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The 2026 Queen's Cardiac Research Conference Book

Kavi Gupta, BHSc Student [1]*, Chrishella Senadeera, BScH Student [2],
Rinusha Piranthapan, BScH Student [2], Joy Liu, BHSc Student [1],
Brahmleen S. Papneja, BHSc Student [1], Sam Balmain, BScH Student [2]

[1] Faculty of Health Sciences, School of Medicine, Queen's University, Kingston, Ontario, Canada
[2] Department of Life Sciences and Biochemistry, Queen's University, Kingston, Ontario, Canada

*Corresponding Author Details: kavi.gupta@queensu.ca

Abstract
The Queen's Cardiac Research Conference was a two-day professional development event designed to foster scholarly engagement, clinical insight, and interdisciplinary collaboration in cardiovascular science. The conference featured a competitive abstract submission process, with a total of ten abstracts submitted on diverse cardiac research topics selected by participants. These abstracts were presented during dedicated research sessions, encouraging critical discussion and knowledge exchange. The top three abstract submissions were recognized for excellence and awarded publication opportunities.
In addition to research presentations, the conference hosted a series of talks by renowned cardiac researchers and physicians, offering attendees exposure to current advances in cardiovascular research, clinical practice, and translational medicine. Interactive workshops focused on first aid and applied clinical case discussions, bridging theoretical knowledge with real-world clinical decision-making. Structured networking opportunities were integrated throughout the program, facilitating mentorship, collaboration, and professional connection among students, researchers, and clinicians.
Overall, the Queen's Cardiac Research Conference provided a comprehensive platform for developing research skills, expanding clinical understanding, and strengthening professional networks within the cardiovascular field.

Keywords: cardiac research; heart; heart disease; undergraduate; 2026

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Conference Abstracts

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Top 3 Abstracts

HeartLink: AI-Assisted Capillary-Driven Microfluidic Biomarker Screening to Reform Cardiovascular Triage and Advance Equitable Public Health Policy

Preet Dhaliwal, BHSc Student [1], Isabella Chen, BHSc Student [1]
[1] Faculty of Health Sciences, School of Medicine, Queen's University, Kingston, Ontario, Canada, K7L 3N6

While cardiovascular disease is largely preventable with early intervention, diagnostic pathways remain oriented toward late-stage detection through imaging and specialist referral. This disproportionately disadvantages remote and under-resourced communities due to barriers such as travel, time off work, and reliance on specialists. These barriers contribute to delayed presentation and emergency-driven care, allowing reversible pathology to progress into advanced disease. This project proposes HeartLink, a low-cost point-of-care screening and triage platform designed to enable earlier, more equitable cardiovascular risk identification using a fingerstick blood sample. A capillary-driven cartridge collects a small-volume sample and performs plasma separation using a borosilicate glass microfiber depth filtration membrane. Cell-free plasma is routed through engineered microchannels and a geometric metering chamber to standardize volume and assay conditions. The metered sample is split into two lanes: a rapid protein biomarker sandwich immunoassay for markers such as cTnI, cTnT, BNP and NT-proBNP, and an RNA biomarker lane for molecular signatures linked to cardiovascular stress and remodeling. The RNA lane employs silica-based RNA capture and enrichment followed by isothermal RT-LAMP amplification and a colorimetric readout scanned by AI, enabling detection of circulating RNA targets. Risk stratification is integrated with referral pathways, ensuring meaningful care and reducing chances of diagnosis without action. HeartLink is designed for deployment in community pharmacies, health centres, and primary care clinics with optional integration into telecardiology services to support timely follow-up. The model is intended for screening and triage, not a replacement for definitive imaging, and leverages technical components that are already established in clinical practice. As the database expands, tailored thresholds can also reduce reliance on symptom-based pathways, reducing underdiagnosis in women and certain racial and ethnic groups. By screening earlier and linking results to care pathways, this model has the potential to improve prevention, optimize specialist resources, and reduce inequities in early cardiovascular detection.

