

In Memoriam

John W. Kirklin, MD

1917–2004

Denton A. Cooley, MD

It is my privilege to be asked to write a memorial for John W. Kirklin, MD, whose innovations in cardiopulmonary bypass strongly influenced the development of the field of cardiac surgery. Dr Kirklin was 86 years old when he died on April 21, 2004, from a head injury he sustained in January.

Born in Muncie, Indiana, Dr Kirklin received his undergraduate education at the University of Minnesota and earned his medical degree from Harvard Medical School. After interning at the University Hospital of Pennsylvania and the Mayo Clinic, he trained in neurosurgery at O'Reilly General Hospital in Missouri and went on to serve 2½ years as an army neurosurgeon. After his discharge from the army in 1946, Dr Kirklin worked as assistant resident to renowned pediatric surgeon Dr Robert Gross at Boston Children's Hospital. It was there that Dr Kirklin's interests shifted from neurosurgery to congenital heart disease, which became his lifelong field of expertise.

In 1950, Dr Kirklin joined the Mayo Clinic's Department of Surgery, of which he later became chairman. It was during his early years there that Dr Kirklin made what was to become his most widely recognized contribution to the practice of cardiac surgery—improving the design of the heart-lung machine that had been developed by Dr John Gibbon of Jefferson Medical College in collaboration with the International Business Machine Corporation. Dr Gibbon had had very limited success with the machine and eventually abandoned it, and some surgeons believed at the time that

cross-circulation (connecting a patient's circulatory system to that of a healthy donor, thereby using the donor's lungs to oxygenate the blood during open heart surgery) held more promise than mechanical support. However, the modifications made to Dr Gibbon's design by Dr Kirklin and his colleagues produced a heart-lung machine with a vertical screen oxygenator that enabled surgeons to repair congenital cardiac anomalies, including tetralogy of Fallot, with consistent success. The new design, although cumbersome, was sufficiently effective that it stimulated other surgeons to develop new open-heart surgery techniques.

In 1966, Dr Kirklin became surgeon-in-chief and chairman of the Department of Surgery at the University of Alabama at Birmingham (UAB), where he built one of the most respected and successful cardiovascular surgery programs in the nation and prepared many surgeons for illustrious academic careers. He also established a training program for surgical assistants at UAB, recognizing that the greater use of technology in the operating room required more specialized training than physicians' assistant programs provided at the time. In addition, Dr Kirklin supported the use of standardized treatment path-

ways and algorithmic decision-making to improve outcomes in cardiac surgery. This logical approach to medicine also led Dr Kirklin to promote the development and use of technology for continuous monitoring of patients' vital functions in the intensive care unit, a practice that has since become standard in hospitals all over the world.



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Dr Kirklin's achievements earned him global recognition. He was elected to the National Academy of Sciences' Institute of Medicine, and he served as president of the American Association for Thoracic Surgery from 1978 to 1979. He also received many awards, including the American Heart Association Research Achievement Award, the American Surgical Association Medallion for Scientific Achievement, the Rudolph Matas Award in Vascular Surgery, and honorary degrees from several domestic and foreign universities. In 1977, Dr Kirklin became the sixth recipient of the Ray C. Fish Award—the medal of the Texas Heart Institute.

His analytical mind made Dr Kirklin a respected educator and author. He was widely considered an authority on complex congenital cardiac defects, and he was highly regarded as a lecturer on cardiac surgery. Medical education

and the training of surgical residents were particularly important to him: He advocated detailed observation and refinement of individual residents' surgical techniques and stressed the importance of preparing residents for the ever-changing circumstances of the operating room. Dr Kirklin also published more than 700 manuscripts and, with New Zealand surgeon Dr Brian Barratt-Boyes, compiled the massive textbook *Cardiac Surgery*, which is still considered the authoritative reference today.

Dr Kirklin's son, James, is himself a cardiac surgeon and is presently the Director of Cardiothoracic Transplantation at UAB, as well as the author of a well-reviewed textbook on cardiac transplantation. I join with John Kirklin's family, colleagues, and friends in sympathy and with gratitude for having known this thoughtful and gifted man.

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