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Analyzing the influence of parental BMI on obesity in survivors of childhood-onset craniopharyngioma
Insights from the German registries

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Background

- In Germany, a distinctive feature of pediatric cancer treatment is the enrollment of patients in registries and clinical trials (1)
- In contrast to the German Childhood Cancer Registry, clinical registries (GPOH) collect additional treatment- and family-related data
- Brain tumor registries and studies are organized in the so-called *HIT-Network* (2)

1. Rossig, C. et al. (2013). Effective childhood cancer treatment: the impact of large scale clinical trials in Germany and Austria. *Pediatr Blood Cancer, **60**(10), 1574-1581. https://doi.org/10.1002/pbc.24598.* 2. Kinderkrebsstiftung. HIT-Netzwerk. *Retrieved from: https://www.kinderkrebsstiftung.de/wir-foerdern/hit-netzwerk/* [16/09/2024].

GESELLSCHAFT FÜR PÄDIATRISCHE ONKOLOGIE UND HÄMATOLOGIE
GPOH

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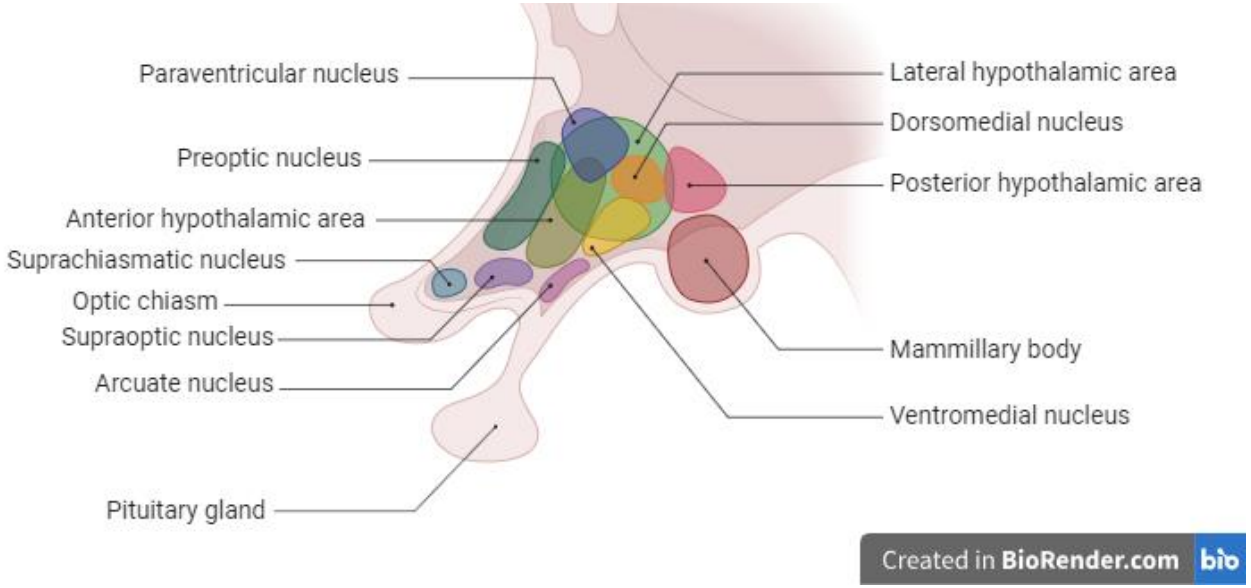
Background

– Childhood-onset craniopharyngiomas (CP) are rare malformational tumors (1)

– Incidence is approx. 20 new cases per year in Germany (1)

– Infiltration into hypothalamus and pituitary gland result in hormonal dysfunction and morbid obesity (2)

– Besides tumor-related factors, the influence of parental BMI on the development of obesity in children after CP treatment has been rarely studied



Schematic illustration of the Hypothalamus

1. Muller HL. Craniopharyngioma. *Endocrine reviews* 2014; **35**(3): 513-43. 2. Daubenbuchel AM, Muller HL. Neuroendocrine Disorders in Pediatric Craniopharyngioma Patients. *Journal of clinical medicine* 2015; **4**(3): 389-413.

