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## Treatment of chronic enterocolitis in the first half of the XIX century: Beethoven's mineral water intake

The great German composer of the First Viennese School Ludwig van Beethoven suffered from hearing impairment and diseases of the digestive system for most of his life. His health status strongly influenced both his life and creativity. The use of mineral waters in the first half of the 19th century was an important part of the therapeutic arsenal of physicians; it was actively used in the Beethoven's treatment. Balneotherapy is one of the least-studied aspects of the composer's medical history. The purpose of the research was to study the use of mineral water in the treatment of Ludwig van Beethoven. Beethoven's letters and works of his most authoritative biographers were analyzed with a view to revealing information about the use of mineral waters in his treatment. Scopus, WebOfScience, MedLine and PubMed databases, electronic archives were searched without time restriction for information on the use of mineral waters in European spa resorts in the first half of the 19th century. Since 1796, Beethoven suffered chronic enterocolitis and progressive hearing impairment, since 1820 — portal cirrhosis of the liver. Mineral water intake was an important part of Beethoven's treatment from 1799 until his death in 1827. The medicine of its time was mainly empirical, the diagnosis was based only on the data of a survey and examination of the patient, methods of physical research have not yet received wide application. Beethoven's treatment meets the advanced achievements of balneology at the end of the 18th century. The composer annually took mineral water at spa resorts (Baden, Teplice, Carlsbad, Franzensbrunn) during the season (up to 6 months) and continued to receive bottled mineral water in Vienna. Spa therapy (and, in particular, mineral water intake) became part of Ludwig van Beethoven's life.

**Key words:** the history of Ludwig van Beethoven's disease, the history of gastroenterology and clinical medicine, the history of balneotherapy, the history of European resorts.

The history of life, creativity and illness of Ludwig van Beethoven is reflected in 1700 his letters, 140 «conversation notebooks» (another 260 notebooks have not survived to our day). Dozens of biographical studies and hundreds of scientific articles are written on the basis of this invaluable material. Today, these documents are still of great interest to research in various fields of science, including the history of medicine. Beethoven suffered from progressive deafness and diseases of the digestive system from 1796 until his death in 1827 and, therefore, he almost constantly treated with leading Viennese doctors. Water cure was an important part of the therapeutic arsenal of physicians in the 18th–19th centuries and the treatment of Beethoven was no exception. Beethoven's letters and his «conversation notebooks» are the diaries

of the patient, which tell about medicine first half of the 19th century; the history of hearing aids was supplemented on the basis of these documents [10, p. 262–273]. The analysis of these documents can help to make an idea of the practical application of balneotherapy methods at that time. This aspect of Beethoven's disease has not yet been thoroughly analyzed. Beethoven's biographers provide additional information about his illness as well as his stay at the spa resorts in Europe (Baden near Vienna, Töplitz, Carlsbad, Franzensbrunn). Treatises on balneology of 18th–19th centuries contain information about chemical composition and methods of application of mineral waters at mentioned spa resorts. Information from biographical studies and treatises on balneology of the 18th–19th centuries allows us to supplement the information from Beethoven's letters and perform a kind of reconstruction of the balneotherapy of the composer.

The objective of the study was reconstruction of the use of mineral waters in the treatment of Ludwig van Beethoven, based on the analysis of Beethoven's letters and data on the development of balneology of that period of time, as well as the condition of the spa resorts visited by the composer.

To achieve the goal of study, a search was made for sources in scientometric databases and electronic archives. Keyword combinations were used: Beethoven's illness, balneotherapy in Europe in the XVIII–XIX centuries, spa resorts in Europe in the first half of the XIX century. A search for information on the use of mineral spring waters in Beethoven's letters was also conducted. The works of the composer's most respected biographers, as well as the hydrotherapy treatises of the 18th and 19th centuries, were used to supplement and analyze the information received from the letters.

Biographers found that in the summer of 1896 Beethoven suffered a serious disease (presumably – typhus), after which he had digestive disorders and a progressive hearing disorder [33, p. 201]. Beethoven's medical history has been studied by scientists very well. The famous Canadian physician François Martin Mai in his work «Diagnosis genius» 2007 has analyzed Beethoven's medical biography the most completely [20, p. 273]. Dr. Mai analyzed the symptoms of Beethoven's disease (based on his letters) and systematized earlier studies of the composer's medical biography. Beethoven's medical biographers reached a conclusion: Beethoven suffered from the chronic enterocolitis from 1897 until his death [20, p. 127]. Beethoven's physicians used terminology, quite understandable nowadays: «intestinal inflammation» or «the inflammation of the bowels» [20, p. 127; 4, p. 372]. The first mention of balneotherapy appears in Beethoven's letters in 1800. He reports in his letter June 29, 1800: «...*bad health, has been a stumbling-block in my path. The chief cause of this infirmity proceeds from the state of my digestive organs, which, as you know, were formerly bad enough, but have latterly become much worse, and being constantly afflicted with diarrhea, has brought on extreme weakness. Frank [Director of Vienna general hospital] strove to restore the tone of my digestion by tonics, and my hearing by oil of almonds; but alas! These did me no good whatever; my hearing became worse, and my digestion continued in its former plight*» [3, p. 29]. He further reports that «*the autumn of last year [1799] some judicious doctor recommended me the tepid baths of the Danube which did wonders for me; my digestion improved*». However, the improvement was temporary: «*I did indeed pass a miserable winter; I suffered from most dreadful spasms, and sank back into my former condition*

[3, p. 29]. Frank Johann Peter (1742–1821) was Beethoven's physician from 1800 to 1809. He was Professor of Clinical Medicine at the University of Vienna and director of the general hospital in Vienna. His medical works on health care and preventative medicine were very advanced for that time. After Professor Frank's treatments failed, Beethoven turned to Dr. Gerhard von Vering (1755–1823), who was director of the Health Institute of the hospitals of Vienna from 1797 to 1809 and medical advisor to Emperor Joseph. Dr. Vering again «*ordered the tepid baths of the Danube*» and «*succeeded in almost entirely checking the violent diarrhea*» [3, p. 29]. Beethoven in 1799–1800 was taking baths of the Danube in Vienna's Bathing establishment, which was called «*the Kaiserbad on the Danube*» [35, p. 213].

Part of the summer and autumn in 1799 Beethoven spent in the village Mödling (14 km from Vienna) [3, p. 25]. «Physikalisch-medicinische Darstellung der bekannten Heilquellen der vorzüglichsten Länder Europa's» 1829 (Physico-medical representation of the well-known healing springs of the most exalted countries of Europe) reports that mineral sulfur water from the source is used in the treatment of rheumatism, gout, liver and gall bladder diseases, portal hypertension. Water is used both for baths and for oral administration [23, p. 147]. The healing properties of the source were known for several centuries, but it was landscaped and officially opened only in 1815. Biographers do not report whether Beethoven used the source in 1799, but it is precisely known that in subsequent visits (1818–1821) Beethoven took thermal baths there and drank mineral water from the source [24, p. 369].

