Engineering cancer's end: Scientists say bioengineering will change our ability to research and treat cancer

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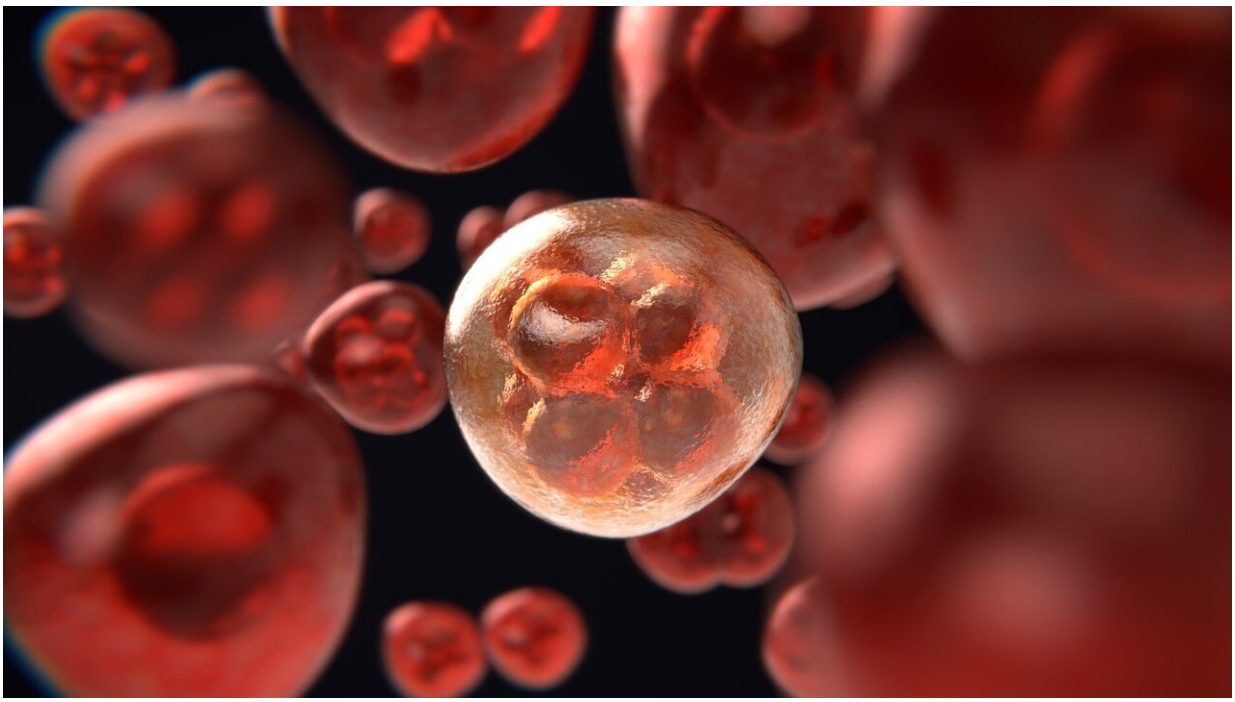

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Bioengineering is revolutionizing cancer research, and Moffitt Cancer Center is at the forefront of this transformative movement. Moffitt is the first National Cancer Institute-designated comprehensive cancer center with a dedicated bioengineering department. This area of science

integrates engineering and physical sciences with oncology to change how we understand and treat this complex disease.

In a new commentary published in *Cancer Cell*, W. Gregory Sawyer, Ph.D., and Elsa R. Flores, Ph.D., share their visionary framework to accelerate cancer discovery and therapy breakthroughs through bioengineering.

"Cancer's complexity has been a formidable obstacle for researchers," said Sawyer, chair of Moffitt's Department of Bioengineering. "Traditional methods often struggle to capture the intricate interplay between cancer cells, the immune system and the surrounding environment. Cancer engineering offers a unique perspective by integrating these diverse fields, creating a powerful platform to develop next-generation solutions."

Cancer engineering blends 12 key fields, including system dynamics, nanomaterials, robotics, and biofabrication, to tackle cancer from all angles. This powerful platform could lead to advancements in early detection with microfluidic devices and advanced imaging techniques. Additionally, nanomaterials engineered on a microscopic level could revolutionize drug delivery by transporting medications directly to cancer cells with minimal impact on healthy tissues.

The potential doesn't stop there. 3D bioprinting technology offers the potential to create customized tumor models, allowing researchers to test drug efficacy and personalize treatment plans for individual patients. Sophisticated mathematical modeling, informed by engineering principles, could provide a deeper understanding of cancer's intricate biological processes, paving the way for developing more effective therapies.

"The possibilities unlocked by cancer engineering are truly exciting,"

said Flores, associate center director of Basic Science at Moffitt. "We envision more universities and cancer centers following Moffitt's lead and creating dedicated cancer engineering programs to foster collaboration and accelerate progress in the fight against cancer."

More information: Elsa R. Flores et al, Engineering cancer's end: An interdisciplinary approach to confront the complexities of cancer, *Cancer Cell* (2024). DOI: 10.1016/j.ccell.2024.05.017

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