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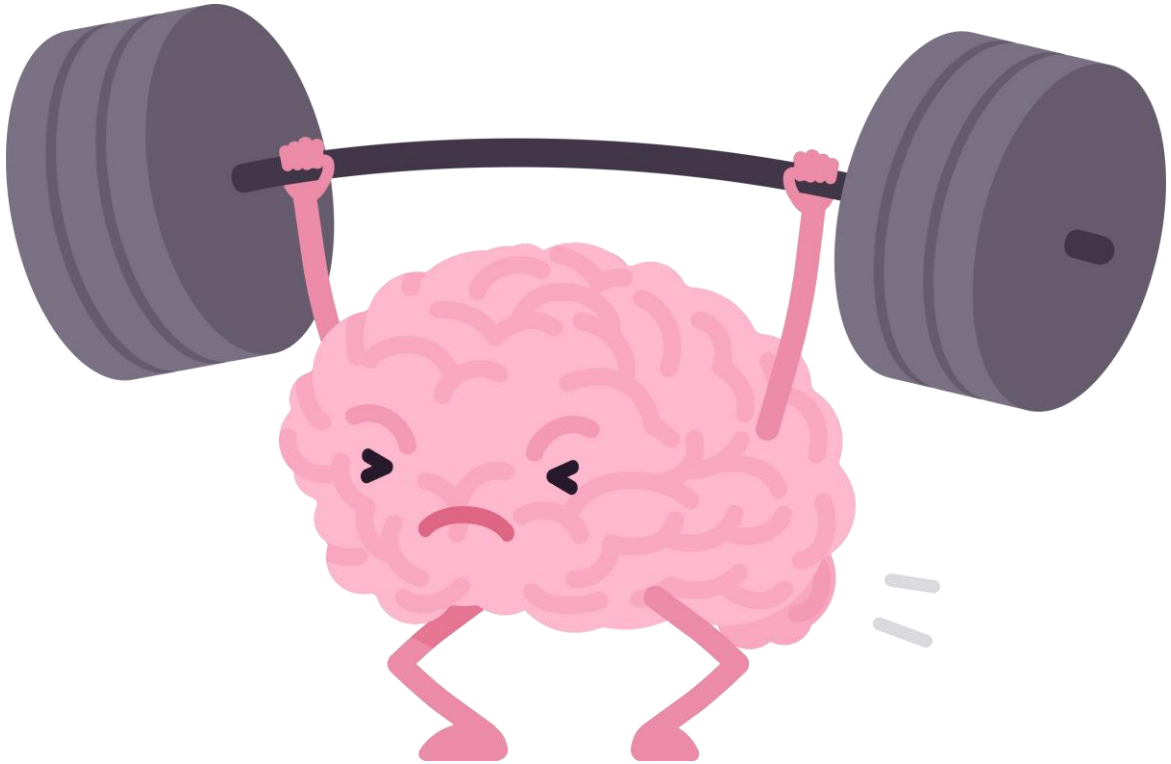
Study aim

To investigate the association between patients' BMI at the time of diagnosis and their last visit, as well as parental BMI at the diagnosis of CP and hypothalamic factors on the development of obesity.



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Methods

- Used data from multicentre registries HIT-ENDO, KRANIOPHARYNGEOM 2000/2007/Registry 2019:
  - >700 patients with childhood-onset CP
  - diagnosed between 1963 and 2021
  - recruited between 1999 and 2022
- Eligibility criteria:
  - CP diagnosis confirmed by central pathological review
  - aged <18 years at diagnosis
  - from Germany, Austria, Switzerland or Belgium
  - at least one parental BMI at diagnosis was available
- Clinical information was retrieved from medical records at diagnosis and at last visit
- Descriptive statistical analyses, univariable and multivariable logistic regression

