1. Environ Microbiol Rep. 2025 Jun;17(3):e70095. doi: 10.1111/1758-2229.70095.

Halophilic and Non-Halophilic Microbial Communities in Relation to Physico-Chemical Characteristics of Salt Mine Air.

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Salt mines are often used for halotherapy against lung and skin diseases. In addition to salt, they also contain various types of microorganisms, which remain poorly characterised. Here, we examined culturable halophilic and non-halophilic microbial populations in relation to the physico-chemical

characteristics in the air of four different sites of the Bochnia Salt Mine, a popular halotherapy resort in Southern Poland. At the mine entrance, the temperature was highest (20.8°C) and decreased with increasing distance from the entrance (15.5°C at 2671 m from entrance), while humidity increased from 55.9% to 77.0%, as did the NaCl concentration. At the entrance, non-halophilic microorganisms prevailed, especially fungi that grew at 21°C. Halophiles gradually dominated with distance from the entrance, including halophilic archaea that grew at 28°C or 37°C on medium containing 15%, 20%, or 25% NaCl. Seven halophilic archaeal species were identified by 16S rRNA gene sequencing. The frequency of non-halophiles was inversely related to distance from the entrance, humidity, and presence of ions, while the reverse was seen for halophiles. An exception was the site used for halotherapy, where non-halophilic bacteria dominated. Thus, natural salt mines contain a wide variety of non-halophilic and halophilic microorganisms, including archaea, which may contribute to the halotherapeutic effects.

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PMID: 40304452 [Indexed for MEDLINE]

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2. Monaldi Arch Chest Dis. 2024 Aug 29. doi: 10.4081/monaldi.2024.3007. Online ahead of print.

Italian survey on the effectiveness of halotherapy administered via the Aerosal(®) system.

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Over the years, halotherapy (HT) has shown promise in the treatment of respiratory and dermatological diseases. However, its widespread acceptance remains limited due to the absence of official guidelines and awareness among doctors and patients. Among the patented systems of administration of HT, Aerosal® is the only one consisting of 3 certified elements, all classified as Medical Devices Class 2A: a dry saline dispenser called Aerosalmed®, a 30 g salt dose named AeroNaCL®, and a confined environment in marine multilayered construction with walls coated in salt called Aerosal®. We conducted an online survey of subjects undergoing Aerosal® HT across 80 Italian centers. Participants provided demographic data, reasons for choosing HT, and perceptions of its effectiveness. Following 10 treatment sessions, they rated improvements in various aspects, such as skin condition, sleep quality, relaxation, and respiratory benefits. Most participants learned about HT through word of mouth rather than medical advice, suggesting a discrepancy between patient satisfaction and medical endorsement. Over 92% reported resolution of their health issues post-treatment, with significant improvements in sleep quality and relaxation, particularly in adults. The therapy showed promise in various conditions, including respiratory and skin disorders, possibly attributed to stress reduction and intrinsic therapeutic effects. Despite skepticism, HT administered through the Aerosal® system has shown therapeutic potential. The psycho-physical benefits observed in patients advocate for greater consideration

of this therapy by clinicians, emphasizing its safety, tolerability, and absence of notable side effects. In this context, standardized systems like Aerosal® are crucial for ensuring treatment safety and efficacy.

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PMID: 39221656

3. Healthcare (Basel). 2023 Jul 24;11(14):2104. doi: 10.3390/healthcare11142104.

Implications in Halotherapy of Aerosols from the Salt Mine Targu Ocna-Structural-Functional Characteristics.

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The paper presents the evolution of the concentration level for four particle size groups of microaerosols (1.0, 2.5, 4.0 and 10.0 μm) in correlation with the microclimatic characteristics (temperature, humidity, lighting, pressure and concentration in CO2 and O2) in three active areas of the Targu Ocna Saltworks, currently used in treatments with solions (hydrated aerosols): in the vicinity of the walls of the old mining salt room, where there is a semi-wet static regime (SSR); in the transition area between the old rooms of exploitation with the semi-wet dynamic regime (DSR); and in the area of the waterfall and the marshy lake with the dynamic wet regime (DWR). The first and last halochamber are the ones recommended for cardio-respiratory, immuno-thyroid and osteo-muscular conditions, as well as in psycho-motor disorders. Based on questionnaires carried out over the course of a year, between 1 September 2021-31 August 2022, in two periods of stationing/treatment: a cold one (15 September 2021-15 December 2021) and a warm one (1 May 2022-30 July 2022), correlated with the data from the Salina medical office, achieved the profile of the improvement rate of the patients' ailments depending on the type of treatment (working regime in halochambers). These studies have allowed the optimization of the treatment conditions in the artificial surface halochambers in order to reduce the stationary period and optimize the treatment cycles.

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PMCID: PMC10379990
PMID: 37510545

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4. Altern Ther Health Med. 2023 Jul;29(5):46-53.

Adjunctive Treatment of Pediatric Adenoidal Hypertrophy: A Review.

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CONTEXT: Adenoids play an important role in the protection of the upper respiratory tract against pathogens. Nonphysiological enlargement of adenoids is defined as adenoid hypertrophy (AH). In treating AH, physicians prefer medical therapy and often disregard adjunctive methods. Studies on the effects of adjunctive methods on adenoid tissue are quite scarce.
OBJECTIVE: The current review aims to examine the clinical studies that have investigated adjunctive methods-nasal irrigation, herbal therapy, bacteriotherapy, and halotherapy-used to treat AH and its associated symptoms and to evaluate their effectiveness in pediatric patients.
DESIGN: The research team performed a narrative review by searching seven electronic databases (Pubmed, Cochrane Library, Google Scholar, Web of Science, EMBASE, Science Citation Index and Elsevier) were used for the literature search. The search used the keywords adenoid hypertrophy, adjunctive treatment, nasal irrigation, herbal medications, bacteriotherapy and halotherapy.
SETTING: This study was took place in Department of Anatomy, Medicine Faculty, Istanbul Medeniyet University.
RESULTS: The nasal irrigation with hypertonic solution decreased to size of enlarged adenoid tissue. The bacteriotherapy used with nasal spray and tablet form decreased to surgery rate and adenoid size.The adenoid and/or tonsillar hypertrophy were decreased by halotherapy used with micronized, iodized-salt aerosol.
CONCLUSIONS: A review of studies on this matter indicates that the studied adjunctive methods can be used safely in the treatment of AH, either separately or in combination with conventional medical treatment. However further clinical studies are needed on this topic.

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5. Ann Transl Med. 2022 Dec;10(23):1279. doi: 10.21037/atm-22-5632.

Halotherapy relieves chronic obstructive pulmonary disease by alleviating NLRP3 inflammasome-mediated pyroptosis.

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BACKGROUND: Airway remodeling and inflammation are considered the main characteristics of chronic obstructive pulmonary disease (COPD). Cigarette smoke promotes the occurrence of inflammation, oxidative stress, and pyroptosis. Halotherapy has been shown to dilute secretions in the airways and promote drainage, but the mechanism remains unclear. In this study, we evaluated the anti-inflammatory and antioxidant effects of halotherapy in COPD rats and investigated the underlying mechanism.
METHODS: A COPD rat model was constructed by cigarette smoke and lipopolysaccharide tracheal instillation. A total of 120 male Sprague-Dawley

(SD) rats were randomly divided into control, model, halotherapy, terbutaline, halotherapy + terbutaline, and Ac-YVAD-CMK (Caspase-1 inhibitor) groups. After modeling and treatment, the pulmonary function of the rats was measured. Pathological changes in the lungs were measured by hematoxylin-eosin (H&E) staining. Serum interleukin-1β (IL-1β), tumor necrosis factor-α (TNF-α), interleukin-4 (IL-4), and nitric oxide (NO) levels were determined using enzyme-linked immunosorbent assay (ELISA) kits. Malondialdehyde (MDA) levels and superoxide dismutase (SOD) activity in the lungs were determined by biochemical tests. The levels of cluster of differentiation 4 (CD4+) and CD8+ T cells in the blood were determined by flow cytometry. The expression levels of Toll-like receptor 4 (TLR4), nuclear factor kappa B (NF-κB), gasdermin-D (GSDMD), nucleotide-binding oligomerization domain-like receptor protein 3 (NLRP3), apoptosis-associated speck-like protein containing a C-terminal caspase recruitment domain (ASC), Caspase-1, and IL-1β in lung tissues were detected by immunohistochemistry, Western blotting, or quantitative polymerase chain reaction (qPCR).

