The Discipline of Cardio-Oncology: Protecting the Heart while Cancer Patients Receive Life Saving Chemotherapy

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Advocate Christ Medical Center
Advocate Heart Institute
Cardiac Disease in Patients with Cancer

• 10% of patients age 55-64 with breast CA die from CV disease\(^1\)
• 24% of patients age 65-74 with breast CA die from CV disease\(^1\)
• Incidence of cardiomyopathy after anthracyclines can range from 5%-65%
• 8% of all survivors of childhood cancer will be diagnosed with cardiomyopathy\(^2\)
• Up to 24% of childhood survivors will develop a cardiac condition by their 30s\(^2\)
• Up to 37% of childhood survivors will develop a cardiac condition once over 40\(^2\) (vs. 14% in general population)

Cardiomyopathy, CAD, Valve disease, rhythm disorder

1. Journal of Clinical Oncology Sept 12 2011
What is Cardio-Oncology?

CardioOncology

• Improved cancer survival and new cancer treatments have resulted in increasing incidence of CV disease in patients during and after treatment of cancer

• CardioOncology involves the management of cardiovascular issues in patients before, during and after treatment of cancer

• Includes cardiovascular effects of chemotherapy and radiation as well as regular preventative measures.

• Involves cardiologists working with oncologists to optimize long-term survival of patients with cancer

• Societies:
  • International CardioOncology Society (ICOS)
  • Canadian Cardiac Oncology Network (CCON)
Cancer Therapy & Heart Disease

Chemotherapy

• Can cause direct or indirect damage to the heart
• Variety of mechanisms – direct myotoxicity; ischemia; HTN; pulmonary HTN, arrhythmias; thromboembolism

Radiation

• Focused thoracic/mediastinal radiation can result in
  • Valvular disease (esp. Mitral and Aortic)
  • Coronary Disease (esp. ostial disease)
  • Pericarditis and pericardial constriction
  • Increased risk of cardiomyopathy in patients receiving cardiotoxic chemotherapy
Prevention of High-Dose Chemotherapy–Induced Cardiotoxicity in High-Risk Patients by Angiotensin-Converting Enzyme Inhibition

Daniela Cardinale, MD; Alessandro Colombo, MD; Maria T. Sandri, MD; Giuseppina Lamantia, MD; Nicola Colombo, MD; Maurizio Civelli, MD; Giovanni Martinelli, MD; Fabrizio Veglia, PhD; Cesare Fiorentini, MD; Carlo M. Cipolla, MD

Cardioprotective effect of metoprolol and enalapril in doxorubicin-treated lymphoma patients: A prospective, parallel-group, randomized, controlled study with 36-month follow-up

Peter Georgakopoulos,1,3 Paraskevi Roussou,1 Evangelos Matsakas,2 Apostolos Karavitis,2 Nick Anagnostopoulos,2 Theodoros Marinakis,3 Athanasios Galanopoulos,3 Fotis Georgakodis,1 Stelios Zimeras,1 Michael Kyriakis,1 and Apostolos Ahimastos1

Protective Effects of Carvedilol Against Anthracycline-Induced Cardiomyopathy

Nihat Kalay, MD*, Emrullah Basar, MD*, Ibrahim Ozdogru, MD*, Ozlem Er, MD;† Yakup Cetinkaya, MD*, Ali Dogan, MD*, Tugrul Inanc, MD, Abdurrahman Onguzhan, MD*, Namik Kemal Eryol, MD, Ramazan Topsakal, (J Am Coll Cardiol 2006;48:2258–62)

Enalapril to Prevent Cardiac Function Decline in Long-Term Survivors of Pediatric Cancer Exposed to Anthracyclines


Expert Consensus for Multimodality Imaging Evaluation of Adult Patients during and after Cancer Therapy: A Report from the American Society of Echocardiography and the European Association of Cardiovascular Imaging

(J Am Soc Echocardiogr 2014;27:911-39)

Cardiovascular toxicity induced by chemotherapy, targeted agents and radiotherapy: ESMO Clinical Practice Guidelines

