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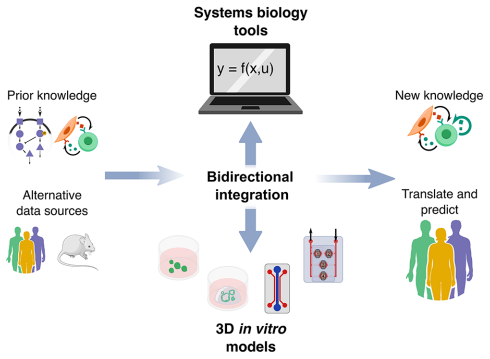
The two fields have much to gain by working together and taking advantage of each other's recent developments.



In the pursuit of a better understanding of biological systems and processes, researchers have built increasingly sophisticated physical models to study. These complex *in vitro* models are often 3D and can feature realistic substrates, multiple cell types, and microfluidic networks to closely simulate the behavior of real organs and tissues. However, more detailed models tend to produce data that is more difficult to interpret.

Cadavid et al. explored how systems biology could lend a possible solution to this problem. This field offers tools and methods for analyzing complex biological systems that can be applied to extract valuable information from the 3D models used in tissue engineering.

A key problem, the authors say, is that both fields tend not to take full advantage of each other's recent developments.

"There's a field that has developed a lot of mathematical approaches to model biological systems in simple *in vitro* models," said author Jose Cadavid. "And there's a field making complex *in vitro* models that has not used a lot of these mathematical advances."

By providing examples of the benefits of collaboration between tissue engineers and systems biologists, the authors hope to encourage both groups to work together.

"Going beyond a description of the system to what underlying phenomena are driving a response requires tools to dissect the complexity of the model itself," said Cadavid. "Mathematical approaches are the only way to do that properly. On the other hand, when building tools of systems biology to be more broadly applicable and translational, it is of interest to apply those tools to *in vitro* models that are more physiologically relevant."

Source: "Bridging systems biology and tissue engineering: Unleashing the full potential of complex 3D *in vitro* tissue models of disease," by Jose L. Cadavid, Nancy T. Li, and Alison P. McGuigan, *Biophysics Reviews* (2024). The article can be accessed at https://doi.org/10.1063/5.0179125.