Survivorship Considerations Following Stem Cell Transplant

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Aspects of Cancer Survivorship

Cancer Survivorship
Post-Treatment Phase

Prevention Survivors and Family
- Promote Healthy Behaviors
  - Physical activity
  - Diet
  - Smoking cessation
  - Other lifestyle changes

Detection Survivors and Family
- Survivors
  - Adherence to follow-up care
  - Screening for second cancers/recurrence
  - Screening for related comorbid conditions (eg, osteoporosis)

Treatment Management of Side/Late Effects
- Survivors
  - Pain
  - Cognitive function
  - Sleep disturbance/fatigue
  - Sexual function
  - Organ function

Family
- Screening for high-risk families

Family
- Psychosocial/caregiver burnout
Significant Spectrum of Survivorship Issues

- Survivorship education or training
- Survivorship experience
- Practice style
- Perceptions regarding preventive care
- Access to survivorship resources
- Knowledge or access to individual survivor health history

- Age at treatment and attained age
- Sex, race or ethnicity
- Familial or genetic factors
- Pre- or co-morbid conditions
- Health behaviours
- Cognitive or developmental status
- Health knowledge
- Health risk perceptions
- Self-efficacy
- Insurance or health care access

- Histology or involved sites
- Biology or response
- Treatment
- Surgery
- Chemotherapy
- Radiotherapy
- Transplantation
- Transfusion
- Treatment events

- Financing and payment policies
- Organization and affiliation of providers
- Data systems and information sharing
- Models of survivorship care
- Insurance coverage and benefits supporting survivorship care (especially preventive and psychosocial services)
- Community resources
- Survivorship advocacy activity
Physical Long-Term Effects of Treatment

<table>
<thead>
<tr>
<th>Growth and development</th>
<th>Organ Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear growth</td>
<td>Cardiac</td>
</tr>
<tr>
<td>Skeletal and tissue growth</td>
<td>Pulmonary</td>
</tr>
<tr>
<td>Intellectual function</td>
<td>Renal</td>
</tr>
<tr>
<td>Emotional/social maturation</td>
<td>Endocrine</td>
</tr>
<tr>
<td>Sexual development</td>
<td>Reproductive</td>
</tr>
<tr>
<td></td>
<td>Gastrointestinal</td>
</tr>
<tr>
<td></td>
<td>Vision/Hearing</td>
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</tbody>
</table>

**Subsequent Neoplasms**
- Benign
- Malignant
Endocrine Effects

Restrictive and Obstructive defects:
- CNS radiation
- Neck radiation
- Gonadal radiation

Metabolic syndrome:
- CNS radiation
- Corticosteroids

Bone Health:
- Corticosteroids
- CNS and bone radiation
- Decreased sun exposure
Fertility After Cancer

• **Surgery**
  – Removal of reproductive organs
  – Pelvic/spinal surgeries that injure pelvic nerves

• **Radiation**
  – Hypothalamus/pituitary (head/brain/TBI)
  – Ovaries/uterus (abdominal/pelvic/TBI)
  – Testes (pelvic/gonadal/TBI)

• **Alkylating agent chemotherapy**
  – Cyclophosphamide, ifosfamide, procarbazine, nitrogen mustard, carmustine, lomustine, mephalan
Heart Health

- **Anthracyclines**:  
  - Cardiomyopathy  
  - Congestive heart failure  
  - Subclinical LV dysfunction
- **Platinums**:  
  - Hyperlipidemia  
  - Hypertension
- **Immunotherapy**:  
  - Myocarditis
- **Chest radiation**:  
  - Cardiomyopathy  
  - Heart valve disorders  
  - Coronary artery disease  
  - Stroke

<table>
<thead>
<tr>
<th>Cumulative Dose</th>
<th>Cumulative Incidence (20 years)</th>
</tr>
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<tbody>
<tr>
<td>Overall</td>
<td>5.5%</td>
</tr>
<tr>
<td>&lt; 300 mg/m²</td>
<td>0.5%</td>
</tr>
<tr>
<td>≥ 300 mg/m²</td>
<td>9.8%</td>
</tr>
</tbody>
</table>
Cumulative Incidence of Second Neoplasms

