

# Retrospective analysis of growth hormone (GH) treatment in children with idiopathic growth hormone deficiency (IGHD), Turner Syndrome (TS) and Small for Gestational Age (SGA) using iGRO\* in a Pediatric Endocrine Practice.

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## Introduction

Quality management of GH treatment in children is important to ensure optimal treatment outcome and to save resources in the health care system. iGRO is a new internet based Medical Device to compare treatment results with predicted results according to published prediction models.

## Patients and Methods

Growth data were analyzed by iGRO for 1st year treatment in 65 IGHD children (Table 1), 54 SGA children (Table 2), and 18 TS children (Table 3). Twenty-eight, 18 and 7 patients were available for the analysis of the 4th treatment year (Tables 4-6). All eligible patients of our practice treated with GH between 2009 and 2015 were included in the study.

## Results

- Overall good concordance between prediction and height results
- Low-responders can be easily identified (0 to 24,6%; Table 7)
- The highest percentage of patients above prediction is found in TS groups (88,9/85,7%)

## Conclusions

- iGRO allows for an **objective** quality control of GH treatment without time-consuming calculations
- It is a valuable tool to identify low-responders (> 1 cm below prediction).
- Reasons for a low response to GH can be detected and corrected accordingly

Table 7. Results after 1yr and 4 yrs of GH treatment in study groups.

Parameter	IGHD 1yr	SGA	TS	IGHD 4 yrs	SGA	TS
n	65	54	18	28	18	7
Sign. difference between 1st/4th yr height and 1st/4th yr prediction	No (p=0,444)	Yes (p<0,001)	Yes (p=0,004)	No (p=0,242)	No (p=0,794)	No (p=0,095)
Patients above prediction (n/%)	41/63,1	38/71,7	16/88,9	18/64,3	10/55,6	6/85,7
Patients more than 1 cm below prediction (n/%)	16/24,6	6/11,3	2/11,1	6/21,4	4/22,2	0/0

Table 1. Clinical and auxological data of IGHD pts. (1 yr GH).

Parameter	Mean ± SD	Minimum	Maximum
Age (yrs)	6,76 ± 2,19	2,4	11,25
GH max (µg/l)	5,50 ± 1,85	0,88	8,0
Height (cm)	109,7 ± 12,9	87,7	142,0
GH starting dose (ng/kg/d)	30,4 ± 3,40	24,8	41,7
Height velocity 1st yr (cm/yr)	9,81 ± 1,95	5,4	16,9

