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## EDITORIAL

### In memoriam Ludwig van Beethoven. Clinical history and possible diagnoses of the genius of musical composition in silence<sup>☆</sup>



### *In memoriam* Ludwig van Beethoven. Historia clínica y posibles diagnósticos del genio de la composición musical en el silencio

In this tragic 2020, year of a pandemic, confinement, and uncertainty, the 250th anniversary of the birth of one of history's most outstanding musicians is commemorated. The anniversary celebrations have been canceled due to the health measures against infection from the SARS-CoV-2 virus. Bad fortune appears to accompany that genius.

Beyond a doubt, it is unfair that we music lovers must abstain from celebrating Beethoven's legacy, but confinement has given us time for reflection, introspection, and evaluation of who we are and what we do. The composer's Ode to Joy, the most beautiful of melodies that has inspired the unity of humanity for nearly 200 years, was created under conditions of isolation, of an absolute inner silence suffered by the artist, caused not by a pandemic, but by deafness. The element of unfairness in the fact that such a great musician could never hear his momentous Opus 125 is undeniable. Nevertheless, it is quite likely that the adverse factor of his disease and isolation, associated with his commitment to his music, his ideals, and to humanity, contributed to making him an outstanding artist in his lifetime and the composer, trapped in silence, of the most powerful music ever created.

The aim of our article is to succinctly present and analyze the clinical history and differential diagnosis of the main medical conditions that affected this incredible musician. The information on and interpretation of their signs and symptoms are mainly based on letters written by Beethoven to his closest friends and on the findings from the autopsy carried out one day after his death by Dr. Johann Wagner

and Dr. Karl von Rokitansky, the father of modern pathologic anatomy.<sup>1</sup>

#### Childhood

Ludwig van Beethoven was born on December 16, 1770, in the small German city of Bonn, situated on the banks of the Rhine. He was the second of 7 children, of whom only 3 lived beyond infancy (Ludwig, Kaspar Anton Karl, and Nikolaus Johann). His paternal grandmother, Josepha, and his father, Johann van Beethoven, suffered from alcohol use disorder, which led to his father's death when Ludwig was 21 years old. Complications from tuberculosis claimed the lives of his mother, Maria Magdalena Keverich, and his younger brother, Kaspar Anton Karl. During his childhood, Ludwig contracted smallpox, which resulted in facial scarring, and he experienced recurrent respiratory infections, facilitated by underlying bronchial asthma. For the rest of his life, up to his death at the age of 56, he was tormented by numerous illnesses, the majority of unknown etiology. The childhood suffering he endured due to paternal violence and abuse, his mandatory role of providing for and supporting his family as an adolescent, the inner silence and confinement brought on by deafness, and his multiple health problems as an adult, interwoven with his immense commitment to music, resulted in Beethoven's leaving us a musical legacy whose melodies, in addition to their beauty, have the power to embrace millions of souls (Fig. 1).

#### Deafness

Beethoven's deafness, one of the most interesting medical enigmas, with a still uncertain etiology, was first described in Ludwig's personal correspondence with his close friend,

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**Figure 1** Portrait of Ludwig van Beethoven, working on the composition of the *Missa Solemnis* in D major, Op. 123, painted by Joseph Karl Stieler in 1820.

