Survivorship: Surviving the Aftermath
Sheetal Kircher, MD
Assistant Professor, Hematology Oncology
November 3rd, 2018
Relevant Financial Disclosure(s)

Sheetal Kircher, MD

- I have nothing to disclose
Cancer is a major public health problem

What is a cancer survivor?
What is a cancer survivor?

A cancer survivor is any person who has been diagnosed with cancer, from the time of diagnosis through the balance of life.

-IOM and NRC, 2005
Increasing Number of Cancer Survivors

US population: 300 million

2012: 14 million cancer survivors

2022: 18 million cancer survivors

de Moor et al. Cancer survivors in the United States, Cancer Epidemiology, Biomarkers, and Prevention, 2013
What is survivorship care?
Cancer care continuum

National Cancer Institute figure “Cancer Control Continuum” (NCI, 2013b)
Progress in Cancer Survival

• 5-year survival rate exceeds 80% in pediatric cancers

• One in every 750 individuals in the US is a survivor of childhood or adolescent cancer

• Lung, breast, colorectal in adults death rate decreasing about 1.5%/year

Howlader N et al. SEER Cancer Statistics Review 1975-2010
Prevalence of health condition in childhood cancer survivors

- \( N = 1713 \) (St. Jude Cohort)
- Median age of dx: 6 years (0-24)
- Median age at study: 32 years (18-60)
- Median time from dx: 25 yrs (10-47)

Hudson et al. JAMA 2013
Late Mortality in Cancer Survivors

Mertens et al. JNCI 2008

<table>
<thead>
<tr>
<th>Condition</th>
<th>SMR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Cancer</td>
<td>15.2</td>
<td>13.9 – 16.6</td>
</tr>
<tr>
<td>Cardiac</td>
<td>7.0</td>
<td>5.9 – 8.2</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>8.8</td>
<td>6.8 – 11.2</td>
</tr>
</tbody>
</table>
Late effects have many influences

- Host Factors
  - Age
  - Gender
  - Race

- Health Behaviors
  - Tobacco
  - Diet
  - Alcohol
  - Exercise
  - Sun

- Premorbid conditions

- Aging

- Genetic
  - BRCA, ATM, p53 polymorphisms

- Tumor Factors
  - Histology
  - Site
  - Biology
  - Response

- Treatment Events
  - Surgery
  - Chemotherapy
  - Radiation therapy

- Treatment Factors

Hudson et al. Cancer 2005
Late effects have many influences: Time from exposure

<table>
<thead>
<tr>
<th>Cancer treatment</th>
<th>Time from exposure to manifestation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weeks</td>
</tr>
<tr>
<td>Cisplatin</td>
<td>Hearing loss</td>
</tr>
<tr>
<td>Ifosfamide</td>
<td>Renal tubular injury</td>
</tr>
<tr>
<td>Brain radiation</td>
<td></td>
</tr>
<tr>
<td>Neck radiation</td>
<td></td>
</tr>
<tr>
<td>Doxorubicin</td>
<td></td>
</tr>
<tr>
<td>Breast radiation</td>
<td></td>
</tr>
</tbody>
</table>
Effects of cancer and treatments: Chemotherapy

- Heart
- Bones
- Lungs
- Fertility/sexual dysfunction
- Cognitive
- Pain
Late effects have many influences: Doses

Chemotherapy

Radiation

Blanco JC et al JCO 2012, Darby et al. NEJM 2013
Late effects influences: Combinations

• Treatment related risk of heart failure

Late effects influences: Addition of chronic health conditions

- N=10,724

Armstrong GT et al. JCO 2013
Cardiac effects: syndromes associated with specific drugs

<table>
<thead>
<tr>
<th>Agents associated with myocardial depression</th>
<th>Agents associated with hypotension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthracyclins</td>
<td>Etoposide</td>
</tr>
<tr>
<td>Mitoxantrone</td>
<td>Paclitaxol</td>
</tr>
<tr>
<td>Cyclophosphamide (high dose)</td>
<td>Alemtuzumab</td>
</tr>
<tr>
<td>Trastuzumab</td>
<td>Cetuximab</td>
</tr>
<tr>
<td>Ifosfamide</td>
<td>Rituximab</td>
</tr>
<tr>
<td>ATRA</td>
<td>IL-2</td>
</tr>
<tr>
<td></td>
<td>Denileukin</td>
</tr>
<tr>
<td><strong>Agents associated with ischemia</strong></td>
<td>IF-alpha</td>
</tr>
<tr>
<td>5FU</td>
<td>ATRA</td>
</tr>
<tr>
<td>Cisplatin</td>
<td>Homoharringtonine</td>
</tr>
<tr>
<td>Capecitabine</td>
<td></td>
</tr>
<tr>
<td>IL-2</td>
<td></td>
</tr>
</tbody>
</table>
### Cardiac effects: syndromes associated with specific drugs

<table>
<thead>
<tr>
<th>Agents associated with hypertension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bevacizumab</td>
</tr>
<tr>
<td>Cisplatin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agents associated with other toxic effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac tamponade: Busulfan</td>
</tr>
<tr>
<td>Cardiac fibrosis: Busulfan</td>
</tr>
<tr>
<td>Bradyarrhythmias: paclitaxol, thalidomide</td>
</tr>
<tr>
<td>Reynaud: vinblastine</td>
</tr>
<tr>
<td>Autonomic neuropathy: vincristine</td>
</tr>
<tr>
<td>QT prolongation or torsades de pointes: arsenic trioxide</td>
</tr>
<tr>
<td>Fibrosis</td>
</tr>
</tbody>
</table>
Peripheral neuropathy is a common dose limited toxicity for many chemotherapy agents

- Platinum agents most common
- Can be reversible or irreversible
- Hearing loss from cisplatin
- Therapy: gabapentin or venlafaxine
Psychosocial challenges

- Psychological: depression, anxiety, isolation, uncertainty, altered body image
- Social: changes in interpersonal relationships, jobs, school, financial burden
- Spiritual issues: sense of purpose or meaning, appreciation of life
Psychosocial challenges

• Anxiety and Depression
  – 29% of survivors
  – Suicide rate twice that of general population

• Post traumatic stress disorder
  – Up to 19% of cancer survivors

Hoffman et al Arch Intern Med 2009
Points of increased vulnerability to distress

- Diagnosis
- Treatment
- End of Treatment
- No Evidence of Disease
- Recurrence or Progression
- Advanced Cancer or Treatment Failure
- End of Life
Survivors Taking Action and Responsibility (STAR)

Adolescent and Young Adult Oncology Program (AYAO)

Lynn Sage Breast Cancer Survivorship Program
AND
Survivor Specialty Clinics
Shared care model

What can you do?

- Continue follow up with primary care and oncology as recommended
- Exercise, “eat well”, decrease stress
- Ask questions
Cure sometimes, treat often, comfort always
~Hippocrates

https://www.cancer.northwestern.edu/cancer-care/survivorship/index.html