Survivorship Issues:
Late Effects of Curative Therapy in Lymphoma Survivors

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Learning Objectives

• Discuss the variety of post therapy survivorship issues in lymphoma patients
• Describe screening, assessment and follow-up guidelines in lymphoma survivors
• Identify preventative and health maintenance strategies in lymphoma survivors
Survivorship Definition

- Any individual who is alive after a diagnosis of cancer
- Family members, friends, and caregivers are also impacted by the survivorship experience

1. National Cancer Institute’s Office of Cancer Survivorship
ARS Question
What percentage of cancer survivors experience late adverse affects of curative therapy?

1. 30%
2. 50%
3. 80%
4. 100%

1  
13

2  
46

3  
60

4  
26

Total: 145
5 year Relative Survival-All Cancers

Cancer Survivors

Total cases

- New Cancer Dx (2015)
- Cancer Deaths (2015)
- Survivors (2014)

Leading Sites of New Cancer Cases and Deaths – 2015 Estimates

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Estimated Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimated New Cases*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prostate</td>
<td>220,800 (26%)</td>
<td>Breast</td>
<td>Lung &amp; bronchus</td>
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<tr>
<td>Lung &amp; bronchus</td>
<td>115,610 (14%)</td>
<td>Lung &amp; bronchus</td>
<td>86,380 (28%)</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>69,090 (8%)</td>
<td>Colon &amp; rectum</td>
<td>Prostate</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>56,320 (7%)</td>
<td>Uterine corpus</td>
<td>Col &amp; rectum</td>
</tr>
<tr>
<td>Melanoma of the skin</td>
<td>42,670 (5%)</td>
<td>Thyroid</td>
<td>Liver &amp; intrahepatic bile duct</td>
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<tr>
<td>Non-Hodgkin lymphoma</td>
<td>39,850 (5%)</td>
<td>Non-Hodgkin lymphoma</td>
<td>17,030 (5%)</td>
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<tr>
<td>Kidney &amp; renal pelvis</td>
<td>38,270 (5%)</td>
<td>Melanoma of the skin</td>
<td>Leukemia</td>
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<tr>
<td>Oral cavity &amp; pharynx</td>
<td>32,670 (4%)</td>
<td>Pancreas</td>
<td>14,210 (5%)</td>
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<tr>
<td>Leukemia</td>
<td>30,900 (4%)</td>
<td>Leukemia</td>
<td>Esophagus</td>
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<tr>
<td>Liver &amp; intrahepatic bile duct</td>
<td>25,510 (3%)</td>
<td>12,600 (4%)</td>
<td>Urinary bladder</td>
</tr>
<tr>
<td>All sites</td>
<td>848,200 (100%)</td>
<td>All sites</td>
<td>Non-Hodgkin lymphoma</td>
</tr>
<tr>
<td></td>
<td>Hodgkin Lymphoma (0.5%)</td>
<td></td>
<td>11,480 (4%)</td>
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<tr>
<td>Female</td>
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<tr>
<td></td>
<td>Estimated Deaths</td>
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<td>86,380 (28%)</td>
<td>Prostate</td>
<td>Lung &amp; bronchus</td>
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<tr>
<td>Prostate</td>
<td>27,540 (9%)</td>
<td>Breast</td>
<td>71,660 (26%)</td>
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<tr>
<td>Colon &amp; rectum</td>
<td>26,100 (8%)</td>
<td>Colon &amp; rectum</td>
<td>40,290 (15%)</td>
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<td>Pancreas</td>
<td>20,710 (7%)</td>
<td>Pancreas</td>
<td>23,600 (9%)</td>
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<td>Liver &amp; intrahepatic bile duct</td>
<td>17,030 (5%)</td>
<td>Ovary</td>
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<tr>
<td>All sites</td>
<td>312,150 (100%)</td>
<td>All sites</td>
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</table>

*Excludes basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.

