Rapid and Sensitive Diagnostic for Blood Clot Formation and Cardiovascular Disease

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Technology description

The Craik lab at University of California, San Francisco has developed a highly sensitive real-time approach to specifically and accurately detect microscopic blood clots both in vivo and ex vivo. The invention is based on UCSF’ s restricted interaction peptides (RIP) platform technology of activatable and detectable membrane interacting peptides that, following activation in the presence of certain proteases, can interact with phospholipid bilayers, such as cell membranes. RIPS have a good safety profile and do not affect hepatic or renal functions.Theseprotease-activated peptide probes can be customized to specific targets and cleaved in the presence of specific proteases, such as thrombin.
To develop a RIP probe for binding and imaging of blood clots, the Craik lab designed a peptide whose sequence is composed of Temporin L followed by the cleavage site and extended interaction sequence from protease-activated receptor-1 (PAR1) and named it PAR1–RIP. Experiments in mice demonstrated that 1) Cy5–PAR1–RIP deposits intensely at the injury site in comparison to an adjacent healthy vessel, 2) PAR1–RIP conjugated to a variety of fluorescent and NIR dyes detected and noninvasively quantified pulmonary emboli (PE) in a dose-dependent manner, 3) achieved Real-time detection and measurement of thrombus generation using PAR1–RIP formulated for NIR fluorescence or PET imaging, and 4) PAR1-RIP clears from circulation in 30 minutes.
This advanced, quantitative, real-time, peptide-based diagnostic technology can provide fast, safe, and highly specific diagnosis, monitoring, and imaging of thrombotic events such as pulmonary embolism, deep vein thrombosis, myocardial infarction and stroke and indirect thrombotic diseases such as cancer and diabetes.
UCSF is looking for licensees and collaborators for this technology.

Unmet Need

Thrombosis is the primary mechanism underlying common diseases such as myocardial infarction, stroke, pulmonary embolism, and cancer. Currently, there are no effective tools to quantify the sizes, positions and rates of blood clot formation. In addition, poor diagnostics for diseases have led to numerous unnecessary surgeries and continuations of therapies. The present invention can provide quicker and more accurate information about the disease state, which will lead to better treatment approaches.

Data Availability

Under NDA/CDA

Additional Technologies by these Inventors

RAPID Non-invasive Diagnostic for Planktonic and Biofilm Fungal Infections

Application area

Diagnosis and assessment of direct thrombosis (pulmonary embolism, heart attack and stroke) and fibrinolysis in live animals
Diagnosis of indirect thrombotic diseases (cancer and diabetes)
Routine quantitative analysis of blood clot formation and dissipation

Advantages

Platformtechnology can be applied to variety of indications beyond thrombosis
Sensitivity to determine aggressiveness of procoagulant lesions
Specificity able to stratify risk and rule-out thrombotic diseases
Compatibilitywith fluorescence, near-infrared fluorescence or radioisotope labels
Low toxicityenables use over longer-periods of time using multiple doses
Extremely fastdetection capabilities

Institution

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