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Results

	maternal BMI ≤ 25 kg/m²	maternal BMI > 25 kg/m²	Overall
	(N = 163)	(N = 128)	(N = 291)
Females	87 (53.4%)	66 (51.6%)	153 (52.6%)
Age at CP diagnosis (years)	9.48 [0.01, 17.9]	9.53 [0.05, 17.5]	9.49 [0.01, 17.9]
Age at last visit (years)	18.60 [1.97, 41.0]	19.50 [5.34, 41.7]	19.10 [1.97, 41.7]
Follow-up time (years)	8.53 [1.08, 31.7]	9.95 [1.05, 33.4]	9.38 [1.05, 33.4]
BMI SDS at CP diagnosis	0.40 [-3.73, 6.40]	1.40 [-2.00, 9.90]	0.73 [-3.73, 9.90]
Missing data	22 (13.5%)	15 (11.7%)	37 (12.7%)
Surgical hypothalamic lesion (HL) grade II	28 (17.2%)	34 (26.6%)	62 (21.3%)
Missing data	3 (1.8%)	1 (0.8%)	4 (1.4%)

Beckhaus, J. et al. (2024). *EJC Paediatric Oncology, 4. https://doi.org/10.1016/j.ejcped.2024.100174*

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Results

	paternal BMI ≤ 25 kg/m²	paternal BMI > 25 kg/m²	Overall
	(N = 114)	(N = 163)	(N = 277)
Female	58 (50.9%)	86 (52.8%)	144 (52.0%)
Age at CP diagnosis (years)	10.1 [0.01, 17.9]	8.49 [0.05, 17.6]	9.48 [0.01, 17.9]
Age at last visit (years)	19.40 [1.97, 41.7]	18.50 [5.34, 41.0]	19.00 [1.97, 41.7]
Follow-up time (years)	9.56 [1.10, 31.7]	8.95 [1.05, 33.4]	9.38 [1.05, 33.4]
BMI SDS at CP diagnosis	0.42 [-3.73, 7.55]	0.96 [-3.23, 9.90]	0.70 [-3.73, 9.90]
Missing data	13 (11.4%)	23 (14.1%)	36 (13.0%)
Surgical hypothalamic lesion (HL) grade II	18 (15.8%)	39 (23.9%)	57 (20.6%)
Missing data	2 (1.8%)	1 (0.6%)	3 (1.1%)

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Results: Univariable logistic regression

Characteristics		Unadjusted OR	Lower limit 95% CI	Upper limit 95% CI
Hypothalamic involvement (HI) & hypothalamic lesion (HL)	HI & HL grade 0	reference		
	HI grade I/II & HL grade I	1.31	0.69	2.52
	HI grade I/II & HL grade II	6.69	3.24	14.65
	HI grade I/II & HL grade 0	1.61	0.86	3.03
Patient's BMI SDS at CP diagnosis		1.43	1.25	1.66
Maternal BMI at CP diagnosis (kg/m²)		1.12	1.06	1.18
Paternal BMI at CP diagnosis (kg/m²)		1.13	1.06	1.22