G. Curigliano1, D. Cardinale2, T. Suter3, G. Plataniotis4, E. de Azambuja5, M. T. Sandri6, C. Criscitiello1, A. Golk Group†

RESPONSE: Cancer and the Heart: A Fortuitous Union Between Oncology and Cardiology

Edward T.H. Yeh, MD
Department of Cardiology, The University of Texas MD Anderson Cancer Center, Houston, Texas
# Chemotherapy and the Heart: Examples of Potential Toxicities

<table>
<thead>
<tr>
<th>Chemotherapy Associated with LV dysfunction and HF</th>
<th>Anthracyclines – Doxorubicin, Daunorubicin, Epirubicin Mitoxantrone Trastuzumab, Bevacizumab Sunitinib, Dasatinib…other TKIs Cyclophosphamide Docetaxel Ifosfamide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemo Assoc w/ Hypertension</td>
<td>Bevacizumab (Avastin), Sunitinib (Sutent), Sorafenib (Nexavar), Nilotinib, Axitinib…many other TKIs</td>
</tr>
<tr>
<td>Chemo Assoc w/ Ischemia</td>
<td>5-Florouracil Capecitabine (Xeloda) Paclitaxel (Taxol), Docetaxel (Taxotere) Avastin</td>
</tr>
<tr>
<td>Chemo Assoc w/ ECG changes</td>
<td>Arsenic Tri-Oxide TKIs – Lapatinib, Nilotinib, Dasatinib…others</td>
</tr>
</tbody>
</table>
The Usual Suspects
Mechanism of toxicity

- Anthracyclines are topo-isomerase 2 (Top2) inhibitors
- Top2 is required for DNA replication
- 2 types of Topoisomerase: Top2α & Top2β
  - Top2α - is found predominantly in proliferating cells
  - Top2β – is found in quiescent cells, including cardiomyocytes
- Also thought to be some component of mitochondrial and free-radical mediated apoptosis.
Anthracyclines

Types of Anthracyclines

- Doxorubicin (Adriamycin)
- Daunorubicin
- Epirubicin
- Idarubicin

TABLE 1  Anthracycline Regimens in the Most Widely Used Protocols for 4 Types of Cancer

<table>
<thead>
<tr>
<th>Type of Cancer</th>
<th>Anthracycline Regimens</th>
<th>Other Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast cancer</td>
<td>Doxorubicin 50–60 mg/m² × 4–6 cycles</td>
<td>Increased cardiotoxicity with trastuzumab (11)</td>
</tr>
<tr>
<td></td>
<td>Epirubicin 75–100 mg/m² × 4–8 cycles</td>
<td>Bolus over 15 min</td>
</tr>
<tr>
<td>Sarcoma</td>
<td>Doxorubicin 75–90 mg/m² × 6–8 cycles</td>
<td>Continuous infusion over 48–72 h or bolus over 15 min + dexrazoxane</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>Doxorubicin 40–50 mg/m² × 6–8 cycles</td>
<td>Continuous infusion over 48–72 h or bolus over 15 min</td>
</tr>
<tr>
<td>Pediatric leukemia</td>
<td>Doxorubicin 30 mg/m² × 10 cycles</td>
<td>Bolus over 30 min ± dexrazoxane</td>
</tr>
</tbody>
</table>
Anthracycline toxicity

Incidence

- Dose dependent
  Cardiotoxicity significantly increases at 400-450mg/m²

Incidence also depends on:

- Prior irradiation
- Female Gender
- Older age (>65 y/o)
- Underlying CV Dz

Other concomitant chemo:

- Cyclophosphamide
- Trastuzumab
- Paclitaxel
Figure 1. Adjusted Kaplan–Meier Estimates of Survival According to the Underlying Cause of Cardiomyopathy. Only idiopathic cardiomyopathy and cardiomyopathy due to causes for which survival was significantly different from that in patients with idiopathic cardiomyopathy are shown.
Herceptin

