

December 2012 Newsletter

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[Current Events in Context: A True Cancer Vaccine?](#)

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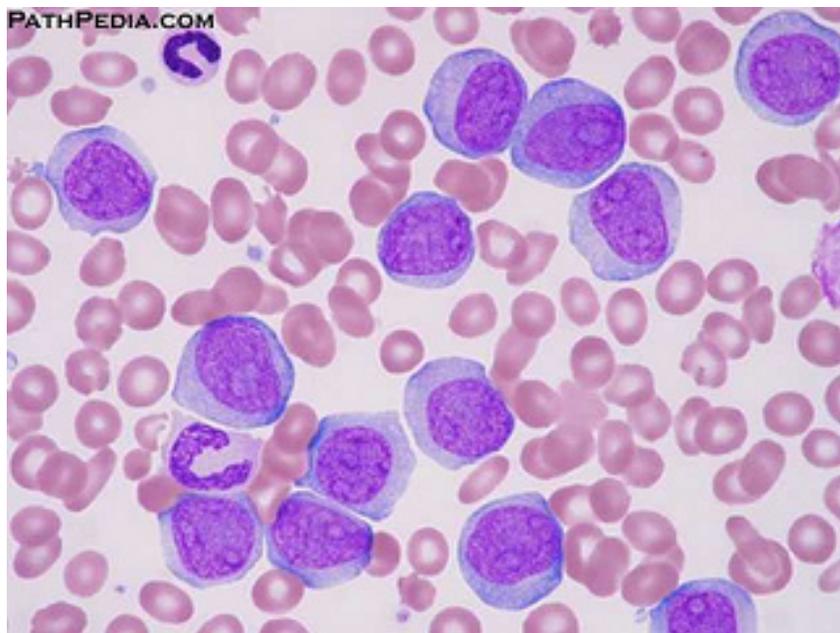


Image by PathPedia.com.

The experimental science of gene therapy has scored a major victory, and gained an adorable new spokesperson, thanks to the remarkable success of a new leukemia treatment for seven-year old Emma Whitehead.

This bright-eyed, young girl was diagnosed at age five with acute lymphoblastic leukemia, a particularly aggressive form of cancer. It causes a rapid increase in white blood cells and a breakdown in the immune system. Although advances in chemotherapy have raised the survival rate among children to 85%, Emma's two prior treatments were unsuccessful. With few remaining options, her parents elected to try an experimental treatment at the Children's Hospital in Philadelphia earlier this year.

The treatment created what amounts to a cancer vaccine that tricked Emma's immune system into fighting back against the growth of cancerous cells. Doctors reprogrammed her T-cells to attack the dysfunctional B-cells that were multiplying in her bone marrow. The process required removing some of Emma's blood, modifying her T-

cells' DNA, then injecting the new serum back into her body. By harnessing the mechanics of her immune system, doctors created a "living drug," with significant advantages over chemical treatments. Unlike chemotherapy, in which the medicine is quickly flushed out of the body, these T-cells continue to fight any reappearance of the cancer cells for the foreseeable future.

Another remarkable aspect of the treatment was the use of the HIV virus to reprogram Emma's T-cells. Scientists have long known of HIV's effectiveness at attaching to certain cells and replacing their DNA with its own—that's what makes AIDS such a difficult disease to treat. By turning that harmful trait into a virtue, however, scientists made HIV into a medical tool. They created a disabled form of the HIV virus that contained their own customized DNA, and it became the Trojan horse for delivering a new set of instructions to the T-cells.

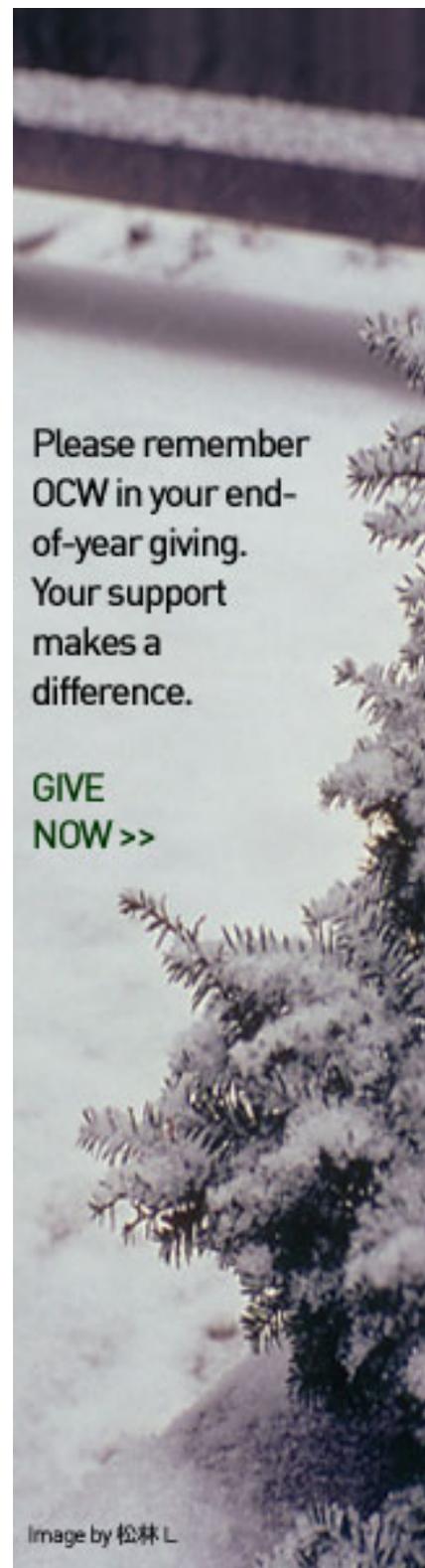
One of the most dangerous aspects of the treatment, as doctors discovered with Emma, occurs during the re-introduction of the modified T-cells into the body. As these new T-cells begin to combat their newly sworn enemies, the B-cells, the patient's immune system shifts into high gear. Controlling the resulting fever and other secondary effects became a life or death struggle for Emma. She spent a full week in intensive care before her condition stabilized.

Now, however, she has returned to school and begun living a normal life once more. The leukemia is in complete remission, and her treatment has gained national attention for its promise as a potential 21st century cure for many other diseases. For those interested in exploring these innovative new forms of cancer treatment, OCW offers several courses that speak directly to these novel biochemical cures.

- [7.341 Bench to Bedside: Molecularly Targeted Therapies in Blood Disorders and Malignancy](#) is an advanced undergraduate seminar that reviews the various types of treatments for patients with deadly blood disorders.
- [7.342 Cancer Biology: From Basic Research to the Clinic](#) is another advanced undergraduate seminar that covers the research and techniques that have evolved in fighting cancer.
- [HST.151 Principles of Pharmacology](#) focuses on the basic principles of biophysics, biochemistry and physiology as related to the mechanisms of drug action, biodistribution and metabolism.

New Courses

- [9.S915 Developmental Cognitive Neuroscience](#)
 - [16.430J Sensory-Neural Systems: Spatial Orientation from End Organs to Behavior and Adaptation](#)
 - [21F.802 Portuguese II](#)
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Updated Courses

- [18.904 Seminar in Topology](#)
- [24.04J Justice](#)
- [SP.722J D-Lab II: Design](#)

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Highlights for High School



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> [See the ChemLab Boot Camp series](#)

Views from Supporters



"As I did last year, myself and others believe in the way of knowledge to unlock human potential, and probably/ hopefully beyond...

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THANK YOU for continuing the project, hats off to everyone and other

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