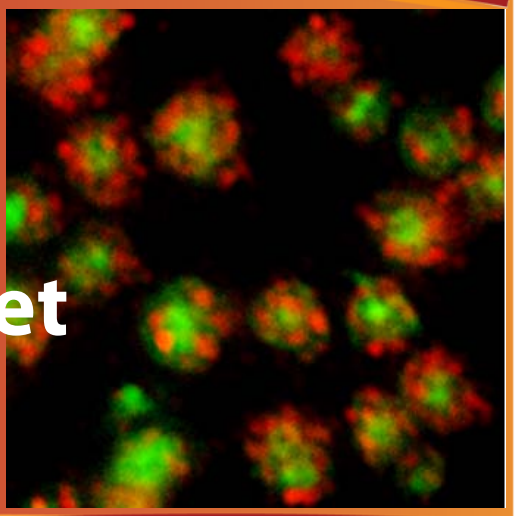
LICENSING OPPORTUNITY

Thrombosis Target: Manipulating Platelet Aggregation



Antithrombotic drugs often fail in the long run due to the emergence of significant compliance and safety issues, including increased bleeding. Thus, a new technology developed at Virginia Tech is unique in that it targets a specific macromolecule that is released in response to platelet activation but otherwise remains intracellular. Lead compounds can be delivered in a nanoparticle-based system to provide high stability, higher carrier capacity, selective release, and feasibility of incorporation of hydrophobic molecules. This approach will allow drug delivery by variable routes of administration, including oral and inhalation.

APPLICATIONS

- Downregulation of haemostasis in patients prone to various diseases ranging from stroke to heart disease
- Controlling bleeding during surgery
- Pro- or anti-thrombotic modulation to restore coagulation homeostasis

ADVANTAGES

- The technology targets a specific molecule released in response to platelet activation.
- The targeted system is inherently reversible.
- Intervention can be tightly regulated to increase or decrease thrombosis
- Various routes of administration are possible.

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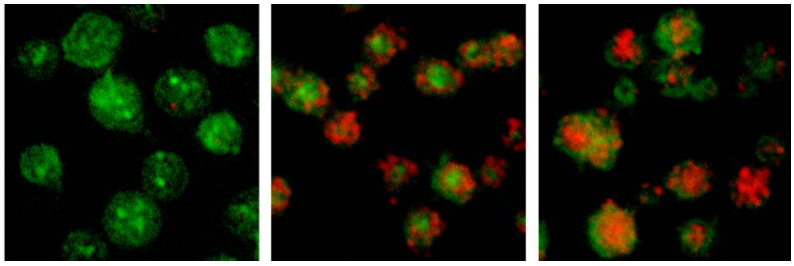
VIRGINIA TECH INTELLECTUAL PROPERTIES

TECHNOLOGY

Protein activators and inhibitors of blood clotting modulate platelet-mediated coagulation and clot formation. Manipulating activity of these molecules is one of the major targets to control undesired effects that occur with blood clotting. Virginia Tech scientists have identified a novel protein target for intervention in thrombosis. It is a platelet aggregation inhibitor that specifically binds and modulates the progression of platelet–mediated coagulation. Expression of this inhibitory protein is restricted to platelets, some tumor cell types, and very early stages of embryogenesis, so small molecules or other therapeutics can be tailored to intervene in a very target-specific manner.

An important concern about antithrombotic drugs is how to reverse their effects in the event of bleeding. The inherent reversibility of this molecular system allows the design of a counter-regulatory intervention. Drug-based nanoparticles can also be designed to allow controlled (sustained) drug release from the matrix, thus avoiding numerous secondary or side effects caused by accumulation of residual drug in the body.



Unactivated (left) and activated (middle and right) human platelets. Green stains actin stress fibers, whereas red tracks the target protein at the surface (middle) and few minutes later when is internalized (right). Note that the target protein only binds activated platelets.

LEAD INVENTORS

Dr. Carla V. Finkielstein *is an Assistant Professor in the Biological Sciences Department at Virginia Tech. She is a cell and molecular biologist with a strong background in signal transduction. Dr. Finkielstein is also a trained biochemist with extensive experience in protein chemistry and biophysical techniques.*

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Dr. Daniel G.S. Capelluto *is an Assistant Professor in the Biological Sciences Department at Virginia Tech. He has vast experience working with protein domains using multidimensional NMR spectroscopy. His research group identifies ligand binding and membrane insertion sites at atomic resolution complemented with other biophysical techniques.*

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