SEER, 2005-2011

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5-year Relative Survival-Lymphoma

# Lymphoma Treatment

<table>
<thead>
<tr>
<th>Cyclophosphamide</th>
<th>Vinorelbine</th>
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<tbody>
<tr>
<td>Doxorubicin</td>
<td>Melphalan</td>
</tr>
<tr>
<td>Vincristine</td>
<td>Carmustine</td>
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<tr>
<td>Vinblastine</td>
<td>Thiotepa</td>
</tr>
<tr>
<td>Rituximab/other moABs</td>
<td>Busulfan</td>
</tr>
<tr>
<td>Prednisone/Dexamethasone</td>
<td>Dacarb/procarbazine</td>
</tr>
<tr>
<td>Etoposide</td>
<td>Mechloretamine</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>Brentuximab</td>
</tr>
<tr>
<td>Carbo/cis/oxaliplatin</td>
<td>Pralatrexate</td>
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<tr>
<td>Ifosfamide</td>
<td>Romidepsin</td>
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<tr>
<td>Bendamustine</td>
<td>Vorinostat</td>
</tr>
<tr>
<td>Fludarabine</td>
<td>Idelalisib</td>
</tr>
<tr>
<td>Pentostatin</td>
<td>Ibrutinib</td>
</tr>
<tr>
<td>Cytarabine</td>
<td>Radiation</td>
</tr>
<tr>
<td>Gemcitabine</td>
<td>Surgery</td>
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</table>
Lymphoma Long Term and Late Effects

Physical Concerns

- Consequence of Chemotherapy, Steroids and Radiation
- May affect any body system
  - General (weakness, fatigue, malaise)
  - Cardiovascular (CHF, myo/pericarditis, valv ds)
  - Pulmonary (pneumonitis/fibrosis)
  - Hepatorenal (long term liver/kidney dysfunction)
  - Musculoskeletal (pain, myopathy, osteopenia/porosis)
  - Endocrine (adrenal/thyroid/vit D, diabetes, hypogon/fert)
  - Gastrointestinal (malabsorption, motility, stricture)
  - Hematologic (2°MDS/leuk, immunosuppression)
  - Neurological (cognitive/memory def., ototox, neuropathy)
  - Ophthalmologic (cataract, dry eye)
  - Dental (periodontal disease)

Lymphoma Long Term and Late Effects
Psychological, Social and Spiritual Concerns

• Anxiety and depression
• Fear and uncertainty
• Body image/self esteem
• Sexuality, intimacy
• Parenting, marriage
• Employment and financial
• Social support
• Spiritual/religious
• Positive effects

Long Term and Late Effects

• Extreme variability
• Therapy related
  – Type and length of treatment
  – Age
  – Gender
  – Comorbidities
• Education
• Follow-up plan (screen, assess, treatment)

1. Leukemia and Lymphoma Society. Long-Term and Late Effects of Treatment in Adults Facts. No. 22. www.LLS.org.
Quality of Life and Survivorship

Long Term and Late Effects Management Strategy

- Follow-up Assessment
  - Psychological, physical, social, spiritual

- Prevention and Surveillance
  - Recurrence
  - New cancer
  - Late/long term effects

- Intervention

- Coordination of care

Lymphoma
Long Term and Late Effects

• Cardiotoxicity
• Pulmonary toxicity
• Endocrine dysfunction
• Anxiety/depression
• Cognitive dysfunction
• Fatigue
• Pain
• Sleep disorders
• Infection
• Sexual function/fertility
• Relapse/Secondary cancers
• Preventative health and maintenance
ARS Question
True or False? All patients who receive an anthracycline containing chemotherapy regimen are considered to have heart failure.

1. True
2. False

Total: 159

21.4% True
78.6% False
Cardiotoxicity

- **Anthracyclines** (doxo, dauno, ida)
- Antimetabolites (Flud, Pento, MTX, Cytara)
- Vincas (vinc, vinbl, vinorel)
- Alkylators (CY, Ifos, Cisplat, Bu)
- Antibiotics (Bleomycin)
- MoAbs (Ritux, Ofa, alemtuz)
- Nitrogen mustard (carmustine)
- HDACi (vorinostat, romidepsin)
- Ibrutinib
- Radiation (IFRT, TBI)
- Glucocorticoids (dex, pred)
Anthracycline-induced Cardiotoxicity

- May occur early or late
- Dose limiting toxicity
- Myocardial necrosis and dilated cardiomyopathy
- Subclinical decline in heart function (sys/dias)
- May progress to symptomatic heart failure and death
- Association with *cumulative dose*, chest radiation, pre-existing heart disease, young/old

