

Short-term changes in bone formation markers following growth hormone (GH) treatment in short prepubertal children with a broad range of GH secretion

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Aim

The purpose was to study the time course of different bone formation markers during GH treatment in prepubertal children and to study the bone markers relation to the first year growth response during GH treatment.

Background

Growth hormone (GH) promotes longitudinal growth and bone modeling/remodeling. The bone formation markers intact amino-terminal propeptide of type I procollagen (PINP), bone-specific alkaline phosphatase (BALP), and osteocalcin reflect different stages in bone formation, i.e., proliferation with collagen synthesis, matrix maturation, and mineralization.

Conclusions

- The bone formation markers PINP, BALP and osteocalcin increased during short-term GH treatment, and showed different temporal patterns¹
- GH treatment increased the number of patients within the reference intervals
- PINP and osteocalcin correlated with the growth response during the first year of GH treatment
- These markers may be a useful addition to existing prediction models for growth response

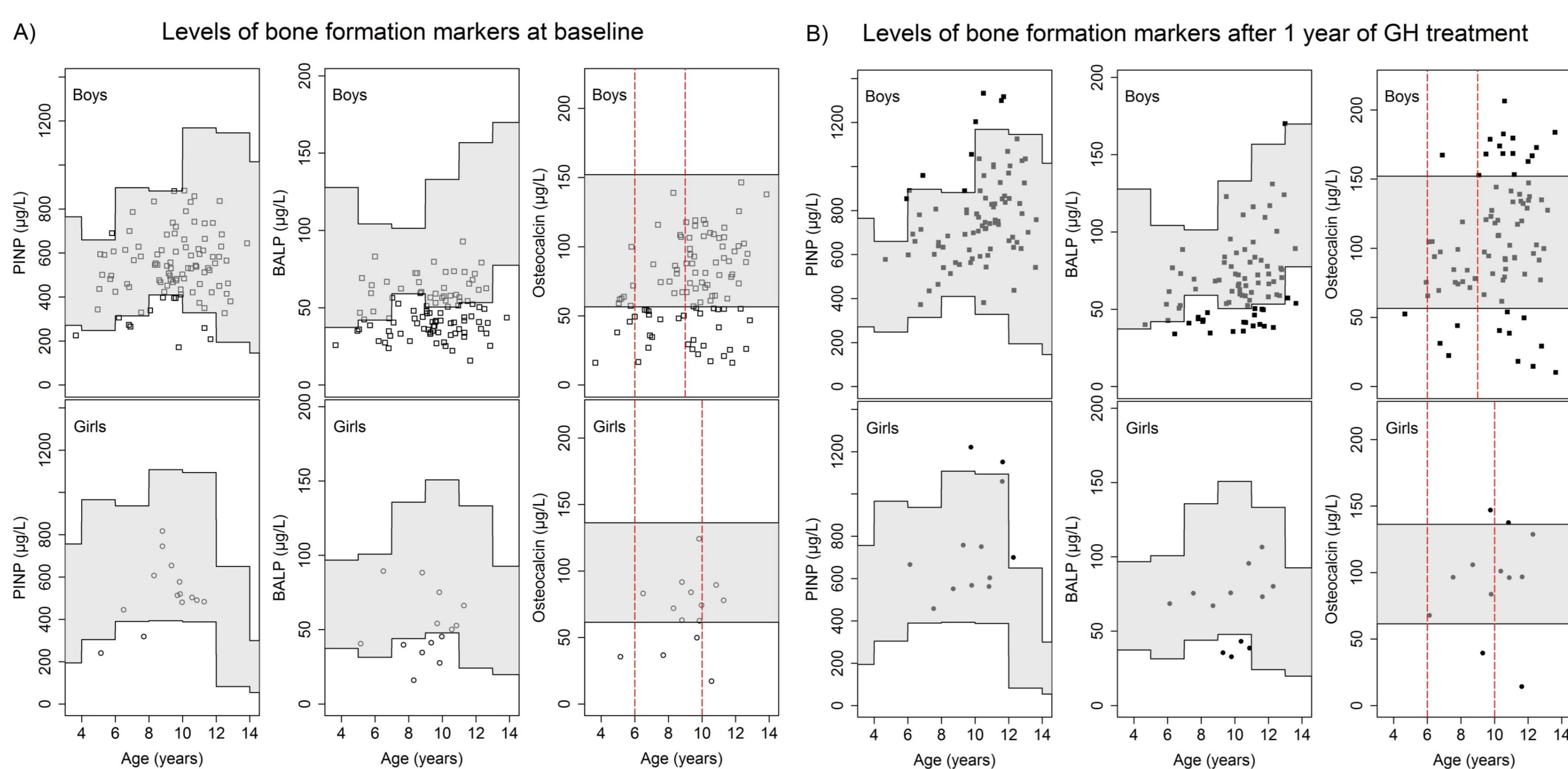


Figure 1. shows the bone markers values for PINP, BALP and osteocalcin for all of the patients in comparison with reported reference intervals for healthy children²⁻⁴.