In the letters of Beethoven, as in the works of his biographers, there is no mention that Beethoven in 1799–1800 drank mineral water. However, an analysis of the history of the development of European balneology shows that by this time the internal use of natural mineral waters was almost as widespread as the external (in the form of baths). Dr. Aidall in his famous book «The German nature-cure, and how to practice it» 1897 (the chapter «Inner application of water») reports: «*Water drinking is often useful in the natural treatment of sickness*» [2, p. 61]. Sigismund Sutro in his «Lectures on the German mineral waters, and on their rational employment for the cure of certain chronic diseases» 1851 writes: «*In most spas, bathing and drinking of the respective springs take place. Some, however, are merely employed internally, others only externally*» [32, p. 17]. Augustus Bozzi Granville in his two-volume monograph «The spas of Germany» 1838 wrote: «*The word «Spa» employed to*

*signify a mineral source, at which people assemble, to drink as well as to bathe in the waters»* [13, p. 13]. By the end of the 19th century, the culture of water cures had reached full bloom. Balneotherapy at the European spa resorts was carried out not only on the basis of a huge experience of practical application of natural mineral waters, but also on the basis of achievements of chemistry and clinical medicine [31]. The history of European balneology shows that the scientific study of the therapeutic effect of Austrian mineral waters began much earlier. Caspar Schober, an Austrian physician of the early 16th century, in 1530 wrote «Tractatus de balneis Germaniae» – a treatise concerning the most famous German and Austrian spas (including Baden near Vienna, where Beethoven annually took baths and drank mineral water during 1801–1825). Caspar Schober in 1530 reports the benefits of combined application of mineral water (internal and external) [12].

Dr. Donald Monro (1727–1802, famous Scottish physician and medical author) in his two-volume «A treatise on mineral waters» 1770 gives a description of the chemical composition of the mineral waters of the famous European spa, lists indications and contraindications for the use of natural mineral waters, as well as specific therapeutic techniques. Donald Monroe in 1770 (like Sigismund Sutro in 1851) recommends a combination of internal and external use of mineral waters [22, p. 167]. Donald Monro wrote in preface for his book: «Physicians have, in all age, been desirous of discovering mineral waters contents, in order more precisely to determine their peculiar virtues and properties: in sixteenth century physicians began to evaporate them, and to try other experiments to discover their qualities» [21, p. 2]. There is no doubt that Dr. Frank and Dr. Vering were well acquainted with the treatises of Caspar Schober and Donald Monroe, as well as all the subsequent doctors of Beethoven. They are aware of at least 11 physicians during Beethoven's lifetime. All of them were recognized authorities in medicine, all of them were highly educated specialists with great practical experience, almost all were professors and authors of textbooks on diagnosis and treatment of diseases, all of them were adepts of balneotherapy [28]. Therefore, balneotherapy was the basis of Beethoven's treatment until the last days of his life.

In the summer of 1801, Beethoven first goes to treatment in Baden. Dr Donald Monro describes the resort in his treatise: «Baden is a small town situated about twenty English miles from Vienna, and is celebrated for its hot sulphureous baths» [22, p. 167]. Dr Donald Monro describes Baden's water: «Water

*contain a mixture of sulphur, vitriol, a martial earth (or salt) the basis of sea salt; sometimes in evaporating them, the vitriolic acid unites with the basis of sea salt, and forms a Glauber salt».* «The waters [inner application] and bath have been used with success in many disorders» [22, p. 172]. In 1801 Baden was a favorite resort of the Viennese. The baths, in which sulphate of lime is one of the chemicals, were known to the Romans under the name of «Pannonian Baths» (the reign of the Roman emperor Marc Aurel 161–180 A. C.). Famous English physicians and adept of balneotherapy professor Charles Hutton in his treatise «Cursory observations on the mineral water of Baden» 1838 described the mineral springs of Baden: «It is supplied by twelve springs, differing only in temperature. The principal of these springs, called the Ursprung, is situated on a considerable elevation, near the collegiate church of St. Peter. The temperature of the Ursprung is 153,5 degrees of Fahrenheit (67,5 °C). This temperature never varies. That of the other sources is somewhat lower, the lowest temperature of any being 117,5 of Fahrenheit (47,5 °C)» [15, p. 9]. «It has been ascertained by the analysis of this mineral water, made by that most accomplished physician and chemist Koelredter, that each pound of it contains, in solid ingredients. Hydrochlorate of soda – 16 grains. Hydrochlorate of lime – 1 3/4 grains. Hydrochlorate of magnesia – 1/4 grains. Sulphate of lime – 3 grains. Carbonate of lime – 1 2/3 grains. Carbonate of iron – 1/10 grains. Silica – 1/3 grains. Extractive matter – 1/20 grains. Whole – 23 3/20 grains. It contains also half a cubic inch of free carbonic acid» [15, p. 12].

Until the beginning of the 19th century the Baden's mineral waters have always been used more for bathing than for drinking, but Charles Hutton in his «Cursory observations on the mineral water of Baden» states that from the early 19th century «In all cases, in addition to bathing, it will be advisable to take the Baden water internally. I would recommend, after a few days use of it, in order to render it more active, the addition of a small quantity of hydrochlorate of lime, or as it is called in the London Pharmacopoea, chloride of calcium. This would obviate the necessity of swallowing such quantities of the water, as sometimes oppress the stomach» [15, p. 18]. Beethoven's doctors were of the same opinion: on their advice, the composer received water from the Baden source throughout his stay in Baden. Beethoven repeatedly mentions this in his letters from Baden: «in addition to baths I have to take mineral waters» [4, p. 203]. Charles Hutton writes: «When the mineral water of Baden is taken internally, it would be as well to divide it by drinking small quantities at several distant intervals

during the day, more especially, so as to have finished the dose an hour before meal» [15, p. 35].

One of the most respected biographers Alfred Christlieb Kalischer reports that Dr. Staudenheimer usually advised Beethoven to take «several glasses of mineral water from the Baden source per day». Outside the spa periods (where Beethoven drank water directly from the source), he used bottled mineral waters. Dr. Malfatti prescribed Beethoven a long course of taking sulfate mineral water from the Baden source, and therefore Beethoven continued to take mineral water even after returning from Baden to Vienna. Beethoven's letters confirm this fact. Late September 1815 he wrote from Döbling to Magister Brauchle in Jedlesee, Vienna (Brauchle was the tutor of the Countess Erdödy's children) «it would be very kind if the dear Countess would send me a bottle of Spa water; I ought not to discontinue it for such a long time» [3, p. 368]. June-September 1815 Beethoven spent in Baden. At end of September he returned to his summer country lodging in Döbling. In the comments to this letter, Alfred Kalischer points out that mean the bottled water from the Baden source. This method of prolonging the intake of mineral water looks quite modern. Since Dr. Malfatti became Beethoven's physician in 1809 on the death of Professor Schmidt, it is logical to assume that Beethoven practiced prolonging the course of mineral water from the summer of 1809 (however, there is no direct evidence of this assumption in the works of biographers).