Cumulative Dose

Anthracycline-induced Cardiotoxicity
Evaluation

• H&P
  – Signs of heart failure
• Evaluate risk factors
  – Cardiac risk factors
  – Social history
  – Family history
  – Medications
  – Oncology history
Anthracycline-induced Cardiotoxicity Prevention

• DO NOT exceed lifetime dose
  – Doxo(550mg/m2), ida(150mg/m2), dauno(550mg/m2)
• Caution in elderly, XRT, cardiac risk factors
• Infusional vs bolus
• Structural modification/Liposomal formulations
• Dexrazoxane
• Beta blockers/ACEi/ARB
• Pretreatment ECHO and surveillance

Anthracycline-induced Cardiotoxicity
Management

• Early detection is key
• Based on risk factors and symptoms
• Echocardiogram
  – w/i one year if ≥1 risk factor
  – immediately if symptomatic
• ECG, troponin, BNP
• Treat based on heart failure stage
• All patients previously treated with anthracyclines are considered Stage A

Anthracycline-induced Heart Failure Management

Radiation-induced Cardiotoxicity

- Hodgkin Lymphoma and mediastinal XRT
- Endothelial damage, vascular narrowing, inflam. injury, myocardial ischemia, infarct
- Effects all heart structures
- Pericardial disease, myocardial fibrosis, valvular ds, heart failure, dysrhythmia

Radiation-induced Cardiotoxicity

Risk Factors

• Radiation dose
  – Exponential risk of acute coronary event with each gray XRT
  – Risk maintained for decades

• Volume of heart irradiated

• Concomitant cardiotoxins
  – anthracyclines

• Young

• Additional coronary risk factors

Radiation-induced Cardiotoxicity Management

• Prevention is key
  – RT planning to reduce OAR exposure
  – IFRT/IMRT/ISRT/involved-node RT/resp. gating
  – Inspiration techniques

• Omit RT when appropriate (low risk, low stage)

• Eliminate cardiac risk factors when possible

• Screening techniques after therapy
  – Perfusion imaging/CT beginning at 5 years
  – ECHO/MUGA if >300mg/m2 anthracycline

• Early cardiology/oncocardiology management

Delayed Pulmonary Toxicity
Bleomycin-induced Lung Injury

• ABVD, BEACOPP
• Pulmonary symptoms with non-infectious bilateral interstitial infiltrates
• Acute or gradual
• Interstitial pneumonitis progressing to *fibrosis*
• May occur in up to 18% of patients
• Mortality 10-27%
• Induced by oxidative damage, deficiency of bleomycin hydrolase, inflammatory cytokines
• Risk factors=age, dose, renal fxn, concomitant O2, smoking, XRT, other chemo, G-CSF

## Delayed Pulmonary Toxicity
### Bleomycin-induced Lung Injury

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Clinical Signs</th>
<th>Lab/diagnostic testing</th>
</tr>
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<tbody>
<tr>
<td>Dyspnea</td>
<td>Fever</td>
<td>Restrictive PFT</td>
</tr>
<tr>
<td>Non-productive cough</td>
<td>Rales</td>
<td>Low DLCO</td>
</tr>
<tr>
<td>Chest discomfort</td>
<td>Hypoxia/cyanosis</td>
<td>Wide alveolar-arterial gradient</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Tachycardia</td>
<td>No eosinophilia</td>
</tr>
</tbody>
</table>

Bleomycin-induced Lung Injury
Diagnosis and Management

• Exclude other causes of pulmonary failure
• CXR, ILD CT scan, PET/CT
• Pulmonary consultation
• BAL/open lung biopsy
• D/C Bleomycin
• Consider steroids if symptomatic
• Imatinib
• Use O2 sparingly
• Supportive care for pulmonary fibrosis/transplant consideration

Delayed Pulmonary Toxicity
Radiation-induced Pulmonary Fibrosis

- May occur 6 months after initial exposure and progress for years
- Direct cytotoxicity of ionizing XRT
- Cytokine mediated fibrosis
  - TGF-beta, TNFa, IL-1a, IL-6, PDGF, bFGF
- Risk factors
  - Lung volume irradiated, XRT dose, concurrent chemo, prior XRT, smoking/ COPD

