Cancer Survivorship Research: Recovery and Beyond

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www.cancer.org/survivorship2010
Rehabilitation for Brain Tumor Survivors: Current Knowledge and Future Directions

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Incidence
Brain and Other CNS

- 1.4% of all malignancies
- 62930 new primary brain tumor (PBT) diagnoses estimated in 2010
- 23720 malignant
- 57--Median age (peak incidence 75-85, 65.5/100,000)
- Childhood - most common solid tumor (21.3% of all childhood malignancy; 4.7/100,000)
- 4030 cases childhood brain tumor (benign + malignant)
- Metastatic brain tumor – incidence at least 10X greater than PBT

-Central Brain Tumor Registry of the United States. www.cbtrus.org
Prevalence
Brain and other CNS

- 612,000 people (2004 estimate)
- 209/100000
- 124,000 malignant
- 488,000 benign
- 28,000 children

For malignant tumor, 5 year survivorship 36% for adults (decreases with age) and 71-72% for pediatric (dx 1999-2005)

Central Brain Tumor Registry of the United States. www.cbtrus.org
Rehabilitation Considerations

- Varying **survivorship**
- Variable **trajectory** even for benign diagnoses
- High **frequency** of disabling complications
- High **severity** of disabling complications
- Life **context**
Frequency of Rehabilitation Needs or Disability

- >80%: Nervous system
- >70%: Breast, head and neck, lung
- >60%: Prostate, bone, bladder

Neurologic Complications in Brain Tumor Inpatients

- Cognitive deficits 80%
- Weakness 78%
- Visual-perceptual deficit 53%
- Sensory loss 38%
- Bowel/bladder 37%
- Cranial nerve palsy 29%
- Dysarthria 27%
- Dysphagia 26%
- Aphasia 24%
- Ataxia 20%
- Diplopia 10%

Neurologic Complications in Brain Tumor Inpatients

- 75% have 3 or more deficits
- 39% have 5 or more deficits

Mukand
Childhood Cancer Survivor Study
Participation Restriction
(ADL’s, IADL’s, work/school)

Ness et al, 2005
Database of 1433 cancer survivors age 25-62.

Nearly 20% report cancer-related limitations on ability to work (1-5 years after diagnosis)

13% unable to work at all.

Impact of disease stage and other health comorbidities

Short et al, Cancer 103(6):1292-1301, 2005
Severity of Disability
Employment After Cancer
Odds Ratios

■ Most affected:
--Blood (3.03); CNS (2.2); Head and Neck (1.7)
■ Least affected:
--Uterus (0.38); Prostate (0.44); Breast (0.48); Thyroid (0.6)
**Frequency/ Severity of Disability Employment**

- Finnish Cancer Registry
- 12,542 cancer survivors “free of cancer and alive” and age/gender matched controls; age 15-60 at diagnosis

Frequency/Severity of Disability
Employment After Cancer

Rehabilitation Data

- Acute Inpatient Rehabilitation
  - Brain tumor vs other brain diagnoses
  - Brain tumor subgroups
- Other Settings
  - Cognitive studies (rehab, meds)
  - Exercise
Inpatient Rehabilitation
**Functional Independence Measure (FIM)**

**Motor**
- Eating
- Grooming
- Bathing
- Dressing-upper body
- Dressing-lower body
- Toileting
- Bladder management
- Bowel management
- Bed, chair, wheelchair
- Toilet transfers
- Tub, shower transfers
- Walking
- Stairs

**Cognitive**
- Comprehension
- Expression
- Social interaction
- Problem solving
- Memory
Uncontrolled respective studies


Controlled studies

- **Brain tumor vs stroke.**

- **Brain tumor vs traumatic brain injury**
Controlled studies
Brain tumor subtypes

- **Primary vs Metastatic Brain Tumor; High Grade vs Low Grade Tumor.**

- **High Grade vs Low Grade Astrocytoma.**
Inpatient Brain Tumor Rehabilitation: The Evidence