RESULTS: Halotherapy recovered the clinical symptoms of COPD rats, and reduced lung inflammatory cell infiltration and air wall attenuation. It also relieved oxidative stress in the lung tissue of COPD rats, reduced CD4+ and CD8+ T cell accumulation in lung tissue, and decreased inflammatory factor production in the serum of COPD rats. Furthermore, it inhibited the TLR4/NF-κB/GSDMD and NLRP3/ASC/Caspase-1 signaling pathways. Ac-YVAD-CMK could not completely inhibit the therapeutic effect of halotherapy on COPD rats.

CONCLUSIONS: Halotherapy improves lung function by inhibiting the NLRP3/ASC/Caspase-1 signaling pathway to reduce inflammation and pyroptosis in COPD rats, and may be a new option for the prevention and treatment of COPD.

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PMID: 36618788

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6. Altern Ther Health Med. 2022 Mar;28(3):52-56.

Halotherapy for Chronic Respiratory Disorders: From the Cave to the Clinical.

Barber D, Malyshev Y, Oluyadi F, Andreev A, Sahni S.

CONTEXT: Halotherapy (HT) is a form of speleotherapy, a respiratory therapy involving breathing inside a cave, and its therapeutic environment is similar to that of a natural salt cave. Natural crystallized salt is inhaled via aerosols or from the environment directly to enhance breathing and respiratory health-related quality of life (HRQoL). Clinicians need to be aware of its potential benefits, with relatively few or no adverse effects and consider its use an adjuvant therapy for standard care.
OBJECTIVE: The current review intended to compile the existing literature on HT's use in various chronic respiratory diseases. It examines the use of dry salt inhalers; the use of saline nebulizer therapy is already well established in the literature.
DESIGN: The research team performed a literature review to identify all articles published in the English language between January 1980 and December 2018 that used HT or heliotherapy and speleotherapy in the title. Pseudonyms such as salt cave therapy and salt mine therapy were also included. The source of data was the National Library of Medicine's MEDLINE/PubMed.

SETTING: Literature search took primarily from the main campus of Brookdale University Hospital Medical Center and the Touro College of Osteopathic Medicine.
RESULTS: Literature search and review yielded a total of 13 manuscripts that were completely assessed and incorporated into this review. Overwhelmingly studies comparing various methods of halotherapy showed improvement in various pulmonary function measures including forced expiratory volume in one second, forced vital capacity and peak expiratory flow. Other measures were also seen to improve such as HRQoL as assessed by questionnaires.
CONCLUSIONS: HT has been found to have a positive effect on patients suffering from chronic respiratory diseases, improving mucociliary elimination and lung function in common chronic respiratory diseases and also HRQoL. Currently, no official guidelines exist on the use of HT in the form of salt rooms (halo chambers) or dry powder inhalers, but evidence exists for its use as a possible adjuvant therapy. More structured research in the form of randomized clinical trials is required.

PMID: 32827399 [Indexed for MEDLINE]

7. Healthcare (Basel). 2021 Nov 22;9(11):1604. doi: 10.3390/healthcare9111604.

Halotherapy-An Ancient Natural Ally in the Management of Asthma: A Comprehensive Review.

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The increasing production of modern medication emerges as a new source of environmental pollution. The scientific community is interested in developing alternative, ecological therapies in asthma. Halotherapy proved its benefits in asthma diagnosis, treatment, and prevention and may represent a reliable therapeutic addition to the allopathic treatment, due to its ecological and environment-friendly nature, in order to prevent or prolong the time to exacerbations in patients with asthma. We aimed to review up-to-date research regarding halotherapy benefits in asthma comprehensively. We searched the electronic databases of PubMed, MEDLINE, EMBASE for studies that evaluated the exposure of asthmatic patients to halotherapy. Eighteen original articles on asthma were included. Five studies in adults and five in children assessed the performance of hypertonic saline bronchial challenges to diagnose asthma or vocal cord dysfunction in asthmatic patients. Three papers evaluated the beneficial effects of halotherapy on mucociliary clearance in asthmatic adults. The therapeutic effect of halotherapy on acute or chronic asthma was appraised in three studies in adults and one in children. The preventive role was documented in one paper reporting the ability of halotherapy to hinder nocturnal asthma exacerbations. All studies seem to sustain the overall positive effects of halotherapy as adjuvant therapy on asthma patients with no reported adverse events. Halotherapy is a crucial natural ally in asthma, but further

evidence-based studies on larger populations are needed.

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PMCID: PMC8623171
PMID: 34828649

Conflict of interest statement: The authors declare no conflict of interest.

8. Holist Nurs Pract. 2021 Nov-Dec 01;35(6):300-305. doi:
10.1097/HNP.0000000000000481.

"Everything Old Is New Again": A Review of Current Complementary and Alternative Medicine Trends.

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Complementary and alternative medicine therapies can be used as adjuvant or preventive therapy, and have newer applications: cryotherapy, halotherapy, floatation therapy, and compression therapy. Nurse practitioners need to know about these therapies and their applicability to patient populations. Appropriate integration of these therapies is part of holistic care, which they strive to provide.

DOI: 10.1097/HNP.0000000000000481

PMID: 34647911 [Indexed for MEDLINE]

9. Altern Ther Health Med. 2021 Oct;27(S1):223-239.

Salt Therapy as a Complementary Method for the Treatment of Respiratory Tract Diseases, With a Focus on Mold-Related Illness.

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Salt therapy has been used for millennia, but modern salt therapy can be traced to the salt mines and caves in Europe and Russia from the early 19th century. Today, breathing in the microclimate of caves with their stable air temperature and moderate to high humidity in the presence of sodium, potassium, magnesium and calcium and the absence of airborne pollutants and pollen is called speleotherapy. The inhalation of natural pure sodium chloride (NaCl) in a controlled environment (air temperature 18° to 24°C and relative humidity 40% to 60%) is called halotherapy. The main active ingredient in halo- and speleotherapy is NaCl aerosol particles, which penetrate all layers of the respiratory tract. In addition to their antibacterial and anti-inflammatory properties, salt particles also facilitate mucociliary transport and reduce immunogloblin E (IgE) levels. Clinical trials have confirmed that salt therapy is an effective option for relieving symptoms and improving functional parameters in sinusitis, bronchiectasis, chronic bronchitis, mild and moderate asthma and chronic obstructive pulmonary disease (COPD). Rinsing with hypertonic saline has been found to be beneficial in reducing airway inflammation in patients with bronchiolitis. In addition to avoidance, salt therapy should be recommended as a complementary therapy in patients with prolonged exposure to indoor air dampness microbiota, which may cause damage to the respiratory mucosa. Salt therapy is safe and well tolerated.

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10. Environ Geochem Health. 2021 Sep;43(9):3533-3556. doi: 10.1007/s10653-021-00832-2. Epub 2021 Feb 11.

Origin, distribution, and perspective health benefits of particulate matter in the air of underground salt mine: a case study from Bochnia, Poland.

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The composition and distribution of airborne particles in different locations in a salt mine were determined in terms of their origin, the distance from the air inlet, and the adaptation of post-mining chambers and corridors for tourists and general audience. The composition of aerosols in air was also evaluated from the perspective of human health. Air samples were collected on filters by using portable air pumps, in a historical underground salt mine in Bochnia (Poland),

which is currently a touristic and recreation attraction and sanatorium. The particulate matter (PM) concentration was determined using the gravimetric method by weighing quartz filters. The content of carbon, water-soluble constituents, trace elements, and minerals was also determined. A genetic classification of the suspended matter was proposed and comprised three groups: geogenic (fragments of rock salt and associated minerals from the deposit), anthropogenic (carbon-bearing particles from tourist traffic and small amounts of fly ash, soot, and rust), and biogenic particles (occasional pollen). The total PM concentration in air varied between 21 and 79 μg/m3 (with PM4 constituting 4-24 μg/m3). The amount of atmospheric dust components coming from the surface was low and decreased with the distance from the intake shaft, thus indicating the self-cleaning process. NaCl dominated the water-soluble constituents, while Fe, Al, Ag, Mn, and Zn dominated the trace elements, with the concentration of majority of them below 30 ng/m3. These metals are released into air from both natural sources and the wear or/and corrosion of mining and tourists facilities in the underground functional space. No potentially toxic elements or constituents were detected. The presence of salt particles and salty spray in the atmosphere of salt mine, which may have anti-inflammatory and antiallergic properties, is beneficial to human health. This study will allow for a broader look at the potential of halotherapy in underground salt mines from a medical and regulatory point of view.

