When Life Is Sewn Back Together, It Has Changed

Late Effects of Cancer Treatment
Cardiac Effects

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Director of Cancer Survivorship,
UNC Lineberger Comprehensive Cancer Center
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Objectives
1. Summarize impact of projected cancer statistics
2. Describe late and long-term effects of cancer and its treatment;
3. Understand treatment induced cardiovascular late effects
4. Discuss role of primary care provider in identifying and caring for cancer survivor

Thanks to Brian Jensen, MD for use of some of his slides

Cancer Statistics, 2016

Estimated New Cases

<table>
<thead>
<tr>
<th>Type</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>100,000</td>
<td>120,000</td>
</tr>
<tr>
<td>Lung &amp; Bladder</td>
<td>70,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Colon &amp; Rectum</td>
<td>10,000</td>
<td>15,000</td>
</tr>
<tr>
<td>Leukemia</td>
<td>9,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Non-Hodgkin Lymphoma</td>
<td>45,000</td>
<td>50,000</td>
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<tr>
<td>Kidney &amp; Ureters</td>
<td>8,000</td>
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<tr>
<td>Other &amp; Unspecified</td>
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<td>23,000</td>
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<tr>
<td>Liver &amp; Hepatic conditions</td>
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<td>23,000</td>
</tr>
<tr>
<td>All Races</td>
<td>601,000</td>
<td>643,000</td>
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</table>

Estimated Deaths

<table>
<thead>
<tr>
<th>Type</th>
<th>Males</th>
<th>Females</th>
</tr>
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<tbody>
<tr>
<td>Breast</td>
<td>20,000</td>
<td>22,000</td>
</tr>
<tr>
<td>Lung &amp; Bladder</td>
<td>12,000</td>
<td>14,000</td>
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<tr>
<td>Colon &amp; Rectum</td>
<td>2,000</td>
<td>3,000</td>
</tr>
<tr>
<td>Leukemia</td>
<td>1,000</td>
<td>1,200</td>
</tr>
<tr>
<td>Non-Hodgkin Lymphoma</td>
<td>9,000</td>
<td>10,000</td>
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<tr>
<td>Kidney &amp; Ureters</td>
<td>1,000</td>
<td>1,200</td>
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<tr>
<td>Other &amp; Unspecified</td>
<td>13,000</td>
<td>15,000</td>
</tr>
<tr>
<td>Liver &amp; Hepatic conditions</td>
<td>8,000</td>
<td>10,000</td>
</tr>
<tr>
<td>All Races</td>
<td>454,000</td>
<td>481,000</td>
</tr>
</tbody>
</table>
As of January 2014, it is estimated that there are 14.5 million cancer survivors in the United States. This represents over 4% of the population. The number of cancer survivors is projected to increase by 31%, to almost 19 million, by 2024, which represents an increase of more than 4 million survivors in 10 years.

Demographic Trends

Aging population (70%)  
By 2050 20.2% US population will be >65

Minority populations (28%)  
By 2050 US population will be 35% Hispanic and 25% combined AA, Native American and Asian.

1.5→2.3 million cancer diagnosis/year → ↑ survivors

Survivors Projected in 2022
Estimated Number of US Cancer Survivors

<table>
<thead>
<tr>
<th>2014 (n=14.5m)</th>
<th>2024 (n=19m)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male</strong></td>
<td><strong>Female</strong></td>
</tr>
<tr>
<td>Prostate</td>
<td>Breast</td>
</tr>
<tr>
<td>43%</td>
<td>41%</td>
</tr>
<tr>
<td>CRC</td>
<td>CRC</td>
</tr>
<tr>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>Melanoma</td>
<td>Uterus</td>
</tr>
<tr>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Bladder</td>
<td>Melanoma</td>
</tr>
<tr>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>NHL</td>
<td>Thyroid</td>
</tr>
<tr>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>Testis</td>
<td>NHL</td>
</tr>
<tr>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Kidney</td>
<td>Cervical</td>
</tr>
<tr>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Lung</td>
<td>Lung</td>
</tr>
<tr>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>H&amp;N</td>
<td>Ovary</td>
</tr>
<tr>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>Kidney</td>
</tr>
<tr>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td><strong>NC</strong></td>
<td><strong>NC</strong></td>
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<tr>
<td>348,850</td>
<td>457,114</td>
</tr>
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</table>

 Among today's survivors, the most common cancer sites represented include female breast (22%), prostate (21%), colorectal (9%) and gynecologic (7%). 60% of survivors are currently 65 years of age and older.

