

What is Abraham Lincoln's connection to Marfan syndrome?

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ABSTRACT

Abraham Lincoln, a tall and thin young lawyer from Kentucky, who decided in the middle of the 19th century to enter politics, had all the necessary qualifications. His name has become synonymous with the unwavering honesty of a truthful fighter who is unconcerned in the face of adversity. From the first moment he assumed the presidency of the United States, he set as his life's goal the realization of a youthful vision, the abolition of slavery. When diplomatic contacts and attempts at compromise failed, he was forced to resort to the dynamic solution. The American Civil War was the inevitable product of intransigence, but it resulted in mutual agreements bringing order, freedom and democracy to the United States. Lincoln's life was full of difficulties, unexpected obstacles, childhood losses, teenage frustrations, chronic illnesses, and periods of depression, triumphs, victories, but also defeats in politics and on the battlefields. Medicine played an important role in the health problems of the 16th American president, especially those that probably hindered his course and determined his decisions in critical periods. The possibility that he suffered from Marfan syndrome has been the subject of research, in order to justify Lincoln's body type and his special facial features.

KEYWORDS: Abraham Lincoln, Marfan syndrome, American civil war.

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Childhood

Abraham Lincoln was born on February 12, 1809 in a poor one-room hut in the wooded western provinces of the country, a few kilometers south of Hodgenville, Kentucky (Figure 1). He was the second child of Thomas and Nancy Hanks Lincoln. A distant ancestor of his, the weaver Samuel Lincoln, had first immigrated to Massachusetts from England in 1637. The next generations preferred to live in more western areas (New Jersey, Pennsylvania, Virginia). Grandfather Abraham eventually settled in the greater Kentucky area, where he was killed in an Indian raid in 1786 [1, 2].

His father Thomas and his family were forced to move to southwestern Indiana in 1816 under pressure as he faced a lawsuit challenging the title to his Kentucky farm. Abraham's memories of that period can be summed up in a few words: he helped his father with farm work but mostly watched him in his various pursuits. His parents were members of the Separate Baptists church, which forbade alcohol, dancing and human slavery [3].

On October 2, 1818, he experienced one of the worst disasters of his life, the death of his mother. Next to the father, his sister Sarah, only 11 years old, two years older than him, was left to take care of the house. However, his father married a year after Nancy's death, on December 2, 1819. His second wife was Sarah ("Sally") Bush Johnston, a widow with three children, who was to become Lincoln's "angel mother". It seems that this woman instilled in him the mood for constant study. She also instilled in him the subtle sense of humor that so often got him out of difficult situations in the years of big decisions.

When Abraham became an adult, he only knew how to read, write, and do mathematical calculations using the rule of three. The books he read during this period were the King James' Bible, Aesop's Fables, John Bunyan's *The Pilgrims' Progress*, Daniel Defoe's *Robinson Crusoe*, Mason Locke Weems's *The Life of Washington*, and *The Autobiography of Benjamin Franklin* [4].

The beginning of a brilliant career

Lincoln was essentially self-taught. He received

only occasional lessons from traveling teachers for a total of 12 months. This did not prevent him from turning into an insatiable bookworm. As a teenager, he took on services for neighbors and used to give his father all the proceeds from them, until the age of 21. He was tall, strong, athletic and excellent at chopping wood with an ax (Figure 2). His daring was so great that he once defeated in a wrestling match Jack Armstrong, a notorious bully of a gang of youths called the *Clary's Grove boys*.

In March 1830, the family immigrated to Illinois. The restless Lincoln tried a variety of professions but obeying his natural attraction to knowledge he turned to legal science. In 1836, after passing the licensing exam, he began practicing law. At the same time, he became interested in the opposite sex. His first love affair was with Ann Rutledge when he had moved to New Salem in 1835. It was a "romance with a lot of truth" and Lincoln had never loved so hard. Ann died early of typhoid fever in August 1835. Lincoln never stopped mourning her death. Her memory saddened him but inspired him at the same time.

Another consulship, with Mary Owens of Kentucky, did not prosper. Instead, his acquaintance with Mary Todd, in 1839, resulted in marriage in November 1842. It is said that on the eve of the wedding, when asked where he was going, he replied "*To the Hell, I suppose*". In 1844, the couple purchased a home in Springfield, near Lincoln's law office [4, 5].