Exploring the Potential of Using an N-Eicosane-Based Apparatus in IVC Filter Deployment

Derek Sun, BHSc Student [1], Grace Jiang, BHSc Student [1]
[1] Faculty of Health Sciences, School of Medicine, Queen's University, Kingston, Ontario, Canada, K7L 3N6

Abstract Pulmonary embolisms, often caused by deep vein thrombosis, is the third-leading cause of sudden cardiovascular mortality. For patients who cannot tolerate anticoagulant therapies, inferior vena cava (IVC) filters provide an alternative by trapping thrombi before they reach the heart. However, current IVC filters rely on tensile deployment, risking misplacement and puncturing vessel walls. Inspired by thermally softening intravenous needles, this study will evaluate the potential of controlled IVC filter deployment through thermally-regulated slow-release mechanisms; specifically, we propose placing hooked sinusoidal rings — composed of layered filament containing an N-eicosane phase-changing material (PCM) core, aerogel paste insulation layer, and synthetic polymer encapsulant — within Günther-style IVC filters. As the device warms to body temperature, the filament softens, allowing the ring to slowly expand. By varying aerogel thickness, we can delay the hooks' release of Günther limbs, further permitting precise positioning and reduced mechanical impulse on the IVC wall. A two-part methodology is used to test this apparatus. First, we will determine if the PCM softens predictably within the human body. This will be simulated through a benchtop experiment in which a flowing, blood-mimicking fluid directly contacts an uninsulated mockup containing the PCM, permitting convective heat transfer while mimicking physiological conditions of 37ºC and a blood velocity of 15-60 cm/second. Then, under identical conditions, we will systematically vary the thickness of the aerogel layer within an insulated mockup of the apparatus, establishing a relationship between aerogel thickness and thermal delay. This allows us to identify the minimum insulation needed to inhibit the core's phase change until the IVC filter is ready for deployment. The results should demonstrate the feasibility of using PCMs to create a passive, predictable, electronic-free, slow-release mechanism that can limit risk of vessel puncturing or misplacement during IVC filter implantation, while simultaneously informing future iterations of thermally triggered release systems.

Bridging Gaps in Cardiac Care Through Equity-Focused Machine Learning for Stroke Risk Prediction in Atrial Fibrillation Patients

Jia Xun Song, BHSc Student [1], Andrew N. Ganea, BHSc Student [1], Wesley Kwan, BHSc Student [1], Raymond Wang, BHSc Student [1].
[1] Faculty of Health Sciences, School of Medicine, Queen's University, Kingston, Ontario, Canada, K7L 3N6

Disparities in atrial fibrillation (AF)-related stroke remain a persistent and preventable driver of global cardiovascular morbidity. AF confers an approximately five-fold increased risk of ischemic stroke, and anticoagulation decisions are commonly guided by the CHA_2DS_2-VASc score, a validated clinical tool that stratifies stroke risk, including variables like age, sex, hypertension, and prior stroke or transient ischemic attack. While CHA_2DS_2-VASc has improved standardization of anticoagulation decision-making, it assumes uniform predictive performance across populations and does not take into account social determinants of health that research has shown to consistently increase stroke risk. In practice, substantial inequities in stroke prevention persist among individuals from equity-deserving populations and communities with limited access to longitudinal cardiovascular care, which arise from structural barriers towards accessing cardiovascular care. Consequently, individuals with similar CHA_2DS_2-VASc scores may experience markedly different stroke risks and treatment trajectories.

We propose the development of an equity-focused machine learning framework that builds upon CHA_2DS_2-VASc outcomes as key predictor variables. Our model will leverage open electronic health record datasets, such as the MIMIC-IV and eICU Collaborative Research Databases. Together, these datasets comprise ~560,000 adult hospital encounters across multiple U.S. centres, and key predictor variables to be included in our model are demographic data, CHA_2DS_2-VASc components, and operationalized indicators of structural inequity. A calibrated ensemble model will estimate 3-year ischemic stroke risk and individualized net clinical benefit of anticoagulation. Fairness-aware training constraints and post-hoc calibration will be applied to trained models to minimize group-wise error, and model performance will be evaluated using discrimination and calibration (ROC/AUC) metrics across demographic strata.

Implementation will integrate predictions into electronic health records alongside evidence-based outreach pathways, including tele-anticoagulation consultation and culturally safe patient education.15 Our scalable approach aims to measurably reduce inequities in anticoagulation initiation and preventable AF-related stroke while strengthening equitable cardiovascular care delivery.

Conflict of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

KG: conceived the conference topic, served as conference directors, edited and revised abstracts to ensure adherence to submission guidelines, drafted the abstract booklet, and provided final approval for publication.
CS: conceived the conference topic, served as conference directors, edited and revised abstracts to ensure adherence to submission guidelines, drafted the abstract booklet, and provided final approval for publication.
RP: oversaw committee operations, led the abstract editing process, and assisted authors with abstract preparation and submission.
JL: oversaw committee operations, led the abstract editing process, and assisted authors with abstract preparation and submission.
BSP: coordinated the collection of abstract submissions, reviewed and edited abstracts to ensure compliance with formatting and submission guidelines, and supported the abstract review process.
SB: coordinated the collection of abstract submissions, reviewed and edited abstracts to ensure compliance with formatting and submission guidelines, and supported the abstract review process.

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