PURDUE INNOVATES | Office of Technology Commercialization

Inhibiting Leukocyte Binding to Disfunctional Endothelial Cells

Multifunctional therapeutic molecules target the early pathology of endothelial cell dysfunction to protect blood vessel lining, promote healing, and can be used preventatively in device coatings.

Endothelial cell dysfunction is present in a number of life-threatening diseases including diabetes and sepsis and may be brought on by surgical procedures such as the creation arteriovenous fistulas. This pathology affects the lining of blood vessels and can lead to blood clots and organ failure. The affected endothelial cells lose their layer of protective glycosaminoglycan molecules exposing the cell surface receptors that facilitate platelet binding and lead to detrimental changes to the blood vessel. Previous molecules studied for treatment of endothelial cell dysfunction have targeted the biological processes downstream of glycosaminoglycan loss.

Researchers at Purdue University are pioneering an approach to treating and preventing endothelial cell dysfunction at the level of glycosaminoglycan loss by targeting the exposed cell surface receptors. The researchers have developed a family of multifunctional therapeutic molecules designed to simultaneously protect cell surface receptors and promote healing and regulation of blood coagulation. In these therapeutics, a peptide targeted to the receptor is attached to a protective glycosaminoglycan. An optional hydrophobic group can be incorporated so that the molecules form nanoparticles that will dissociate more slowly in vivo. This therapy can be administered in response to endothelial cell dysfunction or as a preventative measure that may be incorporated into the coating of devices including stents and angioplasty balloons.

Advantages:

-Targets biological processes early in the pathology of endothelial cell dysfunction

Technology ID

2014-PANI-66748

Category

Pharmaceuticals/Biopharmaceuti
Pharmaceuticals/Computational
Drug Delivery & Nanomedicine

Authors

Alyssa Panitch
Kinam Park
Rebecca Scott
James Wodicka

Further information

Clayton Houck
CJHouck@prf.org

View online

-Protects cell surface receptors and promotes healing and normal function of blood vessels

-Holds potential for preventative applications

TRL: 1

Intellectual Property:

Provisional-Patent, 2014-05-12, United States | NATL-Patent, 2015-05-12, New Zealand | NATL-Patent, 2015-05-12, Republic of Korea | NATL-Patent, 2015-05-12, China | NATL-Patent, 2015-05-12, Canada | NATL-Patent, 2015-05-12, India | NATL-Patent, 2015-05-12, Russia | PCT-Patent, 2015-05-12, WO | NATL-Patent, 2015-05-15, Australia | NATL-Patent, 2016-11-10, United States | NATL-Patent, 2016-12-12, European Patent | NATL-Patent, 2016-12-12, South Africa | NATL-Patent, 2017-11-22, Hong Kong

Keywords: Endothelial cell dysfunction, glycosaminoglycan loss, cell surface receptors, multifunctional therapeutic molecules, peptide, blood coagulation, nanoparticles, stents, angioplasty balloons, preventative therapy