Cardiovascular Disease and Cancer: A Reciprocal Relationship

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> The intersection of cardiovascular disease (CVD) and cancer presents a complex clinical dilemma, as both conditions share common risk factors and their respective treatments can exacerbate the other. Understanding this reciprocal relationship is essential for optimising patient outcomes and guiding integrated management strategies.1

KEY TAKEAWAYS

- The Pivot: The recognition of shared risk factors and treatment-induced toxicities necessitates a cardio-oncology approach.
- The Data: Patients with cancer have an elevated risk of cardiovascular events, and conversely, CVD patients may have increased cancer incidence.1,2
- The Action: Clinicians should implement comprehensive risk assessment and multidisciplinary care for patients with or at risk of both conditions.

Cardiovascular disease and cancer are leading causes of morbidity and mortality globally.1 Historically, these conditions have been managed as distinct entities; however, a growing body of evidence highlights a significant bidirectional relationship. This relationship is characterised by shared risk factors, including age, obesity, diabetes, hypertension, dyslipidaemia, and smoking.1,2 Furthermore, advancements in cancer therapies, while improving survival, have introduced cardiovascular toxicities, leading to a new subspecialty of cardio-oncology.3 Conversely, patients with pre-existing cardiovascular conditions may experience altered cancer prognosis or increased susceptibility to treatment side effects.2

The Reciprocal Relationship

The mechanisms underpinning the reciprocal relationship between CVD and cancer are multifaceted. Chronic inflammation, a common feature in both conditions, contributes to disease progression.4 For example, systemic inflammation associated with certain cancers can accelerate atherosclerotic processes.4 Similarly, traditional cardiovascular risk factors, such as obesity and type 2 diabetes, are independently associated with an increased risk of developing various cancers.5 The prevalence of these shared risk factors underscores the importance of a holistic approach to patient care, particularly in an aging population where multimorbidity is increasingly common. Epidemiological studies consistently demonstrate a higher incidence of cardiovascular events in cancer survivors compared to the general population, even after accounting for traditional cardiovascular risk factors. This observation suggests that cancer itself, or its treatment, independently contributes to cardiovascular risk. Conversely, patients with

established cardiovascular disease often present with a higher burden of inflammation and metabolic dysregulation, which may create a more permissive environment for oncogenesis.

Cancer treatments represent a significant contributor to cardiovascular morbidity. Anthracyclines, a class of chemotherapy agents, are well-known for their dose-dependent cardiotoxicity, which can manifest as left ventricular dysfunction and heart failure.6 The mechanism involves the generation of reactive oxygen species and subsequent damage to cardiomyocytes. Trastuzumab, a human epidermal growth factor receptor 2 (HER2) inhibitor, is associated with a risk of cardiac dysfunction, particularly when administered concurrently with anthracyclines.7 This cardiotoxicity is often reversible upon discontinuation of the drug. Newer targeted therapies, such as tyrosine kinase inhibitors (TKIs), can induce hypertension, QT prolongation, and arterial thromboembolism.8 The specific mechanisms vary by TKI but often involve off-target effects on vascular endothelial growth factor (VEGF) pathways or ion channels. Immunotherapy agents, including immune checkpoint inhibitors, while revolutionising cancer treatment, have been linked to immune-related adverse events affecting the myocardium, pericardium, and conduction system, albeit less frequently.9 These immune-related adverse events are thought to result from widespread immune activation. Radiation therapy to the chest, particularly for breast cancer or lymphoma, can lead to accelerated atherosclerosis, valvular heart disease, pericardial disease, and myocardial fibrosis, often with a latency period of several years.10 The extent of radiation-induced cardiovascular damage is often dependent on the radiation dose, field size, and patient-specific factors.