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PMCID: PMC8405481
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11. Wiad Lek. 2020;73(4):773-776.

Optimization of pathogenetic therapy in patients with chronic obstructive lung disease.

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OBJECTIVE: The aim of the study is to increase the effectiveness of the treatment of exacerbation of COPD group B GOLD II with the use of combined therapy of the combined drug PulmoBRIZ containing two components - ambroxol and acetylcysteine and the course of halotherapy.
PATIENTS AND METHODS: Materials and methods: We observed 60 patients with COPD B, GOLD II. They were divided into two groups: the first - the main (n=30) - patients receiving basic therapy, mucolytic therapy - a combination of Ambroxol and acetylcysteine - 200/30 to 1 tabl. 2 times a day, number 7 days and, from the 3rd day - sessions of halotherapy 1 time per day № 10. The second group, the control group (n=30), followed only basic therapy, did not take mucolytics and halotherapy sessions.
RESULTS: Results: Patients receiving therapy with the combination of ambroxol and acetylcysteine and halotherapy sessions experienced a significant increase in FEV1 by 8.3% ($p < 0.05$); the Tiffon index was 7.2% ($p<0.05$), reactive anxiety levels (RA) and manifestations of autonomic dysfunction decreased, whereas in patients in the control group these indicators did not improve significantly.
CONCLUSION: Conclusions: The proposed complex therapy of COPD patients with the inclusion of the combined drug ambroxol and acetylcysteine and halotherapy sessions contributes to the improvement of the quality of life of patients.

PMID: 32731714 [Indexed for MEDLINE]

12. Vopr Kurortol Fizioter Lech Fiz Kult. 2020;97(4):31-36. doi: 10.17116/kurort20209704131.

[Halotherapy in patients with vasomotor rhinitis after surgical treatment].

[Article in Russian; Abstract available in Russian from the publisher]

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The problem of rehabilitation of a patient with vasomotor rhinitis after surgery due to the high percentage of relapses is relevant in the practice of an otorhinolaryngologist. The use of halotherapy in the postoperative period is pathogenetically substantiated in connection with its multifactorial effect on the nasal mucosa.
THE PURPOSE OF THIS STUDY: Was to investigate the effectiveness of using dry sodium chloride in the postoperative period in patients with vasomotor rhinitis.
MATERIAL AND METHODS: 56 patients were examined after bilateral submucosal vasotomy with laterofixation of the lower turbinates. Patients were divided into 2 groups depending on the ongoing rehabilitation. The 1st group (comparison) included 28 patients who underwent standard measures, the 2nd (main) group included 28 patients who were additionally prescribed a course of halotherapy. The clinical effectiveness of the treatment was evaluated on a 4-point scale according to subjective and objective signs on the 5th, 8th and 10th postoperative days.
RESULTS: After treatment on the 10th day, the total score in the group of

patients undergoing halotherapy was significantly lower than in the comparison group - 245 and 310 points, respectively. Significantly in the main group, in comparison with the 1st group, the patency of the nasal passages improved (1.8±0.7 points versus 3.2±0.7 points), the swelling of the lower turbinates was reduced (1.0±0.3 points versus 1.5±0.6 points). The average score by the criterion «mucociliary transport time» was 1.5±0.6 points in patients in the 1st group and 1.0±0.3 points in the 2nd group. In the 2nd group, the normalization of mucociliary transport time occurred faster than in patients who underwent standard therapy.
CONCLUSION: Halotherapy has shown high efficiency and safety, therefore it is advisable to use it in clinical practice along with generally accepted treatment regimens to reduce the drug load, including the need for decongestants. In addition, halotherapy contributes to an earlier restoration of the functional state of the nasal cavity.

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PMID: 32687298 [Indexed for MEDLINE]

13. Allergy Asthma Proc. 2019 Nov 1;40(6):490-493. doi: 10.2500/aap.2019.40.4278.

Unproved and controversial methods and theories in allergy/immunology.

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Unproved methods and controversial theories in the diagnosis and management of allergy/immunology are those that lack scientific credibility. Some definitions are provided for perspective, as in chronic medical conditions, frequently nonscientifically based treatments are developed that can have a profound psychological effect on the patients in the absence of objective physical

benefit. Standard practice uses methods of diagnosis and treatment used by reputable physicians in a particular subspecialty or primary care practice, with the understanding that diagnosis and treatment options are consistent with established mechanisms of conditions or diseases. Conventional medicine (Western or allopathic medicine) is that which is practiced by the majority of physicians, osteopaths, psychologists, registered nurses, and physical therapists. Complementary medicine involves diverse practices or products that are used with the practice of conventional medicine, such as using acupuncture in addition to opioids for pain relief. Alternative medicine implies use of complementary practices in place of conventional medicine. Unproved and controversial methods and theories do not have supporting data, validation, or sufficient scientific scrutiny, and they should not be used in the practice of allergy/immunology. Some examples of unproven theories about allergic/immunologic conditions include allergic toxemia, idiopathic environmental intolerance, and toxic disease from indoor molds. Unconventional diagnostic methods for allergic conditions include cytotoxic tests, provocation-neutralization, electrodermal diagnosis, applied kinesiology assessments, chemical analysis of body fluids, and serum immunoglobulin G (IgG) or IgG4 testing. Unproven treatments and intervention methods for allergic/immunologic conditions include acupuncture, homeopathy, halotherapy, and autogenous urine injections.

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PMID: 31690401 [Indexed for MEDLINE]

14. Wiad Lek. 2019;72(4):589-594.

Combined differentiated therapy in patients with urticaria.

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OBJECTIVE: Introduction: The necessity of the study of urticaria is called for by its high specific gravity in the structure of dermatoses, lack of effective therapies and, consequently, negative impact on the quality of life of patients and members of their families. Among the factors that initiate clinical manifestations of urticaria are autoimmune disorders, diseases of the gastrointestinal tract, nervous system, bacterial and viral infections, helminth infestation. However, the state of the internal secretion glands in such patients is understudied. Although, it is recognised that thyroid gland plays an important role in the development of allergic dermatitis, but its role in the formation of autoimmune processes at urticaria is still unclear. Such diversity of mechanisms of urticaria development considerably complicates the choice of rational ways of effective therapy. In particular, traditional agents (antihistamine and other hyposensitizing ones) often do not have the desired effect. Due to such complicated current condition of treatment of patients with urticaria, non-medicated methods of treatment seem to be getting more and more prospective. The aim:To develop differentiated treatment of urticaria patients, taking into account the functional state of the thyroid gland and its participation in the formation of autoimmune processes.
PATIENTS AND METHODS: Materials and methods: We had been supervising 127 patients with chronic idiopathic urticaria (49 men and 78 women) of the age range from 15 to 67 years old with the disease duration from 5 months to 29 years. The control group consisted of 20 healthy individuals. The mild degree of severity of dermatosis was diagnosed in 43 (33.9%) patients, the average degree of the disease severity - in 41 (32.2%), and severe form of the disease was observed in 43 (33.9%) patients. The functional state of thyroid gland was evaluated by determining the level of thyroxine, triiodothyronine, thyroglobulin, and autoantibodies to thyroperoxidase and thyroglobulin in serum.