The analysis of treatises on balneology in the first half of the 19th century allows supplementing the information about methods of application of mineral waters, derived from the letters of Beethoven. Augustus Bozzi Granville in his two-volume manual «The Spas of Germany» 1838 reports: «if the patient cannot be sent to the springs, mineral water may be given at home 1000 ml daily of the alkaline and alkaline-chloride waters; 1000 ml sulphur waters (for example Baden's or Carlsbad's waters), but only 100 ml (1/2 glass) at once on an empty stomach» [11, p. 20]. It seems that the method of prolonging the intake of mineral water was generally accepted in the first half of the 19th century. Granville calls Dr. Malfatti «the great leading physician at Vienna» and gives Malfatti's recommendations on the use of Carlsbad salts and mineral water to achieve the choleric effect and treat constipation: «as a proper means of opening the bowels in case of costiveness during the use of hot mineral springs, half a glass of lukewarm new milk, taken half an hour before the use of the water. It becomes, at times, necessary to warm the cold mineral water before it can be drunk; this is done very readily — each Spa having for that purpose

a little stone kettle of the natural mineral water, simmering over a charcoal furnace. By this addition the purgative properties are generally increased» [11, p. 43]. Certainly, such advices on the reception of mineral water Malfatti gave to Beethoven also. Beethoven visited Carlsbad only in 1812, but it is likely that he was drinking the artificial Carlsbad water much earlier (in Baden). Charles Hutton in his «Cursory observations on the mineral water of Baden» writes: «Some years since, Dr Koelreuter, by adding some carbonate and sulphate of soda to the Baden water, formed artificial Carlsbad water, closely resembling the natural one. The only perceptible difference therefore is that each pound of the artificial water contains 12 grains of hydrochlorate of soda, and 4/50 of grains of carbonate of iron, more than the same quantity of the natural water. This water is recommended chiefly, in debility of the digestive organs, congestion of the vena portae, visceral obstructions, and calculous complaints; also for obstinate adhesions, the result of inflammation» [15, p. 25]. «The usual time, for taking the artificial Carlsbad water, is early in the morning, so as to have finished the dose an hour before breakfast» [15, p. 35].

At first glance, the indications for the purpose of Carlsbad mineral water and the method of its application seem completely scientific and even modern. But this impression is deceptive. François Martin Mai is right to point out: «The 18th century saw a rapid development in chemistry and chemical analysis, and there was much debate about the chemical composition of water for drinking and bathing, its effect on health, and its uses in treatment of disease. Knowledge of the chemical composition of water gave physicians confidence that their recommendations were based on scientific principles» [20, p. 21]. The stomach was known to produce acid, but the process of digestion was thought to be analogous to putrefaction because the existence of intestinal enzymes was unknown. Only in the second half of the 20th century researchers concluded that Karlovy Vary healing mineral water has the following positive effects on the pancreas and pancreatic digestive enzymes: supplies the pancreas with essential minerals and microelements for manufacturing digestive enzymes; supplies the pancreas with bicarbonates, the main ingredient of pancreatic juices; Increases secretion of pancreatic juices Increases digestive activity of pancreatic enzyme; Promotes the manufacture and release of digestive hormones in the duodenum, regulating the digestive process in the gastrointestinal tract and liver; Neutralizes high levels of gastric acid; Promotes secretion of bile by the liver cells and elimination of bile throughout the hepatic and common bile ducts, and gallbladder;

Opens the Sphincter of Oddi, decreasing pressure in the system, promoting secretion and elimination of pancreatic juices, and decreasing inflammation and congestion in the pancreas [6].

Comparison of the results of chemical analysis of mineral water, the views of doctors about the effects of mineral water and the diagnostic criteria used by them in different time intervals of 18th–19th centuries allows to trace the evolution of European balneology. Medicine 18th century (including balneology) was mostly empirical. Physicians even at the time realized the need for a differentiated approach to the administration of mineral waters. Hugh Smith writes in his «A treatise on the use and abuse of mineral waters» 1776: «*It is One Great Point towards a Cure [Water Cure] to know the disease. Indeed, it will be impracticable to give the intelligent Reader [physicians and patients] an adequate Idea of the daily use of Water, without entering little into the immediate Causes, as well as curative Intentions, of chronic Complaints*» [29, p. 14]. This approach can be considered etiopathogenetic, but for its full clinical implementation balneology did not have the necessary scientific and clinical base. The physical and instrumental methods of research have not yet been invented. François Martin Mai writes: «*Physicians' limited clinical skills were based largely on the medical history and observation (inspection) of the patient. Other than feeling the pulse, physicians didn't lay hands on their patients*» [20, p. 15]. The choice of balneotherapy method was also based on the patient's complaints and pulse investigation; Hugh Smith writes in 1776: «*Chronic Complaints are totally opposite to inflammatory Diseases, which require Evacuations to reduce the quick, hard, and throbbing Pulse, and pull down the animal strange. In Chronic Complaints, muscular motion is universally oppressed, the pulse languid, and the Strange of Constitution mach below*» [29, p. 17]. The first regular analysis of Carlsbad's waters was made by Dr David Becher (1725–1792) in 1770. He examined the Sprudel, and found in all the same constitutive parts, viz: sulfate of soda 2,52 parts, carbonate of soda 1,54 parts, muriate of soda 0,87 parts, carbonate of lime 0,56 parts, iron oxide 0,06 parts, total 5,55 parts. A later analysis in 1789 by the celebrated Dr Klaproth proved similar to that of Becher [7, p. 38].

But the result Strudel's chemical analyses, obtained in 1822, by Dr. Berzelius, who not only confirmed what had been found previously, but discovered many other constituent parts, unknown to his predecessors. As collective result of all his analytic experiments, Dr. Berzelius found in 1000 parts of weight of the Sprudel water: sulfate

of soda 2,58713 parts, carbonate of soda 1,26237 parts, muriate of soda 1,03852 parts, carbonate of lime 0,30860 parts, fluuate of lime 0,00320 parts, phosphate of lime 0,00022 parts, carbonate of strontium 0,00096 parts, carbonate of magnesia. 0,17834 parts, sub-phosphate of alumina 0,00032 parts, carbonate of iron 0,00362 parts, carbonate of manganese 0,00084 parts, silica 0,07515 parts, total 5,45927 parts [7, p. 39]. Inorganic chemistry has indeed made a significant advance in these half-century, while clinical medicine has continued to rely on achievements of William Harvey, Francois Broussais, Samuel Hahnemann, John Brown, and Maximilian Stoll. Famous Austrian physician Jean de Carro (1770–1857, author of 110 scientific works in 246 publications in 7 languages) in his «*Essay on the mineral waters of Carlsbad for physicians and patients*» 1835 writes: «*Physicians, who devote themselves to directing patients during a course of mineral waters should make themselves fully acquainted with the diagnosis of their disease*» [7, p. 65]. «*The use of the waters can only be decided upon when the origin of these disorders is fully ascertained*», in particular, he talks about «*so called cachectic forms of disease, as chlorosis, scurvy, and dropsy. These forms proceed from various internal momenta, and are mostly compound disorders*» [7, p. 33]. However, clinical medicine still had no theoretical basis or effective examination methods for this purpose. So Jean de Carro writes: «*We must, therefore, maturely consider the general state of the vital principle, as well as the degree of glandular morbidity in those separate organs whose nutrition depends on the lymph, before we venture to recommend the Carlsbad waters, even in primary dyscrasies of the lymph. However, both the lymph and the blood are subject, in various ways, to dyscrasies, to which the waters do not apply, or at least only under very limited conditions*» [7, p. 32]. Jean de Carro believes that dropsy [ascites in patients with portal cirrhosis as in the case of Beethoven] «*depend on morbidity of the abdominal organs; but far from necessarily proceeding from general and real debility, they depend mostly on an original defect of the blood, or of the lymph itself; or they arise, although less frequently, from a weakness of the abdominal nerves, by which the return of the blood is delayed*» [7, p. 39]. Patient complaints and arterial pulse are still used as diagnostic symptoms. He writes: «*If the water has been judiciously administered, we soon perceive that the pulse becomes fuller, the eyes more lively, the face of a redder color, the skin clearer and more of a flesh color, the feeling of vigor and health increased, and the functions of digestion, as well as the openness of the bowels, freer*» [7, p. 123]. Jean

de Carro describes symptoms of «*an inflammatory nature disorders*»: «*the pulse is strong and full; the heat considerable; local inflammations generally ensue, for instance, in the liver or lungs. At the sometime we perceive symptoms of a violent internal fermentation of the blood; for instance, by the skin assuming a considerable redness, of rather a deeper shade than usual, or by a tendency to hemorrhage, to thickness of urine, and excessive perspiration*» [7, p. 11].