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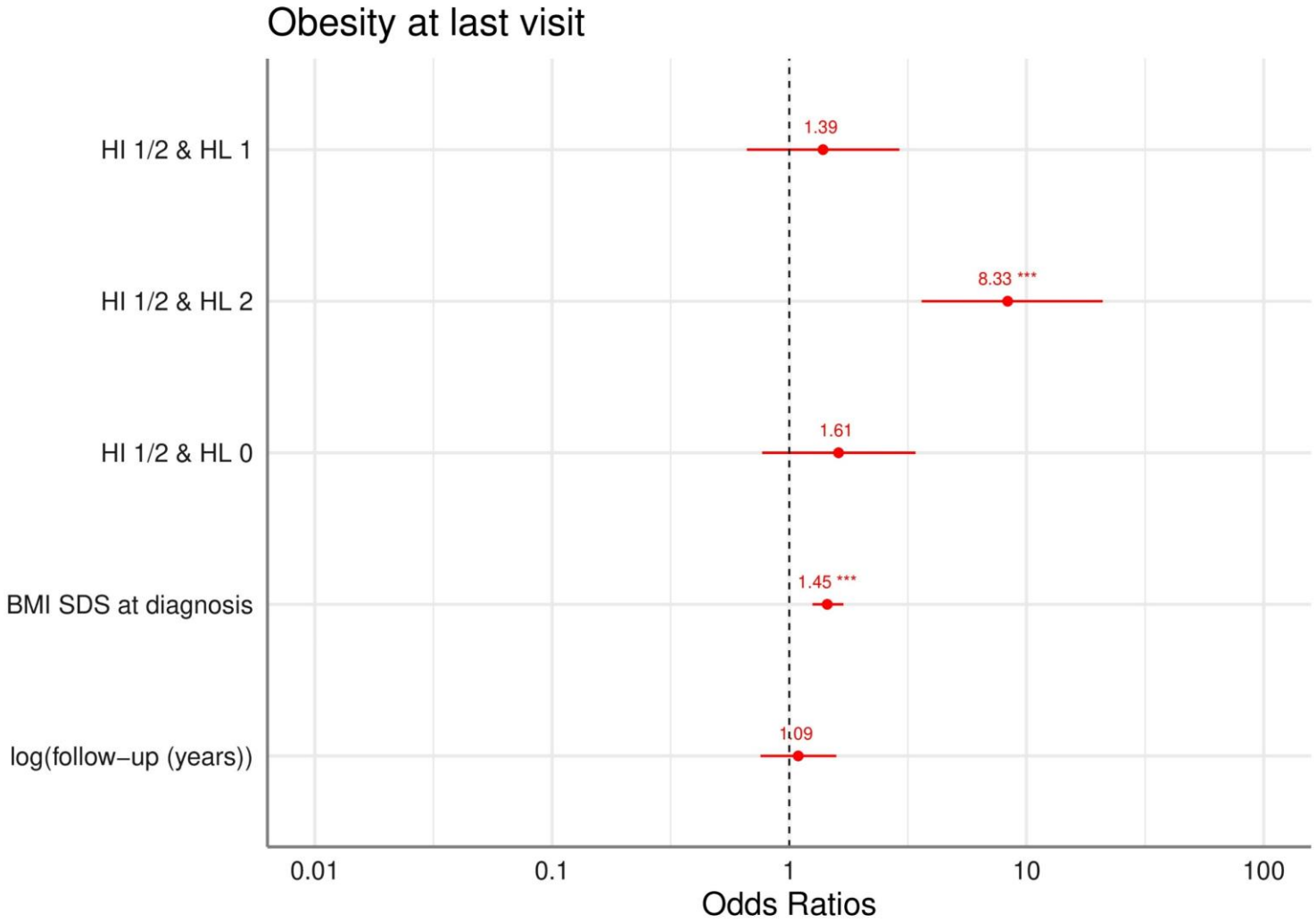
Results: Multivariable logistic regression

After adjustment for follow-up,
posterior hypothalamic lesion (grade 2) and patient‘s BMI SDS at diagnosis were associated with obesity at last visit



Abbreviations:
Hypothalamic involvement (HI);
Hypothalamic lesion (HL)

