Researcher makes bold move by releasing nanotech 'recipe'

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In a rare move, a Houston Methodist researcher is sharing his recipe for a new, more affordable way to make nanoparticles. This will empower any laboratory in the world to easily create similar nanoparticles and could lead to a whole new way of delivering biotherapeutic drugs and do it more quickly.

"We're the only lab in the world doing this," said Ennio Tasciotti, Ph.D., director of the Center for Biomimetic Medicine at the Houston Methodist Research Institute and corresponding author on a paper coming out March 7 in *Advanced Materials*. "There are several questions about how our system works, and I can't answer all of them. By giving away the so-called 'recipe' to make biomimetic nanoparticles, a lot of other labs will be able to enter this field and may provide additional solutions and applications that are beyond the reach of only one laboratory. You could say it's the democratization of nanotechnology."

In the article, Tasciotti and his colleagues show how to standardize nanoparticle production to guarantee stability and reproducibility, while increasing yield. Eliminating the need for multi-million-dollar facilities, Tasciotti and his team demonstrate this using a readily available and relatively affordable piece of benchtop equipment to manufacture nanoparticles in a controlled, adjustable and low-cost manner.

"Nanoparticles are generally made through cryptic protocols, and it's very often impossible to consistently or affordably reproduce them," Tasciotti said. "You usually need special, custom-made equipment or

procedures that are available to only a few laboratories. We provide step-by-step instructions so that now everybody can do it."

For decades nanoparticles have been made out of bioinert, or inorganic, substances that don't interact with the body. In more recent years, nanoparticles were made to be bioactive, meaning they could respond to the environment. Now, Tasciotti is pushing the field forward by creating biomimetic nanoparticles that resemble cell composition and work in synergy with the laws that govern the physiology of the body.

"The body is so smart in the ways it defends itself. The immune system will eventually recognize nanoparticles no matter how well you make them," Tasciotti said. "In my lab, we make nanoparticles out of the cell membrane of the very same immune cells that patrol the blood stream. When we put these biomimetic, or bioinspired, nanoparticles back in the body, the immune cells do not recognize them as something different, as they're made of their same building blocks, so there is no adverse response."

Despite the complexity of this new class of particles, Tasciotti says it's incredibly simple how they put it together, which is why he decided to publish this paper.

"While our lab will remain fully devoted to this line of research, if somebody else develops some solutions using our protocols that are useful in clinical care, it's still a good outcome," he said. "After all, the ultimate reason why we are in translational science is for the benefit of the patients."

More information: Design and Development of Biomimetic Nanovesicles Using a Microfluidic Approach, *Advanced Materials*, DOI: 10.1002/adma.201702749 , onlinelibrary.wiley.com/doi/10 … /adma.201702749/full

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