

[Arthur Earl Walker \(1907-1995\)](#) ^[1]

By: Bohnenberger, Alexandra Keywords: [Dandy-Walker Syndrome](#) ^[2] [Development](#) ^[3] [Neurology](#) ^[4]

Arthur Earl Walker was a medical researcher and physician who studied the brain and neurosurgery in the United States during the twentieth century. Walker examined the connections of the thalamus to the rest of the brain and how the thalamus coordinates sensory signals. The thalamus is a cluster of [nerve cells](#) ^[5] located between the two hemispheres of the brain and it is responsible for consciousness and sensory interpretation. While studying the thalamus, Walker noted that cerebral spinal fluid, the clear fluid surrounding the brain and spinal cord, sometimes became obstructed in certain parts of the brain in infants. Scientists linked the cerebral spinal fluid obstruction with a congenital brain malformation, later called Dandy-Walker Syndrome. Walker's work on the brain and cerebral spinal fluid enabled early diagnosis and treatment for complications in the development of the brain.

Walker was born in 1907 in Winnipeg, Manitoba. To finance his university education, Walker worked at a psychiatric hospital in Edmonton, Alberta. In Edmonton, he worked with mentally ill, epileptic, and heavily sedated patients. According to historian Ernst Niedermeyer, Walker's experiences with those patients led him to consider a career as a psychiatrist to improve psychiatric care. However, after completing his undergraduate degree at the University of Alberta in Edmonton, Walker instead chose to pursue a medical degree in neurosurgery, also at the University of Alberta. In 1930, he received his medical degree from the University of Alberta, and the following year he completed a medical internship at the Toronto Western Hospital in Toronto, Ontario.

In 1932, Walker moved to Chicago, Illinois, to start his medical residency. There, he worked in the division of [neurology](#) ^[6] and neurosurgery at the [University of Chicago](#) ^[7] in Chicago, Illinois. During his residency, Walker worked with Percival Bailey, who studied brain tumors. Walker's research focused on the thalamus in primates. The thalamus is a cluster of [nerve cells](#) ^[5] responsible for consciousness and sensory interpretation located between the two hemispheres of the brain. Walker specifically studied the thalamus in Macaque monkeys (*Simia inuus* ^[8]), and he found that in primates, the thalamus is responsible for transferring sensory information from the nerves in the body to the cerebral cortex, the outer layer of neural tissue surrounding the cerebrum that plays a role in higher level cognitive functions.

In 1935, Walker received a Rockefeller Fellowship to continue his neurological studies at Yale University in New Haven, Connecticut. In 1937, as a part of his fellowship, Walker moved to study at the University of Amsterdam in Amsterdam, Netherlands, to continue his research on the thalamus. Walker returned to the [University of Chicago](#) ^[7] at the end of 1937 as a neurological surgery instructor. The next year, Walker published *The Primate Thalamus* on his work with the anatomy and function of the thalamus in primates. Walker's anatomical descriptions and observations of the thalamus clarified how the thalamus communicates with the rest of the brain.

At the [University of Chicago](#) ^[7], Walker also studied cavities of the brain, called ventricles. In particular, he observed the ventricle obstructions that impede the flow of cerebral spinal fluid. He examined the openings of the ventricle in the lower region of the brain called foramina and observed obstructions in the foramina of Luschka and foramen of Magendie. Walker recognized that the cause of the obstruction was a congenital brain malformation. Walker's research later led to the recognition of Dandy-Walker syndrome, a congenital brain malformation characterized by the formation of cysts that obstruct the flow of cerebrospinal fluid and the absence of the medial part of the brain. Walter Edward Dandy, a neurosurgeon at [Johns Hopkins Hospital](#) ^[9] in Baltimore, Maryland, independently observed similar obstructed foramina. Due to his research in neurosurgery, Walker's received membership in the American Neurological Association in 1940.

