

Richard Doll (1912–2005)

Richard Doll was an epidemiologist and public figure in the twentieth and early twenty-first centuries. Working primarily at the University of Oxford, in Oxford, England, Doll established a definitive correlation between cigarette smoking and lung cancer. Furthermore, Doll's work helped legitimize epidemiology as a scientific discipline. Doll's research also helped establish modern guidelines for oncological studies, as well as for contemporary and future research on the effect of smoking on pregnancy and fetal development. In addition to studying the health effects of smoking, Doll also studied cervical cancer and contraceptives.

Doll was born in Hampton Hill, England, on 28 October 1912. He was the oldest son of Amy Kathleen Shaboe, a concert pianist, and her husband, Henry William Doll, a surgeon. Doll's father suffered from tremors related to early multiple sclerosis, which halted his surgical career. Attending Westminster School in Westminster, England, in his youth, Doll studied mathematics despite his father's wish for him to pursue medicine. After graduating Westminster, he failed the mathematics entry exam to Trinity College in Cambridge, England. According to Doll, he failed the exam because he had become too intoxicated on the night before.

Next, Doll turned toward medicine and was accepted to Saint Thomas's Hospital Medical School, in London, England, in 1931, where he studied until his graduation in 1937. In medical school, he became increasingly interested with society and politics and was particularly concerned with improving living standards to alleviate the burden of disease in lower-class families. He delivered infants in the ghettos of Lambeth, a neighborhood in London, England, helped found the Saint Thomas's Socialist Society, and joined the Communist party. In the early 1930s, he met Joan Mary Faulkner at a meeting of communist doctors. In 1936, he participated in a mass protest against unemployment in Jarrow, England, and fundraised for medical aid for antifascists in the Spanish Civil War. After graduating from Saint Thomas's, he joined the Royal College of Physicians headquartered in London, England.

Three days after World War II began, Doll travelled to France to serve as a medical officer to the French First Loyalists battalion. Throughout the war, he served the Allied Powers, or the political and military coalition formed by the United Kingdom, France, the United States, the Soviet Union, and their co-belligerents, as a Royal Army Medical Corps specialist aboard a British hospital vessel, aiding in the 1940 Allied evacuation of Dunkirk, France. In 1941, he was ordered to Cairo, Egypt, where he worked in an infectious disease ward. Next, he was sent to another hospital ship in the Mediterranean Sea. He returned to England in 1944 after contracting renal tuberculosis and recovered after having the infected kidney removed.

Doll proposed to Faulkner, who was married at the time, on 8 May 1945, the day of formal Allied victory in Europe. Faulkner eventually divorced her first husband and married Doll on 4 October 1949. Faulkner was unable to have future children due to infertility, and the Dolls had difficulty adopting because British adoption agencies were prejudiced against non-Christians, like Doll and Faulkner, who were both nonreligious. To circumvent those difficulties, the couple founded the secular Agnostics' Adoption Society, based in their own house. The organization quickly expanded, and the Dolls adopted two children, Nicholas and Catherine, in 1954 and 1956, respectively. In 1969, the Agnostics' Adoption Society was renamed to the Independent Adoption Society, and remained active until the religious stipulations on adoption in Britain were lifted with the passage of the 1975 Children Act.

After World War II, Doll undertook epidemiological research at the Central Middlesex Hospital in London, England. He befriended and worked briefly with Francis Avery Jones, a gastroenterologist.

Doll began studying medical statistics and analytics at the London School of Hygiene and Tropical Medicine in London, England, in 1946. There, he worked with professor Austin Bradford Hill, an epidemiologist credited with the idea of using random subjects in medical research. Hill was tasked by the British Medical Research Council, where Faulkner had become an administrator, to investigate lung cancer mortality. Noting the qualifications Doll had acquired in his work with Jones, Hill assigned Doll to assist in research on tobacco smoking. Prior to the work of Doll and Hill, few studies existed to verify the value of statistics in correlating causes to chronic diseases.