They had 4 children, of whom only one survived. Robert Todd Lincoln was born in 1843 and lived until 1926. He became a millionaire business lawyer, and also served as US Secretary of the Army and Ambassador to Great Britain. The other children died early. Edward Baker (1846-1850) died of tuberculosis, Willie (1850-1862) of an unknown fever and Thomas "Tad" (1853-1871) of a heart attack.

The partnership with William Herndon began in 1844. His partner was highly educated, eloquent and had extreme views. This partnership had the qualities of a critical mass and often proved explosive and highly effective. Lincoln also served on the Illinois Central Railroad, where he worked behind



Figure 1. Abraham Lincoln was born in a poor one-room hut.



Figure 2. He was tall, strong, athletic and excellent at chopping wood with an axe.

the scenes to obtain privileges from state authorities. The railway organization retained him in service as a regular attorney. He also handled the affairs of other railway companies, as well as banks, insurance companies and commercial and industrial enterprises.

He soon became one of the most prominent and successful lawyers in the State of Illinois. He became primarily known not only for his intelligence and practical spirit but also for his unswerving and absolute honesty. It was the time when he decided to get involved in politics. His morality and style were soon discernible. As a candidate for Congress in 1846, he printed pamphlets declaring his belief in the doctrine of necessity [1, 2, and 6].

The road to the presidency

He was clear in his views. He agreed with US President Andrew Jackson on most points, but disagreed with the view that the government should stay out of economic activity. At the same time, he admired Henry Clay and Daniel Webster for their conceptions of a growth-promoting economic policy. In his opinion, Illinois and the West as a whole needed a similar aid in their economic development. This explains his enlistment from the beginning with the party of Clay and Webster, the Whigs.

Between 1834 and 1840, he was elected four times as a representative of the Whigs party in the Illinois State Legislature. From this position, he devoted

himself to promoting an ambitious program to build a network of railways, roads and canals. As a member of the local Assembly, he declared that, despite his opposition to slavery, he did not support its abolition.

He served in the federal Congress only once, in the period 1847-1849. It was then that he introduced a bill for the gradual and, upon compensation of the slave owners, emancipation of the slaves in the administrative division of Columbia.

However, no one took it seriously. Much of his time was devoted to "presidential politics," in the sense of overthrowing a Democratic president and placing a Whig in the presidency. On the occasion of the Mexican-American War, he took the opportunity to put forward a candidate for the presidency. He advocated immediate action while rejecting President James Polk's claim that Mexico had started the war by spilling American blood on American soil. With genuine political sensibility, he voted to disapprove of Polk and the war, while at the same time voting to send munitions and supplies to continue the war [7].

At the same time, he was working to promote Zachary Taylor, a war hero, as a candidate for the presidential election. He took an active part in his election campaign, but after Taylor's success he experienced great disappointment when he was not given the post of head of the general land service as a reward. Meanwhile, his criticisms of the war had

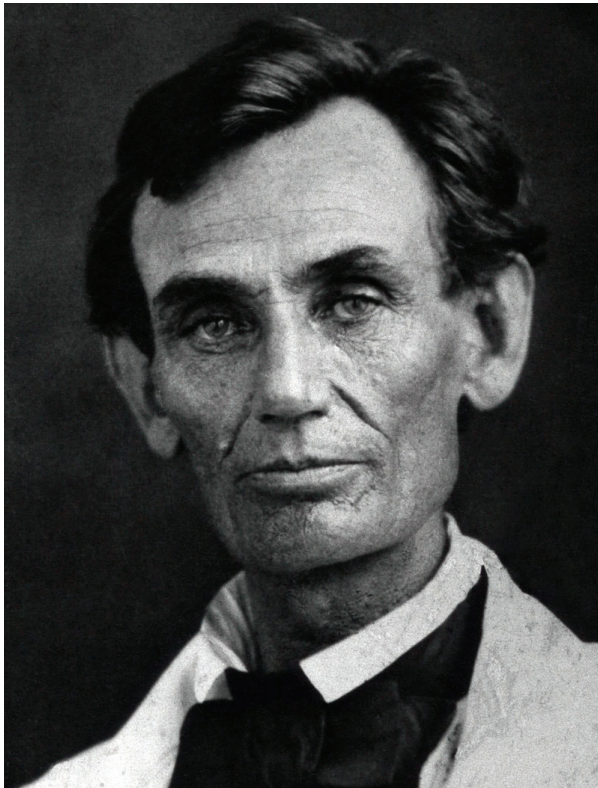


Figure 3. The emerging tendency of the Southern States to secede gave Abraham Lincoln an opportunity to demonstrate his oratorical skills.

not won the approval of the electorate in his district. In his 40s, he had every reason to feel like a failed politician.

