AMERICAN COLLEGE of CARDIOLOGY®

KEY TAKEAWAYS

Diagnosis and Management of Cardiovascular Adverse Effects of Targeted Oncology Therapies: Bruton's Tyrosine Kinase, Immune Checkpoint, and Vascular Endothelial Growth Factor Inhibitors: 2025 ACC Concise Clinical Guidance

This Concise Clinical Guidance (CCG) provides practical guidance for clinicians to recognize, evaluate, and manage cardiovascular adverse effects associated with Bruton's Tyrosine Kinase (BTK), immune checkpoint inhibitors (ICI), and vascular endothelial growth factor (VEGF) inhibitors to support safe continuation of cancer treatment while optimizing cardiovascular outcomes.

1 Perform baseline cardiovascular risk assessment before therapy

Baseline evaluation should include cardiovascular history, blood pressure, ECG, and echocardiography in high-risk patients. Cardiac troponin and natriuretic peptides may be considered, particularly prior to immune checkpoint inhibitor therapy. Baseline assessment enables risk stratification, early detection, and optimized monitoring.

2 Recognize therapy-specific cardiovascular toxicity profiles

BTK inhibitors

- Atrial fibrillation, hypertension, ventricular arrhythmias
- Heart failure and cancer therapy–related cardiac dysfunction
- Increased bleeding risk

ICIs

- Myocarditis (rare but high mortality)
- Conduction abnormalities, arrhythmias, and heart failure
- Pericarditis, vasculitis, and accelerated atherosclerosis
- Troponin elevation may occur even with preserved left ventricular ejection fraction

VEGF inhibitors

- Hypertension (most common toxicity)
- Left ventricular dysfunction and heart failure
- Arterial and venous thrombotic events
- Arrhythmias

3 Implement therapy-specific cardiovascular surveillance

BTK inhibitors

- Blood pressure monitoring at each visit
- ECG every 3–6 months
- Echocardiography and rhythm monitoring, if symptomatic

ICIs

- ECG, cardiac troponin, and natriuretic peptides at baseline and when clinically indicated
- Elevated troponin should prompt urgent evaluation for myocarditis

VEGF inhibitors

- Frequent blood pressure monitoring, especially early in therapy
- Echocardiography if heart failure is suspected

4 Use structured diagnostic evaluation when toxicity is suspected

Evaluation should include ECG, cardiac biomarkers, and echocardiography. Cardiac MRI is recommended when myocarditis is suspected. Coronary imaging may be needed to exclude acute coronary syndromes. Endomyocardial biopsy may be considered in uncertain cases.

5 Apply therapy-specific management strategies

BTK inhibitor–associated atrial fibrillation

- Beta-blockers preferred for rate control
- Avoid diltiazem, verapamil, amiodarone, and dronedarone due to drug interactions
- Factor Xa inhibitors preferred for anticoagulation
- Consider switching to second-generation BTK inhibitors, if toxicity occurs

BTK inhibitor–associated hypertension

- Treat per American College of Cardiology/American Heart Association guidelines
- Preferred agents: beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs), dihydropyridine calcium channel blockers

ICI-associated myocarditis

- Immediate discontinuation of ICI therapy
- Hospital admission and cardiac monitoring
- Prompt initiation of high-dose corticosteroids
- Guideline-directed heart failure and arrhythmia management

VEGF inhibitor–associated hypertension

- Initiate or intensify antihypertensive therapy
- ACE inhibitors, ARBs, calcium channel blockers, and diuretics are appropriate
- Therapy interruption or dose adjustment may be required in severe cases

6 Apply permissive cardiotoxicity principles

When cardiovascular toxicity is mild or manageable, continuation of cancer therapy may be appropriate with close monitoring and multidisciplinary decision-making.

7 Ensure multidisciplinary cardio-oncology collaboration

Early coordination between oncology, cardiology, and cardio-oncology teams improves cardiovascular outcomes and supports safe continuation of cancer therapy.

8 Continue surveillance during and after therapy

Ongoing monitoring should include blood pressure assessment, rhythm surveillance when indicated, and cardiac imaging or biomarker evaluation in high-risk patients. Long-term follow-up is essential to detect delayed cardiovascular toxicity.

Scan this QR code to access the full CCG for detailed figures and clinical nuance.