

# Height and weight dynamics in preschool boys with constitutional delay of growth and puberty

Thomas Reinehr<sup>1</sup>, Elisa Hoffmann<sup>1</sup>, Juliane Rothermel<sup>1</sup>,  
Theresa Johanna Lehrian<sup>2</sup>, Gerhard Binder<sup>2</sup>

1: Vestische Kinder- und Jugendklinik Datteln, University of Witten- Herdecke, Germany  
2: University Children's Hospital, Pediatric Endocrinology, Tübingen, Germany

Email: T.Reinehr@kinderklinik-datteln.de



## Background:

Constitutional delay of growth and puberty (CDGP) is one of the most frequent variants of normal in children presenting with short stature. Knowing the height, growth, and weight pattern of CDGP in the first years of life may help distinguishing CDGP from other diseases with short stature.

## Method:

We evaluated retrospectively height and weight in the first 5 years of life based on the screening examinations documented in the German screening examination booklet for children in 54 boys with CDGP. Furthermore, we measured prospectively height and weight at the age of  $\geq 20$  years.

## Statistic approach:

The height and BMI data were transformed into standard deviation scores (SDS) for chronological age according to the reference data for German children and adults (1). Corrected height SDS was calculated by height-SDS minus target height-SDS. To establish normative values for height and growth in children with CDGP smoothed parameters for height and height velocity in the first 5 years of life were calculated based on the following procedure: For every chronological age, the median, 5<sup>th</sup> and 95<sup>th</sup> percentile of measured height and the median, 25<sup>th</sup> and 75<sup>th</sup> percentile of height velocity were chosen. In a next step, regression models (linear, exponential, potential, logarithmic and hyperbolic) were calculated based on these factors. The model with the highest  $r^2$  was chosen (smoothed model).

Ref 1: Rosario AS, Schienkiewitz A, Neuhauser H. German height references for children aged 0 to under 18 years compared to WHO and CDC growth charts. Ann Hum Biol 2011 Mar;38(2):121-30.

