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## Immunotherapy: Teaching the Body to Fight Disease

By Gigi Reed, MD    October 2, 2026

Thank you Joy Bishop for suggesting this fabulous topic! Immunotherapy is a broad subject and I will try to hit on some highlights.

Pretty much everyone knows that the immune system protects us from infections and helps identify “invaders” in our body, such as the actual bacteria or viruses, as well as infected cells that have changed because of the infection. In Immunotherapy we try to take advantage of such a recognition process.

The idea of immunotherapy is actually quite old: In 1796, Edward Jenner showed that exposure to cowpox could protect against smallpox- meaning that he somehow was able to train the immune system to recognize and destroy something it had never seen before- which was quintessentially the first disease which was preventable by vaccination based immunotherapy. Today, we use the HPV vaccination as a potent preventative agent against cervical cancer.

Other cancer immunotherapies try to strengthen our body in identifying and destroying cancer cells. Cancer cells change and become abnormal, which makes them susceptible to get recognized by our immune system’s antibodies. In the 1890’s, surgeon William Coley noticed that a patient with an inoperable, severe neck cancer experienced complete tumor regression after contracting a certain skin infection. Believing that the fever and immune response caused by the infection cured the cancer, he developed an injectable mixture of heat-killed bacteria in hopes of curing cancer. His results were inconsistent, but the underlying question—could immunity be used against cancer?—endured. Research has now progressed and enables us to not only prevent but also treat, and even cure certain cancers with the help of the immune system. This was accomplished by understanding the signals controlling immune cells, and being able to engineer those cells to recognize particular targets.

This is mainly accomplished by the use of monoclonal antibodies. Monoclonal antibodies are laboratory-made antibodies designed to attach to one specific target. Depending on its specificity, it may tag a cancer cell and label it for destruction by our immune system. One such example is CAR-T-cell therapy which modifies a patient’s so called “T” cells so they can recognize a particular marker on cancer cells. Now it gets complicated: not only does our immune system recognize the abnormal signal on our cells, it also has to recognize the signal that says: “I’m just kidding, I am actually a healthy cell, don’t destroy me.” This is an added security level, called a checkpoint, so our immune system doesn’t go rogue and destroys normal cells. Usually, this checkpoint is not expressed once a cell has become cancerous and the T-cells can go ahead and

label it for destruction. Well, some cancers have found a way to put up these checkpoints in the cancerous cells and evade recognition that way. Immunotherapy using Checkpoint-blocking antibodies counteract this and basically “block the block,” giving immune cells a better chance to attack the tumor.

These advances in immunotherapy sound fantastic (and are!) and can be dramatic for some people, but immunotherapy is not a universal cancer cure. A treatment that works well for one person may do little for another. Some tumors lack a useful immune target; others prevent immune cells from entering or functioning inside the tumor. Researchers are working to identify which patients are most likely to benefit and how to overcome resistance.

Also, “using the immune system” does not automatically mean “safe.” The risks are manifold depend on the particular therapy and they each require appropriate monitoring. Could scientists someday design an immunotherapy for every illness? Probably not every illness—and certainly not with today’s knowledge. The best candidates are diseases in which the immune system plays a meaningful role and there is a target that treatment can change without causing unacceptable harm.

Immunotherapy is a collection of ways to guide the body’s defenses: teach them, strengthen them, redirect them, or rein them in. The challenge—and the promise—is choosing the right adjustment for the right disease and the right patient.