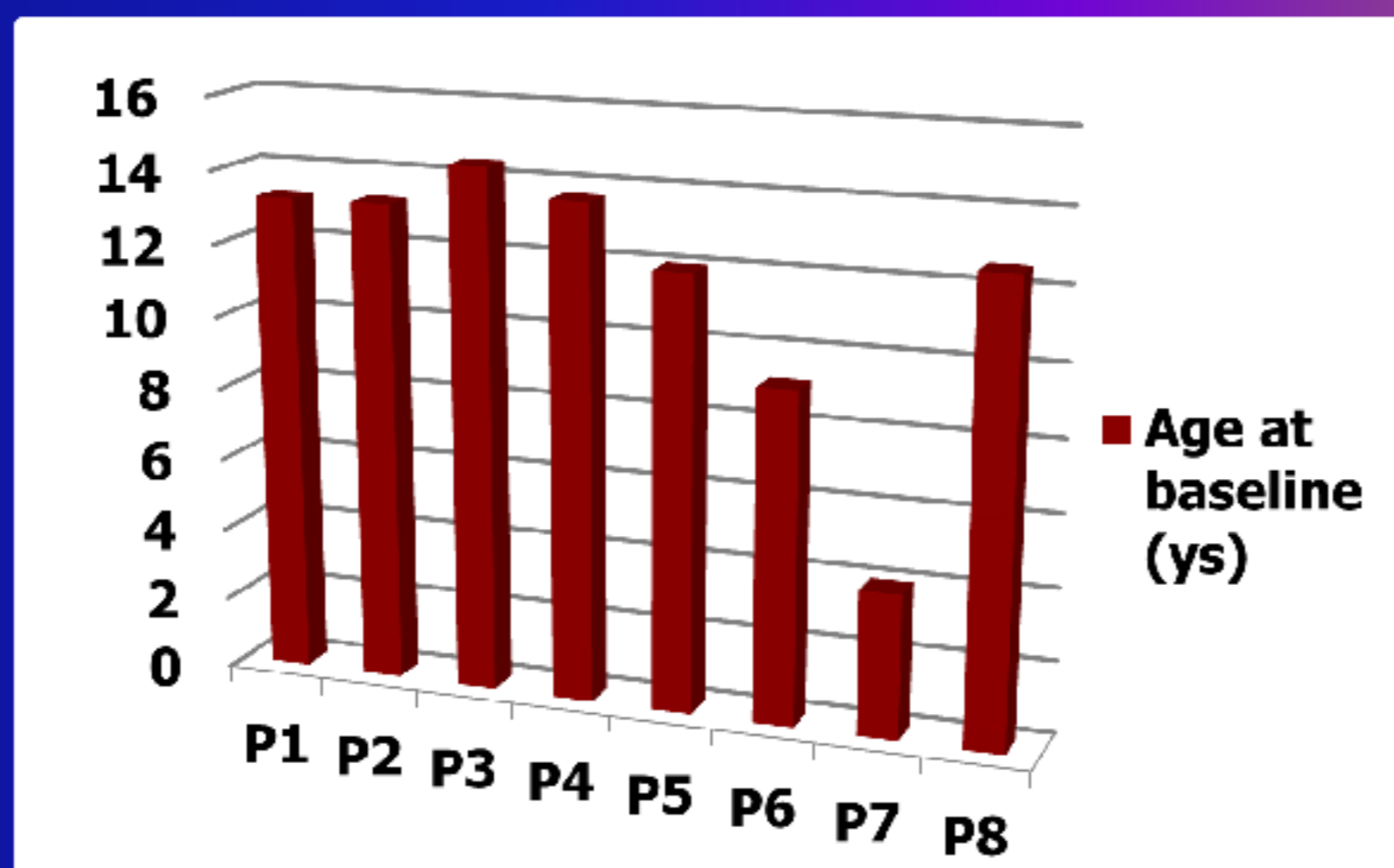


Figure 2. Age of each TS patient at baseline

## RESULTS

- ❖ The mean height standard deviation score (SDS) improved by 2.33, from -3.61 at baseline to -1.28 after 4 years of therapy; main gain over 4ys was 23.55 cm (fig.3)
- ❖ Mean height velocity was maximum in the first year (8.53 cm/yr), decreasing in the second (6.85 cm/yr), third (4.11cm/yr) and fourth year (4.05cm/yr) of treatment (fig.4)