By 1947, medical professionals and researchers had acknowledged a significant rise in lung cancer cases, but some believed the rise was due to the improved diagnostic abilities of physicians. Inhalation of pollutants due to increasing urbanization was the most common theory of lung cancer onset. However, that theory did not account for the disproportionate increase in lung cancer in males over females. Due to the higher prevalence of men smoking cigarettes in comparison to women, German studies beginning in the 1920s suggested a correlation between cigarette smoking and lung cancer, but those studies did not reach scientific prominence. In 1950, Doll and Hill published an article titled "Smoking and Carcinoma of the Lung: Preliminary Report." The article renewed and supported the argument that tobacco smoking and lung cancer were significantly correlated. Compiling data from 709 patients from twenty hospitals in London and controlling independently for sex, smoking frequency, and length of time as a smoker, Doll and Hill concluded that smoking significantly increased the risk of lung cancer. Furthermore, Doll and Hill's study suggested that incidents of lung cancer may be fifty times greater in smokers who consume 25 or more cigarettes per day when compared to nonsmokers.

Doll worked with Hill until 1964. Together, they published five highly-cited research articles that strengthened the case for the correlation of tobacco use and lung cancer. Doll and Hill started the British Doctors' Study, which tracked the smoking habits and lung cancer occurrence of over 40,000 British doctors between 1951 and 2001. In 1956, that study provided statistical evidence that smoking increases the risk of lung cancer. Additionally, Doll and Hill observed higher mortality rates from heart disease and other chronic conditions among smokers.

In the early 1950s, Doll collaborated with statistician Peter Armitage and published the Armitage-Doll model of carcinogenesis. In March 1954, Armitage and Doll published "The Age Distribution of Cancer and a Multi-Stage Theory of Carcinogenesis." Armitage and Doll's analysis of mortality rate data from seventeen cancer types supported the theory that cancer results from accumulated genome mutations.

From his early work with Hill to the end of the twentieth century, Doll produced over one hundred academic publications in addition to dozens of reviews. Primarily, Doll continued to study the causes and prevalence of lung cancer, but also studied the epidemiology of leukemia, stomach cancer, stomach ulcers, heart disease, and heart attacks, in addition to the health effects of alcohol, asbestos, immunosuppressive drugs, and dietary supplements. Later in his career, his research increasingly focused on issues in women's health. For example, Doll conducted studies on the mortality and morbidity rates of women using different forms of contraception between 1968 and 1976. In 1982, he collaborated with researchers at the University of Otago Medical School, Dunedin, New Zealand, to hypothesize a correlation between women's risk of cervical cancer and the sexual activity of male partners. Doll and his colleagues found that the duration of oral contraceptive use in women proportionately reduced the occurrence of cervical cancer.

Doll received many awards and recognitions for his work. Doll was inducted as a Fellow of the Royal Society in 1966, served as Regis Professor of Medicine at Oxford University, Oxford, beginning in 1969, and received knighthood 1971. Doll contributed to the 1972 formation of the United Kingdom's National Health Service Blood and Transplant service and advocated against the practice of paying donors for blood and organs. Doll was a founding member of the World Cultural Council, based in Mexico City, Mexico. He was the chief founder of the Green College of Oxford, which formed in 1979, and he served as warden of the Green College from 1979 to 1983.

Richard Peto, a statistical epidemiologist and coworker of Doll, described Doll as elegant and well-mannered with his apparent austerity betrayed by a mischievous and nonconformist inner personality. Peto claimed in 2004 that Doll's work has prevented millions of deaths, and will continue to

prevent tens of millions more in the twenty-first century.

Doll continued his work on cancer epidemiology after the death of Joan Mary Faulkner in 2001. Doll died of heart failure on 25 July 2005 at John Radcliffe Hospital, in Oxford, England.

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