Delayed Pulmonary Toxicity
Radiation-induced Pulmonary Fibrosis

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<td>Wide alveolar-arterial gradient</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Tachypnea, tachycardia</td>
<td>Pleural eff., pulmonary HTN</td>
</tr>
</tbody>
</table>

Radiation-induced Pulmonary Fibrosis
Diagnosis and Management

• Prevention
  – RT planning to reduce OAR exposure
  – IFRT/IMRT/ISRT/involved-node RT/respiratory gating/hold
• Exclude other cause of pulmonary failure
• CXR, ILD CT scan, PET/CT
• Pulmonary consultation
• BAL/open lung biopsy
• Prednisone (≥60mg/day) x 2 weeks with gradual taper over 3-12 weeks
• Azathioprine, CSA, pentoxifylline
• Improvement may occur within 18 months. after XRT, less likely if delayed >18 months


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ARS Question
M.J. is a 45 y/o male with a history of DLBCL treated with REPOCH chemotherapy 2 years ago. He is in remission, but has been experiencing continued fatigue, trouble sleeping and anxiety over the possibility of relapse. You have ruled out medical causes of M.J.’s symptoms. What intervention would be most appropriate at this time?

1. Continue to follow M.J. with a PET/CT scan every 3 months
2. Tell M.J. to start exercising 5 days per week
3. Have M.J. reschedule a follow-up appointment in 3 months
4. Refer M.J. to your program Survivorship Clinic as soon as possible

Total: 150
Fatigue in Lymphoma

- Persistent sense of tiredness/exhaustion related to cancer or treatment
- Most common and distressing complaint in individuals undergoing cancer therapy
- B-symptom
- Underlying cause
  - anemia, poor nutrition, organ dysfunction, pain, anxiety, depression, lack of exercise or sleep
- May persist for an extended period of time for some cancer survivors

Fatigue in Lymphoma Screening

• H&P
  – Fatigue history
  – Fatigue scale
  – Disease status
  – Contributing factors
• Laboratory evaluation
• Imaging
• Specialty referral if appropriate

Fatigue in Lymphoma

Treatment

• Treat underlying medical etiology
  – Cardiopulmonary dysfunction
  – Endocrine
  – Hepatorenal
  – Neurologic
  – Anemia
  – Arthritis
  – Infection
  – Relapse

• Medication management

• Pain

• Emotional distress

• Sleep disturbances

• Nutrition/exercise


Fatigue in Lymphoma

Treatment

• Exercise program
  – Physical therapy
  – Exercise specialist

• Complementary/Alternative Medicine (CAM)
  – Acupuncture, biofield, massage, music, herbals

• Psychostimulants
  – Caffeine, methylphenidate, modafinil

• Education and counseling
  – What is normal?
  – Monitoring and follow-up plan

Pain in Lymphoma

• An unpleasant sensory and emotional experience associated with actual or potential tissue damage in oncology
• One of the most common symptoms reported in cancer survivors
• Affects quality of life of cancer survivors, families, caregivers and friends
• May adversely affect survival

Pain in Lymphoma

• In general, pain improves dramatically after treatment for lymphoma
• Chronic cancer pain
  – Neuropathic
  – Myalgia/arthralgia
  – Skeletal pain
  – Post-radiation pain
• Severe pain is a medical emergency
• Acute, unusual pain requires immediate attention
Pain in Lymphoma
Screening and Diagnosis

• Assess pain at each visit
  – WILDA (Words to describe, Intensity, Location, Duration, Aggravating or Alleviating factors)
  – Etiology
  – Current pain regimen
  – Medical and Oncologic history
  – Physical exam
  – Disease status
  – Current psychosocial support

Pain in Lymphoma

Treatment

• Treatment based on type of pain
• Neuropathic
  – Gabapentin, pregabalin, duloxetine, amitriptyline, opioids, local/topicals
  – Nonpharmacologic, CAM, TENS
  – Referral to neuro-oncology
• Myalgias/Arthralgias
  – NSAIDS, cyclobenzaprine/baclofen, lorazepam, diazepam, gabapentin, pregabalin, duloxetine, amitriptyline, opioids, local/topicals
  – PT, hot, cold, CAM
  – Referral to pain team, PM&R

