

UNDERSTANDING COGNITIVE LATE EFFECTS

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LEARNING OBJECTIVES:

1. Understand how to **minimize and treat** cognitive late effects throughout the spectrum of pediatric cancer treatment.
2. Discuss the **cognitive and psycho-social challenges** associated with a diagnosis of childhood cancer, treatment, and survivorship
3. Offer **strategies and interventions** to support the patient when challenges are impacting academic and vocational endeavors

WHAT WE KNOW:

- Most children & families adapt quite well, even thrive, throughout this process.
- A subset will not do well (~20%).
 - Rotation and flux of population.
- And, the *impact* and *meaning* of the cancer experience may **change over time** due to **cognitive and social development**.
- Therefore, we need to pay attention to developmental milestones.

COGNITIVE LATE EFFECTS:

(ASKINS & MOORE, 2008; DALY, KRAL, & BROWN, 2008)

- Attention
- Executive functioning
- Processing speed
- Working memory; often necessitates a change to learning style (auditory processing & visual spatial learning).

COGNITIVE LATE EFFECTS

- Internal vs. External “presentations”
 - Often “looks like” ADHD.
 - No “Red Badge” to identify externally
 - What does it feel like to experience?

BEFORE WE MOVE ON:

- What is the *Essence* of being a survivor of childhood cancer with late effects?
- Some Cognitive Examples
 - Interactive quiz
 - “IQ” measures
 - Read a paragraph

INTERACTIVE QUIZ



“IQ” MEASURES

Digit Span

THE CASE OF SUSIE:

“When I go back to school I want them to put my story on the announcements – that way we could just get it all out there and no one would bother me.”

When coming off treatment: *“Why can’t I just stay on chemo for the rest of my life?”*



THE CASE OF SUSIE:

“I still often feel broken and stolen from because of the cancer. It took three years of my life, my fertility, and the opportunity to live a normal life. I think I do pretty well at life, but I think it's harder for me than it is for normal people. I have had to go through a lot to get where I am, and I find that I don't connect with people who haven't had hardships very well. I look at a lot of people my age and just don't understand how they can be the way they are and how they can be concerned with such trivial things.”



COGNITIVE LATE EFFECTS:

HOW TO IDENTIFY

- Neuropsychological Testing
 - “IQ” can be affected
 - Processing Speed (Symbol Search & Coding)
 - Working Memory (Letter Number Seq & Digit Span)
- Children’s Oncology Group (COG)
 - ALTE07C I: Behavioral Science Group
 - Streamlined; Part of Decision-Making
- CogState – brief computer-based screener.
- “ImPACT” – and other concussion & TBI tools.

COGNITIVE LATE EFFECTS: WHITE MATTER REDUCTIONS IN *ALL* SURVIVORS

CAREY ET AL., AJNR, 2008

White matter is thought to be significantly affected by chemotherapy and bone marrow transplant (Anderson et al., 2008; Carey et al., 2008; Rueckriegel et al., 2009).

Fig 1. Significantly associated w:WJIII Tests of Achievement Calculation – also with Trail Marking and Digit Span