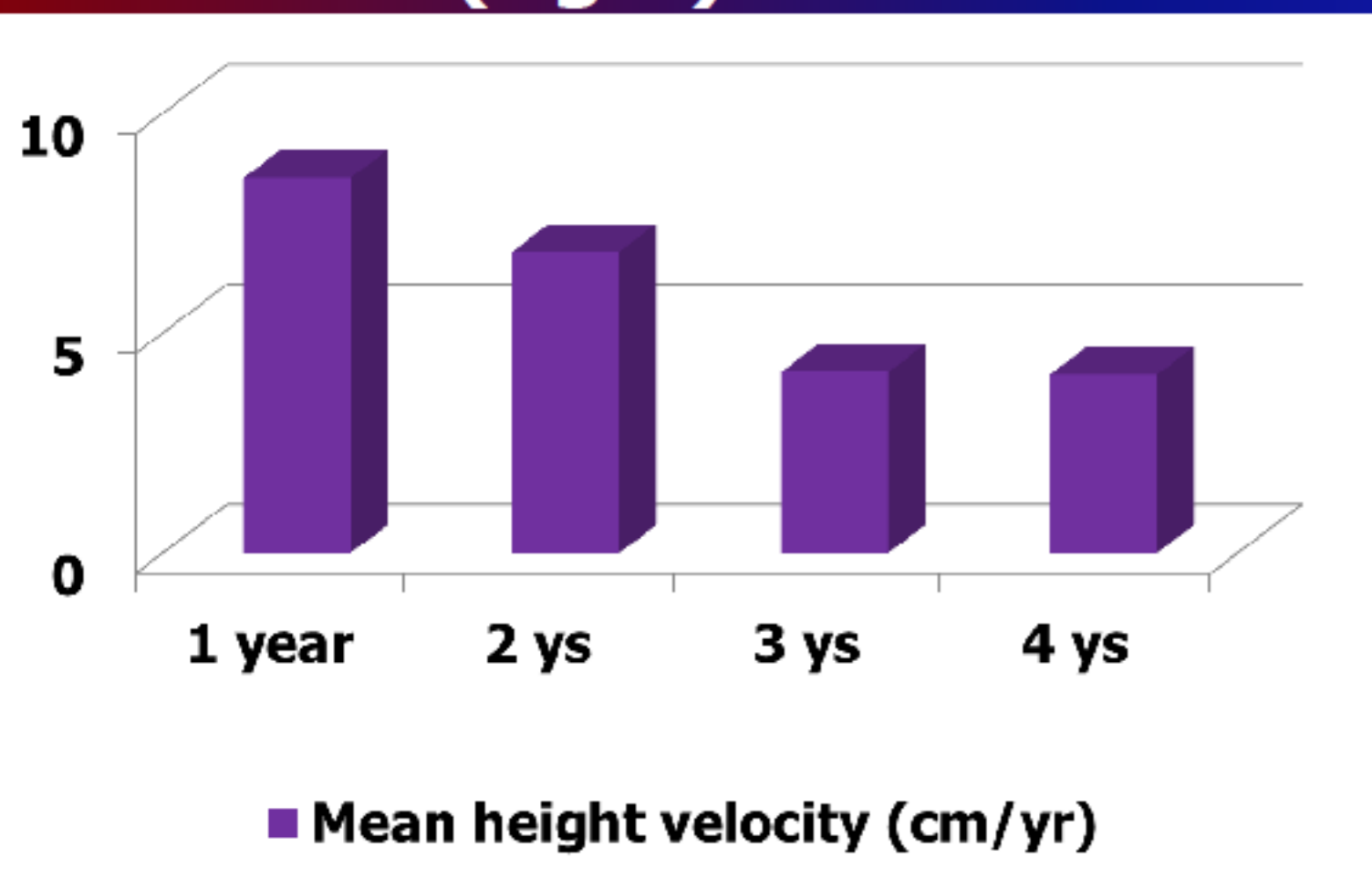


Figure 4. Height velocity (HV) during first 4ys of treatment

- ❖ The mean weight standard deviation score (SDS) improved by 0.6, increasing from -1.28 at baseline to -0.68 after 4 years (fig.5)

