

\$13 million awarded to mount nano-attack on plaque

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A partnership of 25 scientists from the College of Engineering at UC Santa Barbara, and The Burnham Institute and The Scripps Research Institute -- both of La Jolla -- have been awarded \$13 million to use nanotechnologies in the design of new ways to detect, monitor, treat, and eliminate "vulnerable" plaque, the probable cause of death from sudden cardiac arrest. The organizations were selected as a collaborative "Program of Excellence in Nanotechnology" (PEN) by the National Heart Lung and Blood Institute (NHLBI) of the National Institutes of Health (NIH).

UCSB professors participating in the project include Matthew V. Tirrell, PhD, Dean of the College of Engineering and professor of chemical engineering; Andrew N. Cleland, Ph.D., associate professor of physics; Patrick Daugherty, Ph.D., associate professor of chemical engineering; Samir Mitragotri, Ph.D., assistant professor of chemical engineering; and Joseph Zasadzinski, Ph.D., professor of chemical engineering.

As part of the NIH's strategy to accelerate progress in medical research through innovative technology and interdisciplinary research, cardiac disease was chosen as the focus of the National Heart Lung and Blood Institute's recently-established Program of Excellence in Nanotechnology.

The multi-organizational team will build "delivery vehicles" that can be used to transport drugs, imaging agents and nano-devices directly to locations where there is vulnerable plaque; design molecular nano-stents

to physically stabilize vulnerable plaque and replace its fibrous cap with an anti-adhesive, anti-inflammatory surface; devise molecular switches that can sense and respond to the pathophysiology of atheroma (fatty deposits on arterial walls); and develop bio-nanoelectromechanical systems (called BioNEMS) that can sense and respond to vulnerable plaque, ultimately providing diagnostic and therapeutic capability.

"The Programs of Excellence in Nanotechnology is a vitally important research effort that will spur the development of novel technologies to diagnose and treat heart, lung, and blood diseases," said Elizabeth G. Nabel, M.D., director of the National Heart, Lung, and Blood Institute of the NIH. "The program brings together bioengineers, materials scientists, biologists, and physicians who will work in interdisciplinary teams. By taking advantage of the unique properties of materials at the nanoscale, these teams will devise creative solutions to medical problems," she said.

The PEN addresses a critical, unmet medical need. Heart attack remains the number one cause of death in the United States. Of the estimated 60 million Americans who have at least one type of cardiac disease, one million die each year, many without showing signs of disease.

As much as 60% to 80% of these sudden cardiac deaths can be attributed to the physical rupture of "vulnerable" plaque, which is an inflammation embedded in the arterial wall. Vulnerable plaque, which is considered prone to rupture, cannot be diagnosed using conventional visualization methods available to detect so-called stable plaque, such as angiography or fluoroscopy.

Source: University of California - Santa Barbara

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