Carlsbad's physician Adolph Ritter, medical councilor to the grand-duke of Oldenburg, published in 1910 treatise «*Carlsbad: clinical studies on the modes of action, indications for the use and curative value of its mineral springs*». He gives the results of the chemical analyses Sprudel's water made by Prof. E. Ludwig, Panzer, and von Zeynek [26, p. 22–23]. The results of the chemical analyses are more informative than analyses of Sprudel's water 1770 and 1882, for many items it matches the current data [19]. However, Adolph Ritter acknowledged that «*the lack of a definite basis for the therapy of our waters, it is at present impossible to apply Carlsbad's salts and waters in such a way, that their effect may be confined alone to a certain organ and in the degree desired*» [26, p. 73]. He writes: «*Like every medicament, mineral waters also can by prudent use or by abuse become either a good or a bad implement in the fight against disease. Although the question, as to how much and how often, how cold and how warm, and when, waters should be taken, requires as little inventive genius as the prescription for a cough or sleep remedy, their application should be studied, exercised and practiced, if they are to aid the sick to the greatest possible extent in the shortest time*» [26, p. 73]. In fact, it is a declaration of a scientific approach to balneotherapy. The following quote testifies to the same: «*The physicians at our watering place consider this as their serious duty and in their name request here that every cure under all circumstances should be supervised and directed medically on the spot. Apart from trivial considerations of a material nature, – though they stir the medical world very deeply – we make these requests in the first place in the interests of the patients, further in the interests of the watering-place, and not least in the interests of medicine itself*» [26, p. 73]. However, Adolph Ritter's «*Carlsbad: clinical studies on the modes of action, indications for the use and curative value of its mineral springs*» still invites doctors to use as diagnostic criteria «*such Symptoms of discomfort as pains in the stomach, intestinal colic, diarrhea and constipation, headache, congestion, vertigo, palpitation, insomnia, profuse sweating, irritable strangely etc.*» and pulse investigation [26, p. 73].

In 1802, Beethoven first spends part of the summer in the village of Heiligenstad on the recommendation of his new doctor Schmidt. Schmidt Johann Adam (1759–1809) was a royal and imperial advisor and a respected doctor, professor at the Medizinisch-chirurgische Josephs-Akademie in Vienna. He cared for Beethoven until his death in February 1809. Dr. Schmidt advised Beethoven to move away from the hustle and bustle of the capital and retire to the country to rest his ears. Hot-water spring in Heiligenstad has been known for a long time, but the public salt-water hydropathic baths were built only in 1781. Heiligenstad sulphurous water from a thermal spring was used both for baths and for oral administration [23, p. 152]. Beethoven adheres to Schmidt's advice for 25 years (1802–1826). Sometimes he rented an apartment not in Heiligenstad (1802, 1804, 1807, 1808, 1817), but in Hetzendorf (1801, 1805, 1823), Döbling (1802, 1803, 1821, 1823), Mödling (1799, 1818, 1819, 1820, 1821), Gneixendorf (1826) or Nussdorf (1817). All these small villages are a few kilometers from Vienna and very close to each other. During a summer vacation in the village of Beethoven often drove into Vienna (as he writes – «*to the city*») to meet with a physician or with publishers. It is known that Beethoven regularly drank mineral water not only from a source in Heiligenstad, but also from other local sources. For example, from a source in Ober-Döbling (sulphurous cold water) [23, p. 155]. Six months or more of each year Beethoven spent in the country in some obscure village about Vienna, and almost half of this time was in Baden (with the exception of 1802 and 1808).

In some years, Beethoven drank mineral water and at other spa resorts. September 1806 Beethoven visited Hradec nad Moravicí (Moravian-Silesian Region), July 1807 and September 1809 he visited small watering-place in Hungary (presumably this is Komorn, although biographers do not have reliable information) [33, p. 329]. In August 1811 he was treated in Töplitz on the advice of his new doctor Malfatti. von Malfatti Monte Reggion Giovanni (1775–1859) became Beethoven's physician in 1809 on the death of Professor Schmidt. Malfatti was the personal physician to the Archduchess Beatrix von Este and the Archduke Karl. His notoriety led to him taking the presidency of the Medical Society of Vienna, of which he was one of the founders. He is the author of many medical works, such as «*Entwurf einer Pathogenie*» which became a reference work.

In 1812 Beethoven undertook a whole balneological tour: July 14th–26th Töplitz, Carlsbad July 27th – August 7th, Franzensbrunn August 8th – September 6th: «*From Teplitz my doctor*

*Staudenheimer ordered me off to Carlsbad, from there back again here, and probably I shall have to return once again to Teplitz what a running about ! And yet how little certainty is there that my present state of health will improve !»* [4, p. 262]; again Carlsbad September 7<sup>th</sup> – 15<sup>th</sup>, and again Teplitz. September 15<sup>th</sup>: «*My Esculapius [Dr. Staudenheimer] has been leading me round in a circle»* [4, p. 269]. Such a rich balneological journey was largely determined by the influence of Beethoven's new medical adviser, Dr. Staudenheimer. von Staudenheimer Jakob (1764–1830) is pupil of the celebrated clinician Maximilian Stoll. A practitioner of great renown, he was personal physician to Emperor Francis I. It was while staying with the imperial family in Bohemia in 1812 that he made the acquaintance of Beethoven and gave him health advice. He became his former doctor in 1817. Jakob Staudenheimer was adept at the usage of the baths and mineral waters.

Biographers do not give a description of the treatment of Beethoven in Töplitz, Carlsbad and Franzensbrunn. However, there is no doubt that the recommendations of Beethoven's physicians (Dr. Shmidt, Dr. Staudenheimer and Dr. Malfatti) were based on the latest achievements of balneology of that time. Indeed, the description of Beethoven's treatment in Baden coincides with the basic provisions of the book «Cursory observations on the mineral water of Baden» 1838: Beethoven really took exactly the amount of water that is indicated in the treatise. The method of prolongation of the course of mineral water due to bottled water is mentioned in all treatises on balneology of that time [14, p. 47]. It is obvious that the reception of mineral water in the second half of the 17<sup>th</sup> century was not considered as a monotherapy, from Hugh Smith's «A treatise on the use and abuse of mineral waters» 1776: «*Before I proceed to Rules for drinking the Waters, although it is the Province of the Physician only to consider and to remove the first and remote Causes of chronic Complaints, I shall touch slightly upon of them, well known to Patient themselves, with a Waive to guard against their pernicious Consequences. A Want a proper Air and Exercises, irregular Hours and Intemperance, the Indulgence of irregular Passions, and all such Pursuits as relax the Constitution, and render the nervous System too exquisitely sensible»* [29, p. 17]. To strengthen the therapeutic effect of water treatment, it was common to use laxatives: «*Preparatory to drinking the Waters, same gentle Evacuations by Stool are necessarily. Mild Cathartic is to be preferred, especially such as cleanse the first passages; those of more violent and Heating Kind are to be avoided»* [29, p. 19]. Special attention was paid to physical exercises: «*It*