Pain in Lymphoma
Treatment

• Skeletal pain
  – NSAIDS, amitriptyline, cyclobenzaprine/baclofen, opioids
  – PT, brace, vertebroplasty/kyphoplasty
  – Referral to IR/spine, Pain Team, PM&R

• Post radiation pain
  – NSAIDS, gabapentin, pregabalin, duloxetine, amitriptyline
  – PT, surgical lysis of adhesions
  – Referral to Radiation Oncology, Pain Team

Sleep Disorders in Lymphoma

- Disturbances in sleep related to insomnia, excessive sleepiness and sleep related movement or breathing disorders
- Affects 30-50% of cancer patients/survivors
- Often associated with other disorders
- Often contributes to other disorders

Sleep Disorders in Lymphoma

Screening

• Assess sleep at each visit
• Screening questionnaire
  – Insomnia
  – Excessive sleepiness
  – Obstructive sleep apnea
  – Restless legs syndrome
  – Parasomnias
• H&P
  – Contributing factors
  – Oncologic history
  – Current coping strategies

Sleep Disorders in Lymphoma
Diagnosis and Treatment

**Insufficient sleep time**
- Increase sleep time
- Sleep hygiene education

**Obstructive sleep apnea**
- Sleep study
- CPAP
- Weight loss
- Surgery
- Oral appliance
- Refer to sleep specialist

**Restless legs syndrome**
- Ferritin
- iron if deficient
- Ropinirole, pramipexole, carbidopa-levodopa
- Gabapentin
- Pregabalin
- Opioids
- Clonazepam, lorazepam
- CAM
- Refer to sleep specialist

**Other Sleep Disorders**
- Prolonged wakefulness or awakenings (insomnia)
- Prolonged sleep (hypersomnia)
- Cataplexy (narcolepsy)
- Excessive day sleepiness
- Reverse underlying causes
- Medication management (stimulants or sleep aids), CBT
- Sleep hygiene
- Sleep specialist

Anxiety and Depression in Lymphoma

• Occurs during times of worry and distress related to a variety of challenges and stressors affecting cancer survivors
• Common with and as a result of other survivorship issues
• Risk factors include cognitive impairment, medical illness, uncontrolled symptoms, substance abuse, prior psychiatric disorder, social concerns
• Negatively impacts quality of life

Anxiety and Depression in Lymphoma Screening

• Screening should occur during change in clinical status, treatment, life events, symptoms
• Signs of anxiety and depression
  – Nervous, worry
  – Fear
  – Inability to control fear and worry
  – Sleep difficulties
  – Trouble concentrating
  – Lack of interest/enjoyment
  – Feelings of sadness or depression
  – Difficulty with ADL’s
• H&P to assess for medical etiology

Anxiety and Depression in Lymphoma Screening and Diagnosis

Anxiety
- sleep
- restless
- muscle tension
- PANIC
- concentration
- fatigue
- irritability

Depression
- sad/empty
- tearful
- lack of energy
- sleep
- worthlessness
- concentration
- SUICIDAL IDEATION

Anxiety and Depression in Lymphoma Treatment

- Assure safety
- Address non-psych medical etiology
- Isolate and minimize contributing factors
- Psychology/Psychiatry support
  - Reassurance/education – SSRI/SNRI
  - Exercise – Benzodiazepines
  - Chaplain – Monitor closely
  - Social work – Follow-up plan
  - Therapy

Cognitive Dysfunction in Lymphoma

• May be directly related to cancer or cancer therapy
• Approximately 50% of cancer survivors
• Not typically progressive
• Deficits in executive function, learning, memory, attention, processing speed
• Cytokine release, white matter changes, anxiety, depression, sleep, pain, etc.
• Symptoms may persist for years or decades
• Adversely affects QOL and function

Cognitive Dysfunction in Lymphoma Screening

• H&P
  – Cancer history and risk factors for CNS disease and cognitive dysfunction
  – Onset, duration, trajectory
  – Characterize deficits
  – Focal neuro deficits

• Assess contributing/reversible factors
  – Medications/drugs/alcohol
  – Anxiety, depression, sleep/fatigue, pain
  – Medical comorbidities