RESULTS: Results: It was discovered that in patients with urticaria, dysfunctional state of thyroid gland is observed, which is manifested by a probable increase in thyroxine content up to 107.52±4.20 nmol/l (in healthy individuals - 78.13±3.65 nmol/l; $p<0.05$) and thyroglobulin - up to 29.73±2.51 ng/ml (in healthy individuals - 20.16±1.34 ng/ml; $p<0.05$), which is associated with a decrease in the level of triiodothyronine - up to 1.33±0.06 nmol/l (in healthy individuals - 1.52±0.04 nmol/l; $p<0.05$). In order to evaluate the effectiveness of this approach, all patients were divided into 4 groups. The first group, with the total amount of 32 patients were prescribed only traditional standard treatment, according to the guidelines. The pations of second group (31 patients) were prescribed specific phototherapy (once a week, 6-8 sessions) after traditional medication and afterward absence of clinical manifestations of pathological process. 31 patients of the third group were prescribed balneo- and halotherapy after traditional medication and no afterward clinical manifestations of urticaria. The fourth group (33 patients) prescribed combined treatment in the way of combined application of specific therapy, phototherapy, balneotherapy and halotherapy, after the elimination of clinical manifestations of dermatosis by means of 2 month traditional medication. It was established that patients with mild dermatosis were exposed to a probable correction of the functional state of the thyroid gland, improved clinical course and quality of life after medication, balneo- and halomethods of treatment, patients with moderate and severe degree - after combined application of medication, specific photo-, balneoand halotherapy.

CONCLUSION: Conclusions: Thus, the therapy of patients with urticaria requires a differentiated approach. Patients with mild dermatosis, after traditional medication, should be prescribed balneo- and halomethods of treatment. Patients with moderate to severe degree of the disease require more intensive medical intervention. They should be prescribed a combined application of specific photo-, balneo- and halotherapy. This approach allows eliminating the pathological process.

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15. Pediatr Pulmonol. 2017 May;52(5):580-587. doi: 10.1002/ppul.23621. Epub 2016 Oct 10.

Halotherapy as asthma treatment in children: A randomized, controlled, prospective pilot study.

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BACKGROUND AND OBJECTIVES: Asthma is a chronic inflammatory disorder requiring intermittent or continuous anti-inflammatory therapy. Patients often turn to alternative treatments as complements or replacements to conventional treatments. We aimed to evaluate the effect of salt room chambers (halotherapy) on bronchial hyper-responsiveness (BHR), fractional exhaled nitric oxide (FeNO), and quality of life in children with asthma.
PATIENTS AND METHODS: Children aged 5-13 years with a clinical diagnosis of mild asthma not receiving anti-inflammatory therapy. Patients were randomized in this double-blind, controlled study to salt room with halogenerator (treatment group), or without halogenerator (control group). We evaluated the effect of salt room therapy on BHR, FeNO, spirometry, and pediatric asthma quality of life questionnaire (PAQLQ). The treatment period lasted 7 weeks, 14 sessions.
RESULTS: Twenty-nine patients were randomized to the salt room with

halogenerator (treatment group), and 26 patients to the salt room without salt halogenerator (control group). A statistically significant improvement in BHR was demonstrated in the treatment group, which remained unchanged in the control group. There was no improvement in spirometry or FeNO levels following treatment. The treatment group showed a statistical improvement in most parameters of quality of life questionnaires.
CONCLUSIONS: Our pilot study suggests that salt room with halogenerator, may have some beneficial effects in mild asthmatic children. Randomized and larger controlled trials with long-term follow-up are necessary. Pediatr Pulmonol. 2017;52:580-587. © 2016 Wiley Periodicals, Inc.

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16. Med Tr Prom Ekol. 2016;(11):38-40.

Efficiency of controlled halotherapy in rehabilitation of patients with occupational lung diseases.

[Article in English, Russian]

Chervinskaya AV, Kotenko KV.

The study was aimed at features and efficiency of controlled halotherapy method in patients with occupational chronic obstructive lung disease (COLD). Examination covered 73 patients with occupational mild and moderate stages of COLD, aged 45 to 64. All the patients were randomized to 2 comparable groups - main and reference (37 and 36 examinees respectively). The main group in

addition to conventional medical therapy received courses of controlled halotherapy (10 procedures with certain concentration of sodium chloride dry aerosol in accordance to methodic recommendations). Based on complex evaluation of clinical, functional and laboratory methods, the authors assessed efficiency of controlled halotherapy in patients with occupational COLD. Considerable improvement was seen: for mild COLD-- in 40% of cases, for moderate COLD - in 30%, with general efficiency for these patients of 90 and 85% respectively. Analysis of the results obtained enables to evaluate controlled halotherapy as an effective method of rehabilitation and prevention in occupational COLD patients.

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17. Vopr Kurortol Fizioter Lech Fiz Kult. 2016;93(6):61-66. doi: 10.17116/kurort2016661-66.

[The promising directions for the further development of halotherapy in pediatric medicine].

[Article in Russian; Abstract available in Russian from the publisher]

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This article is focused on the modern possibilities for the application of halotherapy with a view to prevention, treatment and rehabilitation of the children with special reference to the main bio-physical properties of the principal active factors of halotherapy including dry finely-dispersed sodium chloride aerosols and specific features of the mechanism of their therapeutic action. The extensive studies have been underway in the recent years for the purpose of development of the new effective methods for the reconstitution of the aerodispersive environment. Halotherapy can be provided either on an individual (haloinhalation) or a group (exposition in the halochambers and halorooms basis. Halotherapy has been shown to produce well apparent anti-inflammatory, draining, mucolytic, immunomodulatory, and sanogenetic action. The high effectiveness of halotherapy for the prophylactic application in the frequently ill children is emphasized together with the possibility of its extensive use for the treatment of acute respiratory diseases and combined medical rehabilitation of the children presenting with chronic ENT disorders, respiratory and skin diseases. The optimal technologies for the clinical application of various types of halotherapy are discussed.

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PMID: 28635700 [Indexed for MEDLINE]

18. Vopr Kurortol Fizioter Lech Fiz Kult. 2016;93(6):21-26. doi: 10.17116/kurort2016621-26.

[The new directions in the physiotherapeutic applications of the natural potassium salts of the Western Ural].

[Article in Russian; Abstract available in Russian from the publisher]

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Salt therapy (halotherapy) as a non-traditional method for the treatment of various pathological conditions has become an increasingly popular therapeutic modality in Russia and abroad. The Perm region houses one of the largest sylvinite-bearing potash deposits in the world. These salts are possessed of special physical and chemical properties of great value for the treatment of different diseases. The objective of the present work was to develop novel approaches to the application of sylvinite for the treatment and prevention of various diseases.
MATERIAL AND METHODS: The subjects of investigations were the modern sylvinite constructions of different types. The study included a total of 195 patients who were randomly divided into two groups. The main group consisted of 50 patients presenting with allergic respiratory diseases, 20 ones with atopic dermatitis, and 21 with vulgar psoriasis. 31 patients had undergone aortocoronary bypass surgery in the preceding period. 49 pregnant women presented with a complicated course of pregnancy. 24 patients suffered from chronic generalized catarrhal gingivitis. The control group was comprised of 188 persons presenting with the same diseases (46, 30, 18, 20, 49, 25 patients in each of the above groups respectively) who received only the traditional pharmacotherapeutic treatment.

All the patients underwent evaluation of the respiratory and cardiovascular functions. The clinical manifestations and the skin damage areas were estimated in the patients with atopic dermatitis and vulgar psoriasis. Blood circulation in placenta, the state of the periodontal tissues, and local immunity in the oral cavity mucosa, as well as the subjective psychological status were evaluated. The physical and chemical characteristics of the internal environment of the salt constructions (microclimatic factors, radiation, air ionization, salt aerosol content) were estimated.
RESULTS AND DISCUSSION: The data obtained provided a basis for the development and patenting of the methods for the treatment of atopic dermatitis, vulgar psoriasis, placental insufficiency, and chronic generalized catarrhal gingivitis based on the halotherapeutic modalities.
CONCLUSION: The results of the long-term hygienic, physical and clinical investigations made it possible to identify the complex of curative factors inherent in the natural mineral sylvinite constructions. These factors are believed to create the optimal conditions for the efficient management of the patients presenting with dermatological, cardiological, obstetrical, and stomatological problems.

DOI: 10.17116/kurort2016621-26
PMID: 28091488 [Indexed for MEDLINE]

19. Ter Arkh. 2016;88(8):19-24. doi: 10.17116/terarkh201688819-24.

[Non-drug rehabilitation of patients with chronic obstructive pulmonary disease concurrent with hypertension].