- A monoclonal antibody that targets and interferes with human epidermal growth factor receptor-2 (HER2/neu)
- Shown to improve disease-free and overall survival in HER2(+) breast CA
- Can also cause LV dysfunction and clinical HF

Mechanism

- HER2 also found on cardiomyocytes
- It’s binding causes cardiomyocyte dysfunction (but not clearly destruction)

Incidence of LV systolic dysfunction

- 2-7% when trastuzumab is used as monotherapy
- 2-13% when combined with paclitaxel
- Up to >25% when combined with anthracyclines
Cumulative Incidence of HF and/or CM in women with breast CA over 5y by adjuvant chemotherapy group

Retrospective Cohort Study

Pop: 12,500 women diagnosed with incident, invasive breast CA from 1999-2007 at eight cancer research network systems

- 29.6% received AC alone
- 3.5% received AC+TRZ
- 19.5% received other
- 46.5% received none

At 5y Cumulative Incidence of HF/CM btwn AC +/- TRZ Group was 36.5%

<table>
<thead>
<tr>
<th>No. of patients at risk</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthracycline only</td>
<td>3443</td>
<td>3125</td>
<td>2699</td>
<td>2146</td>
<td>1659</td>
</tr>
<tr>
<td>Trastuzumab only</td>
<td>90</td>
<td>78</td>
<td>49</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>Anthracycline+ Trastuzumab</td>
<td>347</td>
<td>339</td>
<td>263</td>
<td>179</td>
<td></td>
</tr>
<tr>
<td>Other chemotherapy</td>
<td>2159</td>
<td>1905</td>
<td>1548</td>
<td>1192</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>5235</td>
<td>4798</td>
<td>4076</td>
<td>3288</td>
<td></td>
</tr>
</tbody>
</table>

Cumulative incidence (95% CI), %

- Anthracycline only: 1.2 (1.0 to 1.5), 2.0 (1.6 to 2.4), 2.7 (2.2 to 3.2), 3.5 (2.8 to 4.1), 4.3
- Trastuzumab only: 3.6 (1.5 to 5.6), 5.8 (2.5 to 8.9), 7.8 (3.4 to 12.0), 9.9 (4.3 to 15.1), 12.1
- Anthracycline+ Trastuzumab: 6.2 (4.1 to 8.2), 9.8 (6.7 to 12.8), 13.2 (9.1 to 17.1), 16.5 (11.5 to 21.3), 20.1
- Other chemotherapy: 1.3 (1.0 to 1.6), 2.1 (1.7 to 2.5), 2.9 (2.4 to 3.4), 3.7 (3.0 to 4.3), 4.5 (3.3 to 5.7)
- None: 0.9 (0.7 to 1.0), 1.4 (1.2 to 1.7), 1.9 (1.6 to 2.3), 2.5 (2.1 to 2.9), 3.1 (2.6 to 3.5)

J Natl Cancer Inst 2012;104:1293–1305
But What Can We Do?
BB/Acei after AC-induced CM

- 201 pts with AC-induced CM (EF<45%) treated with carvedilol/enalapril
- Patients broken down as responders (EF>50%), partial responders (EF improved>10% but <50%), and nonresponders

**MOST IMPORTANT FACTOR INFLUENCING RESPONSE WAS TIME TO INITIATION OF THERAPY**

**Figure 1** Percentage of Responders According to the Time Elapsed From AC Administration and Start of HF Therapy
Protective effect of carvedilol

- 50 patients treated with anthracyclines (avg dose >500 mg/m²)
- 25 randomized to prophylactic carvedilol tx vs. 25 to placebo x 6 months

Small Study, but suggestive that carvedilol may even be helpful in high risk patients (high dose AC therapy) even prior to developing LV dysfunction

Figure 1. Comparison of left ventricular ejection fraction (EF) at baseline (black bars) and after chemotherapy (white bars) in the 2 groups. Data from [Journal of American College of Cardiology 2006;48:2258-62](http://example.com).
Additional Tools: Biomarkers
Biomarkers

- Troponin release may be predictive of cardiotoxicity
- In 204 patients being treated with high dose chemotherapy – early troponin I release was associated with LV dysfunction

(J Am Coll Cardiol 2000;36:517–22)
Biomarkers

- Among 703 patients being treated with high dose chemotherapy – early and/or late troponin I release was associated with LV dysfunction and cardiac events.