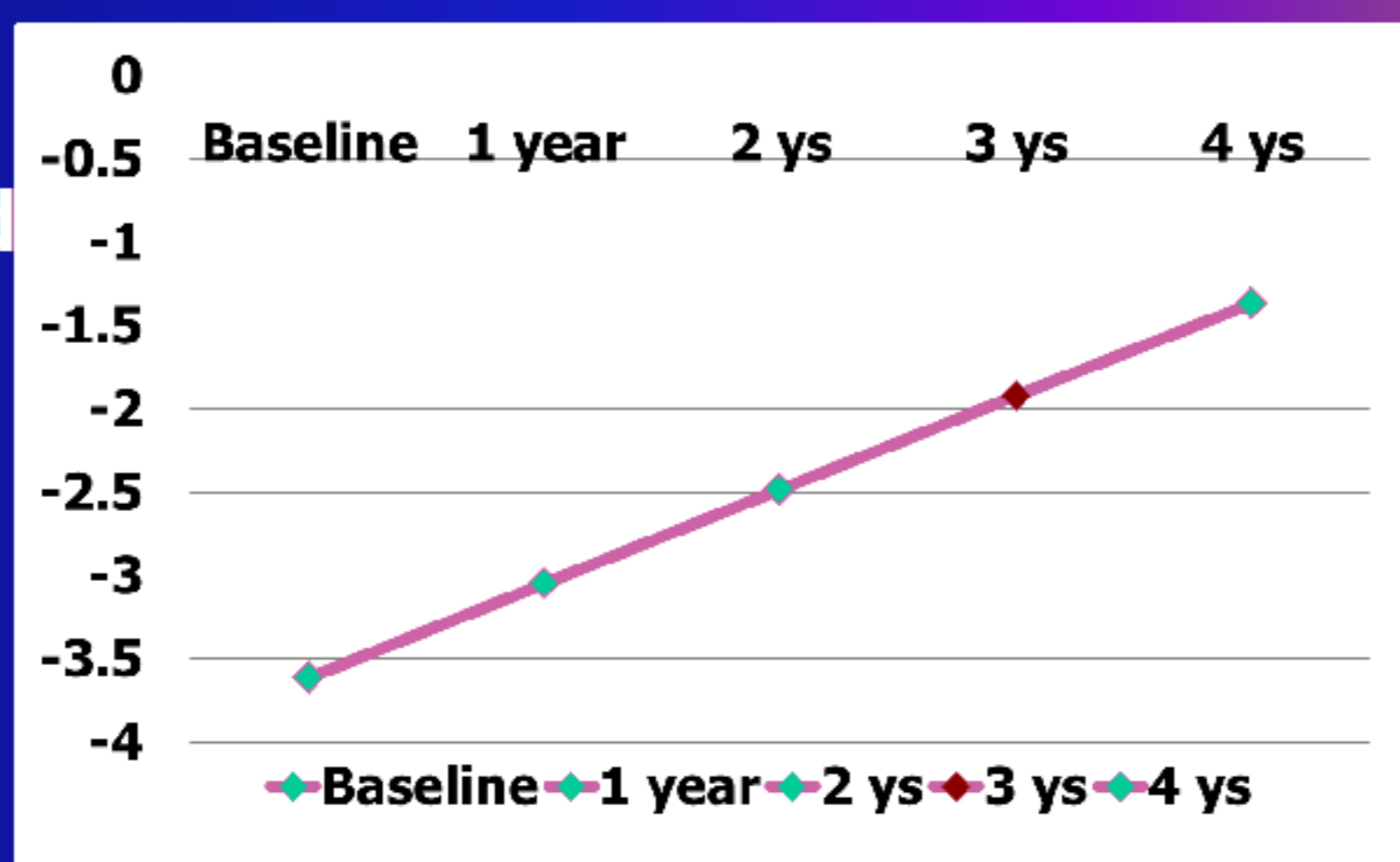


Figure 3. Height SDS during first 4ys of treatment

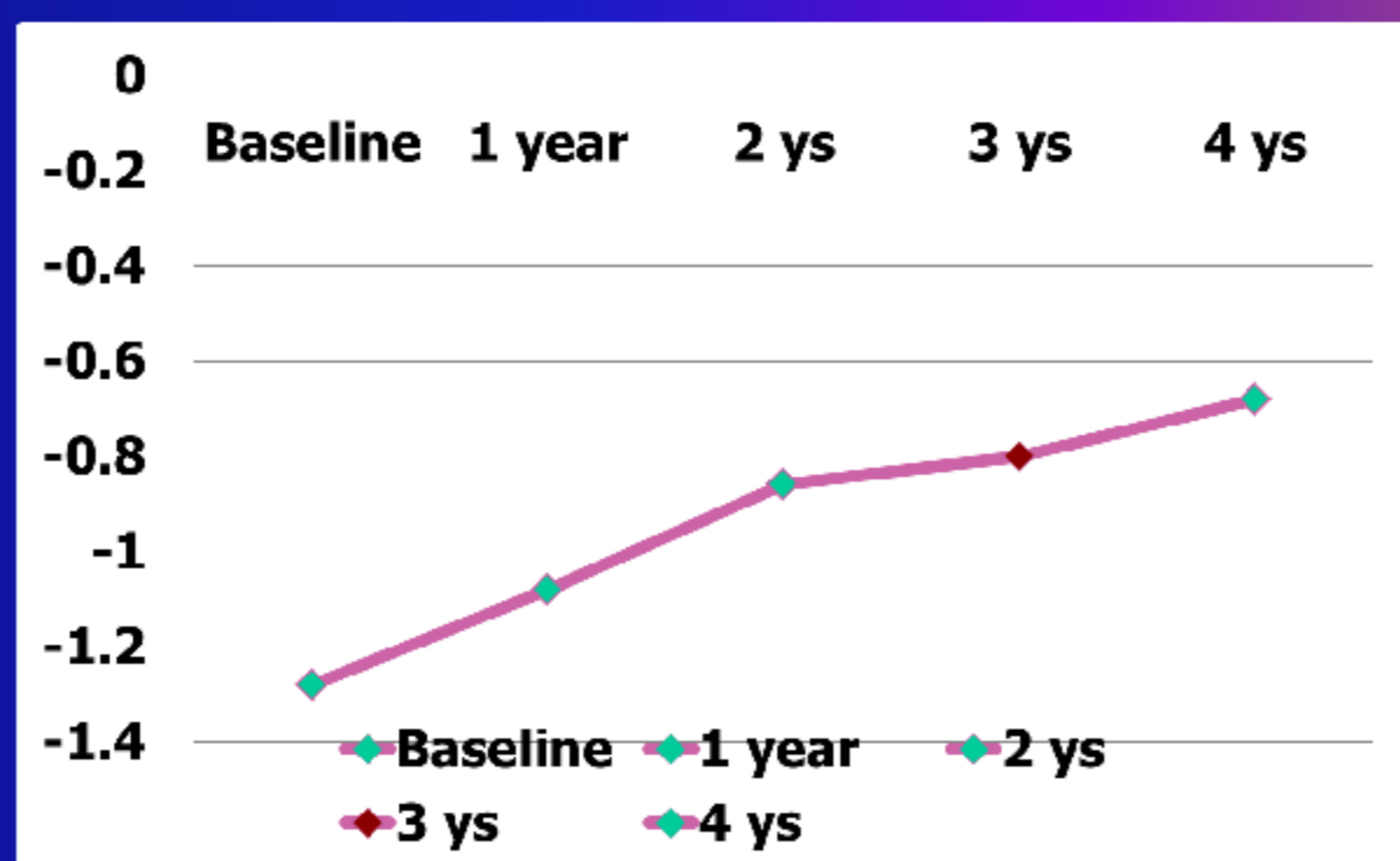


Figure 5. Weight SDS during first 4ys of treatment

## RESULTS

- ❖ Mean chronological age at diagnosis was 11.54 ys (fig.6)
- ❖ Bone age was delayed at diagnosis by a mean value of 1.17ys and after 4ys the delay decreased to 0.22ys (fig.6)
- ❖ Mean IGF-1 values were kept in the upper normal range for age and sex (fig.7)

