

Medical Device & Diagnostic



> TRL 3
> Pre-Clinical

Problem

Acute ischaemic stroke is frequently caused by complex thrombotic and thromboembolic events that develop within diseased blood vessels. Current clinical approaches rely heavily on imaging and population-based risk factors, which provide limited insight into an individual patient's true thrombotic risk or likely response to treatment. Clinicians often cannot directly evaluate how blood flow, vessel geometry, endothelial injury, and coagulation interact within a specific patient. Consequently, treatment decisions may involve trial-and-error selection of antithrombotic therapies, increasing the risk of ineffective treatment or bleeding complications. There is a significant unmet need for personalised tools that can predict stroke-related thrombosis and guide therapy selection.

Solution

This technology uses microprecision 3D printing and microfluidics to create patient-specific carotid artery models that replicate the geometry and flow conditions of an individual's vasculature. A proprietary injury model simulates vascular damage, allowing researchers and clinicians to observe thrombus formation under clinically relevant conditions. Patient blood samples can be exposed to different antithrombotic therapies within the platform to evaluate treatment effectiveness before clinical use. The system captures the combined effects of blood flow, vessel structure, coagulation, and vascular injury, generating personalised insights into thrombotic risk and therapeutic response. The platform is designed to support the future development of digital-twin enabled vascular medicine.

Intellectual Property Status

This invention is the subject of a PCT application:
[WO 2026/178602](#)

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Potential Commercial Applications

- Personalised stroke and thrombotic risk assessment
- Companion diagnostics for antithrombotic therapy selection
- Preclinical drug screening and efficacy testing
- Clinical decision-support tools for vascular disease management
- Digital twin platforms for personalised medicine
- Research tools for thrombosis, embolism, and vascular biology
- Telehealth-enabled vascular monitoring solutions
- Simulation of treatment outcomes and recurrence risk

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