Late Effects of Cancer Treatment

**Late effects:** unrecognized toxicities that are absent or subclinical at the end of treatment and manifest months or years later

**Long term effects:** any side effect or complication for which the survivor must compensate
Long-term and Late Effects

Comorbidities in Cancer Survivors

- Obesity
- Diabetes
- Dyslipidemia
- Hypertension
- Osteoporosis/osteopenia
- Hypothyroidism
- Depression
- Cognitive changes
- Age related changes

Survivors at Greatest Risk for Late Effects

- Late effects:
  - Influenced by genetics and age at which treatment was received
  - Those who receive more complex treatments
  - Those treated with combinations of chemotherapy and radiation therapy
- Risk for second cancer: greatest with Hodgkin disease treatment
- Risk for solid tumors: greater if patient was treated at younger age
- Risk of leukemia: greater in those treated at older age
Late Effects of Cancer Treatment

Risk Assessment Factors

- Host-related
  - Gender
  - Age
  - Time since Dx/Rx
  - Premorbid health
  - SES
  - Health habits (esp. smoking)

- Tumor-related
  - Location
  - Direct tissue effects
  - Tumor-induced organ dysfunction
  - Mechanical effects

- Treatment-related
  - Radiation
    - Total dose, fraction size, organ or tissue volume, type of machine
  - Chemotherapy
    - Agent, dose-intensity, cumulative dose, schedule
  - Surgery
    - Technique, site

This information should be in the patient's medical record or found in their survivorship care plan.

Common Long-Term Sequelae

- Cardiovascular
  - Cardiomyopathy
  - Valvular heart disease
  - Electrical/conductive
  - Coronary artery disease

- Pulmonary
  - Pulmonary fibrosis
  - Interstitial lung disease
  - Strictures/obstructions

- Gastrointestinal
  - Malabsorption
  - Strictures/Obstruction

- Renal

- Musculoskeletal
  - Osteopenia/osteoporosis
  - Osteonecrosis
  - Lymphedema

- Endocrine
  - Hypothyroidism
  - Fertility

- Neurologic
  - Cognitive changes
  - Neuropathies

- Psychological
  - Depression
  - Anxiety
  - PTSD

Cardiovascular Late Effects

>1 in 3 Americans have > 1 types of cardiovascular disease

Cardiovascular disease is leading cause of death in cancer survivors when looking at all cause mortality

Covielo, Knopf (2012)
Why Cardio-oncology?

"Co-incident"

64 year-old smoker with a history of CAD s/p PCI is diagnosed with NSCLC.

"Survivorship"

48 year-old woman with Non-Hodgkin lymphoma s/p CHOP presents with heart failure and an EF of 20%.

74 year-old women with a history of breast cancer presents with atrial fibrillation.

Cancer increases risk of subsequent CV disease

- Survivors have a 10 times higher risk for atherosclerosis
- Survivors have a 5.9 times higher risk of congestive heart failure
- Survivors have a 6.3 times the risk for pericardial disease
- Survivors have a 4.8-fold greater risk for valvular disease
- Risks are particularly high among survivors who had received anthracycline drugs or high-dose radiation therapy to the heart as part of their cancer treatment

Snowball Effect

Cardiovascular Risk Factors

Uncontrollable
- Age
- Heredity
- Race
- Gender

Controllable
- Smoking
- Dyslipidemia
- Hypertension
- Obesity
- Metabolic Syndrome
- Diabetes
- Sedentary lifestyle
- Depression/anxiety

Cardiovascular Risk Factors in Long-term Survivors

- 1582 breast, prostate, CRC, gynecologic cancer survivors 4-14 years after diagnosis
  - > than general population
  - 62% Overweight or obese
  - 55% Hypertension
  - 21% Diabetes
  - 18% Physically inactive
  - 5% Current smokers

  » Weaver, et al. (2013) J Cancer Survivor 7:253-261

CV deaths in breast cancer patients

63,566 women with breast cancer from the SEER-Medicare database
Median follow-up 9 years. Of those women who died of CV disease, only 25% carried a CV diagnosis at enrollment


63,566 women with breast cancer from the SEER-Medicare database
Median follow-up 9 years. Of those women who died of CV disease, only 25% carried a CV diagnosis at enrollment
Cardiovascular Damage