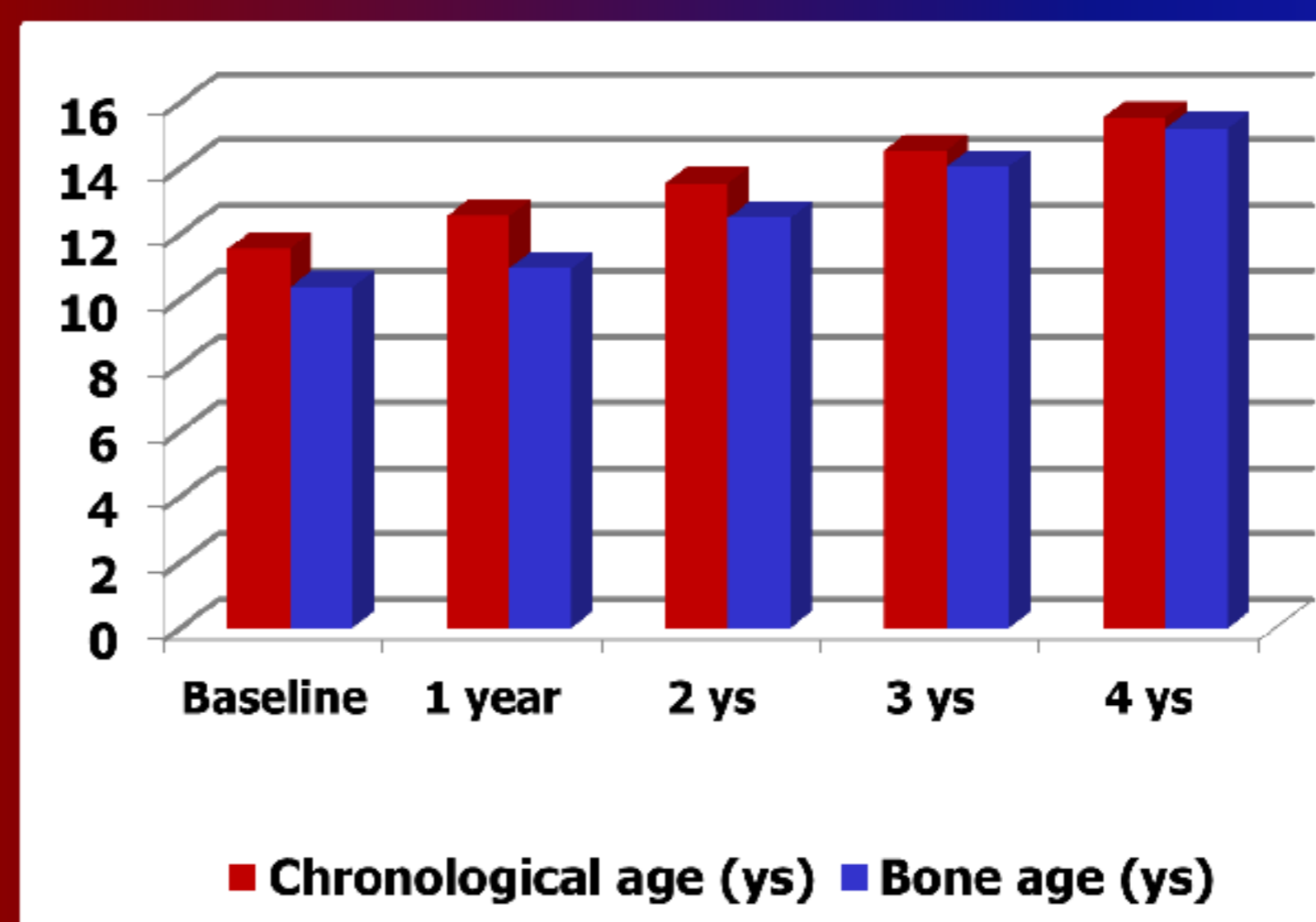


Figure 6. Evolution of bone age through 4ys of therapy

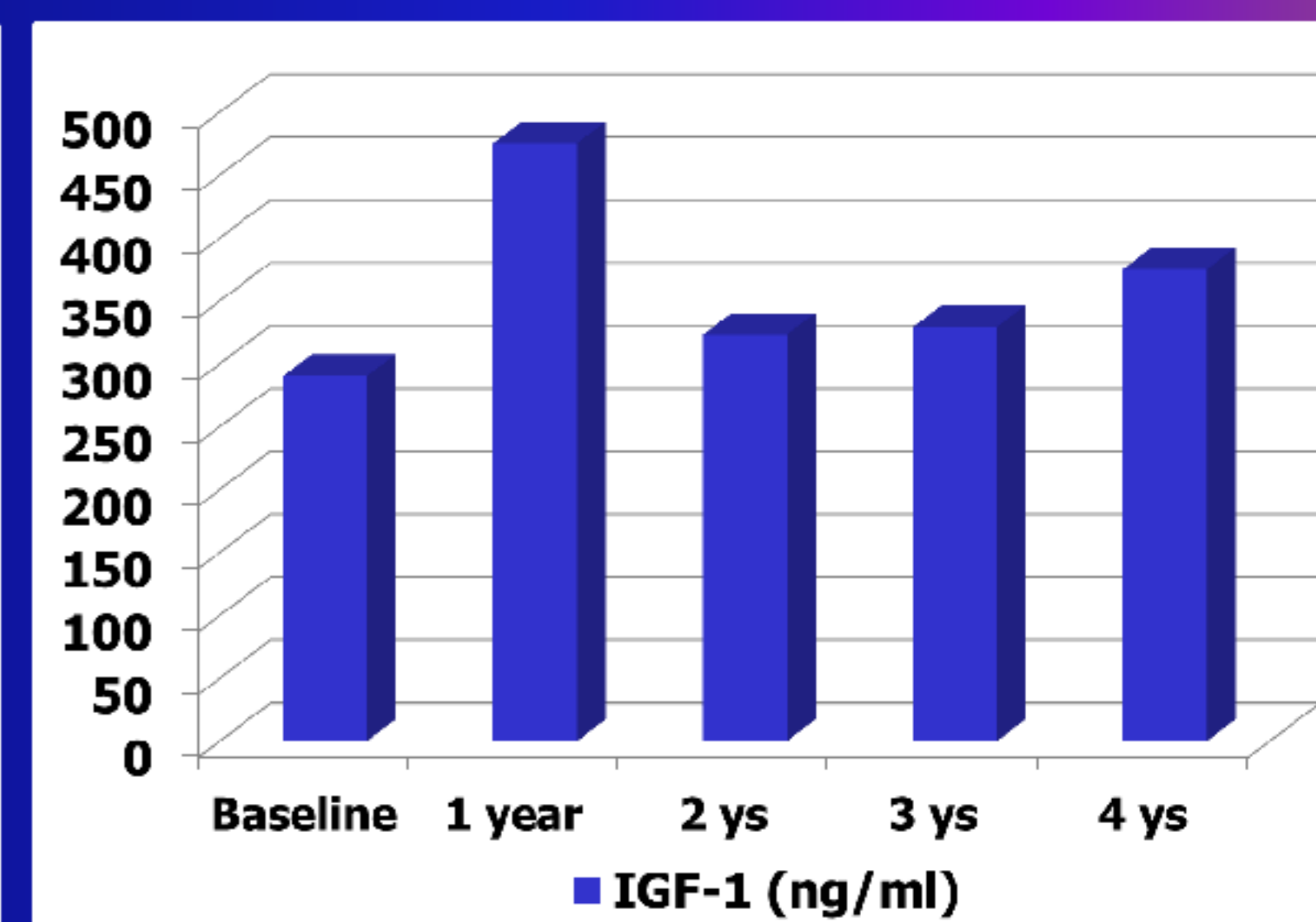


Figure 7. IGF-1 values from baseline to 4ys of treatment

- ❖ Within first 4 years of therapy :
  - There were no cases of diabetes mellitus, impaired glucose tolerance or malignancies
  - Four patients (50%) had transient increase in fasting glucose (>100<126 mg/dl; normal OGTT) (fig.8)
  - Two patients (25%) developed hypothyroidism and was treated with levothyroxine (fig.8)
  - No serious adverse events were observed

