

## Leon Chesley (1908-2000)

Leon Chesley studied hypertension, or high blood pressure, in pregnant women during the mid-twentieth century. Chesley studied preeclampsia and eclampsia, two hypertensive disorders found in approximately five percent of all US pregnancies. In New Jersey and New York, Chesley devoted over forty years to researching preeclampsia and eclampsia, and conducted several long-term studies using the same group of women beginning from their pregnancies. Chesley's multi-decade research led to more accurate diagnosis of preeclampsia and eclampsia in pregnant women and significantly reduced the mortality of pregnant women due to hypertensive diseases.

Chesley was born Carey Commodore Chesley on 22 May 1908 to Gertrude Chesley and Leon Chesley in Montrose, Pennsylvania, the eldest of two siblings. Chesley assumed the name Leon as a tribute to his father. During his youth, Chesley and his family moved to Hop Bottom, Pennsylvania, where he later attended Susquehanna University in Selinsgrove, Pennsylvania, and graduated in 1929 after studying pre-medical sciences. In college Chesley participated on the varsity track team, managed the football and basketball teams, and was a local barber for university students. Chesley then completed his PhD in zoology at Duke University in Durham, North Carolina, in 1932. He conducted his dissertation research on metabolism and digestion in marine fish under the direction of Frank Gregory Hall, an associate professor in the biology department.

After graduating, due to the Great Depression, Chesley worked as a barber before finding employment as an assistant biophysicist at Memorial Hospital, later called the Memorial Sloan Kettering Cancer Center, in New York City, New York. At the hospital, he studied the effects of radiation and deuterium oxide, a heavier form of water, on cellular growth, and published his research in 1934. That same year, Chesley left his position at Memorial Hospital to work as a chemist at Margaret Hague Maternity Hospital in Jersey City, New Jersey. Also in 1934, Chesley married Elizabeth Rusch, and they had two children, Joan and Robert.

As a chemist, Chesley measured the levels of urine components urea and uric acid in the blood plasma of pregnant women. Samuel Cosgrove, the director of obstetrics and gynecology, encouraged Chesley to relate his clinical work to research about obstetrics and water-retaining pregnancy disorders, such as preeclampsia. Preeclampsia, diagnosed by the combined symptoms of hypertension, body swelling, and abnormal levels of protein in urine, precedes eclampsia, which is characterized by seizures that can lead to coma or death.

Chesley worked with colleagues John E. Annitto and Daniel G. Jarvis to observe whether hypertension affected women's pregnancies, using the hospital's patient records, including those prior to Chesley's arrival in 1934. In total, the researchers reexamined 218 women who attended the hospital between 1931 and 1944 with symptoms consistent with high blood pressure during their pregnancies. They reevaluated the patients' blood pressure levels, protein in urine levels, incidence of preeclampsia and eclampsia, and outcomes of later pregnancies.

In the 1947 publication of their study, Chesley and his colleagues concluded that hypertension was not correlated with abnormal pregnancies, except in cases of unmanaged preeclampsia or eclampsia. The study marked the first of several in which Chesley and his colleagues studied the same patients to compare how symptoms of hypertensive disorders, such as high blood pressure, water retention, protein in urine, change over multiple pregnancies and multiple decades. Despite their conclusion that repeated pregnancies were not dangerous to hypertensive women, the researchers emphasized the importance of monitoring pregnancies closely for signs of hypertension that could lead to preeclampsia and eclampsia.

While at Margaret Hague Maternity Hospital, Chesley also conducted research on other methods of diagnosing preeclampsia, as well as other pregnancy-related disorders. In 1945 Chesley published research that provided benchmarks of urine waste components, including levels of inulin, urea, and uric acid, in pregnant women. Those values enabled clinicians to use urine analyses to more accurately monitor pregnancies. Chesley also studied the relation of cardiac disease to hypertension and pregnancy, similarly collecting data using patient records from the 1930s and 1940s at Margaret Hague Memorial Hospital.

In 1948, Chesley's first marriage ended. He remarried a year later to Eleanor Brudnicki, with whom he had three children, Donald, Susan, and Kathy. In 1953, after nineteen years at Margaret Hague Memorial Hospital, Chesley became an associate professor in obstetrics and gynecology at the State University of New York (SUNY) Downstate Medical Center in Brooklyn, New York. He also began collaborating with researchers at Kings County Hospital in Brooklyn, New York, due to the medical school's affiliation with the hospital. In 1958, Chesley accepted a full professorship at SUNY Downstate Medical Center.

While working in Brooklyn, Chesley continued to collaborate with his former colleagues at Margaret Hague Memorial Hospital. Using the same patient records in the 1947 study, Chesley studied genetic influences on preeclampsia. In 1961, Chesley, Annitto, and Robert Cosgrove, a physician at Margaret Hague Memorial Hospital, reported that sisters and daughters of eclamptic women had increased rates of preeclampsia and eclampsia in their first pregnancies. In 1968 with the same data set, Chesley and colleagues further showed that granddaughters as well as daughters of eclamptic women had much higher incidences of preeclampsia.

In 1978, Chesley authored the textbook, *Hypertensive Disorders in Pregnancy*, a comprehensive source of information for obstetricians and medical teachers regarding hypertensive disorders found in pregnancy. Chesley presented the histories, diagnoses, management plans, and other existing information about the subject. Updated editions of Chesley's textbook have been released, with the fourth edition being published in 2014.

After retiring from SUNY Downstate in the late 1970s, Chesley published his latest results from his study of the correlations between heart disease and pregnancy in 1980. The study extended the work begun by Harold Gorenberg, a physician at Margaret Hague Maternity Hospital. By 1975, Chesley had spent over twenty years periodically reexamining 134 women, admitted to the hospital between 1931 and 1943, who were diagnosed with severe rheumatic cardiac disease and had successful pregnancies. Rheumatic cardiac disease is permanent heart damage that occurs from rheumatic fever, and can be exacerbated by pregnancy, which affects women's blood flow and cardiac output. Chesley found that women with cardiac diseases who also had successful pregnancies were not at higher risk of death or other adverse outcomes. That evidence indicated that having rheumatic cardiac disease while pregnant did not necessarily result in worse health.

Throughout the 1980s, Chesley continued to research and publish his work related to the diagnosis, management, and genetic influences of preeclampsia and eclampsia. In 1986, Chesley and Desmond Cooper, a biology professor at Macquarie University in Sydney, Australia, argued that eclampsia was highly heritable, implying that the condition was transmissible from parent to offspring. Their study was an early indication that the development of preeclampsia might be predicted through existence of a single gene. Chesley and Cooper used the same data set that Chesley had used in previous studies.

Towards the end of his life, Chesley suffered a brainstem stroke that destroyed his hearing and required him to communicate using typed messages. However, he continued to contribute publications regarding his life work, eventually totaling over 150 scientific papers. Chesley's wife Brudnicki supported Chesley during his failing health until she died in 1994. At 92 years old, Chesley published his final paper on preeclampsia from his residence in Nassau County, New York, before he died on 29 March 2000.

## Sources

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