[Article in Russian; Abstract available in Russian from the publisher]

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AIM: to evaluate the efficiency of decimeter wave therapy and halotherapy, which were additionally added to basic therapy, in patients with chronic obstructive pulmonary disease (COPD) concurrent with hypertension at the inpatient stage.
SUBJECTS AND METHODS: 36 patients aged 20 to 75 years with Stages I-II COPD concurrent with Stages I-II, first-second grade hypertension were examined and treated. The clinical examination included collection of complaints and medical history data, clinical laboratory and instrumental (electrocardiography, spirography) studies, and health-related quality of life (using the SF-36 questionnaire). The patients were randomized into two groups: a study group and a comparison group. The study group patients received decimeter wave therapy and halotherapy in addition to basic drug treatment; the comparison patients had basic drug therapy.
RESULTS: Pre- and postoperative comparative analysis of the major clinical manifestations of comorbidities revealed more pronounced positive changes with the lower rate of clinical manifestations in the study group. It was also observed to have a more marked reduction in blood pressure (BP) with its goal levels achieved. The mean pulse BP decreased by 28% in the study group (p=0.000005) and did not statistically reduced in the comparison group. In the study group patients, the integral quality-of-life indicator after a package of medical rehabilitation measures became statistically significantly higher by 35%. This indicator in the comparison group was statistically significantly unchanged.
CONCLUSION: The directionality of the proposed rehabilitation complex towards

the common pathogenetic components of the development and progression of COPD and hypertension, as well as the high efficiency of the complex justify its appropriate inclusion in the combination treatment and rehabilitation of this category of patients.

DOI: 10.17116/terarkh201688819-24
PMID: 27636922 [Indexed for MEDLINE]

20. Orv Hetil. 2015 Oct 11;156(41):1643-52. doi: 10.1556/650.2015.30267.

[Theoretical basis and clinical benefits of dry salt inhalation therapy].

[Article in Hungarian]

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Dry salt inhalation (halotherapy) reproduces the microclimate of salt caves, with beneficial effect on health. Sodium chloride crystals are disrupted into very small particles (with a diameter less than 3 μm), and this powder is artificially exhaled into the air of a comfortable room (its temperature is between 20-22 °C, and the relative humidity is low). The end-concentration of the salt in the air of the room will be between 10-30 mg/m(3). The sick (or healthy) persons spend 30-60 minutes in this room, usually 10-20 times. Due to the greater osmotic pressure the inhaled salt diminishes the oedema of the bronchial mucosa, decreases its inflammation, dissolves the mucus, and makes

expectoration easier and faster (expectoration of air pollution and allergens will be faster, too). It inhibits the growth of bacteria and, in some case, kills them. Phagocyte activity is also increased. It has beneficial effect on the well being of the patients, and a relaxation effect on the central nervous system. It can prevent, or at least decrease the frequency of the respiratory tract inflammations. It produces better lung function parameters, diminishes bronchial hyperreactivity, which is the sign of decreasing inflammation. Its beneficial effect is true not only in inflammation of the lower respiratory tract, but also in acute or chronic upper airways inflammations. According to the international literature it has beneficial effect for some chronic dermatological disease, too, such as psoriasis, pyoderma and atopic dermatitis. This treatment (called as Indisó) is available under medical control in Hungary, too.

DOI: 10.1556/650.2015.30267
PMID: 26551167 [Indexed for MEDLINE]

21. Vopr Kurortol Fizioter Lech Fiz Kult. 2015 Jul-Aug;92(4):36-40. doi: 10.17116/kurort2015436-40.

[The role of non-medicamental technologies in the rehabilitation of the children presenting with acute rhinosinusitis].

[Article in Russian; Abstract available in Russian from the publisher]

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Despite the recent achievements in diagnostics and pharmacotherapy of acute rhinosinusitis in the children, the problem of management of this pathology, thus far remains a serious challenge for practical medicine. The objective of the present study was to develop a scientifically sound rationale for the application of halotherapy (HT) and magnetic therapy (MT) or their combination for the treatment of acute rhinosinusitis in the children. The clinical observations and special investigations were carried out in the comparative aspect and encompassed 120 children at the age varying from 5 to 15 years suffering from acute rhinosinusitis. The therapeutic effectiveness of the rehabilitative treatment was evaluated based on the results of the endoscopic study of the nasal cavity, analysis of the X-ray images of paranasal sinuses, rhinomanometry, investigations into the ciliary activity, and assessment of the mucosal immunity. The results of the present study gave evidence of the feasibility of incorporating HT and MT in the combined treatment of the children presenting with acute rhinosinusitis. The integrated use of the two methods proved to have the advantage over the separate application of either of them. The specific effects of HT and MT on the clinical course of acute sinusitis and the functional state of intranasal mucosa are described. The optimal methods of the treatment are proposed.

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clinical observations and special investigations were carried out in the comparative aspect and encompassed 120 children at the age varying from 5 to 15 years suffering from acute rhinosinusitis. The therapeutic effectiveness of the rehabilitative treatment was evaluated based on the results of the endoscopic study of the nasal cavity, analysis of the X-ray images of paranasal sinuses, rhinomanometry, investigations into the ciliary activity, and assessment of the mucosal immunity. The results of the present study gave evidence of the feasibility of incorporating HT and MT in the combined treatment of the children presenting with acute rhinosinusitis. The integrated use of the two methods proved to have the advantage over the separate application of either of them. The specific effects of HT and MT on the clinical course of acute sinusitis and the functional state of intranasal mucosa are described. The optimal methods of the treatment are proposed.

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22. Int J Chron Obstruct Pulmon Dis. 2014 Feb 21;9:239-46. doi: 10.2147/COPD.S57511. eCollection 2014.

A review of halotherapy for chronic obstructive pulmonary disease.

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Australia ; Centre for Pharmacology and Therapeutics, Division of Experimental Medicine, Imperial College, South Kensington, London, United Kingdom.
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BACKGROUND: Chronic obstructive pulmonary disease (COPD) is a chronic, progressive disease and is treated with inhaled medication to optimize the patient's lung health through decreasing their symptoms, especially breathlessness. Halotherapy is the inhalation of micronized dry salt within a chamber that mimics a salt cave environment. Recent media reports suggest that this therapy may help with the symptoms of COPD.
OBJECTIVE: To critically evaluate and summarize the evidence for the use of halotherapy as a treatment for COPD.
DESIGN: A review using systematic approach and narrative synthesis.
DATA SOURCES: Cochrane Central Register of Controlled Trials (CENTRAL), PubMed, MEDLINE, EMBASE, CINAHL, and Google Scholar were searched. Two reviewers independently reviewed abstracts and selected eligible studies based on predetermined selection criteria.
RESULTS: Of the 151 articles retrieved from databases and relevant reference lists, only one randomized controlled trial met the inclusion criteria. A meta-analysis was unable to be conducted due to the limited number of published studies. Inclusion criteria were subsequently expanded to allow three case-control studies to be included, ensuring that a narrative synthesis could be completed. From the pooled data of the four studies, there were 1,041 participants (661 in the intervention group and 380 in the control group). The assessment of methodological quality raised issues associated with randomization and patient selection. Three themes were identified from the narrative synthesis: respiratory function, quality of life, and medication use.
CONCLUSION: Themes generated from the narrative synthesis data reflect outcome measures regularly used for interventional research associated with COPD. From this review, recommendations for inclusion of halotherapy as a therapy for COPD

cannot be made at this point and there is a need for high quality studies to determine the effectiveness of this therapy.

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PMCID: PMC3937102
PMID: 24591823 [Indexed for MEDLINE]

23. J Med Life. 2014;7 Spec No. 2(Spec Iss 2):83-7.

Surveys on therapeutic effects of "halotherapy chamber with artificial salt-mine environment" on patients with certain chronic allergenic respiratory pathologies and infectious-inflammatory pathologies.