*is farther to be remarked the Exercise should ever be used between the Draughts of the Waters; and that of walking briskly is preferable to all other Exercise. It wonderfully promotes the Efficacy of the Water, prevents its passing off too quickly by Urine, and if gentle perspiration, not amounting to a Sweet, can be promoted, it is a sure Prognostic of immediate Benefit»* [29, p. 23]. The recommendations for combining mineral water with taking of laxatives and performing physical exercises are also the same as generally accepted. In August 1823, in a letter from Baden, Beethoven reports: «*I have still to take a whole purging mixture within 24 hours which weakens me very much, and in addition I am compelled every day to take exercise, as you will see from the prescriptions of my doctor»* [4, p. 291]. Indeed, «Cursory observations on the mineral water of Baden» states: «*During the whole of this treatment, the occasional employment of a laxative medicine is attended with great advantage»* [15, p. 18]. Treatise «Austrian health resorts and the bitter waters of Hungary» reports: «*Up to the beginning of the eighteenth century it was common at Carlsbad to subject the patient to a preliminary course of violent purgatives»* (before intake mineral waters) [11, p. 46]. «A treatise on the internal use of the natural and factitious waters of Carlsbad, Marienbad, Ems, &c» 1805 also states: «*During the whole time of drinking, and for about an hour after the last potion has been taken, gentle and continued exercise in the open air is requisite»* [17, p. 32]. John Bell in his treatise «On baths and mineral waters» 1831 writes: «*The exercise necessarily connected with this mode of drinking the water, together with the invigorating effect of a wholesome atmosphere and amusing company, add much to its efficacy as a medicine»* [5, p. 504]. Charles Hutton in «Cursory observations on the mineral water of Baden» writes: «*An invalid is thus encouraged to rise early and to take the exercise of walking, the most salutary of all exercise, to those, who have still sufficient strength to bear it»* [15, p. 8]. Augustus Bozzi Granville in his «The spas of Germany» 1838 also contends: «*Gentle exercise between each glass of water is necessary. It should last about a quarter of an hour. But such patients as are not much accustomed to walking exercise should not force themselves to follow' the above rule»* [11, p. 12].

Thus, there is a complete coincidence of the prescriptions of Beethoven's physicians (mineral water intake, thermal baths, laxatives, exercise) with the main provisions of the treatises on balneology of the 17<sup>th</sup>-18<sup>th</sup> centuries. This fact allows us to confidently assume that in Töplitz, Carlsbad and Franzensbrunn the treatment of Beethoven also corresponded to the methods described in the manuals.

Töplitz (Teplitz). Treatise «Austrian health resorts and the bitter waters of Hungary» reports: «*Whilst the mineral water of Teplitz is chiefly employed in baths, yet it has always been drunk to some extent, and of yearly 18th century its internal use has become more common. When taken internally, in conjunction with the baths, the water is supposed to have a beneficial action in cases of bronchial catarrh, of excessive perspiration, of catarrh of the stomach and bladder, and of gout and rheumatism*» [11, p. 119]. The chief ingredient of the water is carbonate of sodium. The springs have a temperature ranging between 75° and 120° Fahrenheit (23,9–48,9 °C). The water (main spring Haupt-Quelle) is strongly alkaline and having the superiority over it of being richer in carbonic acid gas. The water containing twenty three grains of carbonate of sodium, small quantities of lime and magnesium, and six grains of sulphate of soda in sixteen ounces [14, p. 187].

Franzensbrunn's «*waters belong to the alkaline-saline and not merely to the chalybeate class of mineral springs, and the amount of mineral constituents vary between 87 and 72 grains in 16 ounces of the water. The odor is decidedly sulphurous, the taste saline, somewhat hitter and sulphurous, and at the same time refreshing. They are cold, clear, and highly charged with carbonic acid, and are suitable for the most feeble invalids. The oldest and principal spring (Franzensquelle) has a temperature of 50 °F (10 °C). It is customary to drink from this spring in the afternoon, between 4 and 6 p.m. as well as in the morning. It is beneficial in chronic catarrh of the stomach, and especially of the intestine*» [14, p. 110]. «*The following is summary of the rules for passing the day in accordance with medical advice*» from William Fraser's book «Austrian health resorts and the bitter waters of Hungary» gives us a vivid idea of how Beethoven spent time in Franzensbrunn: «*The patient gets out of bed between five and six in the morning, and reaches the springs not later than six, spending the time between six and eight in drinking water and walking about. Between eight and nine is the time for breakfast. A bath is taken between nine and twelve, and the patient is allowed to read or write letters in the unemployed intervals. The hour for dinner is between twelve and two. An option is given of either making excursions in the neighborhood on foot and in a carriage between half-past three and eight, or sitting in the open air from half-past three till six, the tedium being relieved either by a cup of coffee at four, or by a glass of mineral water between five and six. Supper is eaten between seven and eight and the patient goes to bed at nine*» [11, p. 69]. Beethoven's letter 9th August, 1812 of from Franzens Brunn near Eger confirms this assumption [4, p. 261].

Carlsbad. There are sixteen springs, eleven of which are prescribed by the physicians. The Sprudel (principal water) discharging two-thirds of this quantity. Chemically they are all similar, the only difference being that the cooler springs contain more carbonic acid than the hotter ones. The temperatures range between 85° and 166° Fahrenheit (29–75 °C), the Sprudel being the hottest, at 165° or 165° Fahrenheit (74–75 °C). The general indications for a course internal use Sprudel are «*abdominal complaints, and especially those due to venous stasis in the abdomen. As special indications we would name – Dyspepsia – due to chronic gastric catarrh; catarrh of the duodenum and of the bile-ducts. Chronic constipation and chronic catarrh of the intestines. Congestion of the liver and enlargement due to fatty infiltration*» [23, p. 32]. Up to the beginning of the 18th century it was common at Carlsbad to subject the patient to a preliminary course of violent purgatives. Patient was supposed to be suffering from after having been weakened by strong and the patient was ordered to drink the mineral water for seven days, and to bathe in it for the following seven days, drinking and bathing for successive weeks till the patient was cured or a corpse. From the beginning of the 18th century it is not common to drink more than three glasses of the water, and the immediate effect is not more marked or unpleasant than when the like quantity of spring water is drunk. But early in the 18th century, and for many years later, intemperance in drinking mineral water was the rule. Dr. Hofmann, an estimable physician in his day, writing in 1705, says that no more than from fifteen to eighteen glasses should be taken the first day of the treatment, and that the patient should gradually increase the dose till the glasses emptied numbered forty. Dr. Tilling, who was a patient in 1756, records that he drank from fifty to sixty glasses of water in the course of two hours. Dr. Sangrado did not prescribe warm water in larger doses, and the puzzle is how the patients at Carlsbad in those days succeeded in carrying out the orders of the doctor [11, p. 46]. The hot springs of Carlsbad were never used otherwise than as baths, from the time of their discovery to the first part of the sixteenth century. From that time until the year 1828, bathing, and drinking the waters, went on simultaneously; the former, however, prevailing. But of late years bathing has become a mere auxiliary, to which few only of the invalids have recourse; the rest, or the major part of them, visit Carlsbad for the sole purpose of drinking the waters [14, p. 32]. Carlsbad's «*The summary of the rules for passing the day in accordance with medical advice*» not much different from Franzensbrunn's

ones. According to him, «*patients are to begin the day by rising not later than six, and walking to the springs. After drinking, at intervals of fifteen minutes, three glasses of the particular water prescribed, and taking gentle exercise for an hour after the last glass, they may breakfast*» [11, p. 15]. There is no doubt that Beethoven's day in Carlsbad was going this way. Judging by the fact that Beethoven never returned to Töplitz, Carlsbad or Franzensbrunn again, he was dissatisfied with the results of treatment. A few months later, in a letter to princess Kinsky, he recalls: «*My illness increasing in Töplitz*» [4, p. 274]. There is no improvement in health in the following years also: «*as regards my health, it is about the same*», Beethoven continues to complain about «*persistent colic, diarrhea*» [3, p. 275].