For about five years he was little involved in politics. The emerging tendency of the Southern States to secede, however, provided the opportunity he had been waiting for to display his oratorical skills. In 1854, his political opponent Stephen Douglas attempted to get Congress to pass a bill, according to which slavery was to be allowed in the acquired territory of Louisiana, and the settlers of Kansas and Nebraska were to be given the right to decide for themselves whether to allow slavery in these "territorial divisions" (Figure 3).

The Kansas-Nebraska Act caused a violent reaction in Illinois and the other Northwestern States and gave rise to the Republican Party, hastening the disintegration of the Whigs' Party. Along with many thousands of other homeless Whigs, Lincoln joined the Republican Party in 1856. Very soon, some influential Republicans in the Eastern States



Figure 4. During the four years of fratricidal conflict, individual operations by both factions did not form part of a logical sequence leading inexorably to an ultimate goal, the victory.

began to cultivate the view of a partnership between Douglas and his Democratic followers in the West. But Lincoln was determined that he, and not Douglas, should take over the leadership of the Republicans of his State, as well as of all the Northern States.

On May 18, 1860, he was anointed the candidate on the third ballot at the Republican Party Convention in Chicago. Soon after, he left the legal profession for good and devoted his time to managing his election campaign, choosing not to give campaign speeches himself.

With the Republicans united and the Democrats divided, and with a total of four candidates in the race, Lincoln won the election on November 6th. Such was the electoral system that, although not a single person in the Far South voted for him, and although those who voted for him in the whole country did not exceed 40%, he obtained a clear and decisive majority in the body of electors [8].

American civil war

There are not a few who believe that the presidency of Abraham Lincoln is directly related to the American civil war. Perhaps they are not wrong, if we consider that his election, in 1860 as president of the USA, triggered a chain reaction of secessions. While he himself did not support the immediate or gradual abolition of



Figure 5. After taking blue pills, Lincoln's behavior and physical condition were altered. He exhibited anger outbursts and strange behavior, memory loss and insomnia. His hands trembled under stressful situations and he sometimes stumbled.

slavery, only the prohibition of its spread, his opponents invoked a number of arguments. They argued that article 4 of the constitution "regarding fugitive slaves" was not respected. They were disturbed by the increasing power of the North in the central government, which threatened the interests and way of life of the South. They claimed that Lincoln's vision of the right of self-determination of the constituent States undermined the foundations of the Union. As Lincoln disagreed and reacted to the secession of the Southern States, the dispute was moved to the battlefields for resolution.

Moreover, there are not a few who today believe that the root cause of the civil war was the institution of slavery. The North fought to abolish it while the South fought to preserve it. The truth is that it developed into a total and absolute war, which could only be ended by the complete supremacy of the Union forces over the Confederate forces, or



Figure 6. The hypothesis that Lincoln suffered from Marfan syndrome has been called into question due to his physical strength and athletic ability.

their complete inability to do so. The gulf that separated them was unbridgeable.

Immediately after Lincoln's election to the presidency, seven Southern States (Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina and Texas) seceded, forming the *Confederate States of America*, a completely separate and independent polity entity headquartered in Montgomery, Alabama. Later, the capital was moved to Richmond, Virginia.

The trigger for escalation came on April 12, 1861, when the Confederacy bombarded the frontier *Sumter*, at the entrance to Charleston Harbor Channel. Lincoln managed by clever manipulations to provoke the Confederacy to take that initiative of attack and the responsibility of starting the war [8, 9].

In the four years of fratricidal conflict, it is a fact that the individual operations by both factions did not form part of a logical sequence leading inexorably to an ultimate goal, the victory. On the contrary, they were fragmentary with a strong local character, without interdependence among themselves. The objectives of the operations were not aimed at victories integrated into a more general strategic plan, but at the acquisition of advantages that would ensure the continuation of the war with the same intensity, without a prognosis for a possible exit from it.