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Halotherapy (HT), derived from speleotherapy in salt mines, is also a drug-free therapeutic method. HT effects vary depending on the therapeutic method and the structure of halotherapy environment. The purpose of this article is to show the HT effects of "halotherapy chamber with artificial salt-mine environment" of the National Institute of Rehabilitation, Physical Medicine and Balneoclimatology (INRMFB), on patients with bronchial asthma and other chronic, infectious-inflammatory and allergic respiratory diseases, describing the clinical effects on certain nonspecific resistance factors, on markers of inflammatory processes and on certain immunological changes. Patients were clinically assessed, with the application of hematologic investigations,

analysis of nonspecific resistance to infection and of inflammatory process markers, immunologic assessments, analysis of sodium and potassium concentrations, of mineralocorticoid function and other biochemical tests. For the experimental HT therapy performed in the "halotherapy chamber with artificial salt-mine environment" of INRMFB, 15 patients suffering from bronchial asthma, allergic rhinitis, chronic bronchitis, chronic obstructive bronchopneumopathy were selected, based on specific medical indications and contraindications and applying ethical principles, as well as 4 patients with similar pathologies for the control group, who underwent in-home drug treatment. After the specific halotherapy treatment on patients with bronchial asthma, chronic bronchitis and chronic obstructive bronchopneumopathy, which also showed other chronic, infectious-inflammatory and allergic respiratory pathologies, triggering of anti-inflammatory (and also anti allergic) mechanisms and healing effects on inflammatory process were noted. Data acquired also proved the halo therapeutic effect causing the reduction of sensitiveness of body in patients with bronchial asthma.

PMCID: PMC4391365
PMID: 25870681 [Indexed for MEDLINE]

24. Ann Agric Environ Med. 2014;21(1):124-7.

Salt caves as simulation of natural environment and significance of halotherapy.

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INTRODUCTION: Human activity usually leads to a deterioration in air quality; therefore, searching for places that simulate an environment without pollution is important. Artificial salt caves play crucial role, as a kind of therapy, known as halotherapy, based on treatment in a controlled air medium that simulates a natural salt cave microclimate.
OBJECTIVE: Evaluation of awareness about the existence of salt caves, basic knowledge about the purpose for their presence among people who bought salt caves sessions, and checking their subjective estimation of salt caves influence on their well-being.
MATERIAL & METHODS: 303 inhabitants (18-51-years-old) of 3 randomly chosen cities of southern Poland were surveyed using a validated author's questionnaire. Both genders were represented in comparable numbers.
RESULTS: It was be observed that knowledge about the existence of salt-caves is common - 94% of respondents. 96 persons bought at least 3 salt caves sessions. The majority of women, did this for therapeutic reasons (57%), and men for both therapeutic and relaxation reasons (both 39%). Both among women and men, the dysfunctions intended to be cured by sessions included problems with throat, larynx or sinus. Depression as a reason for buying sessions was mentioned only by women. In general, those who attended felt better after sessions in salt caves.
CONCLUSION: Besides the health benefits, people do not have free time for rest and activities in clean air; moreover, stress is inseparable from everyday life, and for that reasons salt caves become places that help to support a proper lifestyle.

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25. Int J Pediatr Otorhinolaryngol. 2013 Nov;77(11):1818-24. doi: 10.1016/j.ijporl.2013.08.013. Epub 2013 Aug 22.

Double-blind placebo-controlled randomized clinical trial on the efficacy of Aerosal in the treatment of sub-obstructive adenotonsillar hypertrophy and related diseases.

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BACKGROUND: Adenotonsillar hypertrophy (ATH) is a frequent cause of upper airways obstructive syndromes associated to middle ear and paranasal sinuses disorders, swallowing and voice disorders, sleep quality disorders, and occasionally facial dysmorphisms. ATH treatment is essentially based on a number of medical-surgical aids including nasal irrigation with topical antibiotics and corticosteroids and/or treatment with systemic corticosteroids, immunoregulators, thermal treatments, adenotonsillectomy, etc.
OBJECTIVES: The aim of the present study is to assess the efficacy of Aerosal halotherapy in the treatment of sub-obstructive adenotonsillar disease and correlated conditions compared to placebo treatment.
METHODS: A total of 45 patients with sub-obstructive adenotonsillar hypertrophy were randomized to receive either Aerosal halotherapy or placebo for 10 treatment sessions. The main outcome was a reduction greater than or equal to 25% from the baseline of the degree of adenoid and/or tonsillar hypertrophy.
RESULTS: In the intention-to-treat analysis, a reduction of the degree of adenoid and/or tonsillar hypertrophy ≥25% from baseline after 10 therapy

sessions was found in 44.4% of the patients in the halotherapy arm and in 22.2% of the patients in the placebo arm (P=0.204). Among the secondary outcomes, the reduction of hearing loss after 10 treatment sessions in the halotherapy arm was higher than the placebo arm (P=0.018) as well as the time-dependent analysis showed significantly improved peak pressure in the Aerosal group (P=0.038). No side effects were reported during the trial. In addition, the therapy was well accepted by the young patients who considered it as a time for play rather than a therapy.
CONCLUSIONS: Aerosal halotherapy can be considered a viable adjunct, albeit not a replacement, to conventional medical treatment of sub-obstructive adenotonsillar syndrome and related conditions. Further research is however needed to improve ATH treatment.

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PMID: 24041858 [Indexed for MEDLINE]

26. Voen Med Zh. 2013 Oct;334(10):71-4.

[Sanatorium "Arkhangelskoe" celebrates 80th anniversary].

[Article in Russian]

Kirillov GN.

The article is dedicated to the 80th anniversary of sanatorium "Arkhangelskoe" celebrating in October 2013. Since October 16th, 1933 sanatorium is a military health resort, in 1934 sanatorium was named for "Sanatorium for command

personnel of the Red Army". In 1935-1936 such prominent commaders as V.K. Blyukher, A.I. Egorov, A.I. Kork, M.N. Tukhachevskiy, G.M.Shtern, A.V. Khrulev, I.E. Yakir took rest in the sanatorium. Today organization of treatment and diagnostic services in the sanatorium meets modern requirements of medical science. Diagnostics includes the following methods: bicycle ergometry, medical treadmills, ECG and ABP monitoring, rheoencephalography, oscillography, ultrasonic diagnosis, monitoring of lipid and carbonaceous metabolism, blood coagulation and anticoagulation, enzymes, electrolytes and also bacteriologic, immunologic and serological tests. The following treatment methotds are used: climatotherapy, clinical nutrition, exercise therapy, spa treatment, balneo- and fangotherapy. Also methods of magnetotherapy, lasertherapy, ultrasonic therapy, hyperbaric oxygenation, phytotherapy and halotherapy are used.

PMID: 24611299 [Indexed for MEDLINE]

27. Vopr Kurortol Fizioter Lech Fiz Kult. 2013 Mar-Apr;(2):29-32.

[The hygienic characteristic and effectiveness of the application of natural sylvinite screens for the combined treatment of the patients presenting with vulgar psoriasis].

[Article in Russian]

El'kin VD, Vladimirskiĭ EV, Barannikov VG, Gorovits ÉS, Kopytova EA.

The objective of the present study was to provide hygienic assessment of hospital wards equipped with the therapeutic sylvinite screens (TSS) and compare the results of the treatment of 80 patients suffering vulgar psoriasis with the use of TSS and without them. The sylvinite screens made it possible to create comfortable microenvironment in the wards and moderately increased the radiation

background (0,15+/-0,005 Sv/hour) thereby promoting saturation of the ward atmosphere with aeroions dominated by the light negative particles (491,5+/-14,4 units/cm3). Such healthy environment hadc beneficial effect on the clinical course of the psoriatic process, the state of functional systems of the patients and their quality of life. It is concluded that the introduction of halotherapy in the treatment in patients presenting with vulgar psoriasis makes it possible to achieve clinical remission in 65% of them compared with 20% of the patients given the traditional treatment.

PMID: 23718082 [Indexed for MEDLINE]

28. Tanaffos. 2013;12(2):22-7.

Efficacy of Halotherapy for Improvement of Pulmonary function Tests and Quality of Life of Non-Cystic Fibrosis Bronchiectatic Patients.