Franz Gerhardt Wegeler, in 1801. Beethoven described a 3-year history of progressive bilateral hypoacusis to high frequency sounds, such as those produced by the violin, piccolo, and piano, that initially began in the left ear. The hypoacusis was associated with unbearable tinnitus, poor discrimination, and recruitment, characteristics that are consistent with sensorineural hearing loss.<sup>2,3</sup> The hearing defect caused Beethoven to have low self-esteem, emotional lability, and progressive isolation, leading to suicidal ideations (the Heiligenstadt Testament). He was irritable, combative, and arrogant. Like his father and paternal grandmother, Ludwig was a drinker, with important periods of alcohol consumption that began intermittently when he was 17 years old, particularly during his periods of depression. His favorite drink was Hungarian wine, which at that time was of poor quality and tainted with lead to improve its aroma and flavor. The progression of his hearing loss culminated in complete deafness at 47 years of age. During that period of his life, Beethoven composed the *Missa Solemnis*, the Ninth Symphony, which debuted in 1824, and his last sonatas for piano and string quartets, all of them important works that were written when he was completely deaf. The autopsy report described cranial thickness of twice the normal size, with a prominence of the frontal bone and irregularity of the zygomatic bones, thinning of the auditory nerves, predominantly of the left nerve, devoid of medullary substance, and a narrowed Eustachian tube with retracted mucosa at the level of the bone portion.<sup>1</sup> Numerous pathologies in the differential diagnosis have been proposed for Beethoven's sensorineural hearing loss, and the most sustainable are: 1) lead poisoning, based on the presence of

residuals of lead 100 times higher than normal in his hair and bones, according to an analysis performed in the United States in the mid 1990s,<sup>4</sup> 2) Cogan's syndrome, characterized by bilateral sensorineural hearing loss and interstitial keratitis secondary to vasculitis, albeit there is no evidence of vestibular dysfunction in Beethoven's texts; that syndrome can be associated with idiopathic inflammatory bowel disease and reactive arthritis,<sup>5</sup> and 3) Paget's disease is supported by the frontal bone prominence, tinnitus, and headache. Other less probable diagnoses are otosclerosis, sarcoidosis, and syphilis.<sup>1</sup>

## Gastrointestinal manifestations

After his mother's death, estimated to have occurred when he was between 17 and 22 years of age, Beethoven began to have numerous gastrointestinal symptoms that would accompany him for the rest of his life. His clinical symptoms were characterized by generalized colicky abdominal pain with periods of exacerbation and remission. At times the pain was incapacitating, and he had changes in the frequency of bowel movements and stool consistency, with a predominance of watery diarrhea but no malabsorption or inflammatory features. He sometimes complained of hyporexia, headache, arthralgia, and meteorism. The pain episodes were exacerbated during periods of stress or depression and improved with analgesics, such as quinine and salicin, baths with cold or lukewarm river water ("Danube baths"), or with alcohol consumption. The episodes of pain increased in frequency and intensity over time. Between 34 and 37 years of age, Beethoven presented with a purulent soft tissue infection in a toe, consistent with an abscess, that almost required amputation, followed by a submandibular abscess that was resolved in three months. At 53 years of age, he also presented with painful eye redness, most likely due to scleritis, uveitis, or interstitial keratitis.<sup>6,7</sup> Despite the gastrointestinal symptomatology described, Beethoven had a robust physique. He was short, with broad shoulders, and had a short neck, round nose, dark skin, and a wide and prominent forehead. He leaned a bit forward when walking but had no signs of the chronic malnutrition that became apparent during the last years of his life, when he presented with complications associated with liver disease. At autopsy, the chest cavity and contents were normal, the stomach and intestines were distended with air, with no relevant macroscopic alteration, and the pancreas was large and hard. The main pancreatic duct was dilated and appeared "as wide as a goosequill".<sup>1</sup> The semiology of those signs and symptoms suggests that Beethoven suffered from diarrhea-predominant irritable bowel syndrome, given that he had no alarm symptoms, such as gastrointestinal bleeding, or anatomopathologic findings of organic disease in the digestive tract. The description of the pancreas at autopsy is consistent with chronic pancreatitis, probably secondary to alcohol consumption. Other less likely diseases in the differential diagnosis explaining his gastrointestinal symptomatology have been proposed, such as idiopathic inflammatory bowel disease, sarcoidosis, intestinal tuberculosis, Whipple's disease, lead poisoning, and selective IgA deficiency.