- Comparable gains to other “brain” diagnoses
- Comparable or shorter length of stay (LOS)
- Comparable discharge to community rates
- No significant differences between tumor subtypes
- Initial tumor presentation associated with higher gains than recurrence
- Functional goals maintained
- Effect of concurrent radiation therapy? (conflicting data)
- Effect of tumor grade on LOS? (conflicting data)
- Higher interrupted stay
Unplanned transfers

- Marciniak, 1996—33% (35% of brain tumor patients; other groups 31-36%), compared to 12% overall rate.
- Marciniak, 2001—24%
- Alam, 2008—25%

Malignant Versus Benign Transfer Rate

The bar chart compares the percentage of malignant versus benign transfers for different categories: Brain, Spinal cord, Other, Stroke, and Total. The chart shows a higher percentage of malignant transfers in the Brain and Spinal cord categories, while the Other category has a higher percentage of benign transfers. The Stroke category shows a more balanced percentage between malignant and benign transfers. The Total category also shows a higher percentage of malignant transfers.
Cognitive Strategies:
Cognitive Therapy
Controlled studies

- Improved subjective cognitive function post-treatment; improved attention and verbal memory at 6 months (140 adult glioma patients)
- Childhood CNS cancer survivors-improved academic performance in language and mathematics, improved parent report of attention in daily activities, and higher level of “metacognitive strategies”. Neuropsychologic testing (attention, memory) no difference.

Cognitive Strategies: Pharmacologic

- Methylphenidate is best studied agent
- Favorable effects on attention and on caregiver (parent, teacher) reports of attention, social functioning and academic competence
- Learning effect may confound studies with repeated testing, especially crossover studies

Pediatric PBT vs TBI

Psychologic and adjustment status

- Brain tumor patients more likely to internalize problems, and TBI patients more likely to externalize them.
- TBI patients more severely impaired than PBT patients

Exercise Preferences in Primary Brain Cancer

- 106 patients (out of 560 surveys sent)
- 75% with grade III or IV disease
- During treatment at medical center
- After treatment at home
- Cross-sectional

Exercise Preferences
Receiving Information
(very/ somewhat interested)

- Mail 55%
- Email 49%
- Internet 48%
- Flyer 47%
- Computer program 41%
- Face to face 29%
- Phone 24%
### Brain Tumor Patient Perceptions: Exercise Tolerance and Preferences

<table>
<thead>
<tr>
<th>During treatment</th>
<th>After Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>45% want info</td>
<td>70% want info</td>
</tr>
<tr>
<td>47% able to exercise</td>
<td>84% able to exercise</td>
</tr>
<tr>
<td>51% walking</td>
<td>53% walking</td>
</tr>
<tr>
<td>44% resistance training</td>
<td>36% resistance training</td>
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<tr>
<td></td>
<td>19% cycling</td>
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## Brain Tumor Patient Preferences: Exercise Setting

<table>
<thead>
<tr>
<th><strong>During Treatment</strong></th>
<th><strong>After Treatment</strong></th>
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<tbody>
<tr>
<td>25.5% Home</td>
<td>43.4% Home</td>
</tr>
<tr>
<td>9.4% Local fitness center</td>
<td>22.6% Local fitness center</td>
</tr>
<tr>
<td>5.7% Hospital-based center</td>
<td>4.7% Hospital-based center</td>
</tr>
<tr>
<td>14.2% No preference</td>
<td>17% No preference</td>
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Future Implications
Strengths

- Brain rehabilitation care systems are well developed; i.e., the field of rehabilitation relatively well positioned to care for brain tumor patients.
- FIM instrument allows measurement of function.
- Because the need is obvious, brain tumor patients may be more likely to receive needed care than other cancer populations, at least in the initial course.
Challenges

- Identifying downstream needs and providing the right care
- Measuring (and treating) functional deficits vs quality of life and symptom control
- Vocational and avocational issues
- Brain tumors / other brain disorders