(Circulation. 2004;109:2749-2754.)
Biomarkers + Enalapril

- 114 patients with troponin elevation after high dose chemotherapy were randomized to either enalapril vs. placebo.
Patients treated with enalapril also showed more rapid improvement in troponin levels.
Additional Screening Tools: Imaging
Imaging

- Radionuclide image has long been used to obtain an objective, calculated ejection fraction (based on nuclear counts).

- Echocardiography (Ultrasound) is a cheap and safe modality for evaluation of ventricular and valve function.

- Strain echocardiography is a form of echocardiography that evaluates more subtle movements within each myocardial wall segment.

- Strain can be used to detect ‘subclinical’ ventricular dysfunction and therefore ‘screen’ for LV dysfunction before it is grossly apparent.
Strain Echocardiography

- Decline in strain precedes decline in LVEF
Strain Echocardiography

- Decline in strain precedes decline in LVEF

GLS -20.1%

GLS -17.0%

GLS -16.1%

Pre-therapy EF 61%

6M EF 55%

12M EF 49%
Several Studies Now Support Strain in Early Detection of Cardiotoxicity

<table>
<thead>
<tr>
<th>Studies/First Author (Ref. #)</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fallah-Rad et al. (44)*</td>
<td>79%</td>
<td>82%</td>
<td>60%</td>
<td>92%</td>
</tr>
<tr>
<td>2% absolute (10.1% relative) decrease in LS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.8% decrease in RS</td>
<td>86%</td>
<td>81%</td>
<td>60%</td>
<td>95%</td>
</tr>
<tr>
<td>Sawaya et al. (41)†</td>
<td>78%</td>
<td>79%</td>
<td>50%</td>
<td>93%</td>
</tr>
<tr>
<td>1.0% decrease in GLS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevated hSTnI</td>
<td>67%</td>
<td>82%</td>
<td>50%</td>
<td>90%</td>
</tr>
<tr>
<td>1.0% decrease in GLS and elevated hSTnI</td>
<td>55%</td>
<td>97%</td>
<td>83%</td>
<td>89%</td>
</tr>
<tr>
<td>1.0% decrease in GLS or elevated hSTnI</td>
<td>89%</td>
<td>65%</td>
<td>40%</td>
<td>97%</td>
</tr>
<tr>
<td>Sawaya et al. (40)‡</td>
<td>74%</td>
<td>73%</td>
<td>53%</td>
<td>87%</td>
</tr>
<tr>
<td>GLS &lt;19%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hSTnI &gt;30 pg/ml</td>
<td>48%</td>
<td>73%</td>
<td>44%</td>
<td>77%</td>
</tr>
<tr>
<td>LS &lt;19% and usTnI &gt;30 pg/ml</td>
<td>35%</td>
<td>93%</td>
<td>67%</td>
<td>77%</td>
</tr>
<tr>
<td>LS &lt;19% or usTnI &gt;30 pg/ml</td>
<td>87%</td>
<td>53%</td>
<td>43%</td>
<td>91%</td>
</tr>
<tr>
<td>Negishi et al. (42)‡</td>
<td>65%</td>
<td>95%</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>1.1% reduction in global GLS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.6% reduction in global GLSR early diastole</td>
<td>82%</td>
<td>67%</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6.4% reduction in global GLSR</td>
<td>73%</td>
<td>67%</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Absolute GLS at 6 months ≤-20.5%</td>
<td>96%</td>
<td>66%</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Momos et al. (39)§</td>
<td>90%</td>
<td>82%</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>7.1% absolute reduction in GLS × LV twist</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.77% absolute (≈13% relative) reduction in GLS</td>
<td>79%</td>
<td>73%</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>1.75° absolute reduction in apical rotation</td>
<td>70%</td>
<td>78%</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Baratta et al. (37)∥</td>
<td>86%</td>
<td>86%</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>≥15% decrease in GLS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥10% decrease in GRS</td>
<td>86%</td>
<td>69%</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>≥15% decrease in GLS AND ≥10% decrease in GRS</td>
<td>71%</td>
<td></td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*Difference between patients with cardiomyopathy versus without cardiomyopathy at 3 months after trastuzumab initiation following AC therapy. †Difference between baseline and after completion of AC therapy at 3 months, before trastuzumab initiation. ‡Difference between baseline and at 6 months after trastuzumab initiation (± AC therapy) in patients with cardiomyopathy. §Difference between pre-anthracyclines and 6 weeks into anthracycline therapy. ¶Difference between pre-anthracyclines and 3 months into anthracycline therapy for Gls, 4 months for GRS, and 4 months for the combined change.

