Historical note

How Vivien Thomas changed medicine and became a symbol of fighting racism in science: His contribution to the treatment of Tetralogy of Fallot

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Abstract

The story of Vivien Thomas (1910-1985) is about a person who changed the course of cardiothoracic surgery. Through double standards and prejudice in society, due to the color of his skin, his accomplishments were not duly recognized.

Together with the physician Alfred Blalock (1899-1964) and cardiologist Helen Taussig (1898-1986), Vivien Thomas developed a method of arterial shunting that helped to save the lives of thousands of children with congenital "blue baby" heart defects, including tetralogy of Fallot. Thomas was the first to perform a successful shunt operation on a dog's heart (1944) and also produced the necessary tools for its successful implementation.

Only at the age of 60 did he receive recognition for his years of work and was awarded a doctoral degree. He became the first Black person whose portrait was hung at Johns Hopkins University alongside presidents and professors of the university. His story inspired the creation of the films "Something the Lord Made" (2004) and "Partners of the Heart" (2003).

This article aims to shed light on the unrecognized contributions of Vivien Thomas and to call for the addition of his name to the Blalock-Thomas- Taussig shunt, which would be a just recognition of his contributions to the history of medicine, despite the skin color.

Key words: Tetralogy of Fallot, heart defects, congenital, Cardiac surgery procedures, Blalock-Taussig shunt, Vivien Thomas, Johns Hopkins

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Vivien Theodore Thomas was born on August 29, 1910, in New Iberia, Louisiana, USA, and was the grandson of a slave. His father was a carpenter and taught his sons his trade (1). The knowledge of working with various tools and wood, as well as the ability to plan and create complex structures - skills acquired from his father - played an important role in the life of Vivien Thomas. From an early age, Vivien learned his parents' lesson: "Whatever you do, always do your best" (2). Thomas was always determined and hardworking, and by the time he finished high school, he had become a fully trained carpenter.

However, he had a strong passion for medicine. He graduated from high school in Nashville, Tennessee, USA, and raised the necessary funds for his education. Thomas enrolled in a pre-medical course at Tennessee Agricultural and Industrial College, intending to later attend medical.

The Great Depression (1929-1941) had its impact. Due to the bank failures, Thomas lost all his savings and was forced to leave school and temporarily postpone his dream of becoming a doctor in search of work (1, 3-5). In 1930, through his friend Charles Manlove (1910-1989), who worked at Vanderbilt University, Thomas learned about a vacancy for a laboratory assistant for a 30-year-old surgeon and scientist named Alfred Blalock (1899-1964). Thomas was warned by his friend that working with Blalock could be difficult, but he decided to take the risk.

On February 10, 1930, Vivien Thomas entered Blalock's laboratory. This day became decisive in the history of heart surgery. In the interview, Blalock told Thomas: "I'm looking for someone in the laboratory whom I can teach to do anything I can do and maybe do things I can’t do." (2, 6).

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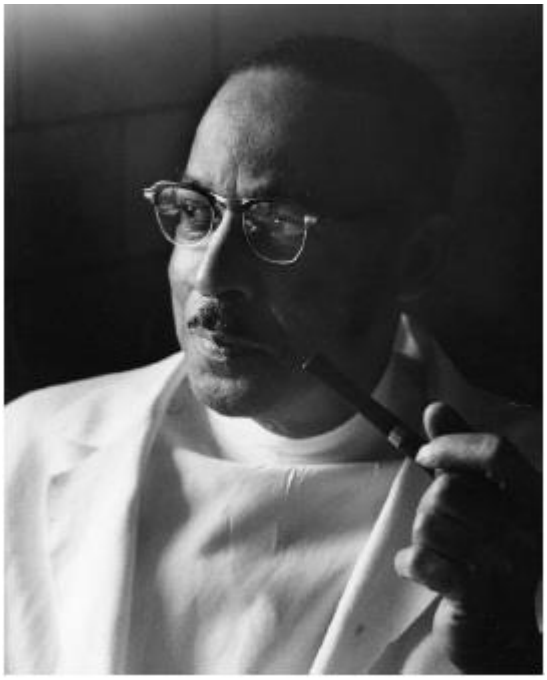

Figure 1. Vivien Thomas (1910-1985), the inventor of the Blalock-Taussig shunt c. 1970s. https://exhibits.library.jhu.edu/items/show/1257

Thomas's first impression of Blalock was that the man knew exactly what he wanted. Probably, Blalock noticed something similar in the young well-mannered man and hired him (2).