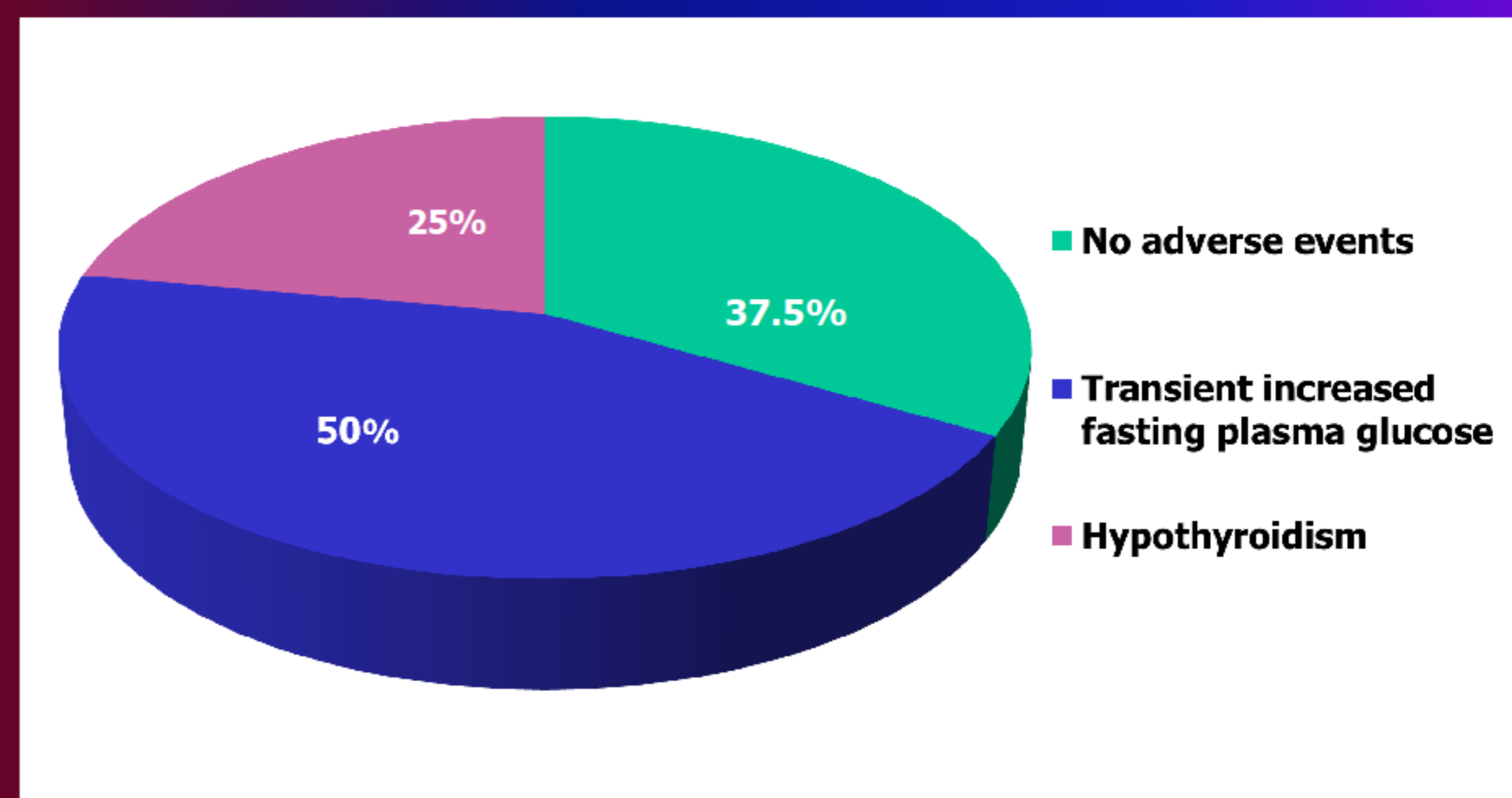


Figure 8. Adverse events in the first 4ys of GH therapy

## DISCUSSIONS

- ❖ GH therapy accelerates the linear growth rate, improving final height.
- ❖ GH treatment may have a diabetogenic potential, affecting the carbohydrate metabolism.
- ❖ Delayed diagnosis of TS has a negative impact on growth.

## CONCLUSIONS

- ❖ GH treatment is associated with highly significant changes in growth.
- ❖ In our study height velocity was maximum (8.53 cm/yr) in the first year of GH treatment; the improvements in growth declined in the second (6.85cm/yr), third (4.11 cm/yr) and fourth year (4.05 cm/yr).
- ❖ GH therapy had a favorable safety profile.
- ❖ No severe adverse events were observed