- Vascular
  - Coronary artery disease
  - Carotid disease/stroke
- Structural
  - Pericardial disease/restrictive cardiomyopathy
  - Valvular heart disease
- Functional
  - Cardiomyopathy/ventricular dysfunction
  - Electrical/conductive system disease/arrhythmias
  - Myocardial dysfunction infarction

Common Terminology Criteria For Adverse Events V4.0 (CTCAE) Cardiotoxicity Events

- Cardiac disorders
- Acute coronary syndrome
- Aortic valve disease
- Asystole
- Atrial fibrillation / flutter
- Atroventricular block
- Cardiac Arrest/ sudden cardiac death
- Chest pain and palpitations
- Conduction disorder
- Constrictive pericarditis
- Heart failure
- Hypertension
- Left ventricular dysfunction
- Mitral valve disease
- Myocardial infarction
- Myocarditis

- Paroxysmal atrial tachycardia
- Pericardial effusion
- Pericardial tamponade
- Pericarditis
- Restrictive cardiomyopathy
- Right ventricular dysfunction
- Sick sinus syndrome
- Sinus bradycardia and tachycardia
- Supraventricular tachycardia
- Thromboembolic events
- Tricuspid valve disease
- Ventricular arrhythmia
- Ventricular fibrillation
- Ventricular tachycardia
- Vascular disorders
Heart disease after radiation therapy

**Cardiovascular Risk: Radiation**

- Mediastinal XRT (left breast, HD)
- Based on volume and dose distribution to heart
- Independent of other CV risk factors
- Treatment has changed so data may not reflect current practices and risk
- Manifestations
  - Pericarditis
    - Latency 1 year
  - Myocardial insufficiency
    - Latency beginning within 5 years
  - Ischemic heart disease
    - Latency >10-30+ yrs
  - Andratschke, 2011, Darby, 2013
Risk Factors for Cardiac Sequelae after Mediastinal Radiation Therapy

Patient factors
- Anthracyline chemotherapy
- Tumor close to heart border*
- < 18 years old
- Associated cardiac risk factors
- Baseline cardiac disease*

Radiation factors
- Orthovoltage radiation (not used since ‘70s)
- Volume of irradiated heart*
- Total dose to heart >30 Gy
- Daily dose fraction >2 Gy
- Absence of subcarinal blocking

Note: These are consensus based – Carver, JCO 25: 3991-4008, 2007.

Chest wall radiation increases risk for CHD

2168 Swedish and Danish women who received XRT for breast cancer
Mean dose = 4.9 Gy Risk of major coronary events increased 7.4% per Gy

Systemic Therapy Effects
Cardiovascular Risk: Chemotherapy

- **Type I: permanent damage**
  - Anthracylines
  - Mitoxantrone
  - Cyclophosphamide
  - 5-fluoruracil, capecitabine

- **Type II: reversible (?) damage**
  - Trastuzumab (MoAb)
  - Sunitinib (TKI)
  - Lapatinib (TKI)

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Cardiotoxic Effects

<table>
<thead>
<tr>
<th>Effect</th>
<th>Agent</th>
<th>Incidence</th>
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</thead>
<tbody>
<tr>
<td>Left ventricular dysfunction</td>
<td>Doxorubicin</td>
<td>3-26%</td>
</tr>
<tr>
<td></td>
<td>Cyclophosphamide</td>
<td>7-28%</td>
</tr>
<tr>
<td></td>
<td>Docetaxel</td>
<td>2.3-8%</td>
</tr>
<tr>
<td></td>
<td>Bevacizumab</td>
<td>1.7-3%</td>
</tr>
<tr>
<td></td>
<td>Trastuzumab</td>
<td>2-28%</td>
</tr>
<tr>
<td>Ischemia</td>
<td>Paclitaxel</td>
<td>1.7%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Bevacizumab</td>
<td>2.3%</td>
</tr>
<tr>
<td>VTE</td>
<td>Cisplatin</td>
<td>8.5%</td>
</tr>
<tr>
<td>Bradycardia</td>
<td>Paclitaxel</td>
<td>&lt;1-31%</td>
</tr>
</tbody>
</table>


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Anthracycline Cardomyopathy Risk Factors

**Patient Characteristics**
- <18 >65 years old at treatment initiation
- Pre-existing hypertension, CAD, Left ventricular dysfunction
- Pregnant or contemplating pregnancy
- Extreme/competitive sports athletics