## Liver disease

The first manifestations of liver failure became evident in 1821, when Beethoven was 51 years old. He presented with progressive jaundice, nausea, vomiting, abdominal pain, asthenia, and adynamia, related to a probable viral hepatitis or alcoholic hepatitis, that remitted after 3 months. In 1822, he had an episode of unilateral pleuritic chest pain, described as "thoracic gout". In 1826, he presented with complications that could be attributed to cirrhosis of the liver with portal hypertension, such as epistaxis that was probably thrombocytopenia-related, altered mental status, hepatic encephalopathy, and tense ascites. He underwent 4 paracentesis procedures, performed by his physician, Dr. Andreas Ignaz Wawruch, through laparotomy. Twenty-two liters of ascites were drained, but no asepsis measures were utilized, nor was there adequate closure of the abdominal wall, and the patient developed an infected ascitic fistula and possible bacterial peritonitis.<sup>8</sup> Despite numerous medical recommendations, Beethoven, now emaciated, continued to eat and drink as he pleased, with intentions of composing a tenth symphony, a requiem, and music for Goethe's Faust. Finally, in March of 1827, he presented with progressive jaundice, tense ascites, lower extremity edema, anuria, fever, and hepatic encephalopathy that resulted in his death. Ludwig van Beethoven died on March 26, 1827, at 56 years of age, in the city of Vienna. The autopsy report described an emaciated, cachectic body, particularly the lower limbs, with multiple petechiae, and a distended abdomen. The abdominal cavity was filled with a turbid, grayish-brown fluid. The liver was half its normal size, hard, bluish-green, and had a nodular surface, characteristic of macronodular cirrhosis. There was sludge in the interior of the gallbladder. The spleen was more than twice its normal size, hard, and blackish. Both kidneys were pale, and when sectioned, each calyx was full of calcareous concretions, consistent with papillary necrosis or kidney stones.<sup>9</sup>

## Death

The probable cause of Beethoven's death was acute-on-chronic liver failure. That syndrome is characterized by acute decompensation manifested by ascites, hepatic encephalopathy, coagulation alterations, bacterial infection, multiple organ failure, and elevated short-term mortality in patients with underlying cirrhosis of the liver.<sup>10</sup> Even though 40% of patients do not have a recognizable precipitating factor, in Beethoven's case, it can be attributed to an infectious process due to the ascitic fistula and secondary peritonitis, severe alcoholic hepatitis, or circulatory dysfunction after the paracentesis. Alcohol consumption appears to be the most probable cause of Beethoven's cirrhosis of the liver, despite the macronodular appearance described in the autopsy. Although that finding is in contrast to micronodular cirrhosis (Laennec's cirrhosis) described in patients with alcoholic liver cirrhosis, other diagnoses that have been proposed for explaining cirrhosis of the liver are hemochromatosis and autoimmune liver disease with primary sclerosing cholangitis associated with probable idiopathic inflammatory bowel disease. However, there is not sufficient evidence to confirm any of them.

On March 27, Anselm Hüttenbrenner,<sup>11</sup> composer and friend, described Beethoven's final moments as follows:

*"He lay there, unconscious, from three in the afternoon until after five. There was suddenly a loud clap of thunder accompanied by a bolt of lightning which illuminated the death-chamber with a harsh light. After this unexpected natural phenomenon, Beethoven opened his eyes, raised his right hand and, his fist clenched, looked upwards for several seconds with a grave, threatening countenance, as though to say, 'I defy you, powers of evil! Away! God is with me.'" It also seemed as though he were calling like a valiant commander to his faint-hearted troops: "Courage, men! Forward! Trust in me! The victory is ours!" As he let his hand sink down on the bed again, his eyes closed half-way. My right hand lay under his head, my left hand rested on his breast. There was no more breathing, no more heartbeat!"*

We music lovers and professionals of medicine, "the most humanistic of the sciences and the most scientific of the humanities",<sup>12</sup> celebrate your 250 years of existence and are eternally grateful for your legacy as a pianist, violinist, organist, composer, conductor, professor, idealist, and as a man who overcame enormous adversities to give full expression to his genius.

Beethoven forever!

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## Conflict of interests

The authors declare that they have no conflict of interests.

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