The leaders of the North were rotated in the early



Figure 7. Nancy Hanks Lincoln was tall, thin, bony, and hunchbacked, with long limbs, a large head, a broad forehead, and a scaphoid shape chest.

years of the war. Names like those of Winfield Scott, George McClellan, and Henry Halleck were tried, but either failed or did not inspire credibility with their practices or inaction. Finally, Lincoln turned to Ulysses Grant. He recognized his military intelligence and made him commander-in-chief in March 1864. The difference was immediately apparent. Military operations were now conducted within the framework of a specific master plan with a defined end goal and an obsession with its fulfillment (**Figure 4**).

In the opposing camp, things were developing differently. The capable General Robert Lee assumed command in the second year of the war, struggling with poorly supplied forces, in attacks and defensive distractions. However, the balance had now turned towards the Northerners. The finishing blow was delivered by assigning initiatives to William Sherman.

Sherman's famous "March to the Sea" began on November 15, 1864. It was the beginning of the end. Along the way, Northerners ravaged Georgia's countryside and burned its towns in order to force the inhabitants to turn against their government for their plight, destroying every available supply. Sherman pretended to attack one city, while actually attacking another [9, 10].

Finally, the capitulation was signed in the early afternoon of April 9, 1865. Lee went first, formally dressed, carrying his sword and waiting for Grant who arrived a short time later unarmed in mud-covered campaign uniform and with his rank insignia faded.

On the evening of April 14, John Wilkes Booth shot Lincoln at Ford's Theater in Washington. It was Good Friday. Early the next morning, Lincoln passed away.

Blue Pills

Abraham Lincoln's health problem has concerned researchers for a long time. The periods of depression that affected some of his decisions, but above all the change in his behavior after taking pills of dubious identity, forced the scientific community to investigate the matter in depth.

When he was only 9 years old, he was kicked in the head by a horse and was knocked unconscious for several hours. He once cut his hand with an axe chopping wood. In 1828, he was hit on the head in a robbery attempt at his home, while he suffered frostbites on his feet in the winter of 1830-1831.

Lincoln contracted malaria twice, in the five years 1830-1835. The second time, his condition was deemed more serious and he was required to remain bedridden, in isolation, in a neighboring house until he recovered. In November 1863, he contracted smallpox. Although the true severity of the disease was not publicized at the time, recent studies suggest that it was severe enough to weaken his strength and force him to curtail scheduled public meetings. Periods of depression have also been reported, mainly due to the loss of loved ones, family strife or some defeats during the civil war.

Most of Lincoln's biographers report that he often resorted to blue pills, implying the ones that doctors of the time prescribed to patients with symptoms of

hypochondriasis and melancholia. The main active ingredient of these pills was the element mercury. We know that this substance was used from the 16th century to treat syphilis, although it was also administered in other pathological cases. It is more than certain that Lincoln did not suffer from syphilis, but the same cannot be said about possible poisoning from chronic mercury intake [1-3].

It has been written that after taking blue pills, his behavior and physical condition changed. He exhibited anger outbursts, adopted strange behavior, experienced memory loss and insomnia. Hands trembled under stressful situations and he sometimes stumbled, signs that can be attributed to mercury (**Figure 5**). People around him have pointed out the irritation that characterized him after taking the blue pills, while, immediately after stopping them, he behaved like a "saint" [3, 4].

After being sworn in and assuming his duties in the White House, Lincoln displayed anger during an official meeting. Because he considered the blue pills guilty, he decided from August 1861 to discontinue them. What is important in the case of his irritable character is not how often the outbursts occurred, but how rarely. Because the challenges were countless. He had to manage soberly the insolence of officers, the insults of friends and foes, the selfishness of editors, representatives, senators, governors, cabinet members and generals. And at the same time he had to tolerate the paradoxes of a multitude of diverse people who irritated him excessively.

It is certain that he never contracted syphilis. The long-term intake of mercury pills is focused on a single word: "syphilophobia". Lincoln, like many of his contemporaries, feared contracting the disease, preferring to take every protective measure against it, even in the absence of symptoms [11].