Cognitive Dysfunction in Lymphoma Management

• Treatment of contributing/reversible factors
• Reassurance/counseling
• Psychology consultation/CBT/OT
  – Relaxation/stress management
  – Cognitive function
  – Exercise
• Memory coping strategies
• Pharmacologic interventions
  – Methylphenidate, modafinil, caffeine

Sexual Function and Fertility

• Important issue affecting patient QOL
• Induced by chemotherapy, surgery, XRT, steroids, disease
• May be affected by other survivorship concerns (anxiety, depression, pain, fatigue)
• *Often not discussed by providers*
• Should be assessed at regular intervals
• Address impact of cancer treatment on sexual function as early as possible

Sexual Function and Fertility Management

- H&P (*ask the question*; symptom checklist)
- Identify traditional risk factors for sexual dysfunction
- Guide treatment based on specific type of sexual dysfunction
- Referral to Specialist as indicated
  - Psychotherapy
  - Sexual/couples counseling
  - Gynecologic care/Urologist/Fertility specialist
- A variety of therapeutic interventions exist
- *DON’T IGNORE THE ISSUE*

Relapse and Secondary Cancers

Incidence

• Relapse
  – 10-30%
  – Assessment/follow-up

• Secondary Cancers
  – Induced by chemo and XRT
  – Most are solid tumors: lung, breast, GI
  – Blood cancers: MDS/AML, NHL
  – Incidence increases over time (8-10% at 15 years)

Relapse and Secondary cancers
Surveillance

- Relapse (Follow-up After Completion of Treatment up to 5 Years)
  - H&P every 3-6 months for 1-2 years, then every 6-12 months until year 3 and annually thereafter.
  - Labs: CBC, platelets, ESR (if elevated at time of initial diagnosis), chemistry profile as clinically indicated
  - Scans: CT scan once during the first 12 months, then as clinically indicated. PET/CT should only be obtained if last PET was Deauville 4-5, to confirm CR.
- Secondary Cancers (Follow-up and Monitoring After 5 Years)
  - H&P annually
  - Counseling: Reproduction, health habits, psychosocial, cardiovascular, breast self-exam, and skin cancer risk
  - Labs: CBC, platelets, chemistry profile annually; TSH at least annually if RT to neck; Biannual lipids
  - Low-dose CT if increased risk of lung cancer
  - Annual breast screening (mammography 8-10 years post therapy or age 40 (whichever comes first); if chest/axillary XRT at age 10-30 years, breast MRI in addition to mammography)
  - Colonoscopy every 10 years for patients age ≥50, if high risk begins at age 40

Preventative Health and Maintenance

• Cancer survivors are at increased risk due to therapy related comorbidities
• Promote healthy behavior and lifestyle
  – Exercise
  – Nutrition
  – Weight management (high and low)
  – Immunizations
  – Infection prevention
• Survivorship Team

What About Us?

• Oncology is difficult and demanding
• Caring for others vs. caring for self
• Healthcare provider burnout
• Provider satisfaction and well being affects patient care
• Obtaining and maintaining balance
• We must have an action plan for caring for providers

Survivorship Team

• MD/APP
• Psychologist
• Social worker
• Case manager
• Nursing
• Pharmacist
• Dietician
• PT/OT

• Specialty Services
  ▪ Cardiology
  ▪ Pulmonary
  ▪ Endocrine
  ▪ Reproductive Med
  ▪ Pain Team
  ▪ PCP/Internist
Conclusion

• 100% of cancer survivors are affected
• May result in permanent physical, emotional and social impairment
• Many suffer for months or years
• Organize a Survivorship Team
• Remember to care for one another
• Your patients depend on you!!
Questions
References

- Omachi TA. Measures of sleep in rheumatologic diseases: Epworth Sleepiness Scale (ESS), Functional Outcome of Sleep Questionnaire (FOSQ), Insomnia Severity Index (ISI), and Pittsburgh Sleep Quality Index (PSQI). Arthritis Care Res (Hoboken) 2011;63 Suppl 11:S287-296.
- Leukemia and Lymphoma Society. Long-Term and Late Effects of Treatment in Adults Facts. No. 22. www.LLS.org.
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