

# INCREASED HEIGHT AND IGF1 SERUM LEVELS IN CHILDREN WITH NON-NEUROFIBROMATOSIS TYPE 1 GLIOMAS

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## RESULTS

163 children with CNS tumours

61 were excluded  
20 craniopharyngiomas  
2 pituitary adenomas  
1 GHD patient,  
5 Russel syndrome  
33 incomplete data

We studied 102 patients

TABLE 1	Group 1: GLIOMAS (n=49)	Group 2: NON-GLIOMAS (n=53)
Sex (F/M)	24/25	27/26
Age years (median and range)	7,9 (0,9-18,8)	7,6 (0,9-18,3)
Pathology	-Low grade gliomas (38): Pilocytic astrocytomas (34), glioneural tumour (1), pleomorphic xantastrocytomas (2), ganglioglioma (1). -High grade gliomas (11): Difuse midline gliomas with H3K27M mutation (7), anaplastic astrocytoma (1), difusse glioma with ATRX mutation (1), glioblastoma (1), gliosarcoma (1)	Medulloblastomas (16), ependymomas (15), germinomas (7), undifferentiated embryonal tumours (6), papillomas (2), others: mesenchymal chondrosarcoma (1), sphenoidal giant cell tumour (1), ganglioneuroma (2), atypical rhabdoid teratoid tumour (1), dysplastic gan-gliocytoma of cerebellum (1), meningioma (1)
Tumour localization	Supratentorial (27) Medular (2) Infratentorial (18) Supra e infratentorial (2)	Supratentorial (23) Medular (2) Infratentorial (28)
Height SD (median and IQR)	0.40 (-0.15;1.6)	0.0 (-0.85;0.85)
Weight SD (median and IQR)	0.60 (-0.6;1.4)	-0.60 (-1.55;0.75)
BMI SD (median and IQR)	0.54 (-1.12;1.77)	-0.32 (-1.12;1.00)
ΔHMH SD (median and IQR)	0.50 (-0,25;1.70)	0.0 (-0.85;0.90)
IGF1 SD (median and IQR)	1.33 (0.08; 2.11)	0.30 (-1.35;1.07)
IGFBP3 SD (median and IQR)	0.30 (-0.88; 1.05)	-1.10 (-2.05; 0.85)

IQR: Interquartile range

## INTRODUCTION

Gliomas are the most common solid tumours during childhood. For a few years now, our group has been working on the IGF system in pediatric central nervous system (CNS) tumors. During clinical follow-up of children suffering gliomas we noted that they grew above their midparental height centiles. Growth hormone excess has been described in children with neurofibromatosis type 1 (NF1) and optic pathway glioma, but we were not able to find in the literature patients with gliomas without NF1, with this phenomenon.

## AIM

The aim of our study was to describe the growth and IGFs/IGFBP3 serum profile in a large cohort of pediatric patients with gliomas (excluding NF1) compared to children with other CNS tumors.

## METHODS

- Cross-sectional study.
- Inclusion criteria:** All patients under 19 years of age with CNS tumours diagnosis in our hospital between June 2012 and February 2020.
- Anthropometric data, medical and family history and images were retrospectively collected from medical records.
- Exclusion criteria:** growth hormone deficiency (GHD) at tumor diagnosis, patients with NF1, craniopharyngiomas or other intrasellar tumours, children with “Russel syndrome” and patients with incomplete medical records.
- Data were expressed in SDS according to local references and Tanner status.

## CONCLUSIONS

- This is the first report of IGFs/IGFBP3 in pediatric patients with gliomas without NF1.
- We demonstrated, in a large cohort of children with CNS tumours, that patients with gliomas are taller than expected when compared to patients with other CNS tumours at diagnosis. Further, their IGF1 and IGFBP3 serum levels were higher in this group as well.
- In the assessment of paediatric population with CNS tumours we should bear in mind that an important group of these patients have gliomas that are chronic, non- resectable tumours, with the potential to grow or relapse.
- The potential impact of elevated IGF1 levels in these children warrant further studies to explore the underlying mechanisms.