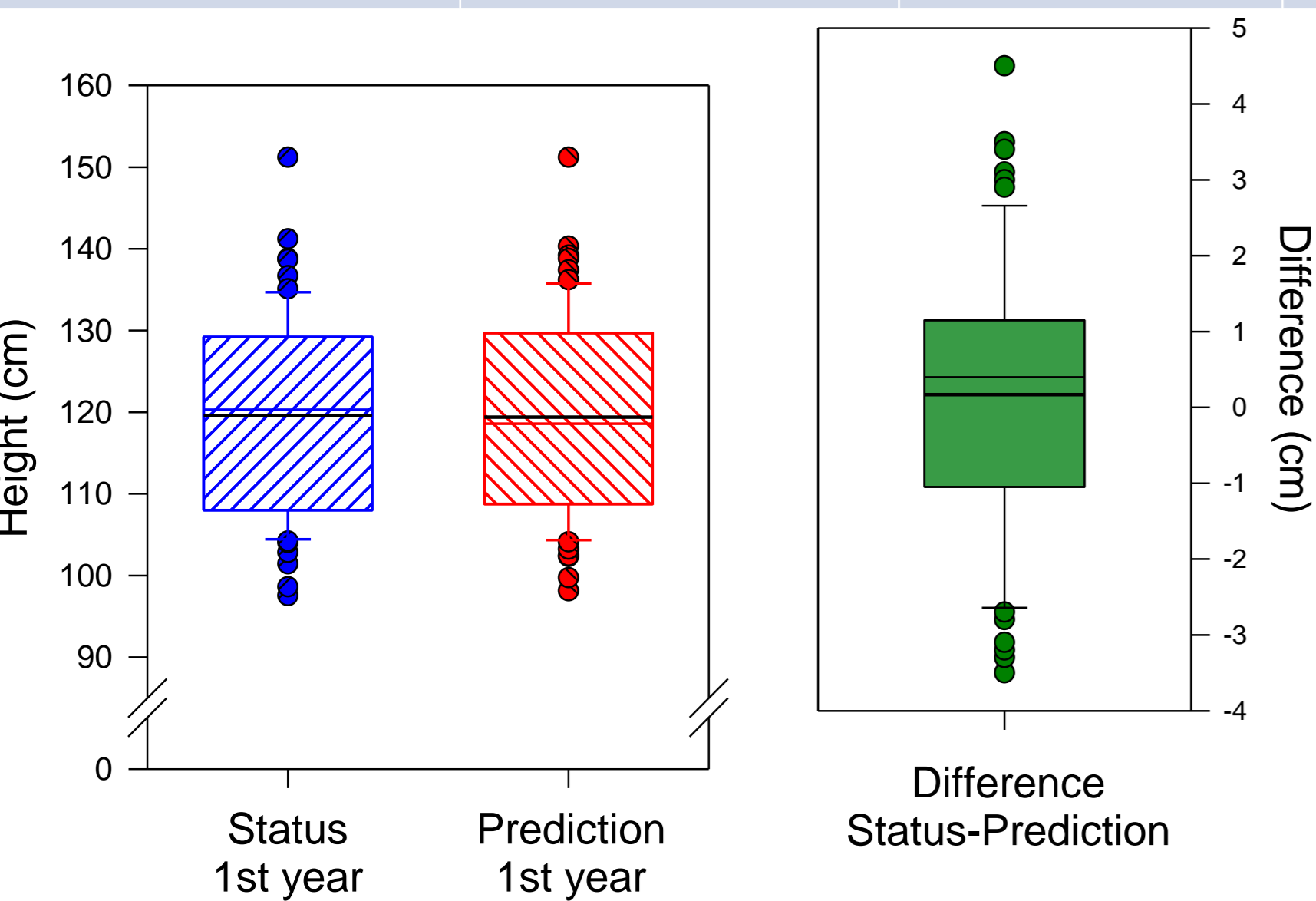


Fig. 1. IGHD: Height after 1 year of GH (blue) and 1 yr height prediction (red; p=0,444). Difference between height and predicted height after 1 yr GH (right panel).

Data are shown as box plots (box: 25th-75th centile; median, mean [bold], whiskers: 5th/95th centile; points: outliers).

Table 2. Clinical and auxological data of SGA patients (1 yr GH).

Parameter	Mean ± SD	Minimum	Maximum
Age (yrs)	5,40 ± 1,79	2,4	10,25
Height (cm)	100,1 ± 11,8	78,2	126,0
GH starting dose (ng/kg/d)	34,4 ± 3,90	25,6	51,0
Height velocity 1st yr (cm/yr)	9,69 ± 1,74	6,5	13,7

