Robert Alan Good (1922-2003)

Robert Alan Good was an American physician and scientific researcher who explored the cellular mechanisms of immunity. His research and discoveries earned him the label of "father of modern immunology." Though his work in immunology is considered his greatest scientific achievement, Good is also well known for his work with tissue engineering. From his research on immunology, Good was able to perform the first successful allogeneic (donor and recipient are unrelated) bone marrow transplant. A bone marrow transplant is a form of hematopoietic stem cell transplant in which hematopoietic stem cells are infused into a patient to treat various diseases of the blood including some autoimmune and inherited conditions, and cancer. Following his success with bone marrow transplants, Good established a bone marrow transplantation program for children at the University of South Florida.

Good was born on 21 May 1922 in Crosby, Minnesota, the second of four sons born to two educators, Ethel Whitcomb and Roy Homer Good. At age five Good decided to pursue a career in medicine to find a cure for cancer after observing his father's unsuccessful fight with testicular cancer. Good was only six years old when his father died. In 1941 he was accepted to the medical school at the University of Minnesota, but then contracted a severe case of Guillain-Barré disease that left him bedridden with total body paralysis. The Dean removed his name from the accepted student list due to his illness, but Good made a personal plea, claiming that while he had physical disabilities, his mental capabilities were intact. He not only retained his matriculation seat for that year, but also decided to apply for the MD/PhD program, which was then a new program at the University of Minnesota. He graduated with honors in both degrees in only three years (1944), and completed a residency in pediatrics the following year.

After his residency, Good sought to understand the cellular basis of immunology including its evolution, development, and mechanisms of protecting an organism. Good's work in immunology began in 1944 with his investigation of plasma cells. A year later he took up a one-year fellowship at the Rockefeller Institute of Medical Research where he was influenced by geneticist Maclyn McCarty and immunologist Henry Kunkel. He later joined the staff at the University of Minnesota where he established a school of immunology for researchers to study the development and phylogeny of immunology in conjunction with inherited immune system defects.

By 1950 Good had conceived of the idea of a two-component system of immunity, according to which there are two lineages of immune cells. In 1954 Good began research on the thymus and immunity. In 1962 he presented his findings on the role of the thymus in the development of cell-mediated immune responses. In this presentation Good demonstrated, with the help of Jacques Miller's contributions, that two lineages of immune cells do exist, supporting his theory of a two-component system of immunity. He concluded that the thymus is responsible for producing T-cells, necessary for cell-mediated immunity, and that B-cells, responsible for producing antibodies, are derived from bone marrow in mammals and the bursa of Fabricius (an outpouching of the cloaca) in birds. Moreover, Good detailed the development of each immune cell lineage within the lymphoreticular system using analyses of lymph nodes, tonsils, and spleens at different stages of embryogenesis of thymectomized (removal of the thymus) mice and bursectomized (removal of the bursa) chickens. Good's work with Max Cooper led to the description of the sequential development of B-cell immunoglobulin classes produced during embryogenesis.

After these landmark discoveries, Good put his research into practice. The same year that he presented his findings on the role of the thymus in immunity (1962), Good identified the crucial role T-cells play in the rejection of skin allografts in mice. He also demonstrated that spleen cells trans-

planted into mice lacking a thymus were not rejected, and thus did not result in graft-versus-host disease (GVHD). This led to the investigation of grafts lacking T-cells. In 1968 Good and his colleagues observed the effectiveness of human skin allografts in hosts matched by mixed lymphocyte culture (MLC) and human leukocyte antigen (HLA) serological typing. Through this observation, Good and his colleagues hypothesized that a compatible sibling donor for a child suffering from severe combined immunodeficiency (SCID) could be found by matching MLC and HLA typing. This research established a foundation for the first successful allogeneic bone marrow transplant in August 1968, on a five-month-old boy, a procedure overseen by Good. The boy's eight-year-old sister was determined to be a matching donor. The transplantation of bone marrow from his sibling cured the child of his SCID and reconstituted his lymphoid and hematopoietic function. The success of this procedure led to the establishment of HLA and MLC compatibility as a standard for conducting a successful bone marrow transplant.

Following his teaching career, Good changed his focus to cancer research. He became the president and director of the Sloan-Kettering Institute for Cancer Research in New York in 1973. In 1982 Good moved to the University of Oklahoma where he became the head of the cancer center at the Oklahoma Medical Research Foundation. After twelve years of cancer research, Good became chairman of the Department of Pediatrics at the University of South Florida in 1985. In addition, Good established a bone marrow transplantation program for children at All Children's Hospital. Amidst all his scientific research, Good married Noorbibi K. Day in 1986. In 2001 Good relinquished his position as physician-in-chief at All Children's Hospital in St. Petersburg.

While his career was already full of academic achievements, Good also received copious awards and held positions in the American Association of Immunology (AAI). In 1962 Good joined the AAI, and worked on the organization's council from 1970 to 1975. From 1975 to 1977 he was president of the AAI. In 1970 Good received the Lasker Award for his contribution to the understanding of immunity mechanisms. In 1973 he received the Karnofsky award, the highest scientific honor offered by the American Society of Clinical Oncology (ASCO), for his work on cancer. In addition, Good received the John Howland Award in 1987 for his dedication to pediatrics. Overall, Good was well recognized across a wide array of medical fields for his scientific contributions. In embryology, his pioneering work in tissue engineering—conducting the first successful bone marrow transplant—and his description of the development of the thymus, remain highlights of his life. Good lost his battle with esophageal cancer on 13 June 2003.

Sources

1. Cooper, Max D. "Robert A. Good May 21, 1922–June 13, 2003." Journal of Immunology 171 (2003): 6318–19.
2. O'Reilly, Richard F. "In Memoriam: Robert Alan Good, MD, PhD." Biology of Blood and Marrow Transplantation 9 (2003): 608–09.
3. Pickette, Diana, and Noorbibi Day-Good. "Robert A. Good: Physician, Scholar, Scientist, Teacher Vignettes." Immunologic Research 40 (2008): 49–86.
4. Wright, Pierce. "Robert Alan Good." The Lancet 362 (2003): 1161.