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Contemporary Role of Echocardiography for Clinical Decision Making in Patients During and After Cancer Therapy



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CME/MOC Objective for This Article: After reading this article the reader should be able to: 1) define current approaches for the evaluation, management and prevention of cancer therapy related cardiac dysfunction before, during and after cancer therapy; 2) recognize the spectrum of echocardiographic phenotype of cancer therapy related cardiac dysfunction and the use of echocardiography in the diagnosis, management and risk stratification; and 3) summarize current cardiology imaging practices and the role of echocardiography in guiding clinical decision making for patients during and after cancer therapy.

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Contemporary Role of Echocardiography for Clinical Decision Making in Patients During and After Cancer Therapy

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ABSTRACT

Early recognition of cancer therapy-related cardiac dysfunction (CTRCD) provides an opportunity to mitigate cardiac injury and risk of developing late cardiac events. Echocardiography serves as the cornerstone in the detection and surveillance of CTRCD in patients during and after cancer therapy. Guidelines from professional societies and regulatory agencies have been published on approaches to surveillance, diagnosis, and treatment of CTRCD, although adoption as standard of care remains limited given the lack of evidence on the prognostic value of asymptomatic left ventricular (LV) dysfunction in the oncology population. The frequency of cardiac monitoring and the appropriateness of the Food and Drug Administration (FDA)-recommended cardiac monitoring schedule in all patients receiving trastuzumab for breast cancer has been challenged. Interruption versus continuation of oncological therapy in the setting of asymptomatic LV dysfunction remains a clinical conundrum given the uncertain balance of the risk of cardiac dysfunction and benefit of oncology efficacy. Despite their limitations, echocardiographic measures of LV function continue to play a pivotal role in clinical decision making, with global longitudinal strain emerging as a promising tool in informing and facilitating the selection of cancer treatment and optimizing cardiovascular outcomes. This review highlights the key recommendations of the existing guidelines and discusses recent developments in cardio-oncology imaging practices with the aim of providing practical guidance on the role and use of echocardiography in challenging clinical cases in cardio-oncology. (*J Am Coll Cardiol Img* 2018;11:1122-31) © 2018 by the American College of Cardiology Foundation.

Advances in cancer treatment have resulted in significant improvement in cancer-specific survival. With prolonged survival, cancer survivors are increasingly subject to late cardiovascular disease related to cancer therapies compounded by the development or progression of age-related cardiovascular risk factors. Consequently, higher cardiovascular disease is observed among subgroups of cancer survivors (1,2), potentially attenuating the survival gains from advances in oncological treatment.

Early recognition of cancer therapy-related cardiac dysfunction (CTRCD) provides an opportunity to mitigate cardiac injury and risk of developing late cardiac events (3). Current approaches for evaluating and managing CTRCD aim to prevent, recognize, and mitigate adverse cardiovascular effects and at the same time minimize interference with optimal anti-cancer regimens. In current cardio-oncology practice, echocardiography serves as a cornerstone in the detection and surveillance of CTRCD and is the most widely used technique in clinical practice because of its availability, feasibility, and cost-effectiveness. There are a number of published studies that have used echocardiography in the diagnosis, prevention, and risk stratification of CTRCD in patients during

and after cancer therapy (Online Tables 1 to 4). The purpose of this review is to summarize recent developments in cardio-oncology imaging practices and present practical guidance on the use of echocardiography in the screening, diagnosis, and treatment of CTRCD.

EVOLVING DEFINITION OF CTRCD

The overarching concept of CTRCD includes heterogeneous effects that different categories of cancer therapies can exert on the cardiovascular system, from apoptosis and necrosis of myocardial cells to microvascular and macrovascular effects such as ischemia and promotion of inflammation and fibrosis (4). The revolution in personalized cancer therapeutics, often targeting molecular pathways with essential roles in cardiomyocyte or vascular homeostasis, has greatly increased interest in cardiovascular injury while providing unprecedented insights into cardiovascular biology. A recent review provides a detailed description of the wide spectrum of cardiotoxicity profiles associated with chemotherapeutic agents and the mechanisms of their actions (5). Clinical application of this new knowledge, particularly with respect

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