Summarizing the analysis of the development of balneotherapy at the spa resorts visited by Beethoven (Baden, Töplitz, Carlsbad, Franzensbrunn, Heiligenstad, Mödling), we can conclude that until the beginning of the 19th century mineral waters were used mainly as bathtubs and only from the beginning of the 19th century they became more widely used for oral administration. Jean de Carro described the stages of the development of European balneology: «*Our medical institutions can be therefore divided into three distinct periods. During the first, bathing alone was usual. The second period, and certainly the most important, dates from Wenzel Payer, on whose suggestion, in 1521, the internal use of the waters was added to bathing. The third began so late as 1827, when the application of steam was joined to drinking and bathing. The junction of these three curative means has manifestly increased the fame of Carlsbad, and, although often prescribed to the same patient, drinking remains in general the most essential part of the cure. A great number accomplish it without water or vapour — baths; but bathing without drinking is rare*» [7, p. 51]. Beethoven's visit to Carlsbad occurred in «*the internal use of the waters was added to bathing*» the second period, when «*the internal use of the waters was added to bathing*». By this time period some experience of mineral water reception has already been accumulated, chemical analysis of mineral waters of the mentioned spa resorts was performed at the end of 18th — beginning of 19th centuries. Treatises devoted to the analysis of clinical experience of internal use of mineral waters of these resorts appeared somewhat later — в 1820th-1830th years. For example «*A treatise on the internal use of the natural and factitious waters of Carlsbad, Marienbad, Ems, &c.*» was published in 1824 [17, p. 155].

Beethoven's health deteriorated significantly in 1821, which required changes in treatment.

Beethoven became a victim of jaundice in spring yearly 1821: «*since last year and up to the present I have been always ill, during the summer I was likewise attacked by yellow jaundice and that lasted to the end of August*» [4, p. 182], for which, no doubt, he was sent to Baden (by dr. Staudenheimer), though he had gotten rid of the disease to some extent at least by the end of August. Alexander Thayer reports, that «*the cure prescribed by Staudenheimer was more severe than he could endure*». Alexander Thayer rightly believes that «*the attack of jaundice may have been an avant-courier of the disease of the liver which brought him to the grave six years later*» [35, p. 39]. Modern Beethoven's medical biographers regard «*yellow jaundice*» as the first manifestation of cirrhosis of the liver [20, p. 138–141]. Beethoven continues to visit Baden and Mödling annually, where he takes thermal baths and drinks sulfur mineral water. In addition, in the summer of 1822, Beethoven begins the taking of soda mineral waters, which will continue until his death. In letter to brother Johann from Vienna Yule 22, 1822 Beethoven wrote: «*I have had to drink for the last few days Johannes-Brunnen-Wasser, take powders four times a day, and now I must go to Baden and take thirty baths; if it is possible to arrange, I shall betake myself there and remain up to the sixth or seventh of August*» [4, p. 199]. Johannes-Brunnen-Wasser (or Johannisbrunnen-wasser, or Johannisbrunnen water) is an Austrian natural carbonated mineral water that is obtained from an Artesian well in the village of Hof bei Straden in the market town of Straden in Styria. The source has been known since 1671; in 1777 the Austrian physician Heinrich Johann Nepomuk von Crantz studied the chemical composition of the mineral water and gave its description. The water issues from a very deep cleft in rock at temperature of 50o Fahrenheit (10 °C). It is highly charged with the free carbonic acid gas, of great purity, and contains bicarbonates and chlorides in such proportions as to render it agreeable to the taste and permanent. Since 1819 Archduke John of Austria gave permission to call therapeutic water Johannes-Brunnen-Wasser, since the same year, water began to be poured into ceramic bottles with a capacity of 1.5 liters and sold throughout Austria. In the middle of the 19th century it was seen that «*Johannes-Brunnen water stimulates the function of the mucous membranes and quickens the circulation of the blood. It is highly recommended in cases of indigestion and feeble appetite, also for rheumatic affection, and it is valuable for persons of a sedentary occupation. On account of the large proportion of carbonic acid, it is an excellent tonic and table water, alone or with wine and cognac. It is of great purity and contains no*

*traces of organic matter. It can be exported and stored for a long time without deterioration»* [16, p. 31]. Johannes-Brunnen-Wasser was supplied to many cities in Austria: Including Baden and Vienna. It is curious that the volume and shape of the Johannes-Brunnen-Wasser ceramic bottle does not differ significantly from plastic bottles with dining mineral water, which are sold in modern supermarkets (photos of Johannes-Brunnen-Wasser vintage bottles can easily be found on the Internet). Beethoven drinks Johannes-Brunnen-Wasser on the recommendation of Dr. Staudenheimer. Beethoven had all the above indications for the purpose of this water and its effect was positive. No wonder Beethoven continued his Johannes-Brunnen-Wasser intake: in letter from Döbling August 3, 1822 he wrote: *«I have already written to you about my health which is not yet completely restored; I take baths, mineral waters, and also medicine»* [4, p. 202]. Ober-Döbling (a part of Döbling) had a source of cold sulfur water [23, p. 155], But in this case, Beethoven talks exactly about Johannes-Brunnen-Wasser.

Obviously, the use of soda mineral table waters since that time has become a habit of Beethoven. June 1825 in letter to the nephew Carl Beethoven wrote: *«to-morrow we go for the seltzer water to the Karoliner Thor, as formerly. If the small bottles are as genuine as the great ones they might be taken, I however believe that it must be safer to take the large ones ce depend de votre Esprit votre distinction, &c.—farewell, dear son, and contrive that we get the genuine, not artificially made seltzer water, otherwise I might, who knows, catch something»* [4, p. 383]. It is clear from the letter that Beethoven not only regularly purchases seltzer water (which was more affordable in Vienna than Johannes-Brunnen-Wasser), but also has a negative experience with drinking *«artificially made seltzer water»*. However, Beethoven was in vain afraid to buy *«the small bottles of seltzer water»*. *«A brief account of the virtues and medicinal properties of seltzers water, with directions for its use»* published 1828 by Royal College of Physicians of Edinburgh states: *«Seltzer Water is shipped in stone bottles, each containing rather more than an Imperial Quart [1,13652 Liter], and in others of half the size. These bottles are manufactured with great care, of a clay peculiar to certain parts of the Duchy of Nassau; on the shoulder of each bottle are the initials H. N. surmounted by a crown, and surrounded by the word Selters; the letters beneath indicate the name and residence of the maker»* [1, p. 8]. One million two hundred thousand flasks of Seltzers water are annually sold by the Duke of Nassau direct from the springs. Beethoven's fears about the artificial seltzer water were based not only on his personal

experience. In the balneological literature of the second half of the 18th and early 19th centuries, practitioners expressed doubts about the effectiveness and safety of the use of artificial mineral waters [9, 24, 25]. Charles Hutton in his *«Cursory observations on the mineral water of Baden»* also writes: *«I firmly believe, that all the cold mineral waters, which have been correctly analyzed, can be very closely imitated. Not so the thermal waters. They indeed may be imitated, as to their component parts; but the artificial hot waters never produce the same effect as the natural ones»* [15, p. 13].

