Combining acoustic waves and CRISPR to create gene therapies for cancer and genetic disorders

A UCLA-led research team [April 28] reports that it has developed a new method for delivering DNA into stem cells and immune cells safely, rapidly and economically. The method, described in the journal Proceedings of the National Academy of Sciences, could give scientists a new tool for manufacturing gene therapies for people with cancer, genetic disorders and blood diseases.

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In current practice, cells used for genetic therapies are sent to specialized labs, which can take up to two months to produce an individualized treatment. And those treatments are expensive: A single regimen for one patient can cost hundreds of thousands of dollars.

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The method could be used with CRISPR, the genetic engineering technique that enables DNA to be edited with remarkable precision. However, using CRISPR efficiently, safely and economically in medical therapies has proven to be a challenge—one this new method may be able to solve.

The technique uses high-frequency acoustic waves coupled with millions of cells that flow through an “acoustofluidic device” in a cell culture liquid. …

That procedure opens up pores along the cells’ membranes that allow DNA and other biological cargo to enter the cells, and it enables the researchers to insert the cargo without the risk of damaging the cells by contacting them directly.

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