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BACKGROUND: Halotherapy is a treatment modality suggested for patients with chronic pulmonary diseases. In this technique, inhalation of crystal salt stones

extracted from mines improves patients' pulmonary function tests and symptoms by facilitating the secretion or expulsion of phlegm and mucus and reducing the risk of bacterial infections. Bronchiectasis is chronic disease of the airways characterized by irreversible dilation of airways. It has a progressive course and despite the available treatments, many of these patients eventually enter the advanced phase of disease. The aim of this study was to evaluate the effect of halotherapy on pulmonary function tests and quality of life of non-CF bronchiectatic patients.

MATERIALS AND METHODS: This clinical trial evaluated the results of spirometry and 6-minute walk test as well as the quality of life (according to SF-36 questionnaire) of stable non-CF bronchiectatic patients presenting to the pulmonary clinic before and after the use of salt spray for 2 months.

RESULTS: Of 40 study patients, 20 were excluded due to various reasons and 20 were evaluated. The mean age of patients was 35±11 years and the underlying cause of disease was chronic pulmonary infection in 65% of cases. Comparison of the results of pulmonary function tests and 6-minute walk test and quality of life indices in SF-36 questionnaire before and after the intervention showed no significant difference ($P > 0.05$). However, 65% of patients were satisfied with halotherapy and requested to receive the medication again.

CONCLUSION: Our study results indicated that 2-month halotherapy with Salitair inhaler containing salt crystals extracted from the Klodawa mine in Poland could not improve the pulmonary function tests or quality of life of non-CF bronchiectatic patients. No significant side effects were noted in understudy patients. Future studies with larger sample size and longer duration of treatment are recommended to better determine the efficacy of this treatment modality.

PMCID: PMC4153239

PMID: 25191458

29. Allergy Asthma Proc. 2012 May-Jun;33 Suppl 1:100-102. doi: 10.2500/aap.2012.33.3562.

Chapter 29: Unproved and controversial methods and theories in allergy-immunology.

Shah R, Greenberger PA.

Unproved methods and controversial theories in the diagnosis and management of allergy-immunology are those that lack scientific credibility. Some definitions are provided for perspective because in chronic medical conditions, frequently, nonscientifically based treatments are developed that can have a very positive psychological effect on the patients in the absence of objective physical benefit. Standard practice can be described as "the methods of diagnosis and treatment used by reputable physicians in a particular subspecialty or primary care practice" with the understanding that diagnosis and treatment options are consistent with established mechanisms of conditions or diseases.(3) Conventional medicine (Western or allopathic medicine) is that which is practiced by the majority of MDs, DOs, psychologists, RNs, and physical therapists. Complementary medicine uses the practice of conventional medicine with complementary and alternative medicine such as using acupuncture for pain relief in addition to opioids. Alternative medicine implies use of complementary and alternative practices in place of conventional medicine. Unproved and controversial methods and theories do not have supporting data, validation, and sufficient scientific scrutiny, and they should not be used in the practice of allergy-immunology. Some examples of unproven theories about allergic immunologic conditions include allergic toxemia, idiopathic environmental intolerance, association with childhood vaccinations, and adrenal fatigue. Unconventional (unproved) diagnostic methods for allergic-immunologic conditions include cytotoxic tests, provocation-neutralization, electrodermal diagnosis, applied kinesiology assessments, and serum IgG or IgG(4) testing. Unproven

treatments and intervention methods for allergic-immunologic conditions include acupuncture, homeopathy ("likes cure likes"), halotherapy, and autologous urine injections.

DOI: 10.2500/aap.2012.33.3562
PMID: 22794702 [Indexed for MEDLINE]

30. Vopr Kurortol Fizioter Lech Fiz Kult. 2012 Mar-Apr;(2):31-5.

[The use of halotherapy for the health improvement in children at institutions of general education].

[Article in Russian]

Khan MA, Chervinskaia AV, Mikitchenko NA.

The objective of the present study was to estimate the influence of halotherapy performed in a specialized salt room on the health status of the children frequently ill with acute respiratory diseases. The application of halotherapy was shown to produce well-apparent antiinflammatory, draining, and sanogenic effects. Observations during 1, 3, 5, and 12 month follow-up periods confirmed the persistence of prophylactic and therapeutic effects of salt therapy. The results of the study were used to develop differential schemes of halotherapy taking into consideration the initial conditions of the children.

PMID: 22908472 [Indexed for MEDLINE]

31. Vopr Kurortol Fizioter Lech Fiz Kult. 2007 May-Jun;(3):8-12.

[Optimal therapy of children with bronchial asthma at Pyatigorsk spa].

[Article in Russian]

Sokolova MIu, Ivanova NA, Shabalov NP.

The study of efficacy of bronchial asthma children's rehabilitation at Pyatigorsk spa with different schemes of treatment has shown that combined treatment with dry air-radon baths and halotherapy is more effective than each of these modalities alone.

PMID: 17645073 [Indexed for MEDLINE]

32. Probl Tuberk Bolezn Legk. 2007;(8):50-3.

[Efficiency of a combination of haloaerosols and helium-neon laser in the multimodality treatment of patients with bronchial asthma].

[Article in Russian]

Faradzheva NA.

A hundred and thirty-eight patients with infection-dependent bronchial asthma, including 73 with moderate persistent asthma and 65 with severe persistent one, were examined. Four modes of a combination of traditional (drug) therapy (DT) and untraditional (halotherapy (HT) and endobronchial helium-neon laser irradiation (ELI) one were used. The efficiency of the treatment performed was evaluated, by determining the time course of clinical symptoms of the disease on the basis of scores of their magnitude and the patients' condition. The findings indicated that in moderate persistent asthma, both HT and ELI in combination

with DT exerted an equal therapeutic effect, which provided a good and excellent condition in 83.3% of cases. In severe persistent asthma, such a condition was achieved in 93.75% of cases only when multimodality treatment involving DT, HT, and ELI had been performed.

PMID: 17915468 [Indexed for MEDLINE]

33. Vopr Kurortol Fizioter Lech Fiz Kult. 2004 May-Jun;(3):35-7.

[Halotherapy--a new treatment of bacterial vaginosis].

[Article in Russian]

Maliavin AG, Filiaeva IuA, Umakhanova MM, Chervinskaia AV.

The analysis was made of clinical efficacy, some mechanisms of a therapeutic action and techniques of halotherapy used for the first time in the treatment of bacterial vaginosis. High efficacy, long-term aftereffect and advantages of halotherapy vs drug therapy are shown.

PMID: 15216790 [Indexed for MEDLINE]

34. Ter Arkh. 2004;76(3):36-9.

[Clinical significance of cytological characteristics of bronchial inflammation in obstructive pulmonary diseases].

[Article in Russian]

Grinshteĭn IuI, Shestovitskiĭ VA, Kuligina-Maksimova AV.

AIM: To evaluate a clinical role of cytological characteristics of induced sputum (IS) and bronchial lavage (BL) in patients with different forms of bronchial asthma (BA) or chronic obstructive bronchitis (COB).
MATERIAL AND METHODS: The study included 128 BA patients (53 males and 75 females) at the age of 17 to 70 years (mean age 51.3 +/- 8.4 years) and 53 COB patients (32 males and 21 females) at the age 17 to 70 years. The material for the cytological examination was BL obtained by fibrobronchoscopy and IS obtained after 20-min halotherapy.
RESULTS: Percentages of eosinophils, neutrophils, lymphocytes and alveolar macrophages in IS and BL have the same trends and a highly significant correlation coefficient by all the studied cells both in BA and COB patients.
CONCLUSION: It was found possible to use IS cytology for evaluation of air way inflammation in BA and COB patients.

PMID: 15108456 [Indexed for MEDLINE]

35. Vestn Otorinolaringol. 2003;(4):42-4.

[Halotherapy in combined non-puncture therapy of patients with acute purulent maxillary sinusitis].

[Article in Russian]

Grigor'eva NV.

Halotherapy was applied for non-puncture treatment of 45 patients with acute purulent maxillary sinusitis. The response was evaluated by changes in clinico-immunological, cytological, x-ray and bacteriological parameters.

Halotherapy was found effective in the treatment of acute purulent maxillary sinusitis without puncture.

PMID: 13677023 [Indexed for MEDLINE]

36. Vopr Kurortol Fizioter Lech Fiz Kult. 2001 Jan-Feb;(1):26-7.

[Efficacy of therapeutic use of ultrasound and sinusoidal modulated currents combed with halotherapy in patient with occupational toxic-dust bronchitis].