*«A brief account of the virtues and medicinal properties of selters or seltzer water, with directions for its use: compiled from the best authorities, English and foreign»* 1828 describes the therapeutic properties of water: *«The operation of this water is chiefly diuretic, for it has no aperients virtues; it is one of the mildest and most innocent of all the mineral waters, and observes, that it may be taken by persons of the weakest constitution. It corrects acidities, renders the blood and juices more fluid, promotes a brisk and free circulation, and therefore is good in obstructions of the glands, and against gross and viscid humors. It is of great use in the gravel and stone, and other disorders of the kidneys and bladder. It is also excellent in gouty and rheumatic complaints, especially when mixed with milk, or improved by the addition of Rhenish wine. It relieves the heartburn, and is an excellent stomachic. On account of its diuretic quality, it is serviceable in dropsical complaints»* [1, p. 14]. It is obvious that Beethoven had *«dropical complaisons»* by 1825: ascites the background of portal cirrhosis of the liver. From another letter, Beethoven shows that he followed the recommendations of the producers of soda waters (as well as the recommendations of his physicians) and used to mix mineral water with wine. May 13, 1825 he wrote to his new physician Prof. Dr. Braunhofer: *«I think a strengthening medicine will be required, one, however, which will not bring on constipation—white wine mixed with mineral water I have been allowed to take, as the mephitic beer is repugnant to me—my cathartic state shows itself in the following way, namely, I spit a good deal of blood, very likely only from the windpipe, but oftener from the nose»* [4, p. 368]. Anton Braunhofer (1780—1846) was an Austrian physician and Professor of Natural History and medical technology at the University of Vienna, medical practitioner, and adept at dietetics. In the context of Beethoven's abdominal symptoms and the relative absence of respiratory complains, it is more likely that the blood originated in the gastrointestinal than in respiratory tract. A retrospective analysis of Beethoven's letters suggests that

«spit a good deal of blood» — this is bleeding from the dilated veins of the esophagus due to portal cirrhosis (but not «from the windpipe» as Beethoven believed) [20, p. 106].

In 1826, lack of finance did not allow Beethoven to spend the season either in Baden, or Mödling, or even in Heiligenstadt. To some extent, this circumstance accelerated the progress of cirrhosis of the liver. Beethoven's friends knew of the composer's unshakable faith in the healing power of the mineral waters, as of his severe illness and financial difficulties. Different proposals for Beethoven's trip to spa were already being offered early 1826. Karl Holz (1798–1858, an Austrian violinist and a friend of Ludwig van Beethoven) offered also to find a house in Baden for him [36, p. 989]. Beethoven spent the summer at his brother Johann's summer home in Gneixendorf. Beethoven was sick when he went to Gneixendorf. Johann wrote later that, when with him, Beethoven ate little. When the food was not prepared to his taste he ate soft-boiled eggs for dinner «and drank all the more wine». He had frequent attacks of diarrhea. His abdomen also became distended so that he wore a bandage for comfort [35, p. 275]. In the beginning of December Beethoven lost his appetite and complained of thirst and abdominal complaints. There had been mention about «edematous» feet. These were clear manifestation of an existing liver disease (portal cirrhosis of liver) [35, p. 275]. Это было начало конца.

Dr. Wawruch was called to his bedside on the 5th December 1826 and lavished attentive care upon the composer until his death. Wawruch Andreas Ignaz (1773–1842) was director of a medical clinic and professor of internal illness at the Vienna's University in 1826. Sometime later he published a circumstantial report on the master's illness and death [37]. Edward Henry Larkin (1908–2002, famous English physician), author of Beethoven's medical history, very accurately described the state of medicine in the time of Beethoven: «There no was medical science as we know it: no microscopes, no laboratories, no bacteriology, no chemical tests. The clinical thermometer was invented but not in use. The cell structure of the body was not known, it was many years before of discovery even the basic principal of *omnis cellula e cellula*. The relating of disease-process to post-mortem findings had barely begun and was far from generally accepted, and consequently there was no knowledge of pathology, or what actually happens in disease. Beethoven's doctors, though they were all eminent, were trained in the eighteenth century, and their ideas were little advanced from those of medieval medicine» [18; 8, p. 444]. Indeed, it may well have

been that the physicians of Beethoven's day were less scientists and more philosophers. They sought generalizations. The medical world had not yet been seized by the scientific approach of Auenbrugger, or Laënnec. Physicians were more interested in speculation than in specifics. Techniques for Physical Assessment (percussion and auscultation) have also been invented, but most doctors touched the patient only for the sake of research of pulse. Joseph Leopold Auenbrugger (1722–1809) published his «*Inventum novum ex percussione thoracis humani ut signo abstrusos interni pectoris morbos detegendi*» 1761 («A new invention, which allows on the basis of percussion data of human thorax, as a sign, to discover diseases hidden in the depth») in Latin, but the treatise did not receive wide distribution even after Jean-Nicolas Corvisart-Desmarest (1755–1821) in 1808 re-published it in French. The English translation of this work was published in 1824, German translation of «*Inventum novum*» was published in 1912 only [30]. René-Théophile-Hyacinthe Laënnec (1781–1826) published his «*Traité de l'auscultation médiate et des maladies des poumons et du coeur*» («A treatise on the diseases of the chest and on mediate auscultation») 1819 in French. The first English translation of «*De l'auscultation médiate*» was by John Forbes, published in London in 1821. The first German translation of Laennec's treatise was Friedrich Ludwig Meissner, published in 1832 only. The stethoscope, along with the Laennec's treatise, could be purchased in Paris in 1819 for 15 francs. However, even French physicians for a long time treated the innovation with great distrust [27]. Beethoven's doctors were no exception; they only used visual examination, collection of complaints and medical history. In his medical history of the case, Dr. Wawruch stated that the cause of the disease was to be found in an «*antiquated*» ailment of liver as well as defects in the abdominal organs. When he observed the first aggravation of the disease he recorded that «*I found him [Beethoven] greatly disturbed and jaundiced all over his body. Trembling and shivering he bent double because of the pains which raged in his liver and intestines, and his feet, thitherto moderately inflated, were tremendously swollen. From this time on dropsy developed, the segregation of urine became less, the liver showed plain indication of hard nodules, there was an increase of jaundice. The disease moved onward with gigantic strides*» [37; 35, p. 275]. The of liver cirrhosis has not been diagnosis even after a patho-anatomical study, although the protocol of autopsy contains a detailed description of typical signs of the disease: «*The liver seemed to have shrunk to one half its normal size, to*