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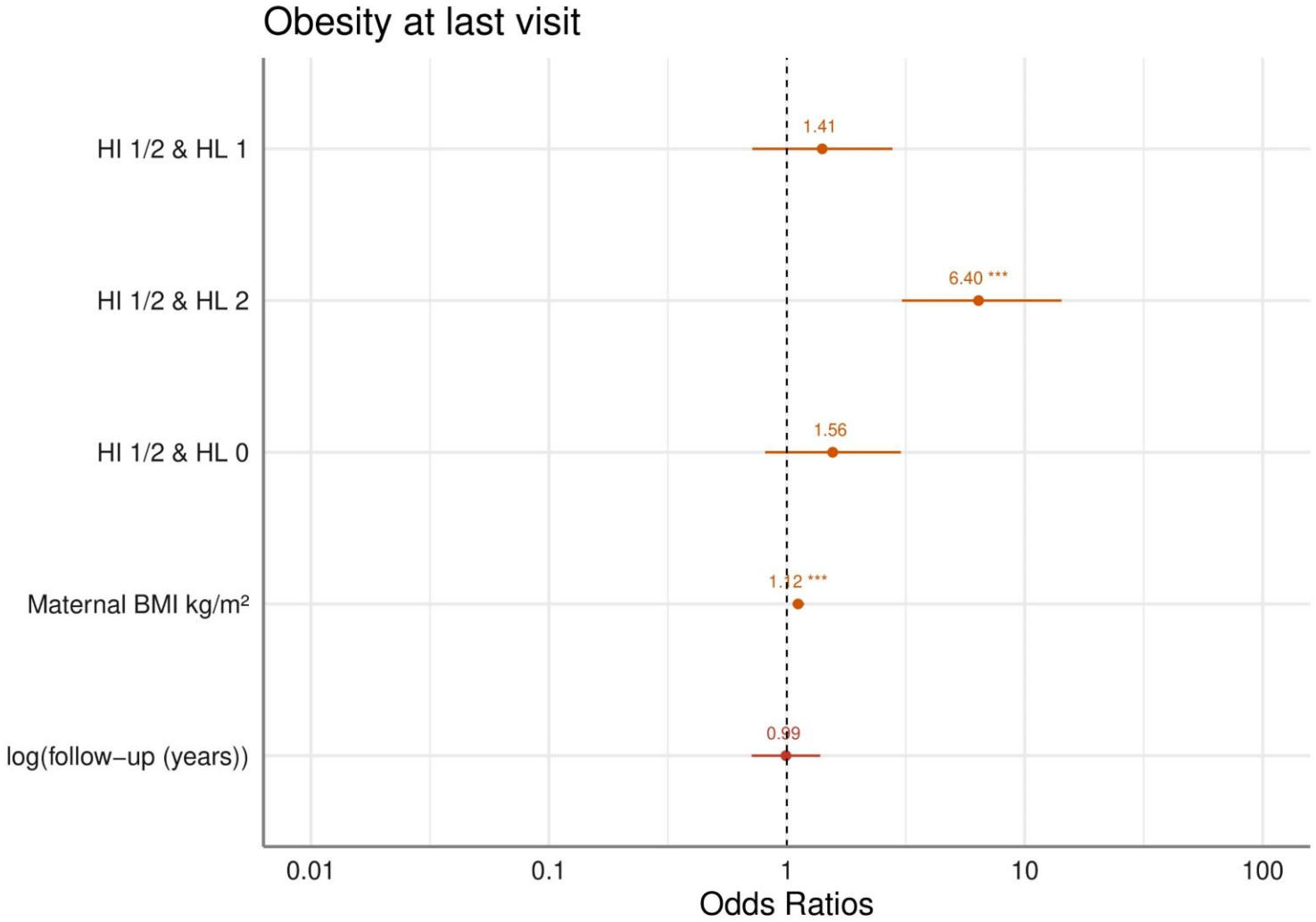
Results: Multivariable logistic regression

After adjustment for follow-up, posterior hypothalamic lesion (grade 2) and maternal BMI SDS at diagnosis were associated with patient's obesity at last visit.

Abbreviations:
Hypothalamic involvement (HI);
Hypothalamic lesion (HL)