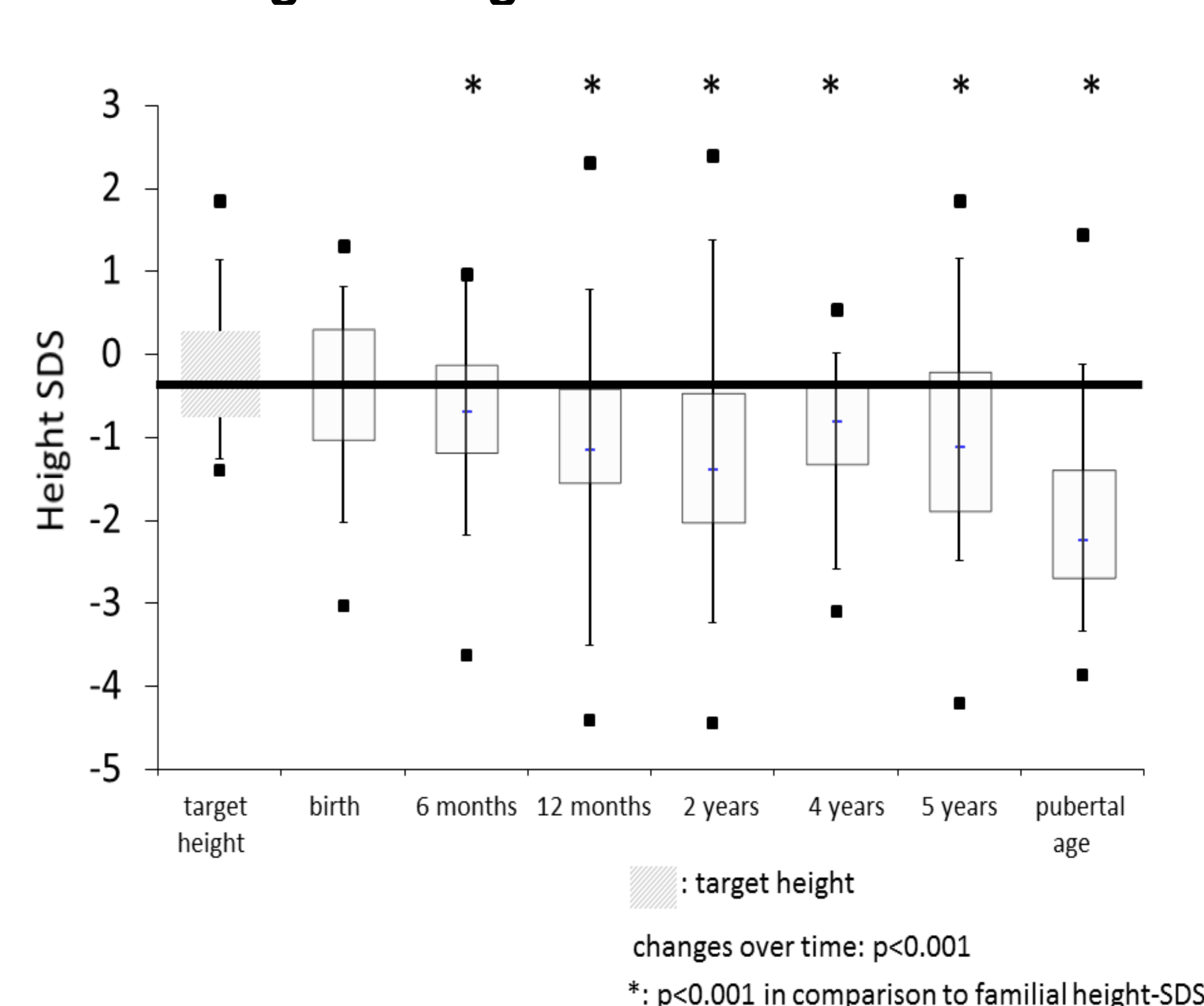
## Characteristics of the study cohort

At first presentation in clinic	Data as Median and interquartile range
Age [years]	14.0 (13.3 - 14.7)
Height [cm]	147.6 (142.8 - 154.5)
Height- SDS	-2.24 (-2.68 - -1.39)
height-SDS corrected for target-height	-2.18 (-2.68 - -1.31)
Bone age [years]	12.5 (12.0 - 13.0)
Bone age delay [years]	2.1 (1.6 - 2.6)
<i>Observation at adult age</i>	
Age [years]	21.5 (20.2-24.4)
Height [cm]	174.6 (170.8 - 179.0)
Height- SDS	-0.67 (-1.21 - -0.01)
<i>Family data</i>	
Target height [cm]	176.5 (174.5 - 180.6)
Target height- SDS	-0.38 (-0.68 - 0.24)

