Adrenocorticotropin Hormone Axis Testing among Children with Optic Pathway and Suprasellar Tumors

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Introduction

- Adrenocorticotropic hormone deficiency (ACTHD) is a life-threatening condition observed in survivors of childhood brain tumors treated with surgery, chemotherapy and /or radiation.
- Time from tumor diagnosis and therapy to development of ACTHD cannot be ascertained from previous studies.
- Lack of knowledge regarding timing of ACTHD onset has led to annual surveillance using low-dose ACTH stimulation testing (LDST) for 10-15 years after tumor therapy is completed.

Aim

- To identify the prevalence of ACTHD and timing to ACTHD onset to allow development of an effective screening strategy among brain tumor survivors.

Methods

- Retrospective review of 76 children diagnosed with tumor in the optic pathway (OP) or suprasellar (SS) region between 2002 & 2012.
- Determination of ACTH status:
  a) Peak cortisol level 20 minutes after LDST with 1 µg/m^2 ACTH or
  b) Random cortisol level

	Peak Cortisol (µg/dL) level on LDST	Random Cortisol (µg/dL) level
ACTHD	≤17	≤12.9 (0700-0900 only)
INDET (Indeterminate)	18 -19	--
NORMAL	≥20	≥13 at any time of day

- Review of other endocrinopathies that were screened for during course of tumor therapy and follow-up.

References

Kazlauskaite R et al. *J Clin Endocrinol Metab.* 2008 Nov;93(11):4245-53
Rose SR et al. *Pediatr Blood Cancer* 2005; 45:808
Nandagopal R et al. *Horm Res.*2008;69:65-74
Rose SR et al. *Horm Res* 1999; 52:73
Gurney JG et al. *Cancer*. 2003;97:663-73

Results

Table 1: **Demographics, tumor therapies, & ACTH status**

	OP, N = 53	SS, N = 23
Age at tumor diagnosis, yrs	4.8 ±3.9	8.8 ±4.3
Sex, n (% male)	27 (50.9%)	9 (39.1%)
Tumor Therapies		
Observation only	26 (49.1%)	4 (16.7%)
Radiation	1 (1.9%)	0
Surgery	1 (1.9%)	8 (34.8%)
Chemotherapy	12 (22.6%)	0
Radiation + Surgery	3 (5.7%)	6 (26.1%)
Chemo + Surgery	3 (5.7%)	3 (13.0%)
Chemo + Radiation	4 (7.5%)	0
Radiation + Surgery + Chemo	3 (5.7%)	2 (8.7%)
ACTH status known	26 (49.1%)	17 (73.9%)
by LDST	18 (69.2%)	14 (82.4%)
by random cortisol	8 (30.8%)	3 (17.6%)
ACTH status unknown	27 (50.9%)	6 (18.2%)
Had some endocrine testing	35 (66.0%)	22 (95.7%)
Had no endocrine testing	18 (34.0%)	1 (4.3%)

Optic pathway (OP); Suprasellar (SS) tumors

Table 2: **Prevalence of ACTHD**

	OP, N = 26	SS, N = 17
ACTHD	2 (7.7%)	4 (23.5%)
Indeterminant	2 (7.7%)	0
Normal	22 (84.6%)	13 (76.5%)
Time from tumor diagnosis to:		
First adrenal testing,yrs	2.81 (0.31, 4.14)	-0.01 (-0.05, 0.34)
First LDST, yrs	3.52 (2.16, 4.49)	0.06 (-0.02, 2.25)

Data presented as n (%) or median (25th %ile, 75th %ile)