**Treatment Characteristics**
- Cumulative dose cardiotoxic agents
- Mediastinal radiation
- Combination chemotherapy (trastuzumab, cyclophosphamide, etoposide, melphalan, paclitaxel, mitoxantrone, idarubicin)

**Longer duration of survival**

From: Carver, JCO 25, 3991-4008, 2007
**Anthracycline Cardiotoxicity**

- **Acute**
  - Arrhythmias, heart block, ventricular dysfunction, pericarditis-myocarditis syndrome
- **Chronic**
  - Asymptomatic diastolic or systolic dysfunction → early/late heart failure
  - Mechanism related to myocyte damage from oxygen free radicals, increase in oxidative stress → fibrous tissue
  - Greatest risk factor = cumulative dose, concurrent/prior chest XRT, preexisting heart disease
  - Use of dexrazoxane in patients with metastatic disease to continue above 300 mg/m² with LVEF monitoring
  - ? Use of ACE inhibitors, beta blockers

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**Anthracycline-induced cardiotoxicity**

- **Acute (< 1 yr) vs. Chronic (can occur > 10 yrs later)**
  - **Acute**: rare, arrhythmias, myocarditis, reversible
  - **Chronic**: rarer with current regimens, cardiomyopathy due to cell death; treatable but not completely reversible; high morbidity and mortality

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**Trajectory decline in cardiovascular reserve capacity (CVRC) across the breast cancer survivorship continuum.**

- % CVRC
- Asymptomatic: Normalized
downstream dysfunction
- Morbidity/Mortality
- Diagnosis
- Adjuvant Therapy
- 1-Year Survival
- 5-Year Survival
- 10-Year Survival
- 30-Year Survival

Kuzeltny G et al. JCO 2013;31:4468-4481
Heart failure in older breast cancer patients

Anthracyclines and comorbidities are independent risk factors

43,338 breast cancer survivors (66-80 years old) in Medicare SEER database. At 10 years the risk of incident HF without chemotherapy 29%, with anthracycline-based chemotherapy 39%.

Risk factors for HF
Charlson Comorbidity Score 1:
- HR 2.05
Charlson Comorbidity Score 2:
- HR 3.62
Black race: HR 1.46
Trastuzumab: HR 1.45
Hypertension: HR 1.45
Diabetes: HR 1.74
CAD: HR 1.58

Relative risk of HF after anthracyclines = 1.26
The unexpected cardiotoxicity of trastuzumab

An early model of toxicity from “targeted therapies”

Trastuzumab revolutionized breast cancer treatment. In early RCTs, HER2+ patients had a 30-40% reduction in mortality with trastuzumab.

The mechanism of toxicity is not entirely known, but likely involves disabling of beneficial cross-talk between endothelial cells and myocytes via neuregulin (NRG).

Cardiotoxicity occurs in 3-27% of patients treated with trastuzumab
- Not dose-dependent
- Usually reversible and asymptomatic decline in EF
- Risk factors: age, comorbidities, concomitant anthracycline use

Cumulative Incidence Of Cardiotoxicity Events According To The Use Of Trastuzumab And/Or Anthracyclines In Early Breast Cancer Patients.

Toxicity from other targeted therapies
Kinase Inhibitors in the treatment of Renal Cell CA

- Any CV toxicity
- Hypertension
- Non-HTN toxicity
- Elevated proBNP
- Decreased LVEF

Hypertension is most common, but low EF occurs in 4-15%

Multiple mechanisms of VSP cardiotoxicity
Direct myocardial effects and indirect effects from vasculature

- PDGFs and VEGF-Rs both are protective in cardiomyocytes. Tumors require angiogenesis to proliferate. VSPs disable angiogenesis by blocking the effects of VEGF which decreases NO bioavailability.
- Hypertension is a frequent response, due to the importance of NO to endothelial function.

Non-Anthracycline cardiotoxicity

- 5FU
- Capecitabine
- Fludarabine
- Pentostatin
- Cladribine
- Methotrexate
- Cytarabine
- Vinca alkaloids
- Taxanes
- Alkylating agents
- Antitumore antibiotics
- Monoclonal antibodies
- Topo Inhibitors
- Biologics
- Differentiating agents
- TKI
- Misc agents
Non-Anthracycline cardiotoxicity

- Arrhythmias (eg, histone deacetylase inhibitors, nilotinib)
- Myocardial necrosis causing a dilated cardiomyopathy and clinical heart failure (eg, sunitinib, alemtuzumab, imatinib)
- Vasospasm or vasoocclusion resulting in chest pain or myocardial infarction (eg, fluoropyrimidines, particularly infusional administration of fluorouracil, etoposide)
- Transient stress-induced cardiomyopathy (fluoropyrimidines)
- Pericarditis (eg, cytarabine, bleomycin)

Cardiovascular Risk: Hormonal Therapy

- Androgen suppression therapy (AST) in prostate cancer
  - Earlier onset fatal MI in men >65
  - Increases in CAD, stroke, sudden cardiac deaths, diabetes
  - Worse with preexisting comorbid diseases?
  - Do men on AST need to be monitored differently?

