Dorothy Andersen (1901–1963) [1]

By: Gerais, Reem Keywords: Dorothy Andersen [2]

Dorothy Andersen studied cystic fibrosis [3] in the United States during the early 1900s. In 1935, Andersen discovered lesions in the pancreas of an infant during an autopsy, which led her to classify a condition she named cystic fibrosis [3] of the pancreas. In 1938, Andersen became the first to thoroughly describe symptoms of the medical condition cystic fibrosis [3]. Commonly mistaken for celiac disease prior to the 1900s, Andersen defined cystic fibrosis [3] as the build-up of pancreatic fluid in the body caused by the blockage of pancreatic ducts, and she determined that the two conditions were symptomatically different. Andersen developed an early method for diagnosing cystic fibrosis [3]. By conceptualizing cystic fibrosis [3] and defining its symptoms, Andersen laid the foundation for treatments that enabled infants diagnosed with the disease to survive into adulthood.

Andersen was born in Asheville, North Carolina, on 15 May 1901, the only child born to Mary Lousie Manson and Hans Peter Andersen. In 1914, following the death of her father, Andersen and her mother moved to Saint Johnsbury, Vermont. In Vermont, Andersen became the sole provider for her mother until her mother's death in 1920. While supporting herself, Andersen attended Saint Johnsbury Academy in St. Johnsbury until she graduated in 1918. She then matriculated to Mount Holyoke College in South Hadley, Massachusetts. Andersen graduated from Mount Holyoke College in 1922, and began to pursue medicine.

In 1922, Andersen began medical school at Johns Hopkins School of Medicine in Baltimore, Maryland. While in medical school, she assisted one of her professors who later became her mentor, Florence Sabin, with a study of the lymphatic system in chick [4] embryos. The lymphatic system, part of the immune system, transports lymph fluid composed of white blood cells throughout the body. The lymphatic system also transports bacteria to lymph nodes where they are degraded. While researching with Sabin, Andersen published two papers on the development of the lymphatic system and its role in the reproductive system in female pigs.

After graduating from Johns Hopkins with a medical degree in 1926, Andersen began teaching anatomy at the University of Rochester in Rochester, New York. She held the teaching position for a year before applying for a surgical residency program at Strong Hospital in Rochester. Strong Hospital had not previously awarded residency positions to female applicants. According to historians, Andersen was denied the position due solely to her gender.

Unable to participate in a surgical residency program at Strong Hospital, Andersen focused on medical research and joined Columbia University's College of Physicians and Surgeons' department of pathology in New York City, New York, in 1930. As a research assistant, Andersen studied the relationship between the female reproductive system and endocrine glands, organs in the body that supply blood with hormones [5]. Later that year, Andersen became an instructor in pathology at Columbia College of Physicians and Surgeons. In 1931, Andersen pursued a doctoral degree specializing in endocrinology [6] from Columbia University [7] in New York.

In 1935, Andersen accepted an assistant pathologist position at Columbia-Presbyterian Medical Center's Babies Hospital in New York City. There, she investigated heart malformations in infants after their death. In 1935, she examined the heart of an infant whose death doctors suspected was caused by celiac disease, a condition caused by the body's inability to digest starch. Children with symptoms of celiac disease, such as weight loss, stunted growth, and malnutrition, were placed on starch-free diets, which often eliminated all symptoms. However, Andersen noted that prior to death the infant received a starch-free diet. Unlike other infants diagnosed with celiac disease being treated in the same manner, the infant's condition did not improve and the child ultimately died.

Andersen questioned if the infant's death was caused by celiac disease and began searching for other differences between the health of the child she was studying prior to death and the health of children suffering from celiac disease. While performing the autopsy, Andersen discovered damaged tissue (lesion) in the infant's pancreas. After researching similar cases, Andersen discovered a trend of lesions on the pancreases of children who had died of what was claimed to be celiac disease. Those lesions were not present in infants who responded positively to starch-free diet treatments for celiac disease. Andersen therefore concluded that the condition she observed was not celiac disease, nor was it a condition previously defined. She named the disease cystic fibrosis [3] of the pancreas.

Cystic fibrosis (CF), as established by Andersen, referred to a disease in which abnormalities in the pancreas caused specific symptoms and defects in infants. The symptoms Andersen determined were associated with CF included fluid containing sacs in the pancreas (cysts), difficulty breathing, lung infections, and abnormally low levels of vitamin A in the body. Patients with cystic fibrosis [3] also had difficulty gaining weight and controlling hunger. In 1938, Andersen published her findings. In her paper, Andersen hypothesized that the abnormalities in the pancreas were due to blockage of the pancreatic duct, the tube in the body

that connects the pancreas with the intestine. Andersen concluded that blockage prevented the release of pancreatic enzymes that usually travel through the ducts and function in the digestive system to help the body retain and digest fat. Andersen argued that the blockages caused a build-up of the pancreatic fluid, which disrupts functions of the body including breathing and digestion. According to Andersen, the body's inability to retain fat caused the other symptoms of inadequate weight gain, hunger, and vitamin A deficiency observed in individuals with cystic fibrosis [3].