GLS = global longitudinal strain; hSTnI = high-sensitivity troponin I; NPV = negative predictive value; PPV = positive predictive value; RS = as in Tables 1 and 2.
Whom To Refer
Risk Stratification Tool to guide Cardio-Oncology Referral

### Chemotherapy Risk Stratification Tool

<table>
<thead>
<tr>
<th>Feature</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Anthracycline exposure (&lt;400mg/m²) or other potentially cardiotoxic chemotherapy including: Trastuzumab, Sunitinib, Cytokine, Bevacizumab (Avastin)</td>
<td>1 point</td>
</tr>
<tr>
<td>High dose Anthracycline exposure</td>
<td>2 points</td>
</tr>
<tr>
<td>Doxorubicin 400mg/m²</td>
<td></td>
</tr>
<tr>
<td>Daunorubicin 500mg/m²</td>
<td></td>
</tr>
<tr>
<td>Anthracyclines in combination with either: Trastuzumab, Cyclophosphamide, Taxanes</td>
<td>2 points</td>
</tr>
<tr>
<td>Young or Advanced Age at Exposure (&lt;18y/o or &gt;65y/o)</td>
<td>1 point</td>
</tr>
<tr>
<td>Pre-Existing CV disease or risk factors: HTN, DM, HL, CAD, PAD, MI, HF, Tob, Family Hx</td>
<td>1 point</td>
</tr>
<tr>
<td>Mediastinal radiation</td>
<td>1 point</td>
</tr>
<tr>
<td>Abnormal baseline EF &lt;50%</td>
<td>2 points</td>
</tr>
<tr>
<td>Decrease in ejection fraction &gt;10% during treatment</td>
<td>2 points</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

1 point – Consider referral to cardio-oncology clinic  
≥2 points – Recommend referral to cardio-oncology clinic

### Radiation Risk Stratification Tool

<table>
<thead>
<tr>
<th>Feature</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total dose &gt;30–35 Gy</td>
<td>1 point</td>
</tr>
<tr>
<td>Presence of tumor next to the heart</td>
<td>1 point</td>
</tr>
<tr>
<td>Younger age at exposure</td>
<td>1 point</td>
</tr>
<tr>
<td>Cardiotoxic chemotherapy (e.g., anthracycline)</td>
<td>2 points</td>
</tr>
<tr>
<td>CV Risk Factors – CAD, PAD, HTN, HL, DM, Tob, FHx</td>
<td>1 point</td>
</tr>
<tr>
<td>Left Ventricular Dysfunction (EF&lt;50%)</td>
<td>2 points</td>
</tr>
<tr>
<td>New or worsening valvular disease or pericardial effusion</td>
<td>2 points</td>
</tr>
<tr>
<td>Signs or Symptoms of Heart Failure/Angina/Neurological symptoms</td>
<td>2 points</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

1 point – Consider referral to cardio-oncology clinic  
≥2 points – Recommend referral to cardio-oncology clinic
Anthracycline Algorithm
Radiation Therapy Algorithm