Patients and Methods

The study group comprised 113 short prepubertal children (mean age \pm SD, 9.37 ± 2.13 years; 99 boys) on GH treatment (33.0 ± 0.06 $\mu\text{g}/\text{kg}/\text{day}$) for 1 year.

Blood samples were drawn at baseline, after 1 and 2 weeks, 1 and 3 months, and 1 year after treatment start. PINP, BALP, and osteocalcin were measured using an automated IDS-iSYS immunoassay system.

References:

1. Andersson B, et al, Clin Endocrinol. 2014 May 13. [Epub ahead of print]
2. Huang, Yet al. Clin Biochem 2011, 44, 771-778.
3. Cavalier, E, et al, Clin Chem 2012, 58 Suppl, A70.
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Percentage change in bone markers after GH start

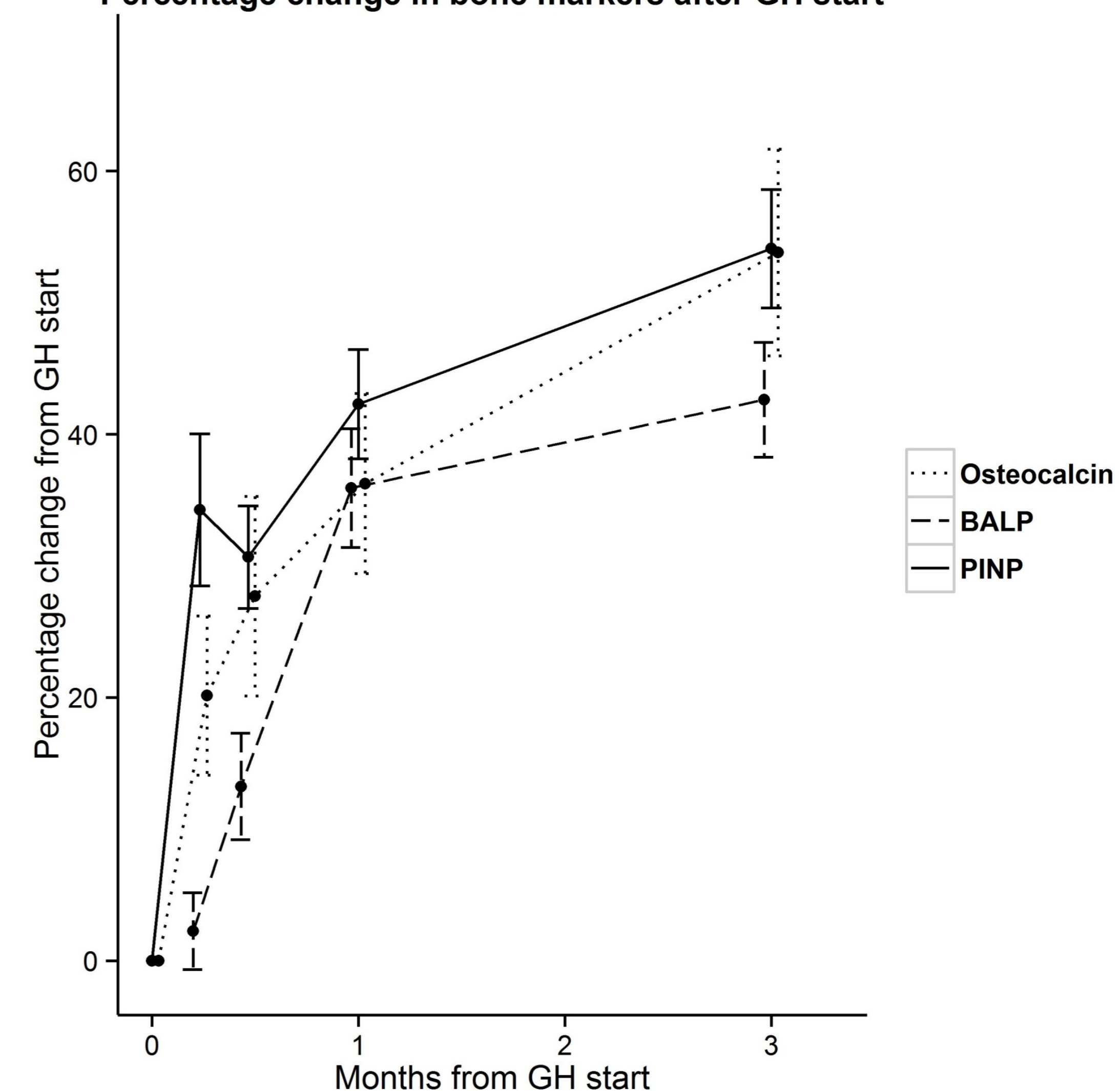


Figure 2. PINP, BALP and osteocalcin, increased in the short-term during GH treatment. PINP after 1 week, and BALP and osteocalcin after 1 month¹.

Results

PINP levels at 1 and 3 months correlated positively, and osteocalcin levels at 1 week and percentage change after 1 month correlated negatively, with first year growth response. No significant correlations were found between BALP and first year growth.

Multiple regression analysis showed that bone marker levels together with auxological data and insulin-like growth factor binding protein-3 explained the variation in first year growth response to 36 % at start and 48 % at 3 months.