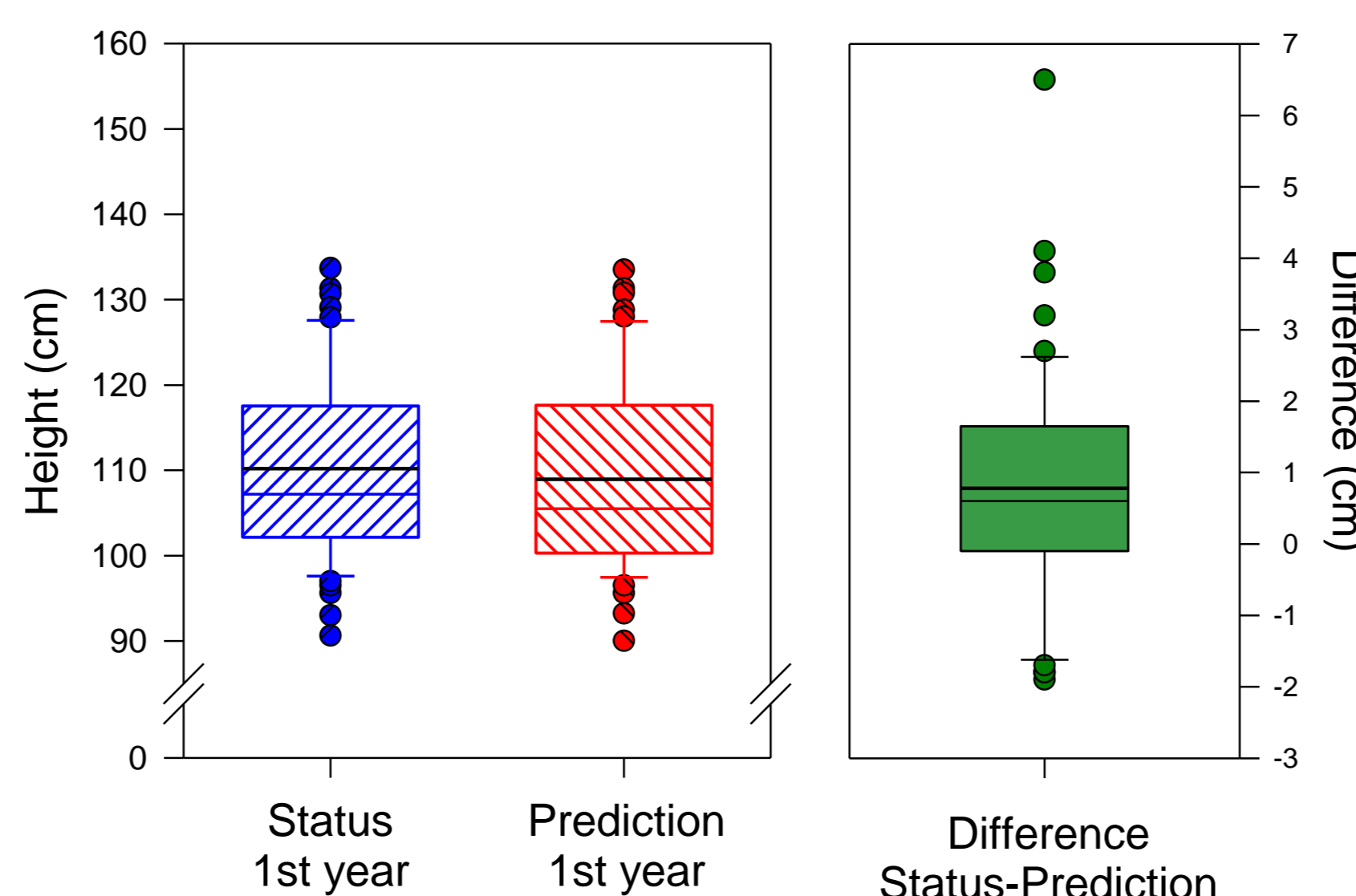


Fig. 2. SGA: Height after 1 year of GH (blue) and 1 yr height prediction (red; p<0,001). Difference between height and predicted height after 1 yr GH (right panel).

Table 3. Clinical and auxological data of TS patients (1 yr GH).

Parameter	Mean ± SD	Minimum	Maximum
Age (yrs)	7,850 ± 3,31	3,33	12,4
Height (cm)	112,7 ± 17,0	85,0	138,5
GH starting dose (ng/kg/d)	42,5 ± 9,73	28,2	55,0
Height velocity 1st yr (cm/yr)	9,20 ± 1,36	7,0	11,5