Bourke, 2012

Management of Long Term and Late Sequelae
### Potential Strategies To Reduce Chemotherapy-induced Cardiotoxicity (Truong, 2014)

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Example(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General approach</td>
<td>Anthracycline exposure, prior chemotherapy or radiation, young age, female, pre-existing cardiovascular disorders and electrolyte imbalances</td>
</tr>
<tr>
<td>Identify and/or treat risk factors</td>
<td>Daunorubicin &lt; 450-900; Doxorubicin &lt; 350-700; Liposomal doxorubicin &lt; 550; Epirubicin &lt; 600-720; Idarubicin &lt; 150; Mitoxantrone &lt; 120</td>
</tr>
<tr>
<td>Limit cumulative anthracycline dose (mg/m²)</td>
<td>Anthracyclines, 5-hydroxytryptamine antagonists</td>
</tr>
<tr>
<td>Limit drugs that prolong QTc interval</td>
<td>Hypocalcemia, hyperkalemia, hypokalemia, and hypomagnesium</td>
</tr>
<tr>
<td>Limit risk of radiation-induced cardiotoxicity</td>
<td>Coronary artery disease, dyslipidemia, hypertension</td>
</tr>
<tr>
<td>Manage electrolyte imbalances</td>
<td>Continuous infusion instead of bolus doxorubicin</td>
</tr>
<tr>
<td>Heat cardiotoxicity</td>
<td>Epirubicin instead of doxorubicin; molecular targeting agents instead of anthracyclines</td>
</tr>
<tr>
<td>Alternative chemotherapy treatment/regimen</td>
<td>Liposomal formulation Liposomal doxorubicin instead of adriamycin</td>
</tr>
<tr>
<td>Cardiovascular drugs</td>
<td>Hold or discontinue chemotherapy Symptomatic and/or asymptomatic with &lt;40% left ventricular ejection fraction</td>
</tr>
</tbody>
</table>

### Screening for Cardiovascular disease

- Consensus guidelines vary, no EBP recommendations
  - Asymptomatic, low risk: Observe
    - Asymptomatic, high risk: EKG, Echo, MUGA, Fasting glucose, lipid profile 5-10 years after treatment
      - Ng, 2011
  - Serum troponins? Value
  - Brain natriuretic peptide (BNP)? Value
  - No evidence-based guidelines for adult cancer survivors (ASCO in 2016)
  - ACE inhibitors if symptomatic heart failure

### Screening/Diagnostic Tests For Chemotherapy-induced Cardiotoxicity (Truong, 2014)

<table>
<thead>
<tr>
<th>Diagnostic tool</th>
<th>Assessment</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac MRI</td>
<td>LVEF; cardiac systolic and diastolic function</td>
<td>Most accurate and reproducible; Tissue characterization (edema/scar); Versatile</td>
<td>Contraindication to MRI; Expensive; Gadolinium contrast contraindicated in severe CKD; Less available; Time-consuming</td>
</tr>
<tr>
<td>12-Lead ECG</td>
<td>Arrhythmia, prolonged QT</td>
<td>Easy to perform; Inexpensive; Wide availability</td>
<td>Limited information on cardiac structure, and systolic and diastolic function</td>
</tr>
<tr>
<td>ECG</td>
<td>LVEF; cardiac structure; systolic and diastolic function</td>
<td>Inexpensive; Widely available; Versatile</td>
<td>Inter/intraobserver variability</td>
</tr>
<tr>
<td>Holter</td>
<td>Arrhythmia</td>
<td>Easy to perform; Inexpensive; Wide availability</td>
<td>Limited information on cardiac structure, systolic and diastolic function</td>
</tr>
<tr>
<td>Radionuclide angiography (MUGA scan) or ECHO</td>
<td>LVEF; systolic function</td>
<td>Reproducible; Widely available; Measures left ventricular function; Ejection fraction (≥50%) evaluates systolic function; Diastolic dysfunction may signal early anthracycline cardiotoxicity/heart failure or ischemia</td>
<td>Limited information on diastolic and valve functions; Low temporal and spatial resolution; Radiation exposure</td>
</tr>
</tbody>
</table>
Cardiopulmonary syndromes