Initially, Thomas's job involved cleaning the laboratory and clearing animal cages used for experiments. His curiosity and thirst for knowledge allowed him to take an active part in experiments related to the study of the causes of shock, which Blalock was working on (7). Vivienne calculated the equations needed for the experiments and compiled accurate reports. After just one month of work, Vivien was already conducting experiments on his own, performing complex and delicate manipulations. Blalock was impressed by Vivien's talent and perseverance (7). According to the research results, it was found that the cause of traumatic shock is the loss of intravascular fluid. This discovery had significant clinical significance and was responsible for saving the lives of a large number of soldiers during World War II (1939-1945) (7).

At that time, they were also working on creating a model of arterial hypertension, but their experiments were unsuccessful (1).

The relationship between the two men was built on deep mutual respect throughout many years of collaboration. Thomas and Blalock often stayed late in the lab discussing scientific topics. Due to the segregation between white and colored people at that time, the two men could only freely communicate in the laboratory. The friendship outside the laboratory threatened Blalock, as a white person, with sanctions. A clear boundary separated them, and neither of them was supposed to cross outside the laboratory. Thomas could only attend events organized by Blalock as a bartender. Similarly, Vivien was unable to attend Blalock's 60th birthday celebration due to the hotel's rules regarding black people (8, 9).

Thomas was appointed as a senior research associate, but as later revealed in a casual conversation with another black employee, he was paid the salary of a janitor (9). The issue of finances was always painful for him. And only at Blalock’s demand was his pay slightly increased.

In 1937, Alfred Blalock was offered a prestigious position at the Henry Ford Hospital in Detroit. The main condition he had was that Thomas would also be employed. The offer was rejected due to the hospital's strict and unwavering policy on hiring black individuals (2).

Blalock understood how important Thomas was to him. He once said that Thomas's hands were more important to him than his own (5). In 1941, Blalock was offered the position of chief surgeon at his alma mater, Johns Hopkins. This time his conditions were met. For Thomas, this relocation was a difficult decision, as he had to leave his own built house, and also give up financial stability (8). The Johns Hopkins Hospital was a reflection of the racially segregated community in Baltimore, Maryland, USA. This was a clear segregation of black and white people. Even after their death, their bodies were kept in different refrigerators.

Thomas, dressed in a white lab coat, would make people stop in the hospital hallways (5, 7, 9). Vivien worked tirelessly in the laboratory to achieve the impossible. Here, he performed the first surgical treatment of transposition of the great arteries on one of the laboratory dogs completely independently. Blalock praised Vivien's work with the following comment: "Vivien, it looks like something that God made." Later, Blalock would describe this procedure in his article and performed this palliative operation on a patient in 1948 (10, 11).

It was at the university clinic of Hopkins in 1943 that Blalock and Thomas met one of the first female cardiologists, Helen Taussig. She approached them in search of surgical treatment for Tetralogy of Fallot, also known as "blue baby syndrome". Tetralogy of Fallot is a congenital heart disease consisting of infundibular pulmonary stenosis, overriding aorta, ventricular septal defect, and right ventricular hypertrophy. Due to the ventricular septal defect, oxygenated and deoxygenated blood mixes in the left ventricle, and the mixed blood flows out of both ventricles through the aorta. As a result, the lungs, and eventually, and eventually all other organs, receive insufficiently oxygenated blood, leading to cyanosis and shortness of breath. This congenital heart defect took the lives of thousands of children in America at that time.

