IMMUNO-THERAPY

HARNESSING THE BODY'S NATURAL DEFENSE SYSTEM TO FIGHT CANCER

A PRIMARY MISSION OF THE HUMAN IMMUNE SYSTEM IS TO PROTECT US AGAINST continued assault from the outside world. These protective immune mechanisms have evolved to protect us from everything that isn't "us," what scientists call "nonself." For researchers on the front lines of cancer therapy, these protective mechanisms present the basis for a cutting-edge form of treatment called immunotherapy. Because cancer cells undergo multiple changes or mutations as they transition from normal to malignant cells, they become, in small but important ways, nonself.

"Immunotherapy leverages the potent activity of the immune system to recognize and target nonself and directs immune cells, such as T cells, to specifically attack cancer," explains Michael Kalos, Ph.D., vice president of immuno-oncology and oncology cell therapies, Janssen Research & Development, LLC. The application of immunotherapy to treat cancer is also referred to as immuno-oncology.

In clinical trials, two different immunotherapy approaches have shown promise in oncology. One approach, called "checkpoint immunotherapy," focuses on unleashing an immune response that already exists in patients by inactivating "checkpoints," or brakes that the cancer utilizes to prevent the attack by the immune system. The second approach is called "adoptive cell therapy" and involves molecularly engineering T cells from patients to enable them to effectively recognize and destroy cancer cells. This involves isolating T cells from patients; engineering them to express synthetic receptors called "Chimeric Antigen Receptors," or "CARs," that allow the T cells to recognize and destroy the cancer cells; growing them to large numbers outside of the body; and then giving them back to patients. Other immunotherapy treatments that also work with the body's immune system are being actively explored in different cancer types.

NEW CANCER THERAPIES MODULATE THE IMMUNE SYSTEM, OFFERING PERSONALIZED TREATMENT—AND HOPE—FOR PATIENTS.

Together, checkpoint and CAR immunotherapy have shown real promise and have revolutionized cancer treatment in important ways. In subsets of people, these approaches can deliver profound results. "Patients who receive immunotherapy could potentially achieve a curative response," Kalos says.

But while some patients benefit greatly from immunotherapy, there is still more work ahead, since the complexity of both tumor and the immune response can limit the effectiveness in patients. "The goal for the next generation of immunotherapies is to understand how to boost activity so that most, if not all, patients receive real benefit," Kalos says. "We need to understand at a molecular level why some patients are responding while others are not."

Because T cells play such a critical role in the process, Kalos and Janssen oncology scientists are particularly interested in developing ways to ensure that potent T cells can be generated that recognize and kill tumors in all patients. Kalos and colleagues are working to develop comprehensive treatment regimens that focus on ways that further boost the T cell activity and to optimize treatments that benefit as many patients as possible facing a cancer diagnosis.

Immunotherapy offers a personalized approach that will continue to offer hope to those suffering from various forms of this devastating disease. "Immunotherapy ultimately uses the body's own defense mechanisms to fight cancer," says Kalos. "That matters and empowers patients."■

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