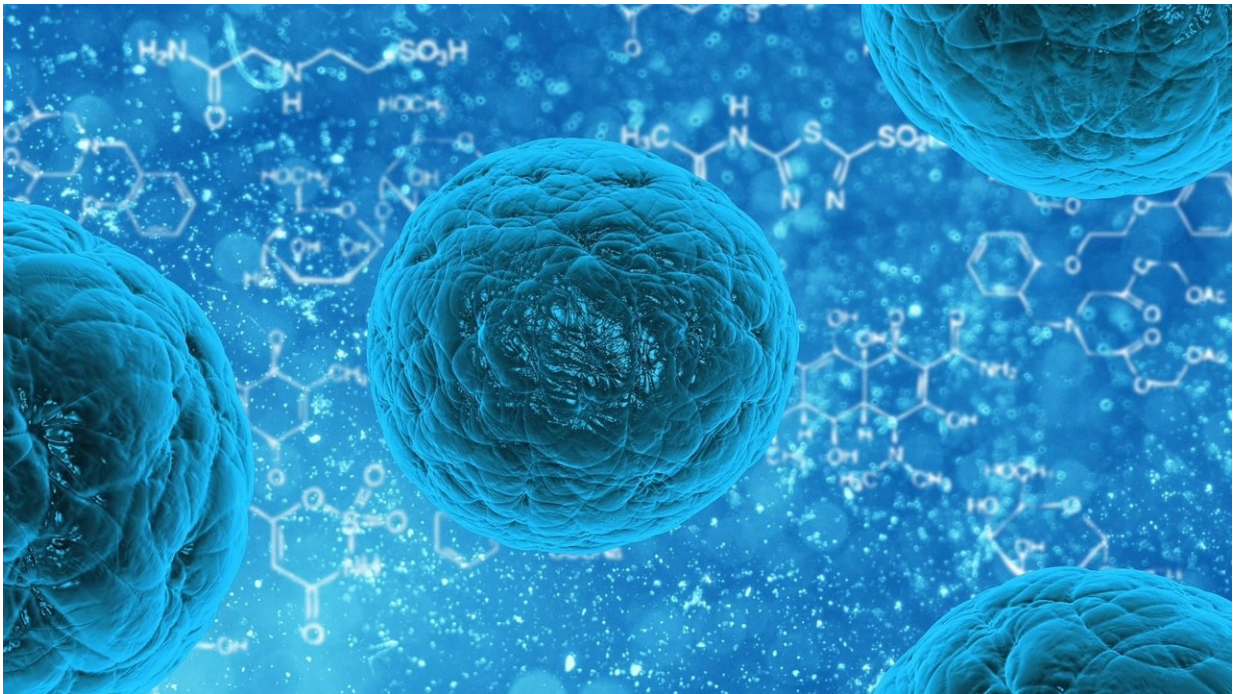


New technique isolates placental cells for non-invasive genetic testing

August 26 2019



Credit: CC0 Public Domain

Brown University researchers have developed a simple method for isolating placental cells from cervical swabs. The technique, described in the journal *Scientific Reports*, could aid in developing less invasive ways of diagnosing genetic disorders in developing fetuses.

The technique isolates trophoblast cells—placental cells that carry the

complete fetal genome—by taking advantage of their tendency to settle to the bottom of microwell plates. The researchers lay out a procedure for optimally isolating the cells, enabling them to be picked individually from the plate.

"This is the first study to use cell settling for enriching trophoblast cells from a heterogeneous cervical cell population," the researchers write.

"Ultimately, we provide a technique that is quick, inexpensive, minimizes cell loss, and results in retrieval of individual trophoblast cells."

The work was led by the lab of Anubhav Tripathi, a biomedical engineering lab at Brown that specializes in lab-on-a-chip diagnostics—in collaboration with the Shukla Lab for Designer Biomaterials at Brown's School of Engineering, led by Anita Shukla, and with PerkinElmer, Inc.

Currently, the only way to diagnose genetic disorders in developing fetuses is by retrieving trophoblasts through amniocentesis or chorionic villus sampling, both invasive procedures that carry a small risk of miscarriage. Blood tests that look for fetal genetic material in the mother's bloodstream can be useful screening tools, but they can't be used for definitive diagnosis. And screening is limited to whatever [genetic material](#) happens to turn up in the blood, which limits the range of disorders that can be screened.

Trophoblasts are known to be present in the cervical canal in the early stages of pregnancy, but the quantities are small, and isolating those cells from cervical cells and mucus is difficult. For this new study, a team of researchers led by Christina Bailey-Hytholt, a Ph.D. candidate in biomedical engineering at Brown, wanted to see if there were any physical characteristics of trophoblasts that might help in isolating them from cervical cells and other material.

The researchers found that trophoblasts are smaller than cervical cells, differ in shape and have relatively large nuclei. Those characteristics suggested that they may settle more quickly than cervical cells when cell mixtures are placed on microwell plates.

Using polystyrene plates, the researchers found that the trophoblasts did indeed settle more quickly than cervical cells. The study showed that the maximum separation of cell types was achieved around four minutes after the cells were put on the plate. At that point, the cervical cells and mucus on top of the cells could be removed, leaving a large concentration of trophoblasts behind. The technique increased the proportion of trophoblasts in samples by 700%, enabling individual trophoblasts to be picked out for [genetic testing](#).

No specialized equipment beyond what any diagnostic lab would already have is required to perform the technique, the researchers say. And takes only a few minutes to produce the [cells](#) necessary for genetic testing.

"There is a large need for [biomedical engineering](#) techniques toward advancing prenatal and women's health," Bailey-Hytholt said. "Our work is a step toward more non-invasive prenatal testing options."

More information: Christina M. Bailey-Hytholt et al, A Rapid Method for Label-Free Enrichment of Rare Trophoblast Cells from Cervical Samples, *Scientific Reports* (2019). [DOI: 10.1038/s41598-019-48346-3](#)

Provided by Brown University

Citation: New technique isolates placental cells for non-invasive genetic testing (2019, August 26) retrieved 11 May 2024 from

<https://medicalxpress.com/news/2019-08-technique-isolates-placental-cells-non-invasive.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.