Controversies about Marfan syndrome

The figure of Lincoln is deeply etched in the collective memory in all its details. In a report of the time, he is described as "tall, languid, thin, reaching the height of 2 meters, with hunched shoulders and upper limbs that swing and end in long-fingered hands, disproportionately long compared to the legs." [5]. His tall and lean body shape, the long and

thin face, as well as the huge hands and feet, raised suspicions that he was suffering from Marfan syndrome already in the early 1960s.

French pediatrician Antoine Bernard-Jean Marfan first described the syndrome in a young girl with thin fingers (arachnodactyly) and several skeletal abnormalities [12]. The incidence of the disease ranges from 2 to 3 cases per 10,000 people and is inherited in an autosomal dominant manner. Thirty percent of cases are sporadic and represent spontaneous mutations. There is considerable variation within the same family, which suggests that altered genes and/or environmental factors are involved in the development of the disease. The pathogenesis is related to the abnormal biosynthesis of the extracellular protein fibrillin-1 which is the main component of microfibrils, which provide a supportive function in inelastic tissues such as the aortic orifice and eye ligaments. [13].

Diagnosis is based on clinical criteria, from the cardiovascular system, the skeleton and the eyes. Many manifestations depend on age or maturation. Tall stature can be noticed from birth and persists into adulthood. Reduced subcutaneous fat gives the impression of stunted growth in infancy. Mental function is normal. Patients are characterized, in addition to tall stature, by a long length of the upper limbs at full extension, arachnodactyly, loose joints, and ectopy of the eye lens, early myopia, aortic enlargement and mitral valve prolapse in the heart [13].

In 1962, Gordon from Cincinnati first hypothesized that Lincoln suffered from Marfan syndrome, based primarily on his and his mother's body shape [14]. Two years later, Harold Schwartz, a cardiologist from California, in his article described the case of a 7-year-old patient with Marfan syndrome, whose ancestry coincided with distant ancestors of Lincoln [15]. In 1964, in the scientific journal JAMA, letters were published between Gordon and Schwartz on the same issue. An issue was whether the president had inherited the mutated gene from his mother or father [16, 17]. In this public debate Montgomery took part, who denied the hypothesis that Lincoln suffered from the syndrome, because of his physical size and athletic skills [18] (**Figure 6**).


However, it was never reported that Lincoln had loose joints or that he had a heart murmur and eye problems. No aortic abnormalities were revealed at autopsy. In his article, John Sotos, a cardiologist with a special interest in the medical histories of US presidents, proposes a theory based on the new mutations of the gene locus expressed in the known phenotype of the syndrome [19]. We are talking about "marfanoid syndromes", one of which is called multiple endocrine neoplasia type 2B or MEN2B. It is a cancer syndrome characterized by neuromas, thyroid cancer, pheochromocytoma and Marfan syndrome-like features.

Sotos relies on the anatomy of Lincoln and his mother to argue that both had MEN2B. Nancy Hanks Lincoln was tall, thin, bony, and hunch-backed, with long limbs, a large head, a broad forehead, and a scaphoid shape chest (**Figure 7**). Both of their faces looked alike, both to each other and to the classic face of Marfan syndrome. Both were characterized by muscle weakness and had periods of inexplicable melancholy. Nancy died at the age of 34 and her death was reported as "death from exhaustion", confirming the hypothesis that she was suffering from a cancer syndrome.

DNA analysis of Lincoln himself had also been suggested at one time. The material would come from tufts of hair and small pieces from the skull.

A panel of geneticists, forensics and lawyers was formed and met in 1991 to decide whether Lincoln's genetic material contained mutations in the gene that codes for fibrillin-1. However, bioethical issues arose [20]. How sure are we that this analysis does not violate personal data? We also know the positive psychological effects that the discovery that a successful US president suffered from Marfan syndrome would have for those suffering from the genetic disease and have low self-esteem. Many argued that Lincoln himself would have viewed analysis favorably if he was convinced that it would contribute to the common good. However, the analysis was never performed due to technical difficulties.

Conclusions

The current opinion holds that Abraham Lincoln suffered from roughly the same cancerous marfanoid syndrome that his mother suffered from. However, the hypothesis that he suffered from Marfan syndrome itself has not completely collapsed. A patient once said: "The fact that Lincoln may have suffered from a genetic disease gives all of us hope that one day we will be able to contribute to society and be useful." 

Conflict of interest

The authors declared no conflicts of interest.

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