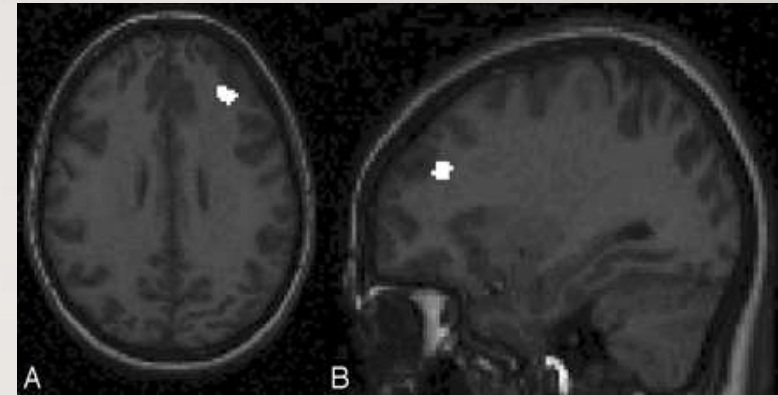
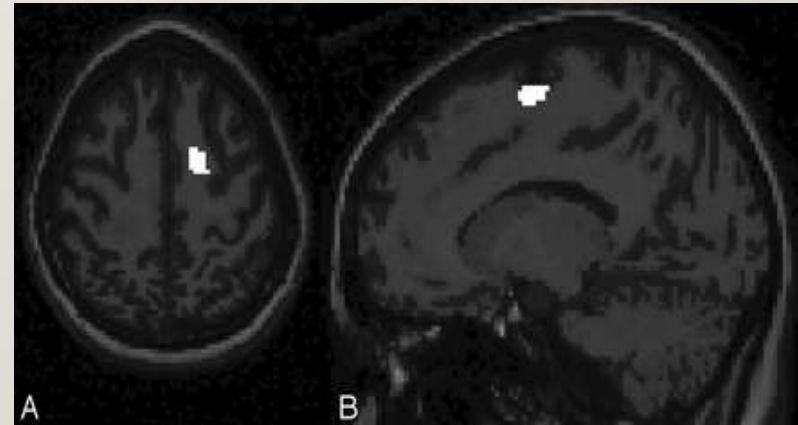


Fig 2. Significantly associated w:Vocabulary – also with Digit Span and Block Design.



COGNITIVE LATE EFFECTS:

HOW TO MINIMIZE & TREAT

- Advanced Radiotherapy
- Advanced Chemotherapy
- Cognitive Remediation (Butler et al., 2008)
 - Very extensive time, effort, & Money
- **Early** Education, Cognitive Training, & Pharmacotherapy. (Askins & Moore, 2008)
- Continuation of Academic Instruction

COGNITIVE REMEDIATION

(BUTLER ET AL., 2008)

- 7 large sites nationwide; $N= 161$.
- 2 hours sessions/wk for 20 weeks.
 - Hierarchically graded mass practice
 - Strategic acquisition
 - Cognitive-behavioral interventions
- Results: only modest effect sizes; parents reported improved attention; significant increases in academic achievement.
- Continued application at home afterwards?

COGNITIVE LATE EFFECTS:

HOW TO MINIMIZE & TREAT

- CogMed (www.cogmed.com)
 - Home-based computerized attention training program.
- <http://www.spaceminespatrol.com/gamepage.html>
- Kristi Hardy, Ph.D., now of DC Children's.

SPACE MINES PATROL



COGNITIVE LATE EFFECTS: *HOW TO MINIMIZE & TREAT*

St. Jude Reading Skills Intervention Study

- Ongoing many years
- For pt's with newly dx brain tumors
- Uses Fast ForWord during chemo and radiation.
- Hopes to reduce or ameliorate spelling and reading difficulties.

- Problems with fatigue and feasibility?

COGNITIVE LATE EFFECTS: *HOW TO MINIMIZE & TREAT*

- Pharmacotherapy
 - Methylphenidate (Ritalin): RCTs show improvements in attention, cognitive flexibility, & processing speed
 - Safe and well tolerated.
 - Male, older at Tx, higher IQ predictive of effects.
 - 45% were “responders” to moderate dosing
 - More problems prior to trial positively predictive of medication response.
 - Long term efficacy.

Conklin et al., 2007; 2009; 2010

COGNITIVE LATE EFFECTS: *HOW TO MINIMIZE & TREAT*

- Pharmacotherapy (continued):
 - To Be Determined:
 - ACCL 0922: A Phase II Placebo-Controlled Trial of Modafinil to Improve Neurocognitive Deficits in Children Treated for a Primary Brain Tumor
 - Strattera
 - Aricept (Donazipil) – prevents breakdown of acetylcholine.

COGNITIVE LATE EFFECTS: *HOW TO MINIMIZE & TREAT*

Final Take Home Messages

- Comprehensive & multidisciplinary approach
 - Early and repeated evaluations for all
 - Early interventions for those at risk
- School consultations – reintegration, etc.
 - Advocacy, Class in-services, back to school video program.
- Specialized tutoring services available.
- Comprehensive Psychosocial Support during all phases of Dx, Tx, and Survival.
 - Support the entire family during this tiring, chronic, process

QUESTIONS AND COMMENTS?

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