have a leathery hardness, a greenish-blue color, and its lumpy surface, as well as its substance, was interwoven with knots the size of a bean. All the blood-vessels were narrow, with thickened walls and empty» [37; 35, p. 308]. Alexander Thayer writes: «Dropsy, said the world for three-quarters of a century, is the disease which caused the death of the greatest of all tone-poets. But dropsy is not a disease; it is only a symptom, a condition due to disease. To Dr. Theodor von Frimmel [1853–1928, famous Austrian medical historian, musicologist, and Beethoven medical biographer] belongs the credit of having made it clear that the fatal malady was cirrhosis of the liver, of which ascites, or hydrops abdominalis, was a consequence. Beethoven had suffered from disorders of the liver years before» [35, p. 308]. The term cirrhosis of the liver was first introduced by René-Théophile-Hyacinthe Laënnec in 1819: He described a patient with ascites and a reduced liver size. Physicians used the term «*Laënnec's cirrhosis*» for a long time. Laënnec's works, including the «*Traité de l'auscultation médiante et des maladies des poumons et du coeur*» 1819 were published in French and widely distributed in Austria much later. Treatment of Beethoven's physicians' also based mainly on empirical data and was essentially symptomatic (even not pathogenetic). Alexander Thayer states: «*Dr. Wawruch and adopted empirically at the suggestion of friends was designed, not to go to the seat of the difficulty but to relieve the dropsical condition of the abdominal cavity;—medicaments, decoctions, the unfortunate sweat-bath, all were intended to produce liquid evacuations from the bowels, increase the secretion of urine and induce perspiration; the final resort was to paracentesis*» [35 p. 308; 37]. «*The unfortunate sweat-bath*» was a sort of sweat-bath a few days after the second operation (a vapor bath from a decoction, the ingredients of which were a head of cabbage, two handfuls of caraway seeds and three handfuls of hayseed): jugs filled with hot water were arranged in a bath-tub and covered thickly with birch leaves on which the patient was seated, all of his body but the head being covered with a sheet [35, p. 287]. Beethoven's physicians hoped for a beneficent action upon the skin and to put the organs into a productive perspiration. But the very opposite effect resulted. «*The body of the patient, which had been emptied of its water by the scarcely*

*completed tapping, attracted the moisture developed by the bath like a block of salt; it swelled visibly in the apparatus and in a few days compelled the introduction a new of the tube into the still unhealed puncture*» [35, p. 287]. Ludwig van Beethoven died on 26 March 1827 at the age of 56.

As we see, the mineral waters intake was an important component of Beethoven's treatment throughout 1799–1827 (along with thermo-mineral baths, diet therapy and physical exercises). European balneology of the 18–19th centuries developed rapidly, but during Beethoven's time it was still based mainly on empirical data. All Beethoven's physicians were the most advanced representatives of medicine of that time, their treatment was based on the latest medical achievements 18th century. By the beginning of the 19th century, great experience of using the mineral waters Baden, Heiligenstadt, Töplitz, Carlsbad, Franzensbrunn, Mödling was already accumulated and published in treatises. The basic principles of balneotherapy and methods of mineral water intake in the first half of the 19th century do not have significant differences from modern ones. This fact cannot but delight as many very important discoveries in medicine at that time have not yet been made (or have not been widely known). No less admiration is caused by Beethoven's indestructive commitment to life and his unconditional faith in the healing power of water. Spa treatment became part of Beethoven's life: biographers believe that most of his greatest works the composer wrote during the treatment periods at spa resorts. François Martin Mai in his book about Beethoven's medical biography «*Diagnosing genius*» wrote: «*Throughout his life Beethoven retained a strong belief in the effectiveness of water spa treatment*» [20, p. 77]. Confirmation of this opinion is the history of the composer's illness: 25 seasons of balneotherapy. One of the last letters of the dying composer (February 17, 1827) is symbolic also: Beethoven was planning a trip to spa resorts to restore his health with mineral waters and thermal baths [4, p. 463]. March 18, 1827 (one week before his death) Beethoven wrote to his pupil I. Moscheles: «*If God restores me to health, I shall try practically to show my gratitude by works. A whole sketched Symphony [the 10th] is in my desk, also a new Overture or even something else*» [4, p. 472].

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*The authors have contributed equally to conception and design, acquisition and interpretation of data, drafting the article.*

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## Лікування хронічного ентероколіту в першій половині XIX століття: бальнеотерапія Бетховена

Великий німецький композитор, представник віденської музичної школи композитор Людвіг ван Бетховен майже все життя страждав від захворювань травної системи та порушення слуху. Стан здоров'я значною мірою вплинув як на його життя, так і на творчість. Вживання мінеральних вод у першій поло-

вині XIX ст. було важливою частиною терапевтичного арсеналу лікарів. Їх активно застосовували при лікуванні Бетховена. Бальнеотерапія — один з найменш вивчених аспектів історії життя композитора. Метою нашого дослідження було вивчити використання мінеральної води в лікуванні гастроентерологічних захворювань Бетховена. Проаналізовано листи композитора та праці його найавторитетніших біографів для виявлення даних щодо застосування мінеральних вод у його лікуванні. Проведено пошук у базах даних Scopus, WebOfScience, MedLine та PubMed, електронних архівах (без обмеження часу) інформації щодо використання мінеральних вод на європейських спа-курортах у першій половині XIX ст. Установлено, що з 1796 року Бетховен страждав на хронічний ентероколіт та прогресуюче порушення слуху, з 1820 року — на портальний цироз печінки. Споживання мінеральної води було важливою частиною лікування Бетховена з 1799 року до смерті в 1827 році. Лікування композитора проводили з урахуванням досягнень медицини на початку XIX ст. Медицина того часу була переважно емпіричною, діагностика ґрунтувалася лише на опитуванні та огляді, оскільки методики фізикального дослідження ще не набули широкого застосування. Композитор щорічно приймав мінеральну воду на спа-курортах (Баден, Теплице, Карлсбад, Франценбрунн) протягом сезону (до 6 міс) і продовжував отримувати мінеральну воду у пляшках у Відні. Спа-терапія (зокрема вживання мінеральної води) стала частиною життя композитора. Більшість його творів написано саме під час перебування на спа-курортах.

**Ключові слова:** історія хвороби Людвіга ван Бетховена, історія гастроентерології і клінічної медицини, історія бальнеотерапії, історія курортів Європи.

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## Лечение хронического энтероколита в первой половине XIX века: бальнеотерапия Бетховена

Великий немецкий композитор, представитель Венской музыкальной школы композитор Людвиг ван Бетховен почти всю жизнь страдал от заболеваний пищеварительной системы и нарушения слуха. Состояние здоровья в значительной мере повлияло как на его жизнь, так и на творчество. Потребление минеральных вод в первой половине XIX в. было важной частью терапевтического арсенала врачей. Их активно применяли при лечении Бетховена. Бальнеотерапия — один из наименее изученных аспектов истории жизни композитора. Целью нашего исследования было изучить использование минеральной воды в лечении гастроэнтерологических заболеваний Бетховена. Проанализированы письма композитора и труды его наиболее авторитетных биографов для выявления данных о применении минеральных вод в его лечении. Проведен поиск в базах данных Scopus, WebOfScience, MedLine и PubMed, электронных архивах (без ограничения времени) информации об использовании минеральных вод на европейских спа-курортах в первой половине XIX в. Установлено, что с 1796 года Бетховен страдал хроническим энтероколитом и прогрессирующим нарушением слуха, с 1820 года — портальным циррозом печени. Потребление минеральной воды было важной частью лечения Бетховена с 1799 года до смерти в 1827 году. Лечение композитора проводили с учетом достижений медицины в начале XIX в. Медицина того времени была преимущественно эмпирической, диагностика основывалась только на опросе и осмотре, поскольку методики физикального исследования еще не получили широкого применения. Композитор ежегодно принимал минеральную воду на спа-курортах (Баден, Теплице, Карлсбад, Франценбрунн) в течение сезона (до 6 мес) и продолжал получать минеральную воду в бутылках в Вене. Спа-терапія (в частности употребление минеральной воды) стала частью жизни композитора. Большинство его произведений написано именно во время пребывания на спа-курортах.

**Ключевые слова:** история болезни Людвиг ван Бетховена, история гастроэнтерологии и клинической медицины, история бальнеотерапии, история курортов Европы.

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