Figure 1: **Concurrent Endocrinopathies**

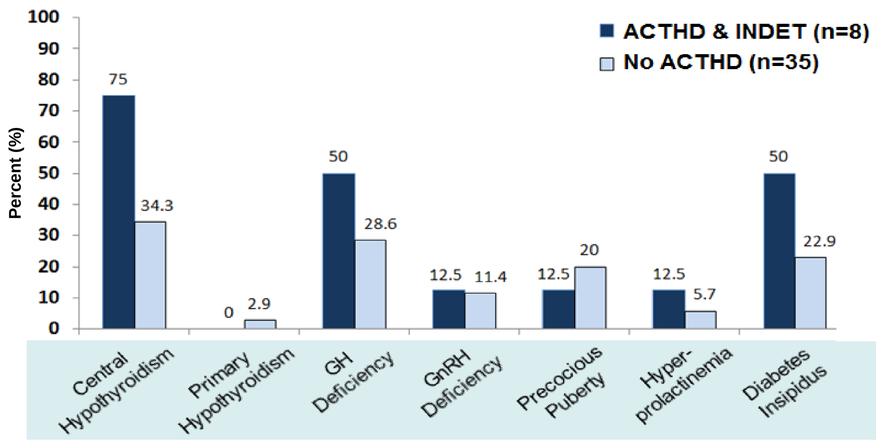
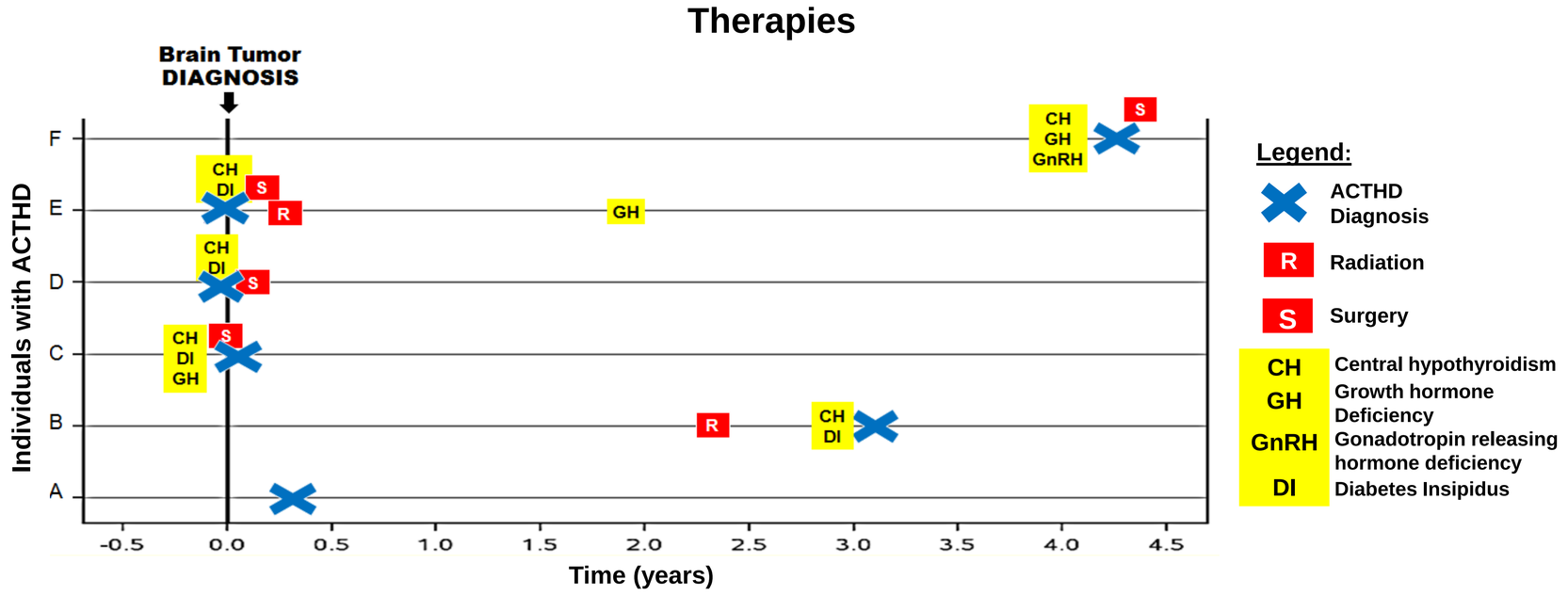


Figure 2: **Onset of ACTHD in Relation to Tumor Therapies**



Discussion

- Radiation and surgery for brain tumors are well-known risk factors for ACTHD. We show that ACTHD can occur even **prior to** or **at the time of** tumor diagnosis and tumor therapies.
- Concurrent endocrinopathies occurred more often in those with ACTHD
- This project highlights the importance of determination of baseline endocrine parameters at the time of tumor diagnosis. A systematic prospective surveillance for endocrinopathies is warranted to provide optimal patient care.

Conclusions

- For patients with optic pathway or suprasellar tumors, monitoring for ACTHD should be done at the time of tumor diagnosis, then annually thereafter. A follow up screening for ACTHD should be done 4-6 months after surgery or after completion of cranial irradiation therapy.

Future Directions:
The data presented is a subset of an ongoing retrospective review among 490 individuals with brain tumors diagnosed between 2002-2012.