## Change of BMI and BMI-SDS over time

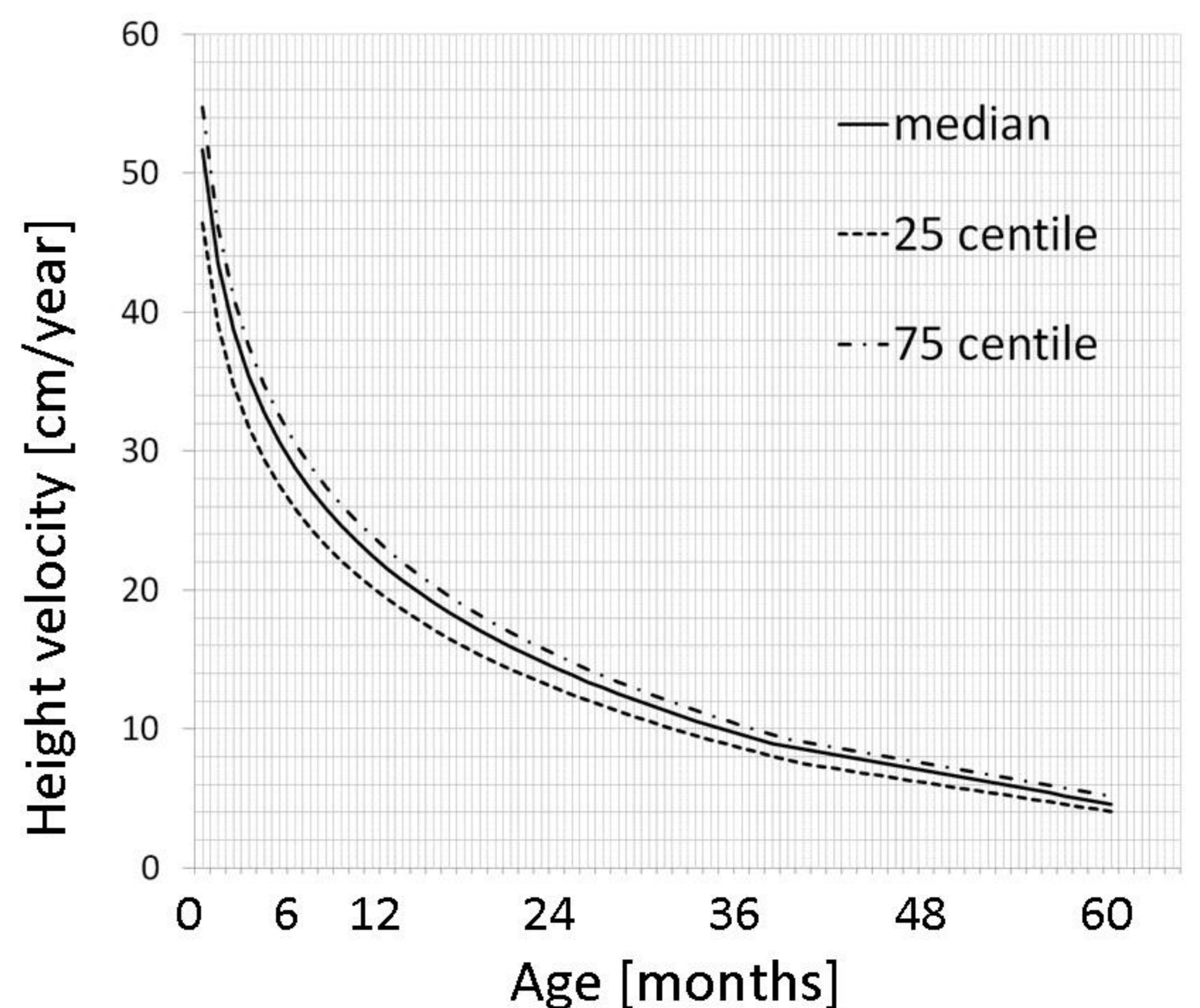
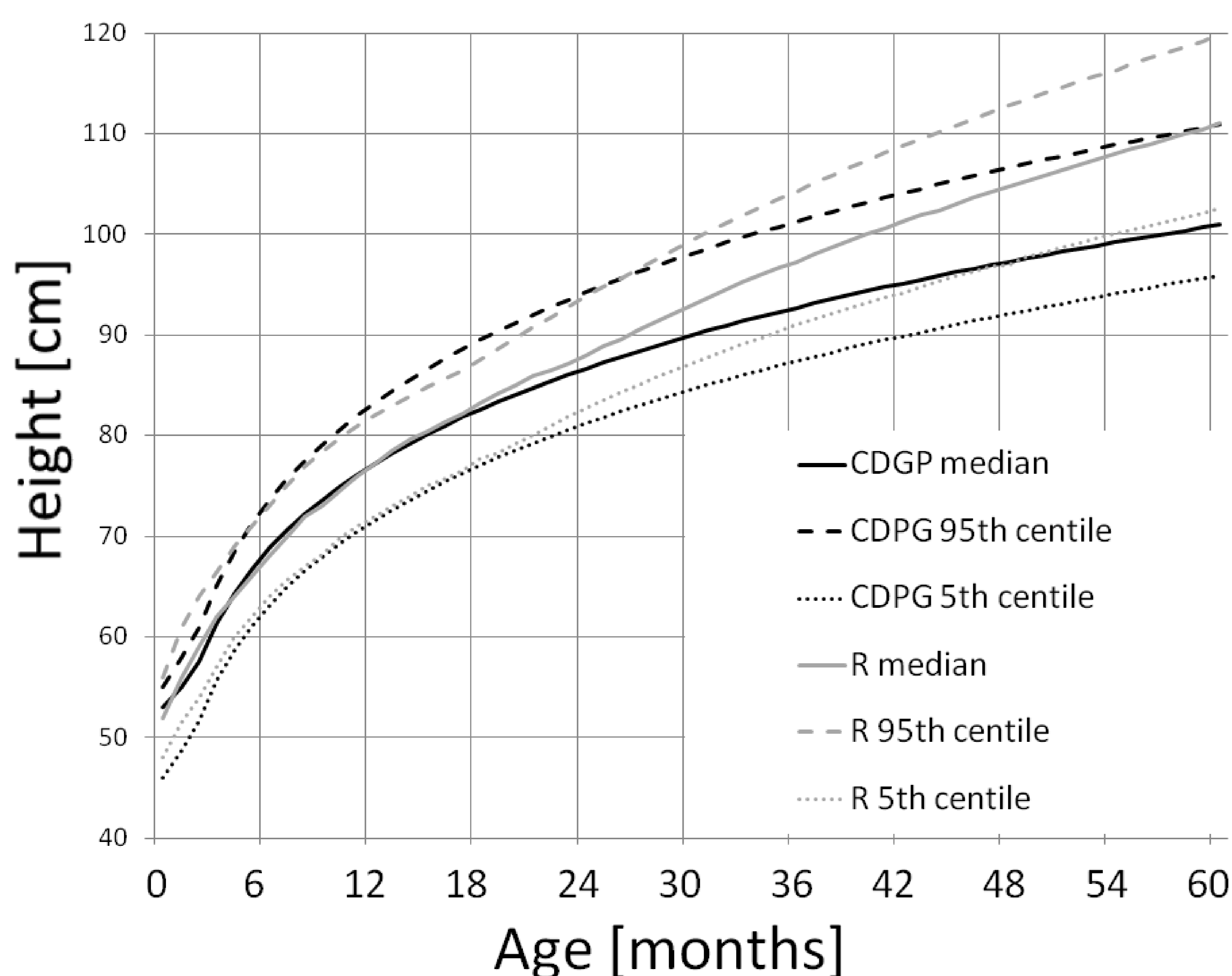
Time point	BMI [kg/m <sup>2</sup> ]	BMI-SDS	p-value
birth	12.0 (11.0 - 13.0)	-0.37 (-1.36 - 0.33)	-
6 months	17.0 (15.7 - 17.7)	0.07 (-0.84 - 0.87)	n.s.
12 months	16.6 (16.0 - 17.3)	-0.08 (-0.76 - 0.53)	n.s.
2 years	15.5 (14.6 - 17.0)	-0.68 (-1.45 - 0.50)	<b>0.031</b>
4 years	14.9 (14.1 - 15.6)	-0.66 (-1.44 - -0.02)	n.s.
5 years	14.5 (14.0 - 15.5)	-0.82 (-1.35 - 0.06)	n.s.
First visit clinic [~14 years]	16.8 (15.3 - 18.6)	-1.35 (-1.91 - -0.48)	<b>&lt;0.001</b>
Last observation [~22 years]	21.9 (19.9 - 23.9)	-0.14 (-0.92 - 0.40)	<b>&lt;0.001</b>

## Change of height-SDS over time



## Conclusions:

- Height and weight deflection occurs during the first two years of life in boys with CDGP.
- Leanness is a typical feature of CDGP in childhood.
- Boys with CDGP frequently have a healthy weight status as adults.



Height percentiles in the first 5 years of life in boys with CDGP (R: reference population (1))

Height velocity in the first 5 years of life in boys with CDGP