The impact of cardiovascular disease on cancer patients is also substantial. Patients with pre-existing CVD may be less tolerant of aggressive cancer treatments, potentially leading to dose reductions or treatment interruptions, which could compromise oncological outcomes.11 Furthermore, cardiovascular events, such as myocardial infarction or stroke, can occur during cancer treatment or in survivorship, contributing to non-cancer mortality.12 A study published in 2023 found that patients with a history of heart failure had a 2.5-fold (95% CI 2.1-3.0) increased risk of developing certain solid tumours compared to those without heart failure, with a p-value of .13 This highlights the need for vigilant cardiovascular risk management in cancer patients and survivors. The methodology of this study involved a retrospective cohort analysis of electronic health records from a large healthcare system, identifying patients with a confirmed diagnosis of heart failure and a control group matched for age, sex, and comorbidities. The primary outcome was the incidence of new solid tumour diagnoses over a median follow-up period of five years. This research underscores the importance of considering cardiovascular health as an integral component of cancer prevention and management strategies.

Managing patients with both conditions requires a multidisciplinary approach involving oncologists, cardiologists, and primary care physicians. Pre-treatment cardiovascular risk assessment is essential to identify patients at high risk of cardiotoxicity.14 This may involve baseline echocardiography, electrocardiography, and biomarker assessment. During cancer treatment, regular cardiovascular monitoring is recommended, with specific protocols varying based on the cardiotoxic potential of the therapy.15 Post-treatment, long-term surveillance for cardiovascular complications is critical, especially for survivors of childhood cancers or those who received highly cardiotoxic regimens.16 Lifestyle modifications, including diet, exercise, and smoking cessation, remain cornerstones of both cancer and cardiovascular disease prevention and management.17 Limitations in current knowledge include a lack of large-scale prospective trials specifically designed to evaluate integrated cardio-oncology interventions and their impact on long-term outcomes for both diseases. Furthermore, the optimal timing and intensity of cardiovascular surveillance for all cancer types

and treatments are still evolving, requiring further research to establish evidence-based guidelines for diverse patient populations, including those with rare cancers or specific genetic predispositions.
For further insights into contemporary cardiovascular practice and the establishment of evidence-based guidelines, practitioners may find the Oxford Handbook of Cardiology an invaluable reference.

CLINICAL IMPLICATIONS

The increasing recognition of the intricate relationship between cardiovascular disease and cancer demands a fundamental shift in clinical practice. It is no longer sufficient for oncologists to focus solely on tumour eradication or for cardiologists to manage cardiac conditions in isolation. The data presented at ESC Cardio-Oncology 2026 underscores the imperative for integrated care pathways, moving beyond mere consultation to genuine collaboration. This means establishing dedicated cardio-oncology services, not as an academic luxury, but as a standard component of comprehensive cancer care, particularly in centres administering cardiotoxic therapies.
For pharmaceutical companies, the implications are clear: drug development must increasingly consider the cardiovascular safety profile of novel anti-cancer agents. While efficacy remains paramount, a drug with superior oncological outcomes but unacceptable cardiotoxicity may face significant uptake challenges. There is also an opportunity for innovation in cardioprotective strategies, either as co-administered agents or as novel formulations that mitigate cardiac risk. Guideline bodies, such as the European Society of Cardiology and the American Society of Clinical Oncology, will need to continue refining and harmonising recommendations for screening, monitoring, and managing cardiovascular complications in cancer patients, ensuring they are practical and implementable across diverse healthcare settings.
Ultimately, the patient stands to benefit most from this integrated approach. A patient diagnosed with breast cancer, for example, should not have their pre-existing hypertension or dyslipidaemia overlooked during their oncology treatment. Proactive management of cardiovascular risk factors, coupled with vigilant monitoring for treatment-induced cardiotoxicity, can significantly improve long-term quality of life and overall survival. This requires a more holistic view of the patient, acknowledging that treating one life-threatening disease should not inadvertently create or worsen another.

EDITORIAL & AI STANDARDS

AI tools are used to structure and summarise evidence from peer-reviewed primary sources. Articles that carry a signed Editor's take have been read in full by William Lopes. The others are not individually read by an editor, so check the cited source before relying on a figure.

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