- Patients with gliomas were significantly taller compared with children bearing other CNS tumours (p=0,03) Fig. 1

- BMI was calculated to exclude weight as a confounder and it was similar in both groups (p=0.075) Fig. 2

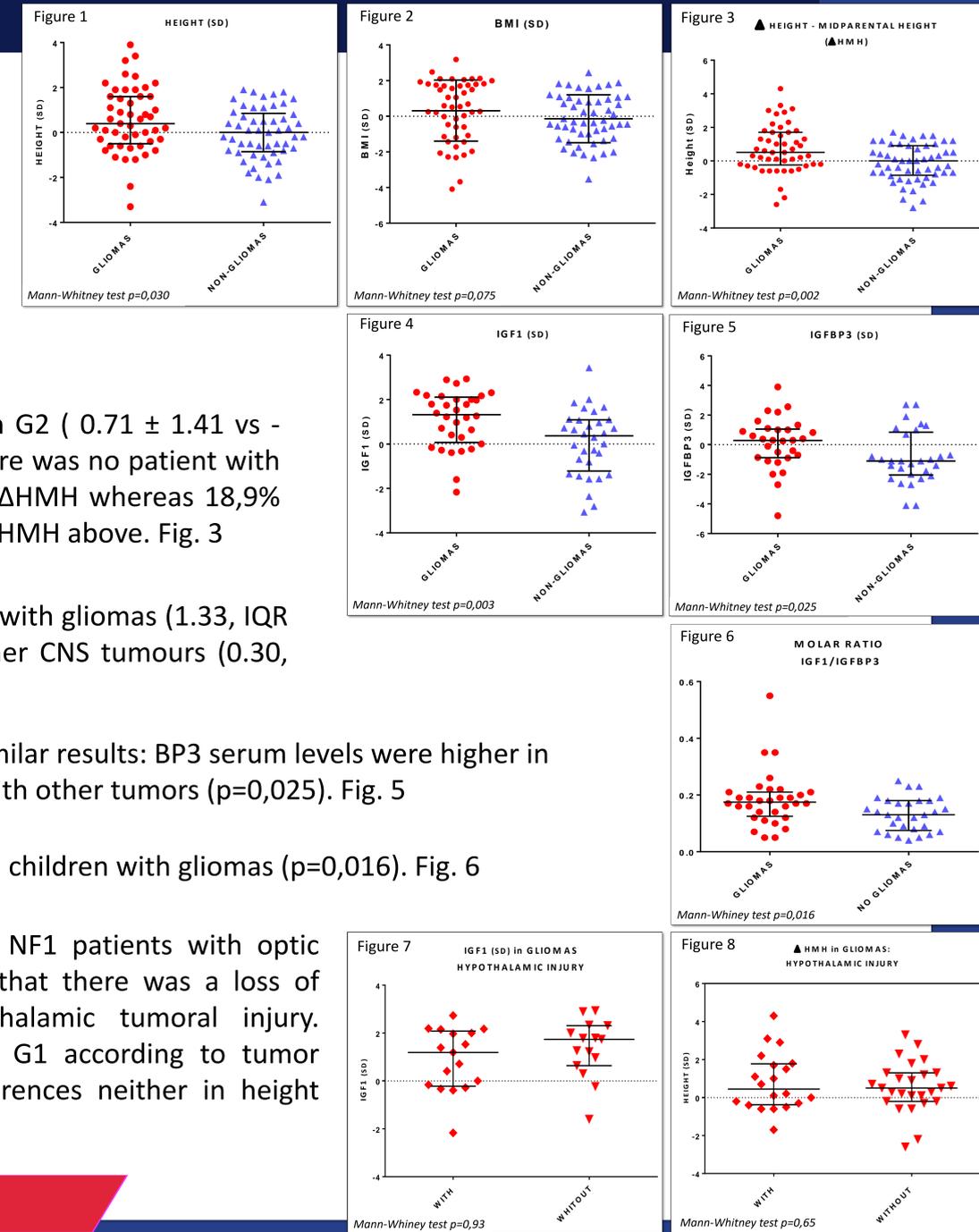
- Patients ΔHMH was higher in G1 than in G2 ( 0.71 ± 1.41 vs -0.13 ± 1.10 SD, respectively; p=0,002). There was no patient with a non-glioma tumor that exceeds 2 SD of ΔHMH whereas 18,9% (9/49) of children with gliomas have their ΔHMH above. Fig. 3

- IGF1 serum levels were higher in patients with gliomas (1.33, IQR 0.08; 2.11) compared to patients with other CNS tumours (0.30, IQR -1.35;1.07). Fig. 4

- We studied IGFBP3 levels and obtained similar results: BP3 serum levels were higher in patients with gliomas compared to those with other tumors (p=0,025). Fig. 5

- The molar ratio IGF1/IGFBP3 was higher in children with gliomas (p=0,016). Fig. 6

- In order to explain high IGF1 levels in NF1 patients with optic pathway gliomas, it has been suggested that there was a loss of inhibitory GH secretion due to hypothalamic tumoral injury. Therefore, we analyzed the results from G1 according to tumor hypothalamic injury. There were no differences neither in height (p=0,93) nor in IGF1 levels (p=0,30). Fig. 7-8



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