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# Oncocardiology: close collaboration between oncologists, cardiologists, and nephrologists

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## ARTICLE INFO

### Article Type:

Epidemiology and Prevention

### Article History:

Received: 11 September 2023

Accepted: 11 November 2023

ePublished: 29 November 2023

## ABSTRACT

Cancer treatment can lead to combined heart and kidney complications, which can have a significant impact on patient outcomes. Chemotherapy and radiation therapy used to treat cancer can cause damage to both the heart and kidneys, leading to a range of complications. Managing combined heart and kidney complications following cancer treatment requires a collaborative and multidisciplinary approach, with regular monitoring and personalized management plans tailored to the individual patient's needs.

**Keywords:** Cardio-oncology, Cancer, Chronic kidney disease, Cardiorenal syndrome, Chemotherapy

### Implication for health policy/practice/research/medical education:

Oncocardiology is an emerging field focusing on the intersection of heart and cancer diseases. It involves cooperating with cardiology, nephrology, and oncology teams to treat cardiorenal disease patients.

**Please cite this paper as:** Salati S, Firouzbakht B, Daneii P, Azarpey A, Hatami B, Johari Moghadam MM, Jafari N. Oncocardiology: close collaboration between oncologists, cardiologists, and nephrologists. J Nephropharmacol. 2024;13(1):e11660. DOI: 10.34172/npj.2023.11660.

## Introduction

Cardio-oncology is a field that focuses on the intersection of heart conditions in patients who have been treated for cancer (1). Nephrologists collaborate with cardiologists in cardio-oncology through a multidisciplinary approach that involves close communication and coordination. Nephrologists may refer patients to cardiologists to evaluate and manage cardiovascular complications related to cancer treatment (2). Cardiologists can provide expertise in assessing cardiac function, monitoring for cardiotoxicity, and managing cardiovascular risk factors (3). Nephrologists and cardiologists collaborate to make treatment decisions for patients with kidney and heart conditions. They discuss various treatment options' potential risks and benefits, considering the patient's health and circumstances (4). Nephrologists and cardiologists work together to monitor patients undergoing cancer treatment for any signs of cardiac toxicity or kidney dysfunction. They may perform cardiac and renal assessments, such as echocardiograms,

electrocardiograms, and kidney function tests, to detect and manage complications early (5). Nephrologists and cardiologists collaborate to optimize treatment strategies for patients with both kidney and heart diseases. They may adjust medication dosages, consider alternative treatment options, or implement preventive measures to minimize the risk of cardiovascular events or kidney damage (6). Nephrologists and cardiologists engage in collaborative research efforts to better understand the cardiovascular and renal effects of cancer treatments. They also participate in educational activities to stay updated on the latest advancements in cardio-oncology and share knowledge with their respective specialties (7).

## Cardiorenal syndrome

One of the most common complications is cardiorenal syndrome, which is characterized by the simultaneous dysfunction of both the heart and kidneys. This can occur due to the shared risk factors for cardiovascular disease and kidney disease, as well as the direct toxic effects of

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cancer treatment on these organs (8). Chemotherapy drugs can be toxic to the heart and kidneys, leading to acute or chronic damage. Radiation therapy can also cause damage to these organs, particularly when targeted at the chest or abdomen. Additionally, cancer-related inflammation and metabolic changes can contribute to cardiorenal syndrome (9).

### Risk factors for developing combined heart and kidney complications following cancer treatment

Some types of chemotherapy drugs can affect the kidneys and raise the risk of developing kidney problems or worsening existing kidney problems (9). Radiation therapy can also affect the heart and kidneys, leading to an increased risk of cardiovascular and renal complications (10). Older adults may already have a higher risk of heart and kidney problems, and cancer treatment can further increase this risk. Hypertension is a well-established risk factor for heart failure, and it may also be associated with an increased risk of cancer (11). Certain types of cancer, such as lung, pancreatic, colon/rectal, kidney, and prostate cancer, may be associated with an increased risk of thromboembolism, which can lead to heart and kidney complications (12).

### Strategies for managing kidney damage caused by cancer treatment

One preventive strategy is to avoid the use of nephrotoxic drugs, which can further damage the kidneys. Identifying and selecting alternative medications that are less harmful to the kidneys can help minimize the risk of kidney damage (13). Ensuring adequate blood flow to the kidneys is crucial in preventing kidney damage. Measures such as maintaining hydration and avoiding dehydration can help optimize renal perfusion and reduce the risk of kidney injury. Regular monitoring of kidney function through blood tests, urine tests, and imaging studies can help detect any early signs of kidney damage. This allows for timely intervention and management to prevent further deterioration (14). Adequate fluid management is important in preventing and managing kidney damage. Intravenous fluids may be administered to help flush out waste products produced during the breakdown of chemotherapy drugs. In severe cases of kidney damage where the kidneys fail to function properly, dialysis may be necessary to remove waste products and excess fluid from the body (13).

### Cancer in patients with chronic kidney disease

The management of cancer in patients with chronic kidney disease is complex and requires a multidisciplinary approach involving both oncologists and nephrologists to ensure optimal care. Nephrotoxicity due to chemotherapy can occur, which may worsen renal function and lead to poor outcomes. Therefore, careful selection of agents and dose adjustment based on renal function are essential

(15). Additionally, supportive care such as hydration and electrolyte management may be necessary during therapy. 2. Kidney transplantation may be an option for some patients with advanced cancer, but the timing and impact on survival should be carefully considered. The role of immunotherapies in kidney cancer is evolving and may have different implications depending on the stage and comorbidities (16).

### Conclusion

Many cancer treatments, including chemotherapy and radiation therapy, can have adverse effects on the cardiovascular system, leading to cardiotoxicity, hypertension, and thromboembolic events. As such, a multidisciplinary approach involving both cardiologists and nephrologists is necessary to provide comprehensive care for patients with cancer. This collaboration can help identify and manage cardiovascular and renal complications early, leading to better outcomes and improved quality of life for cancer patients. Cardio-oncology is a relatively new medical field that focuses on the cardiovascular health of cancer patients. It aims to prevent, diagnose, and manage cardiovascular complications related to cancer treatment. The emerging role of the cardio-renal physician is an example of how nephrologists and cardiologists can work together to manage patients with both kidney and heart conditions.

### Authors' contribution

**Conceptualization:** Negar Jafari and Padideh Daneii.

**Data curation:** Ali Azarpey.

**Investigation:** Sina Salati and Behnaz Hatami.

**Resources:** Mohammad Mehdi Johari Moghadam.

**Supervision:** Negar Jafari.

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**Writing—review & editing:** Sina Salati, Bahare Firouzbakht, and Mohammad Mehdi Johari Moghadam.

### Conflicts of interest

The authors declare that they have no competing interests.

### Ethical issues

Ethical issues (including plagiarism, data fabrication, and double publication) have been completely observed by the authors.

### Funding/Support

None.

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