Dr. Taussig noted that children with an open arterial duct tend to live longer and proposed a procedure to "reroute the plumbing" to increase blood flow to the lung (5, 9, 11, 12). Upon hearing this, Thomas and Blalock looked at each other and realized that they knew what needed to be done. They obtained the result they needed in their "failed experiment" at Vanderbilt 6 years ago. Six years ago, Blalock and Thomas tried to create a model of hypertension. Then they made an end-to-end anastomosis of the left subclavian artery with the left pulmonary artery, which led to the forced transfer of blood from the left ventricle to the pulmonary circulation (10). They decided to first replicate the Tetralogy of Fallot on a dog's heart before "switching the pipes" on a child's heart (7). This gave rise to persistent work that lasted more than a year. The theoretical part was done by Blalock and Thomas together, while Thomas was responsible for the practical part. He conducted many experiments on dogs and also created his instruments, which later became a standard in the operating room.

His knowledge and skills as a carpenter, which he learned from his father, were particularly helpful in this endeavor. Through many experiments, he was eventually successful in creating a subclavian-pulmonary anastomosis in one of the dogs. Her name was Anna, and she was the first of many dogs to undergo the procedure successfully (3). It was then that the shunt now known as the Blalock-Taussig shunt was created. Thomas tried to improve every possible detail to prepare for the operation on a human heart.

The condition of one of Taussig's patients, the 15 or 18-month-old (the age varies in different sources) little Eileen Saxon, deteriorated sharply. Blalock decided to try to save the girl's life (11). Although at that time he had only performed a similar operation on a dog's heart under the guidance of Thomas (8, 11). He insisted that Thomas be by his side, observing and guiding every step he took. On November 29, 1944, Blalock opened Eileen Saxon's chest cavity (9). Behind him stood Thomas (Fig. 2). They were amazed at what they saw. The blood vessels, filled with dark blue blood, were much smaller than in the experimental dogs. That meant that even the slightest mistake in a millimeter could be fatal. When the anastomosis began to function, Eileen Saxon's skin became rosy. It was incredible, it was the beginning of modern cardiac surgery (3). The operation was successful. The girl died a year later, in 1946.

Indeed, the success of this operation paved the way for many subsequent successful surgeries. One by one, children with cyanotic heart disease flocked to Hopkins. Thomas continued to stand behind Blalock's shoulders.

A huge number of surgeons came from all over the world to see it. They were not only outraged by the presence of a black man but also that such a renowned surgeon was seeking his advice. However, who else but he could have given them to him? (8).

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Figure 2. Operation of the blue baby in 1947, Vivien Thomas who is standing behind the lamp in the photo, is positioned behind Alfred Blalock's left shoulder and is controlling the course of the operation. https://exhibits.library.jhu.edu/exhibits/show/the-blue-baby-operation/vivien-thomas

For their successful operation to treat the "blue baby syndrome," the Tetralogy of Fallot, Blalock, and Taussig were nominated for the Nobel Prize

Thomas, on the other hand, remained unnoticed. He became "unofficially" responsible for teaching surgery to residents at Hopkins. Over the years of working together, Blalock published over 200 articles, with only a few mentioning Thomas (9).

It was only after three decades that his contribution would be recognized. On February 27, 1971, his residents, who achieved great success and became leaders in cardiothoracic surgery, will hang his portrait at Hopkins alongside other presidents and professors. It was only in 1976 that Thomas received an honorary doctorate of law instead of the usual honorary doctorate of medicine that white people received. After Thomas died in 1989, his story was told by a journalist from The Washington Post in an article titled "Something the Lord Made". This story inspired the creation of the documentary film "Partners of the Heart" (2003) as well as the award-winning "Emmy" and "Peabody" film "Something the Lord Made" (2004) (13).

The story of Vivien Thomas tells how racism and discrimination not only harm individuals but also hinder the progress of society. Vivian showed that anyone, regardless of skin color or origin, can achieve great success if they have a strong will and an indomitable spirit. Today, we must give credit to Vivien Thomas and honor other individuals who were discriminated against because of their skin color or nationality.

Adding Thomas' name to the Blalock-Taussig shunt would be a fair recognition of his contribution to the history of medicine.

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