• When survivor is symptomatic must rule out
  – Causes related to the cancer:
    • malignant pleural effusion,
    • malignant pericardial effusion,
    • superior vena cava syndrome,
    • lymphangitic carcinomatosis
  – Causes unrelated to the cancer:
    • chronic obstructive airway disease
    • congestive heart failure,
    • anemia,
    • certain acidic states,
    • bronchospasm.

Summary

• Late cardiovascular toxicity observed in longer term survivors
• Certain survivors are at higher risk
• Screening for asymptomatic survivors ill defined
  – Utility and cost effectiveness of regular screening not evaluated
• Careful differential of symptomatic patients must rule out recurrence or other cardiopulmonary syndromes
• More research needed on risks, prevention, interventions
  « Carver, ASCO, 2007

From Cancer Patient to Cancer Survivor: Lost in Transition

Essential Components of Survivorship Care:
  o Prevention of recurrent and new cancers and other late effects
  o Surveillance for cancer spread, recurrence or second cancers and assessment of medical and psychosocial late effects
  o Intervention for consequences of cancer and its treatment
  o Coordination between specialists and primary care providers to ensure that all of the survivors health needs are met
Survivorship Guidelines (NCCN)

- Assessment By Health Care Provider at Regular Intervals (SURV-4)
- Survivorship Baseline Assessment (SURV-A)
- Anxiety and Depression (SANXDE-1)
- Cognitive Function (CF-1)
- Fatigue (SFAT-1)
- Female sexual functioning (SSFF-1)
- Male sexual functioning (SSFM-1)
- Definition of Survivorship & Standards For Survivorship Care (SURV-1)
- General Principles of the Survivorship Guidelines (SURV-2)
- Screening for Second Cancers (SURV-3)
- Survivorship Resources For Healthcare Professionals And Patients (SURV-B)
- Pain (SPAIN-1)
- Sexual Function
- Sleep Disorders (SSD-1)
- Healthy Lifestyles (HL-1)
- Immunizations and Infections (SIMIN-1)
- General Survivorship Principles
- Late Effects/Long-Term Psychosocial and Physical Problems
- Preventive Health
- Physical Activity (SPA-1)
- Nutrition and Weight Management
- Immunizations

Go to [www.nccn.org](http://www.nccn.org) and register for free access

ASCO Cancer Survivorship Compendium

National Resources

- National Coalition for Cancer Survivorship [www.canceradvocacy.org](http://www.canceradvocacy.org)
- American Society of Clinical Oncology [http://www.asco.org](http://www.asco.org)
- American Cancer Society [www.cancer.org](http://www.cancer.org)
- National Comprehensive Cancer Network [www.nccn.org](http://www.nccn.org)
- Lance Armstrong Foundation (LIVESTRONG) [www.livestrong.org](http://www.livestrong.org)
National Resources

Cancer Survivorship E-Learning Series for Primary Care Providers

- Module 1: The Current State of Survivorship Care and the Role of Primary Care Providers
- Module 2: Late Effects of Cancer and its Treatments: Managing Comorbidities and Coordinating with Specialty Providers
- Module 3: Late Effects of Cancer and its Treatments: Meeting the Psychosocial Health Care Needs of Survivors
- Module 4: The Importance of Prevention in Cancer Survivorship: Empowering Survivors to Live Well
- Module 5: A Team Approach: Survivorship Care Coordination
- Module 6: Cancer Recovery and Rehabilitation
- Module 7: Spotlight on Prostate Cancer Survivorship: Clinical Follow-Up Care Guideline for Primary Care Providers
- Module 8: Spotlight on Colorectal Cancer Survivorship: Clinical Follow-Up Care Guideline for Primary Care Providers
- Module 9: Spotlight on Breast Cancer Survivorship: Clinical Follow-Up Care Guideline for Primary Care Providers
- Module 10: Spotlight on Head and Neck Cancer Survivorship: Clinical Follow-Up Care Guideline for Primary Care Providers

Cancer Survivorship in Primary Care

www.cancersurvivorshipprimarycare.org

Any questions?

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faqx.com