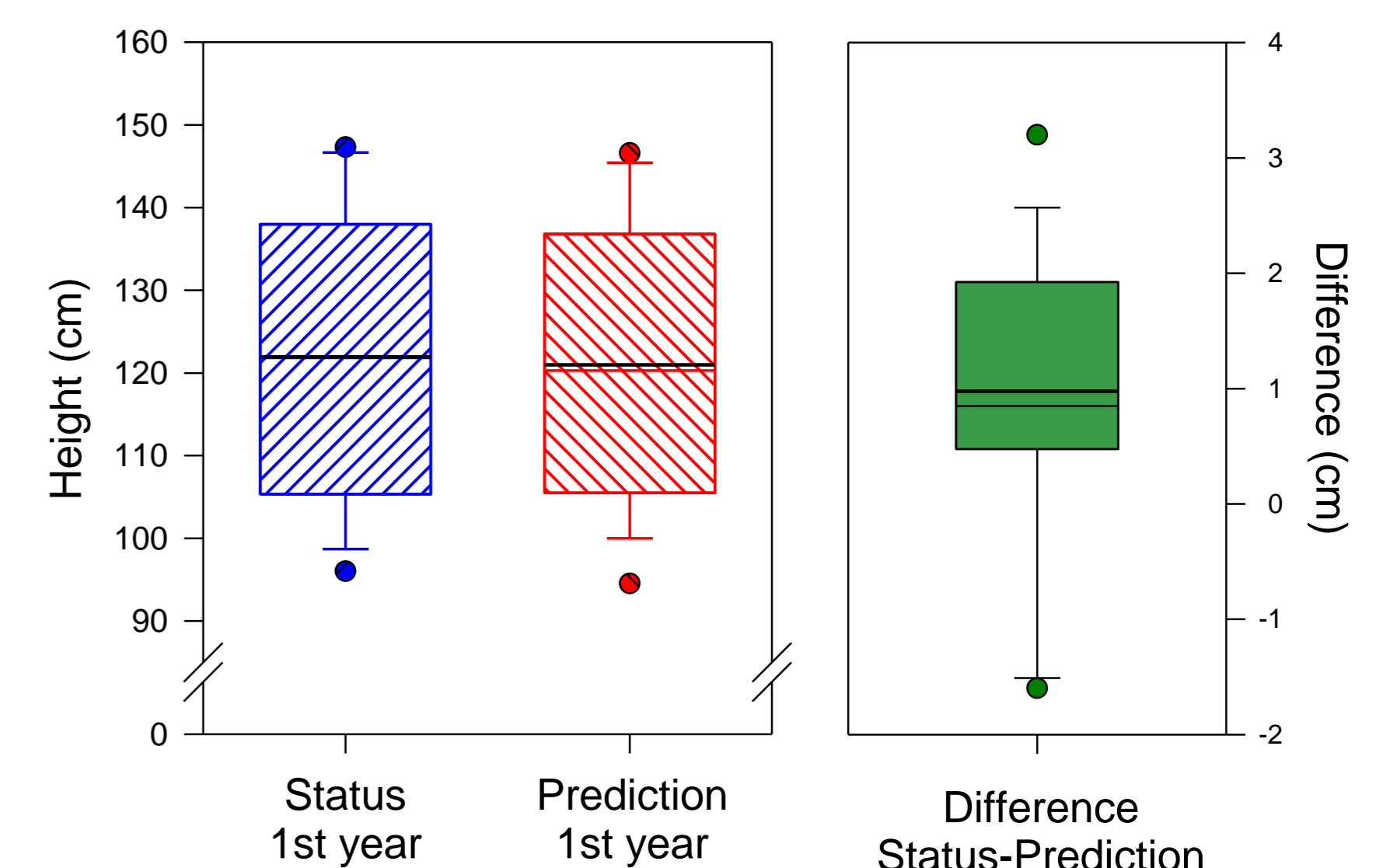


Fig. 3. TS: Height after 1 year of GH (blue) and 1 yr height prediction (red; p=0,004). Difference between height and predicted height after 1 yr GH (right panel).

Table 4. Clinical and auxological data of IGHD pts. (4 yrs GH).

Parameter	Mean ± SD	Minimum	Maximum
Age (yrs)	10,22 ± 1,85	7,6	14,2
GH max (µg/l)	5,60 ± 1,62	1,9	8,0
Height (cm)	138,8 ± 9,4	122,1	158,6
Prediction (cm)	138,4 ± 9,2	123,0	153,8
GH dose (ng/kg/d)	34,95 ± 4,24	26,6	43,5
Height velocity 4th yr (cm/yr)	7,20 ± 1,63	4,40	11,1