- Baseline pre-radiation comprehensive echocardiography
  - Chest radiation exposure
    - Yearly targeted clinical history and physical examination
      - Screen for modifiable risk factors
        - Correct risk factors
          - New murmur
            - Echocardiography
            - CMR if suspicion of pericardial constriction
          - Signs/symptoms of heart failure
            - Angina
          - Neurological signs/symptoms
            - Carotid US
          - LV dysfunction/heart failure
          - Coronary artery disease
          - Carotid artery disease
          - Conduction system disease
          - Asymptomatic
            - Screening echocardiography 5 years after exposure in high-risk patients
              - Functional noninvasive stress test for CAD detection (5-10 years after exposure in the others)
              - Reassess every 5 years
## Algorithm for Survivors of Pediatric Cancer Treated with Anthracyclines

### RECOMMENDED FREQUENCY OF ECHOCARDIOGRAM (or comparable cardiac imaging)

<table>
<thead>
<tr>
<th>Age at Treatment*</th>
<th>Radiation with Potential Impact to the Heart§</th>
<th>Anthracycline Dose†</th>
<th>Recommended Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 year old</td>
<td>Yes</td>
<td>Any</td>
<td>Every year</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>&lt; 200 mg/m²</td>
<td>Every 2 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥ 200 mg/m²</td>
<td>Every year</td>
</tr>
<tr>
<td>1-4 years old</td>
<td>Yes</td>
<td>Any</td>
<td>Every year</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>&lt;100 mg/m²</td>
<td>Every 5 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥100 to &lt;300 mg/m²</td>
<td>Every 2 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥300 mg/m²</td>
<td>Every year</td>
</tr>
<tr>
<td>≥5 years old</td>
<td>Yes</td>
<td>&lt;300 mg/m²</td>
<td>Every 2 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥300 mg/m²</td>
<td>Every year</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>&lt;200 mg/m²</td>
<td>Every 5 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥200 to &lt;300 mg/m²</td>
<td>Every 2 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥300 mg/m²</td>
<td>Every year</td>
</tr>
<tr>
<td>Any age with decrease in serial function</td>
<td></td>
<td></td>
<td>Every year</td>
</tr>
</tbody>
</table>

*Age at time of first cardiotoxic therapy (anthracycline or radiation [see Section 80], whichever was given first)

§See Section 80

†Based on doxorubicin isotoxic equivalent dose [see conversion factors on previous page, "Info Link (Dose Conversion)"]
Conclusion

- Treatment for cancer can have a variety of untoward effects on the heart
- Radiation therapy can affect the valves, myocardium, or pericardium
- Chemotherapy can cause a variety of cardiotoxic side effects including arrhythmias, vascular effects, ischemia, and myotoxicity (Esp Anthracyclines)
- The myotoxicity of anthracyclines could potentially be detected early with biomarkers including troponins
- BB and ACE-I’s can be protective and therapeutic for AC-induced cardiotoxicity – earlier treatment is associated with better outcomes
- Herceptin can also be cardiotoxic however its effects are thought to be more reversible than AC-induced CM
- Imaging such as strain echocardiography can detect pre-clinical LV dysfunction
Advocate
Cardio-Oncology Program

- Collaboration between cardiology, oncology, radiation oncology, and nursing
- Available to patients pre-/peri-/post- therapy
- Assessment of cardiovascular risk
- Prophylaxis
- Early identification of cardiovascular issues during and after treatment
- Timely management
- Aim to support oncology in treating malignancy in high-risk CV patients
- Research & Collaboration with other national centers
Advocate Cardio-Oncology Programs

- Advocate Bromenn Hospital
- Advocate Christ Medical Center
- Advocate Good Samaritan Hospital
- Advocate Good Shepherd Hospital
- Advocate Illinois Masonic Hospital
- Advocate Lutheran General Hospital
- Edward/Elgin Hospitals
- Advocate South Suburban Hospital
- Advocate Sherman Hospital
Thank You!

Questions?

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