



Conquer Cancer - Walther Cancer Foundation Career Development Award in Palliative and Supportive Care in Oncology

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AI Time Series Modeling to Prevent Cancer Treatment Adverse Events

SUPPORTED BY

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Lay Abstract

Cancer treatments such as chemotherapy and immunotherapy save lives but can also cause serious side effects. These complications—including infections from low white blood cell counts (febrile neutropenia), kidney damage (acute kidney injury), and hepatitis—are among the leading reasons why patients are hospitalized, require intensive care, or even die during treatment. Right now, doctors have limited tools to predict who will develop these complications before they occur. Better prediction could allow preventive medications, closer monitoring, or safer treatment choices.

Our team has developed SPARC (Surveillance of Patient Adverse events using Routine Clinical data), an artificial intelligence system trained on more than 78 million lab test results and vital signs from over 57,000 patients at Memorial Sloan Kettering Cancer Center. Unlike older methods, SPARC looks at health information over time, not just one-time snapshots, allowing it to detect subtle trends that may warn of a major complication. In early testing, SPARC outperformed current approaches at predicting which patients would experience treatment-related complications.

This project will take the next step: testing SPARC in large, diverse groups of patients across the United States. We will validate SPARC in two of the largest cancer datasets available: 1) The CAIA consortium, which includes over 1 million patients treated at

Memorial Sloan Kettering, Johns Hopkins, Dana-Farber, and Fred Hutchinson. 2) The INSIGHT network, with over 500,000 patients from six hospitals in New York City (excluding MSK).

We will focus on three major treatment-related complications that are potentially preventable or manageable if detected early: 1) Febrile neutropenia after chemotherapy 2) Kidney injury after cisplatin chemotherapy 3) Hepatitis after immunotherapy.

By providing individualized, accurate risk estimates, SPARC could help oncologists give the right preventive medications, adjust treatments, and monitor patients more effectively. If validated, this tool could improve safety and outcomes for cancer patients everywhere, while reducing hospitalizations and healthcare costs.

Short Professional Biography

Justin Jee is a medical oncologist and physician-scientist on the Thoracic Oncology Service at Memorial Sloan Kettering Cancer Center, where he also leads a research laboratory that studies how to best use AI to improve predict patient outcomes. He also serves as Co-Director of MSK's Thoracic Liquid Biopsy Program and is the principal investigator of MSK's first interventional, prospective trial to test an AI algorithm under an investigational device exemption from the FDA for software as a medical device (NCT07399977). He is also an Associate Editor for JCO Precision Oncology and a Medical Advisory Board member for OpenEvidence.

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