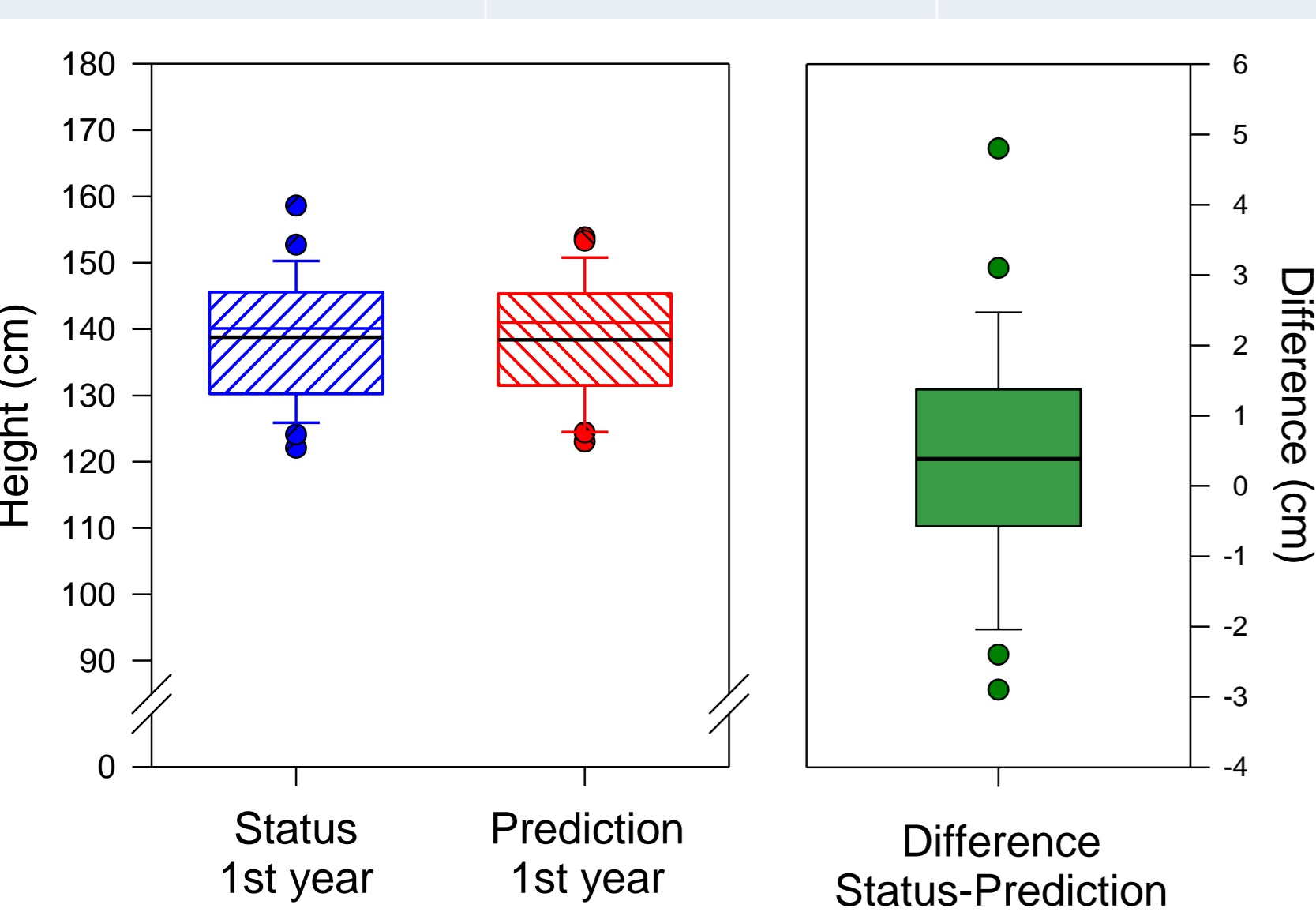


Fig. 4. IGHD: Height after 4 yrs of GH (blue) and 4 yr height prediction (red; p=0,242). Difference between height and predicted height after 4 yrs GH (right panel).

Table 2. Clinical and auxological data of SGA patients (4 yrs GH).

Parameter	Mean ± SD	Minimum	Maximum
Age (yrs)	8,52 ± 0,91	6,8	10,6
Height (cm)	127,5 ± 6,0	115,8	136,7
Prediction (cm)	127,6 ± 5,8	115,8	138,8
GH dose (ng/kg/d)	38,9 ± 5,27	26,2	47,8
Height velocity 4th yr (cm/yr)	6,70 ± 1,23	4,70	8,80