Walker joined the US Army in December of 1941 when the US entered World War II. Walker worked in the neurosurgical service department in charge of patients with post-traumatic epilepsy at the Cushing General Hospital in Framingham, Massachusetts. Post-traumatic epilepsy is a form of epilepsy caused by physical brain damage, often causing patients to suffer repeated seizures of uncontrolled bodily convulsions. During the 1940s, physicians often applied the antibiotic penicillin directly to the brain injury to prevent infection. However, while working with patients with post-traumatic epilepsy, Walker observed that topical application of penicillin to brain caused epileptic seizures due to the toxicity of penicillin interacting with the brain's tissue.

Walker studied the relationship of brain structures and electric activity of the brain during seizures. To examine that, he used a non-invasive method to record electric activity of the brain along the scalp, called electroencephalography (EEG). Using the EEG, Walker examined the electrical changes caused by cerebral concussion, traumatically induced alteration in mental status, as well as penicillin induced seizures in mice, cats, and monkeys. He found that cerebral structures may relate to seizures. Walker also found that limbic structures, a set of brain structures controlling emotions and memory, was closely linked to seizure activity. Previously, researchers had hypothesized that the thalamus was the center of seizure activity. Walker's work on epilepsy not only led him to new discoveries but also perfected his use of electrodes in EEG's and led to his election as

president to the American Electroencephalography Society later in 1955.

After completing his military service, Walker accepted a position as head of the division for neurological surgery at Johns Hopkins Medical School and Hospital in Baltimore, Maryland, in 1947. At Johns Hopkins, Walker emphasized and implemented training for residents in special types of neurosurgery. The program required seven years of study for American medical residents, including research, clinical, and surgical duties.

Following his research on epilepsy, Walker became involved in international affairs regarding epilepsy. He entered the US Public Health Services program in 1968 to study epilepsy in India. The neurosurgery-training program Walker established at Johns Hopkins in earlier years accepted young residents from developing nations to join the program, an uncommon practice at that time. After they completed their training, residents often returned to their home country. For his international contributions, Walker became president of the International League Against Epilepsy, a position he held from 1953 to 1961, and of the American Board of Neurological Surgery in 1956. Additionally, he received numerous honorary memberships and degrees.

At the age of 65, after his retirement from Johns Hopkins in 1972, Walker became a professor emeritus for research and teaching in the department of [neurology](#)^[6] at the [University of New Mexico](#)^[10] School of Medicine in Albuquerque, New Mexico. There, Walker studied the phenomenon called brain death, which is the irreversible loss of brain function. He studied not only on the physiology and pathology but also on the moral and ethical implications attached to brain death. In 1981, Walker published his research on the topic in his book *Cerebral Death*. He retired from his position as professor in 1993. Walker died on 1 January 1995 of a heart attack near Tucson, Arizona.

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Arthur Earl Walker was a medical researcher and physician who studied the brain and neurosurgery in the United States during the twentieth century. Walker examined the connections of the thalamus to the rest of the brain and how the thalamus coordinates sensory signals. The thalamus is a cluster of nerve cells located between the two hemispheres of the brain and it is responsible for consciousness and sensory interpretation. While studying the thalamus, Walker noticed that cerebral spinal fluid, the clear fluid surrounding the brain and spinal cord, sometimes became obstructed in certain parts of the brain in infants. Scientists linked the cerebral spinal fluid obstruction with a congenital brain malformation, later called Dandy-Walker Syndrome. Walker's work on the brain and cerebral spinal fluid enabled early diagnosis and treatment for complications in the development of the brain.

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Topic

[People](#) ^[29]

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- [1] <https://embryo.asu.edu/pages/arthur-earl-walker-1907-1995>
- [2] <https://embryo.asu.edu/keywords/dandy-walker-syndrome>
- [3] <https://embryo.asu.edu/keywords/development>
- [4] <https://embryo.asu.edu/keywords/neurology>
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- [6] <https://embryo.asu.edu/search?text=neurology>
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- [25] <https://embryo.asu.edu/medical-subject-headings/dandy-walker-malformation>
- [26] <https://embryo.asu.edu/medical-subject-headings/nervous-system-malformations>
- [27] <https://embryo.asu.edu/medical-subject-headings/thalamus>
- [28] <https://embryo.asu.edu/medical-subject-headings/neurosurgery>
- [29] <https://embryo.asu.edu/topics/people>
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