[Article in Russian]

Roslaia NA, Likhacheva EI, Shchekoldin PI.

Immunological and cardiorespiratory characteristics were studied in 88 alloy industry workers with occupational toxic-dust bronchitis who received the following therapy: sinusoidal modulated currents (SMC), ultrasound (US) on the chest, halotherapy (HT) (52 patients, group 1); SMC + HT (10 patients, group 2); US + HT (15 patients, group 3); HT (11 patients, group 4). The patients did also therapeutic exercise and were massaged (chest). It was found that device physiotherapy (SMC, US) in combination with HT raise the treatment efficacy to 86.5%. This combined treatment is recommended both for treatment and prevention of obstructive syndrome in toxic-dust bronchitis.

PMID: 11530404 [Indexed for MEDLINE]

37. Vopr Kurortol Fizioter Lech Fiz Kult. 2000 Nov-Dec;(6):21-4.

[Effectiveness of halotherapy of chronic bronchitis patients].

[Article in Russian]

Abdrakhmanova LM, Farkhutdinov UR, Farkhutdinov RR.

The chemoluminescence test in 49 patients with lingering inflammatory chronic bronchitis has revealed inhibition of generation of active oxygen forms in the whole blood, intensification of lipid peroxidation in the serum, depression of local immunity. Administration of halotherapy to the above patients results in correction of disturbances of free-radical oxidation, improves local immunity and clinical course of the disease.

PMID: 11197648 [Indexed for MEDLINE]

38. Klin Med (Mosk). 2000;78(12):37-40.

[Effects of halotherapy on free radical oxidation in patients with chronic bronchitis].

[Article in Russian]

Farkhutdinov UR, Abdrakhmanova LM, Farkhutdinov RR.

Registration of luminol-dependent chemoluminescence of blood cells and iron-induced chemoluminescence of the serum was used to study generation of active oxygen forms and lipid peroxidation in patients with chronic bronchitis (CB). 49 patients with lingering CB showed inhibition of blood cell function and enhancement of lipid peroxidation. The addition of halotherapy to combined treatment of these patients promoted correction of the disorders and improvement of CB course.

PMID: 11210350 [Indexed for MEDLINE]

39. Vopr Kurortol Fizioter Lech Fiz Kult. 2000 Jan-Feb;(1):21-4.

[The scientific validation and outlook for the practical use of halo-aerosol therapy].

[Article in Russian]

Chervinskaia AV.

The paper describes a new medical technique--halo-aerosol therapy, the main acting factor of which is dry highly dispersed aerosol of sodium chloride in natural concentration. Halo-aerosol therapy represents a new trend in aerosol medicine. It includes two methods: halotherapy and halo-inhalation. Biophysical and pathophysiological foundations of the new method, how it can be realized are outlined. Clinical reasons are provided for application of halo-aerosol therapy for prevention, treatment and rehabilitation of patients with respiratory diseases. Characteristics and differences of the two halo-aerosol therapy variants are analysed.

PMID: 11094875 [Indexed for MEDLINE]

40. Voen Med Zh. 1999 Jun;320(6):34-7, 96.

[Halotherapy in the combined treatment of chronic bronchitis patients].

[Article in Russian]

Maev EZ, Vinogradov NV.

Halotherapy proved to be a highly effective method in a complex sanatorium treatment of patients with chronic bronchitis. Its use promotes more rapid liquidation of clinical manifestations of disease, improves indices of vent function of lungs, especially those values that characterize bronchial conduction (volume of forced exhalations per second, index Tiffno), increases tolerance to physical load, normalizes indices of reduced immunity and leads to increasing the effectiveness of patient treatment in sanatorium.

PMID: 10439712 [Indexed for MEDLINE]

41. Vopr Kurortol Fizioter Lech Fiz Kult. 1997 Jul-Aug;(4):19-21.

[The use of an artificial microclimate chamber in the treatment of patients with chronic obstructive lung diseases].

[Article in Russian]

Chernenkov RA, Chernenkova EA, Zhukov GV.

Halotherapy was used for sanatorium rehabilitation in 29 patients with chronic obstructive pulmonary diseases (chronic bronchitis and asthma). Significant positive effects of this method resulted in the improvement of the flow-volume parameters curve of lung function and in hypotensive effects on blood pressure. Halotherapy is recommended for use in patients suffering from chronic obstructive pulmonary diseases with hypertension or coronary heart disease.

PMID: 9424823 [Indexed for MEDLINE]

42. Ter Arkh. 1996;68(8):24-8.

[Bronchial hyperreactivity to the inhalation of hypo- and hyperosmolar aerosols and its correction by halotherapy].

[Article in Russian]

Gorbenko PP, Adamova IV, Sinitsyna TM.

18 bronchial asthma (BA) patients (12 with mild and 6 with moderate disease) were examined before and after halotherapy (HT) for airways reactivity using provocative tests with ultrasonic inhalations of purified water (UIPW) and hypertonic salt solution (HSS). Bronchial hyperreactivity (BHR) to UIPW and HSS before treatment occurred in 13 and 11 patients (72 and 69%, respectively). HT reduced BHR in 2/3 and 1/2 of the patients, respectively. In the rest patients BHR was unchanged or increased, being so to UIPW only in patients with atopic asthma in attenuating exacerbation. Clinical efficacy of HT and initial BHR to UIPW correlated ($r = 0.56$; $p < 0.05$). No correlation was found between HT efficacy and initial BHR to HSS.

PMID: 9019826 [Indexed for MEDLINE]

43. J Aerosol Med. 1995 Fall;8(3):221-32. doi: 10.1089/jam.1995.8.221.

Halotherapy for treatment of respiratory diseases.

Chervinskaya AV(1), Zilber NA.

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This work elucidates the questions upon the development of a new drug-free method of a respiratory diseases treatment. Halotherapy (HT)--is mode of treatment in a controlled air medium which simulates a natural salt cave microclimate. The main curative factor is dry sodium chloride aerosol with particles of 2 to 5 mkm in size. Particles density (0.5-9 mg/m3) varies with the type of the disease. Other factors are comfortable temperature- humidity regime, the hypobacterial and allergen-free air environment saturated with aeroions. The effect of HT was evaluated in 124 patients (pts) with various types of respiratory diseases. The control group of 15 pts received placebo. HT course consisted of 10-20 daily procedures of 1 hour. HT resulted in improvements of clinical state in the most of patients. The positive dynamics of flow-volume loop parameters and decrease of bronchial resistance measured by bodyplethysmography were observed. The changes in control group parameters after HT were not statistically significant. The specificity of this method is the low concentration and gradual administration of dry sodium chloride aerosol. Data on healing mechanisms of a specific airdispersive environment of sodium chloride while while treatment the respiratory diseases are discussed.

DOI: 10.1089/jam.1995.8.221
PMID: 10161255 [Indexed for MEDLINE]

44. Vopr Kurortol Fizioter Lech Fiz Kult. 1995 Jan-Feb;(1):11-5.

[The use of halotherapy for the rehabilitation of patients with acute bronchitis and a protracted and recurrent course].

[Article in Russian]

Borisenko LV, Chervinskaia AV, Stepanova NG, Luk'ian VS, Goncharova VA, Pokhodzeĭ IV, Krivitskaia VZ, Vishniakova LA, Pokhaznikova MA, Faustova ME, et al.

Halotherapy was used for rehabilitation in 25 patients with acute bronchitis of long-standing and recurrent types. The main therapeutic action was ensured by aerodispersed medium saturated with dry highly dispersed sodium chloride aerosol, the required mass concentration being maintained in the range of 1 to 5 mg/m3. Therapy efficacy was controlled through assessment of clinical, functional, immunological and microbiological findings. Metabolic activity values were taken into consideration as well. Positive dynamics of the function indices in the clinical picture resulted from elimination of pathogenic agents, control of slowly running inflammatory lesions and stimulation of some immune system factors. Favourable changes in metabolic activity were present: normalization of serotonin excretion, marked decrease of unbalance in lipid peroxidation-antioxidant system.

PMID: 7785211 [Indexed for MEDLINE]