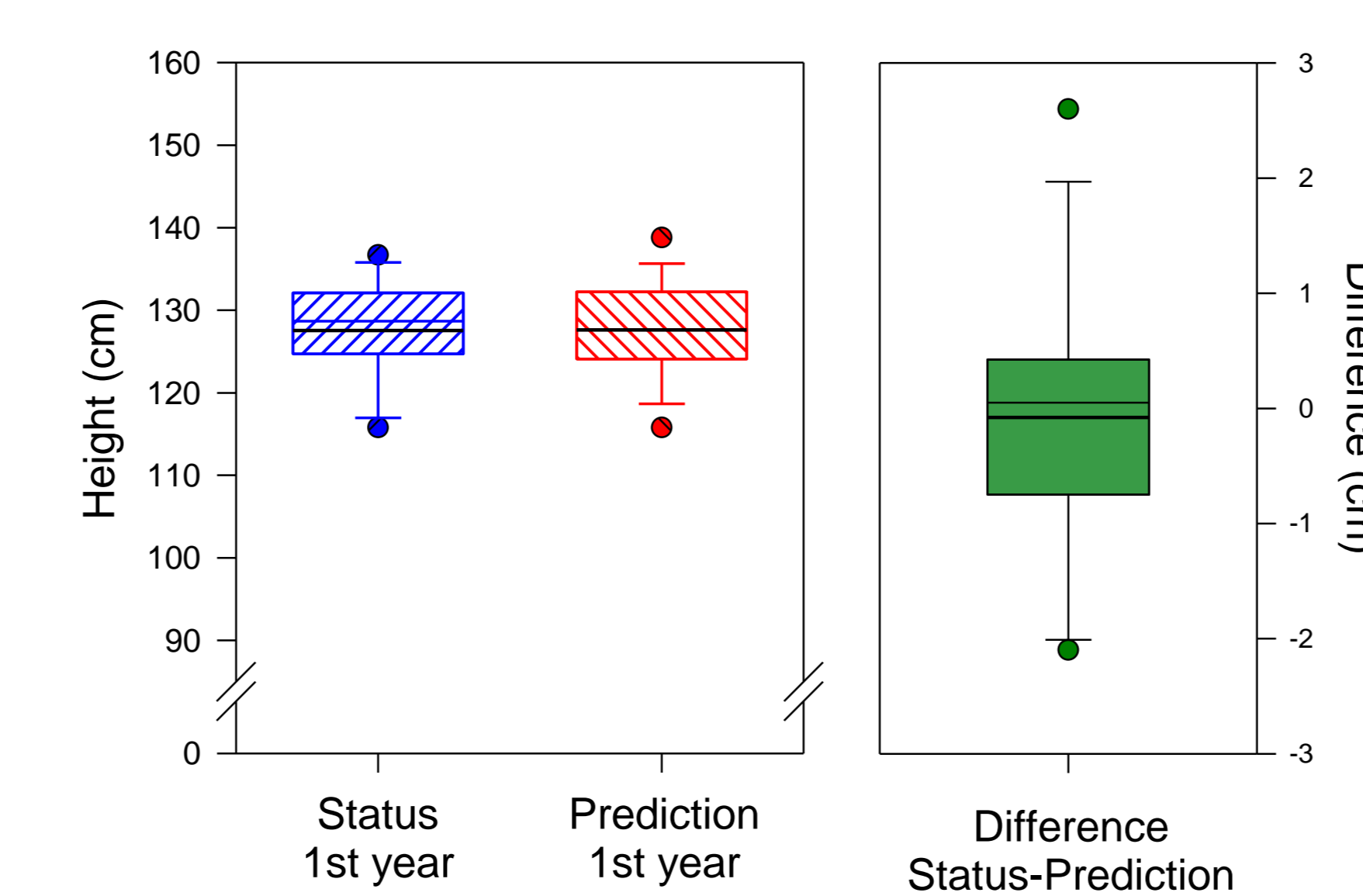


Fig. 5. SGA: Height after 4 yrs of GH (blue) and 4 yr height prediction (red; p=0,794). Difference between height and predicted height after 4 yrs GH (right panel).

Table 3. Clinical and auxological data of TS patients (4 yrs GH).

