CANCER BACKGROUND
While much of the focus of cardio-oncology has been on heart failure and left ventricular dysfunction, it is increasingly recognized that many traditional and novel cancer therapeutics are associated with various arrhythmias which can range from benign to potentially life-threatening. Management of these issues in cancer patients requires a thoughtful and nuanced approach to ensure optimal outcomes.

ADVERSE EFFECTS
Atrial Arrhythmias are quite common in cancer patients, especially atrial fibrillation. In fact, there is a 20% higher adjusted risk of AF in patients with cancer, especially within the first year of diagnosis. Various cancer therapeutics are associated with an increased incidence of atrial fibrillation including anthracyclines. Melphalan, an alkylating agent, also has significantly increased rates of atrial fibrillation especially when used as a stem cell transplant preconditioning chemotherapeutic. Finally, various tyrosine kinase inhibitors (TKI) are associated with atrial arrhythmias including anthracyclines and fluoropyrimidines, generally resulting from other toxicities such as cardiomyopathy and ischemia. Ibrutinib has been associated with increased ventricular arrhythmias. The mechanism is unclear and is likely related to direct arrhythmogenic effects on the myocardium.

Bradyarrhythmias are relatively uncommon and rarely symptomatic. There are seen most commonly with ALK (anaplastic lymphoma kinase) inhibitors, a group of TKIs primarily used for non-small cell lung cancer and taxanes. Bradyarrhythmias can also be the presenting manifestation of checkpoint inhibitor (immunotherapy) myocarditis.

RECOMMENDATIONS
Diagnosis of arrhythmias are often based on physical exam findings, patient reported symptoms and then electrocardiographic (ECG) confirmation. An ECG should be obtained if patients report palpitations or syncope/pre-syncope or if physical exam reveals tachycardia or an irregular pulse. Various cancer treatments have specified ECG monitoring for QT interval prolongation based on FDA and manufacturer recommendations. Treatment of arrhythmias should follow the same algorithms for these conditions in the general population. Special consideration should be given to potential drug-drug interactions as well as the risk of bleeding (especially with ibrutinib or due to hematologic abnormalities) if anticoagulation is required.

DATA TO SUPPORT

INDICATIONS
Arrhythmias are associated with various cytotoxic, targeted and immunotherapies used to treat various solid and liquid tumors.

ONCOLOGY COMMENTS
Oncologists must be aware of the arrhythmogenic potential of various cancer therapeutics. Based on
clinical suspicion, an ECG should be obtained. In addition, careful attention should be paid to QT monitoring recommendations and employ appropriate risk mitigation strategies including electrolyte repletion and dose adjustment when necessary. Finally, drug-drug interactions may limit the available treatment options in certain patients.