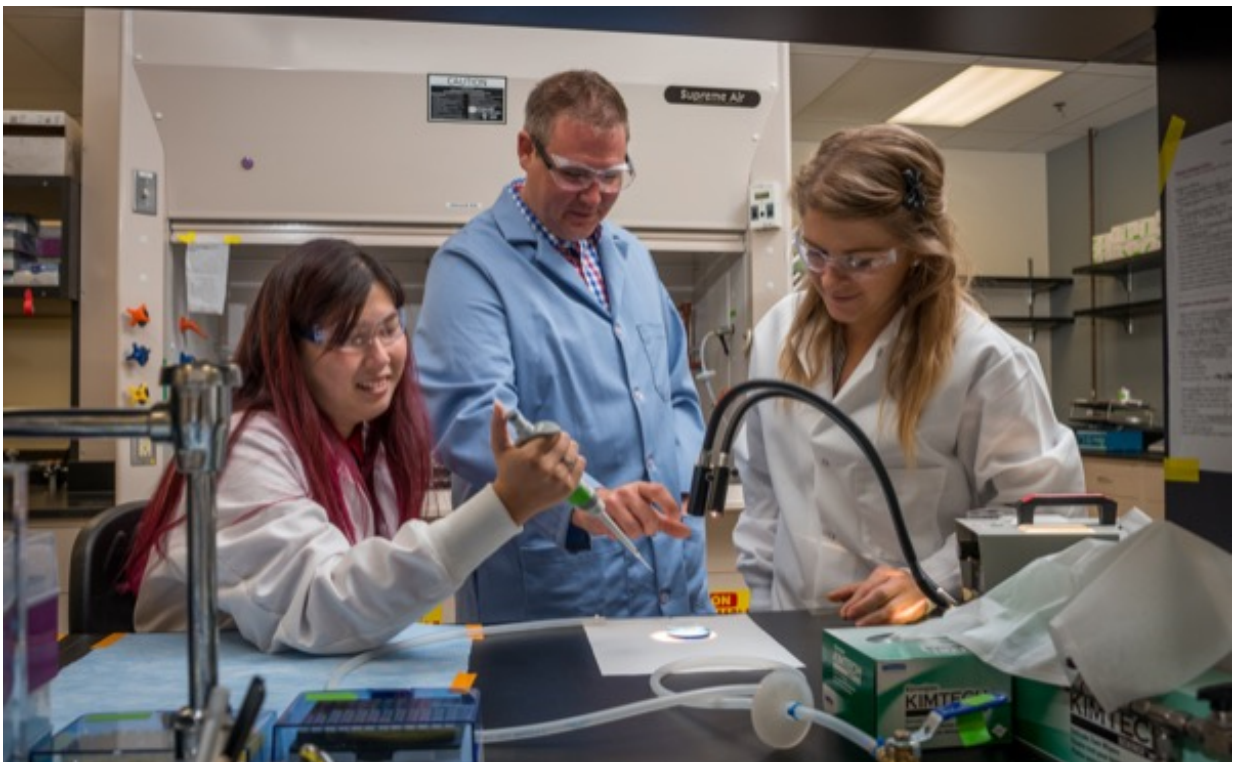


Scientists report new approach to generating homogeneous cell populations for cell-based assays

August 11 2015, by Diane Kukich



UD's John Slater (center) is part of a team that has developed an image-based, biomimetic patterning strategy that produces a more homogeneous cell population for high-throughput cellular assays.

High-throughput cell-based assays are a powerful research tool used to

quantify the responses of individual cells or small cell populations under varied conditions. Their applications include drug screening, genomic profiling and environmental impact studies.

However, since most cell-based assays rely on population-averaged measurements, the ability to tease out important findings and draw accurate conclusions can often be compromised due to cell population heterogeneity.

"The ability to generate a more homogeneous cell population, at least with respect to a chosen trait, could significantly aid basic biological research and development of high-throughput assays," says John Slater, assistant professor of biomedical engineering at the University of Delaware.

Now, Slater and a team of researchers from Duke University, Baylor College of Medicine and Rice University have developed an image-based, cell-derived patterning strategy that produces arrays of homogeneous cells with anatomical properties that mimic the cells from which the patterns were derived.

The work is reported in a paper, "Recapitulation and Modulation of the Cellular Architecture of a User-Chosen Cell of Interest Using Cell-Derived, Biomimetic Patterning," published in *ACS Nano*.

An important feature of the technique is that it could provide a means to decouple the influences of several factors on mechanotransduction-mediated processes, a term that refers to the many mechanisms by which cells convert mechanical stimuli into biochemical activity.

These factors include cytoskeletal structure, adhesion dynamics and intracellular tension, which combine to govern signaling functions within cells and ultimately cell fate.

In addition, it could allow for direct recapitulation of the tension state of a user-chosen cell in a large population of patterned cells.

"The ability to fine-tune cytoskeletal architecture, adhesion site dynamics, and the distribution of intracellular forces through simple 'on-the-fly' pattern modifications provides an unprecedented level of control over cytoskeletal mechanics," Slater says.

He sees the new tool as potentially synergistic with an existing technique known as FACS (fluorescence-activated cell sorting), which is often employed prior to experimentation to minimize the problem of heterogeneity.

Slater explains that with FACS, homogenous [cell populations](#) are generated based on the presence of specific cell surface markers.

In contrast, with the new technique, a cell of interest can be chosen based on simple image analysis of protein expression, and a pattern configuration can be derived to produce a phenotype similar to the cell of interest in a large population of patterned [cells](#).

This could drive a chosen cell phenotype through mechanotransduction and also help maintain phenotypes that have already been selected for via FACS.

"Such a tool could prove extremely useful in investigating the influence of subtle local environmental changes on cell behavior, for example, stem cell differentiation, particularly when moving to high-throughput assay platforms and single-cell analyses," Slater says.

More information: "Recapitulation and Modulation of the Cellular Architecture of a User-Chosen Cell of Interest Using Cell-Derived, Biomimetic Patterning." *ACS Nano*, 2015, 9 (6), pp 6128–6138 [DOI](#):

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