After her publication, Andersen and her team at Columbia-Presbyterian Medical Center's Babies Hospital worked to find a method to diagnose cystic fibrosis [3]. She established a technique of extracting the protein-filled fluid secreted by the duodenum, a section of the small intestine, and testing that fluid for pancreatic enzymes. Andersen tested the fluid for the pancreatic enzymes trypsin, lipase, and amylase. She found that the levels of trypsin enzymes, important in protein digestion, were significantly lower in patients with cystic fibrosis than in those without cystic fibrosis [3], while infants with many other gastrointestinal conditions maintained normal levels of the enzyme. That test of pancreatic enzymes became one of the first techniques for diagnosing cystic fibrosis [3].

Due to her experience with heart abnormalities in infants, in 1940, Columbia-Presbyterian Memorial Center's Babies Hospital invited Andersen to help develop training programs for physicians preparing to become cardiac surgeons. She helped design many of the first courses used by hospitals to train their doctors in cardiac surgery. The Babies Hospital required all physicians to complete Andersen's established training course before becoming cardiac surgeons.

In 1952, the Babies Hospital appointed Andersen chief of pathology. In 1958 the College of Physicians and Surgeons named Andersen a full professor of pathology. While at Columbia-Presbyterian, Andersen completed her final research paper on cystic fibrosis [3]. That paper focused on cystic fibrosis [3] in adults instead of in infants. In the 1940s, scientists discovered the drug penicillin could be used to treat the symptoms of cystic fibrosis [3], allowing those diagnosed with the disease to survive into adulthood. The penicillin killed bacteria that caused infections in patients diagnosed with cystic fibrosis [3] including bronchitis in the lungs, making cystic fibrosis [3] a less life-threatening illness for young children. Her later work described methods of diagnosing cystic fibrosis [3] in adults as well as understanding its affect on the adult body.

Throughout her life, Andersen enjoyed canoeing, swimming, skiing, hiking, and carpentry. In 1962, after years of heavy smoking, Andersen was diagnosed with lung cancer. On 3 March 1963, Andersen died of the disease while living in New York City. Following her death, Andersen received the Distinguished Service Medal by the Columbia-Presbyterian Medical Center.

Sources

1. Andersen, Dorothy. "Cystic Fibrosis of the Pancreas and its Relation to Celiac Disease." *The American Journal of Diseases of Children* 56 (1938): 344–99.
2. Andersen, Dorothy. "Pancreatic Enzymes in the Duodenal Juice in the Celiac Syndrome." *Archives of Pediatrics and Adolescent Medicine* 63 (1942): 643.
3. Andersen, Dorothy, and Warren Sperry. "A Study of Cholesterol in the Adrenal Gland in Different Phases of Reproduction in the Female Rat." *The Journal of Physiology* 77 (1933): 159–73. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1395113/ [8] (Accessed March 28, 2016).
4. Boyd, George, Brian McNamara, Keith Suckling, and Douglas Tocher. "Cholesterol metabolism in the adrenal cortex." *Journal of steroid biochemistry* 19 (1983): 1017–1027.
5. Lobitz, Stephan, and Eunike Velleuer. "Guido Fanconi (1892–1979): A Jack of All Trades." *Nature Reviews Cancer* 6 (2006): 893–8.
6. Sabin, Florence R. "Studies on the origin of blood vessels and of red corpuscles as seen in the living blastoderm [9] of the chick [4] during the second day of incubation." *Contributions to Embryology* 9 (1920): 213–262.
7. Sicherman, Barbara, and Carol Green. *Notable American Women: The Modern Period: a Biographical Dictionary*. Cambridge: Harvard University Press [10], 1980.
8. U.S. National Library of Medicine. "Doctor Dorpthy Hansen Andersen." National Institute of Health. http://www.nlm.nih.gov/changingthefaceof medicine/physicians/biography_8.html [11] (Accessed September 05, 2014).
9. US National Library of Medicine. "The Florence R. Sabin Papers." National Institute of Health. http://profiles.nlm.nih.gov/ps/retrieve/Narrative/RR/p-nid/89 [12] (Accessed September 10, 2014).
10. Windsor, Laura Lynn. *Women in Medicine: An Encyclopedia*. Santa Barbara: ABC–CLIO, 2002.

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