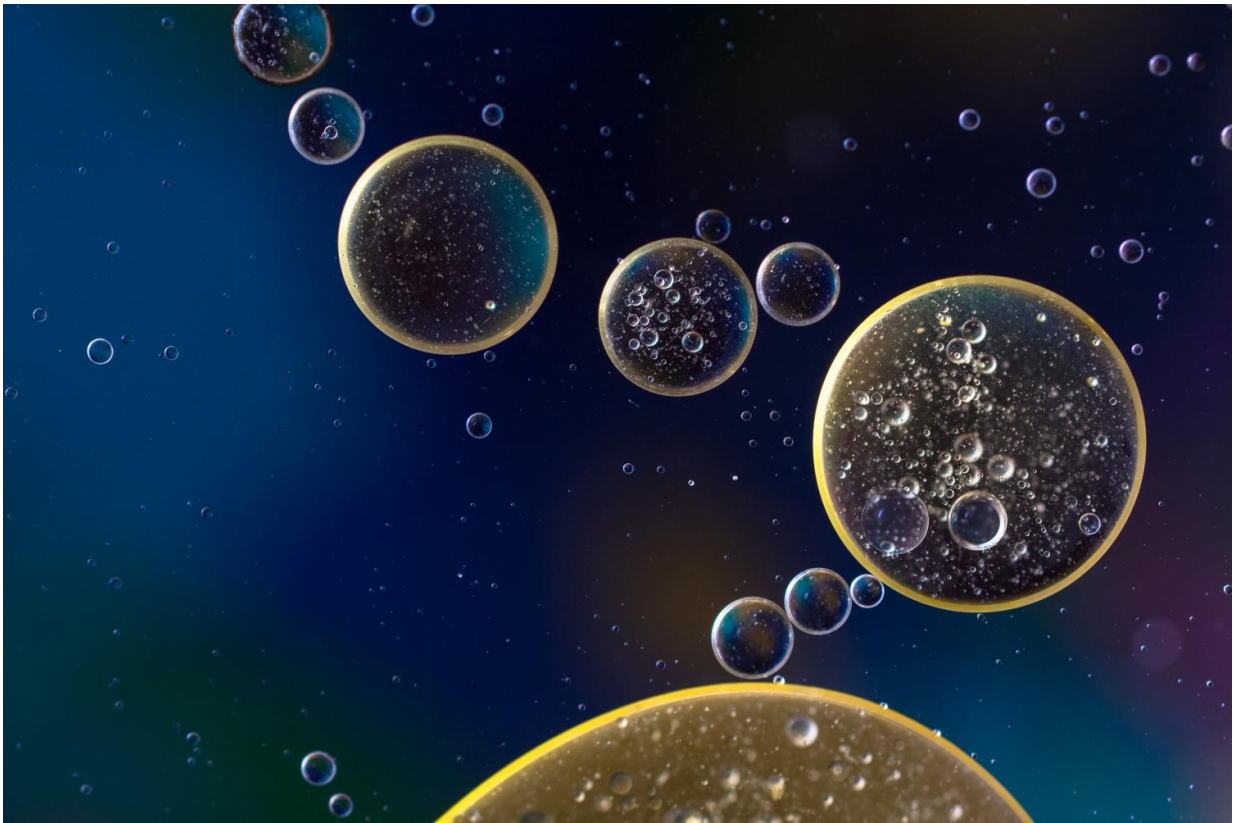


High-resolution lab experiments show how cells 'eat'

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A new study shows how cell membranes curve to create the "mouths" that allow the cells to consume things that surround them.

"Just like our eating habits basically shape anything in our body, the way cells 'eat' matters for the health of the cells," said Comert Kural, associate professor of physics at The Ohio State University and lead author of the study. "And scientists did not, until now, understand the mechanics of how that happened."

The study, published last month in the journal *Developmental Cell*, found that the intercellular machinery of a cell assembles into a highly curved basket-like structure that eventually grows into a closed cage. Scientists had previously believed that structure began as a flat lattice.

Membrane curvature is important, Kural said: It controls the formation of the pockets that carry substances into and out of a cell.

The pockets capture substances around the cell, forming around the extracellular substances, before turning into vesicles—small sacs one-millionth the size of a red blood cell. Vesicles carry important things for a cell's health—proteins, for example—into the cell. But they can also be hijacked by pathogens that can infect cells.

But the question of how those pockets formed from membranes that were previously believed to be flat had stymied researchers for nearly 40 years.

"It was a controversy in cellular studies," Kural said. "And we were able to use super-resolution fluorescence imaging to actually watch these pockets form within live cells, and so we could answer that question of how they are created."

"Simply put, in contrast to the previous studies, we made high-resolution movies of cells instead of taking snapshots," Kural said. "Our experiments revealed that protein scaffolds start deforming the underlying membrane as soon as they are recruited to the sites of vesicle

formation."

That contrasts with previous hypotheses that the protein scaffolds of a cell had to go through an energy-intensive reorganization in order for the membrane to curve, Kural said.

The way cells consume and expel vesicles plays a key role for living organisms. The process helps clear bad cholesterol from blood; it also transmits neural signals. The process is known to break down in several diseases, including cancer and Alzheimer's disease.

"Understanding the origin and dynamics of membrane-bound vesicles is important—they can be utilized for delivering drugs for [medicinal purposes](#), but at the same time, hijacked by pathogens such as viruses to enter and infect [cells](#)," Kural said. "Our results matter, not only for our understanding of the fundamentals of life, but also for developing better therapeutic strategies."

Emanuele Cocucci, an assistant professor in Ohio State's College of Pharmacy, co-authored this study, along with researchers from UC Berkeley, UC Riverside, Iowa State University, Purdue University and the Chinese Academy of Sciences.

More information: Nathan M. Willy et al, De novo endocytic clathrin coats develop curvature at early stages of their formation, *Developmental Cell* (2021). [DOI: 10.1016/j.devcel.2021.10.019](https://doi.org/10.1016/j.devcel.2021.10.019)

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