

## UCSB Researchers Discover Shape Matters to Macrophages

Researchers at UC Santa Barbara have made a surprising discovery: phagocytosis depends more on particle shape than size. The research, which has far-reaching implications for immunology, vaccine development and drug delivery, is published today online in the Proceedings of the National Academy of Sciences by Samir Mitragotri, a UCSB professor of chemical engineering, and graduate student Julie A. Champion. The paper will be published in print on March 28.

Phagocytosis, a key part of the body's innate immune system, depends on macrophages - the cell's clean-up crew. The macrophages find and frequently remove particles from the body. Prior to this discovery, it was believed that the ability of a macrophage to process a particle through phagocytosis was dependent solely on its size. Previous studies have been performed only with spherical samples because it was presumed that size was the main issue in phagocytosis, and because fabrication of non-spherical particles of controlled dimensions has been difficult.

The researchers used macrophages from alveolar (lung sac) rat tissue and developed polystyrene particles of various sizes and shapes as model targets. Mitragotri and Champion used scanning electron microscopy and time-lapse video microscopy to study the action of the macrophages when presented with targets of varying shapes.

Mitragotri says the next challenge is clear: learning how to engineer the shape of particles to enhance, delay or prevent phagocytosis. Such a discovery, for example could allow researchers to design drug carriers that can be purposefully retained by the body for a longer period of time, or could help researchers create vaccines that would be quickly removed to stimulate a rapid immune response.

Released by Barbara Bronson Gray

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