

[Edward Donnall Thomas \(1920-2012\)](#) ^[1]

By: Lopez, Angel Keywords: [Biography](#) ^[2] [Stem cells](#) ^[3] [Medical procedures](#) ^[4] [Regeneration](#) ^[5]

[Edward Donnall Thomas](#) ^[6], an American physician and scientist, gained recognition in the scientific community for conducting the first bone marrow transplant, a pioneering form of hematopoietic stem cell transplantation (HSCT). Bone marrow transplants are considered to be the first successful example of tissue engineering, a field within [regenerative medicine](#) ^[7] that uses [hematopoietic stem cells](#) ^[8] (HSCs) as a vehicle for treatment. Prior to Thomas's groundbreaking work, most blood-borne diseases, including certain inherited and autoimmune diseases, were considered lethal.

Thomas was born on 15 March 1920 in Mart, Texas, to Angie Hill Donnall and physician Edward E. Thomas. During his years at Mart High School, according to Thomas, he was unable to distinguish himself as a student even in a class as small as fifteen students. In 1937 he attended the University of Texas, Austin, where he developed a strong passion for chemistry and chemical engineering. By 1943 Thomas had been awarded both BA and MA degrees. While working as a waiter in the women's dormitory at the University of Texas, he met his future wife, Dorothy Martin. In 1943, Thomas was accepted to [Harvard Medical School](#) ^[9]; he graduated in 1947. His wife, who originally was studying journalism, began working as a lab assistant to support them while he obtained his medical degree. Her background in writing and laboratory techniques later helped him with his scientific research.

While in medical school Thomas became interested in bone marrow and leukemia, an interest that was strengthened through his association with Sidney Farber, who gave Thomas his first laboratory space. In addition, Thomas was given the opportunity to witness the first child whose acute lymphoblastic leukemia (ALL) was induced into remission by the use of an anti-folate. After obtaining his medical degree, Thomas became involved with several different endeavors. He completed a one-year internship in hematology working under friend and colleague Clement Finch, served as a physician in the US Army from 1948 to 1950, and completed postdoctoral work on stimulating factors of bone marrow under John Loofborow at the [Massachusetts Institute of Technology](#) ^[10] (MIT). Thomas's original interest in stimulating factors came after following Allan Erslev's attempts to induce erythropoietin, where Thomas hoped to apply this knowledge to bone marrow stimulation. Last, Thomas completed a two-year medical residency, attaining the status of chief resident in his second year at Peter Bent Brigham Hospital. During his time as a resident he assisted his colleague Joseph Murray with the first human kidney transplant. All of these experiences helped prepare him for his future work with bone marrow transplants.

Thomas also used research from other prominent scientists, specifically Leon Jacobson and Egon Lorenz, to expand his knowledge on bone marrow. Jacobson had demonstrated that mice could be protected from lethal irradiation by protecting the organism's spleen. Lorenz showed the same protection from irradiation by giving infusions of marrow to mice. Since it was originally believed that stimulating factors were what protected mice in these experiments, Thomas hypothesized that there were links to his research on stimulating factors of bone marrow. In 1955 an experiment by Joan M. Main and Richmond T. Prehn demonstrated that mice saved from lethal irradiation by marrow infusion would accept skin grafts from donor mice demonstrating possible tolerance. Moreover, a demonstration by Charles Edmund Ford and his colleagues that same year showed that, rather than acting as stimulating factors, the transfused bone marrow cells were responsible for protecting the mice. Thus, Thomas left stimulating factor research behind, and moved to Mary Imogene Basset Hospital in Cooperstown, New York, upon Joseph Ferrebee's request. Using canines as their test subjects, Ferrebee and Thomas investigated several aspects of bone marrow transplantation.

In 1957 Thomas and his colleagues published the paper "Intravenous Infusion," in which they highlighted two important facts: large amounts of bone marrow samples can be safely infused into patients when correctly prepared, and transplantation between unrelated patients was going to be very difficult due to rejection. In 1959, Thomas and his colleagues reported that they had conducted the first successful human bone marrow transplant with twin children. For the next few years Thomas focused on trying to overcome the difficulty of tissue rejection. In 1963 he moved to Seattle, Washington, to continue his research on transplantation at Seattle Public Health Hospital. Again, using canines as the test subjects, he discovered the importance of human leukocyte antigen (HLA) typing for allogenic (between unrelated individuals) transplantation. In 1967 Thomas began to develop a team to conduct an allogenic transplant, but in 1968 [Robert Alan Good](#) ^[11] and his team became the first to achieve this goal, curing a child of an autoimmune disease. Following Good's transplant success, Thomas and his team conducted their own allogenic transplant, successfully treating a child with advanced leukemia.

In 1975 Thomas and his team moved to the [Fred Hutchinson Cancer Research Center](#) ^[12] in Seattle, Washington, where they continued their research with bone marrow and carried out more than 4,000 human blood marrow transplants. In 1990 Thomas retired from patient care and took up a career of advocating for stem cell research. In 1990 he won the [Nobel Prize in Physiology or Medicine](#) ^[13] for his work on bone marrow transplantation, sharing the prestigious award with his friend and colleague Joseph Murray. His pioneering work earned Thomas the title of "the father of bone marrow transplants."

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Publisher

Arizona State University. School of Life Sciences. Center for Biology and Society. Embryo Project Encyclopedia.

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Last Modified

Wednesday, July 4, 2018 - 04:40

DC Date Accessioned

Friday, May 25, 2012 - 15:48

DC Date Available

Friday, May 25, 2012 - 15:48

DC Date Created

2010-11-19

DC Date Created Standard

Friday, November 19, 2010 - 07:00

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