Parameter	Mean ± SD	Minimum	Maximum
Age (yrs)	9,87 ± 2,43	7,3	13,6
Height (cm)	132,9 ± 12,1	116,5	148,2
Prediction (cm)	132,1 ± 12,1	115,3	145,6
GH dose (ng/kg/d)	47,3 ± 6,11	40,8	58,8
Height velocity 4th yr (cm/yr)	6,71 ± 0,95	5,1	8,10

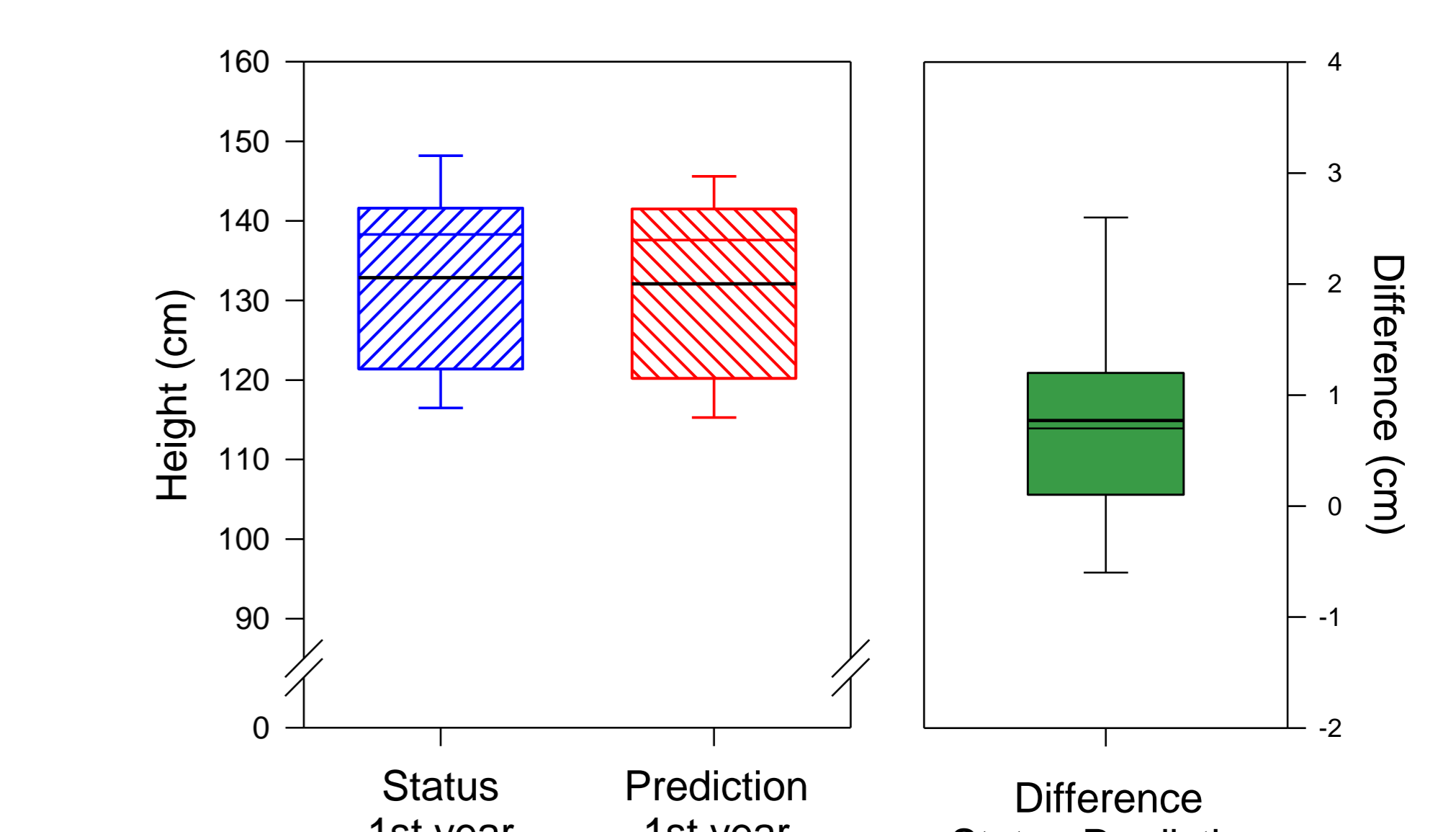


Fig. 6. TS: Height after 4 yrs of GH (blue) and 4 yr height prediction (red; p=0,095). Difference between height and predicted height after 4 yrs GH (right panel).