Friedman, 2007
Cumulative Incidence of Skin and Mucosal Cancers

- Basal Cell Carcinoma
- Squamous Cell Carcinoma

Years after HSCT

Percent

0 5 10 15 20

8.4%

5.5%
Cumulative Incidence of Breast Cancer

Years after HSCT

Probability of Secondary Breast Cancer

0.11
# Psychosocial Effects

<table>
<thead>
<tr>
<th>Mental Health</th>
<th>Social Interaction</th>
<th>Social Competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Mood and Affect</td>
<td>- Family/peer relationships</td>
<td>- Ability to live independently</td>
</tr>
<tr>
<td>- Distress and Anxiety</td>
<td>- Social withdrawal/isolation</td>
<td>- Intimacy/marriage/family</td>
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<tr>
<td>- Post-traumatic stress</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Education/Vocation/Health</th>
<th>Health Risking Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Academic achievement</td>
<td>- Substance Use/Abuse</td>
</tr>
<tr>
<td>- Vocational achievement</td>
<td>- Medical noncompliance</td>
</tr>
<tr>
<td>- Employment</td>
<td></td>
</tr>
<tr>
<td>- Access to Insurance</td>
<td></td>
</tr>
<tr>
<td>- Access to Health Care</td>
<td></td>
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</tbody>
</table>
Cognitive Complaints

- Memory acquisition and retrieval
- Executive functions: Planning and organizing, Trial and error reasoning, Complex attention
- Speed of information processing
- Sustained attention, screening out distractions
- Multi-tasking
Health-related quality of life

• Most survivors after treatment have good-excellent health by self-report

• Physical impairments have a major impact on function and quality of life in a meaningful minority.
  ♦ ~ 1 in 5 will have work limits up to 5 years later
  ♦ ~ 50% of those continue working
  ♦ 8% cannot work after cancer treatment
Survivorship Care Plan

- Diagnostic information
- Treatment modalities/cumulative dose
- Clinical events and status
- Transfusion history
- Family history
- Cancer-related health risks
- Risk-based screening recommendations

Health Promotion

- Regular primary care
- Healthy weight
- Physical activity
- Healthy eating
- Avoid or limit alcohol
- Avoid tobacco use
- Cancer screening
## Surveillance for Late Toxicities

<table>
<thead>
<tr>
<th>System</th>
<th>Surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>Blood counts, Ferritin</td>
</tr>
<tr>
<td>Cardiac</td>
<td>Lipids, Blood Pressure, Echocardiogram</td>
</tr>
<tr>
<td>Liver</td>
<td>Liver function blood tests</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>Pulmonary function tests</td>
</tr>
<tr>
<td>Neurological</td>
<td>Neurocognitive assessment</td>
</tr>
<tr>
<td>Renal</td>
<td>Renal blood tests, BP, urine for protein</td>
</tr>
<tr>
<td>Eye</td>
<td>Exam</td>
</tr>
<tr>
<td>Thyroid</td>
<td>Thyroid function blood tests</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Hgb A1C, blood sugar</td>
</tr>
<tr>
<td>Gonadal</td>
<td>Hormone assessment</td>
</tr>
<tr>
<td>Bone health</td>
<td>Bone mineral density</td>
</tr>
<tr>
<td>Dental</td>
<td>Exam and oral cancer observation</td>
</tr>
<tr>
<td>Skin</td>
<td>Exam and skin cancer observation</td>
</tr>
<tr>
<td>Vaccines</td>
<td>Up to date</td>
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Conclusions

• Survival post stem cell transplant is increasing
• Survivors are at increased risk for adverse health-related outcomes
• Special issues exist for patients who receive transplants for non-malignant diseases
• Need for integrated survivorship and primary care
• Transition remains a problem
  – from acute to long-term care
  – from stem cell transplant to primary care

Need to continue to conduct efficient and effective research and provide optimal clinical care for stem cell transplant survivors
Thank You!

Questions?

Comments?

Suggestions?