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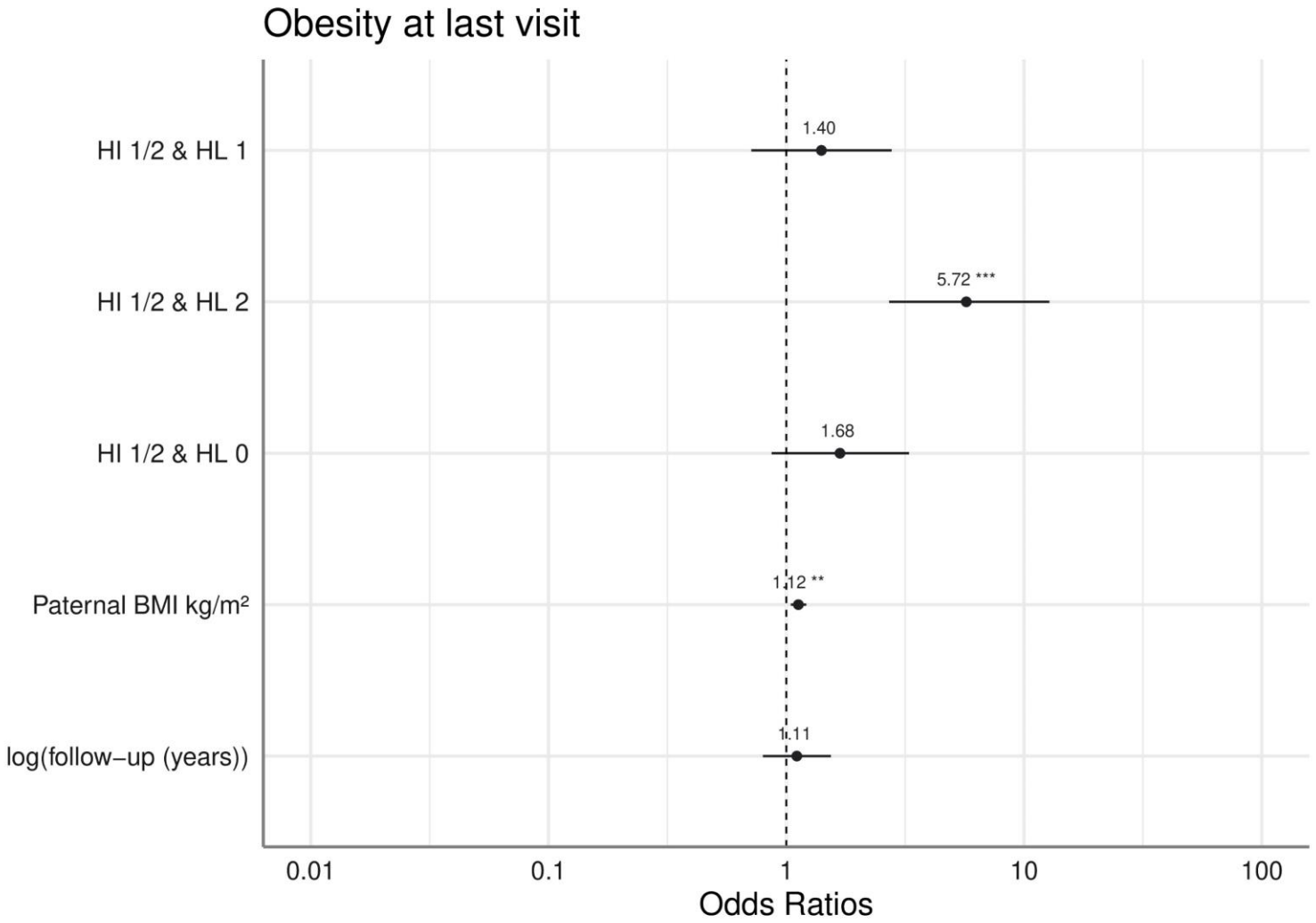
Results: Multivariable logistic regression

After adjustment for follow-up, posterior hypothalamic lesion (grade 2) and paternal BMI SDS at diagnosis were associated with obesity at last visit.



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Strengths and limitations

Strengths

- Relatively large sample size of this rare condition
- Use of real-world data from medical records

Limitations

- Self-reported parental weight and height
- No further data on weight development in parents or data on siblings
- Application of three different logistic regression models could not fully reflect relationship

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Conclusion

Besides hypothalamic lesion, our data has shown a small association of parental BMI with the development of obesity in patients after CP. In future studies on pediatric patients at risk for (hypothalamic) obesity, data on parental body composition and weight is required.

Interventions for prevention of obesity should consider the whole family.

International collaborations of multiple registries are needed to increase the power of analyses.

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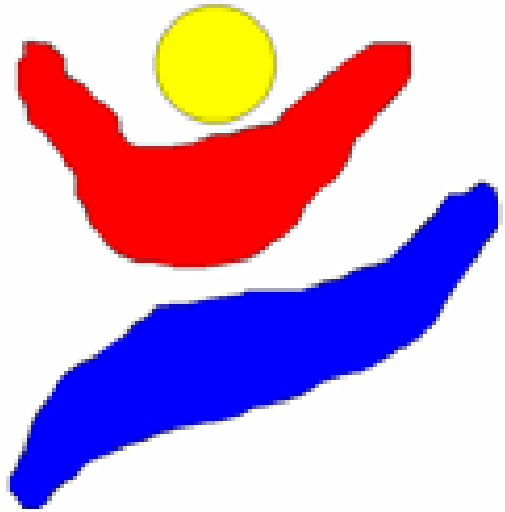

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KINDER KREBS STIFTUNG

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Thanks for listening!

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