

SECTION IV

Remove obstacles
to healthy function
& stimulate
self-healing
processes.

Section 4 overview

Remove Obstacles to Healthy Function & Stimulate Self-Healing Processes

Having established the basis for health through introducing patients to a sound nutritional and lifestyle regimen (Section 3), it may then be necessary to ensure the organs of elimination can support the essential self-healing processes. Original nature cure practitioners attached great importance to using nature's non-suppressive resources to stimulate the organs of detoxification and elimination. Or, as Henry Lindlahr advised, ‘...to rid the body of morbid encumbrances.’ⁱ In contemporary naturopathic practice, this has been developed as the science of emunctorology, which targets the primary organs of elimination (skin, lungs, bowels, and kidneys) supported by the secondary emunctories (liver, lymphatics, and connective tissues).

The processes of physical culture (exercise) and breathing also perform essential detoxification functions within the body, and were recognized by nature cure doctors as essential components of healthy living. Hydrotherapy — the application of water externally or internally to treat disease and support a healthy ecology is not a standalone modality, but is an *integrated* component of comprehensive nature cure treatment, because it stimulates the body’s self-healing processes. The versatility of water facilitates its therapeutic use in its many forms:

¹ Lindlahr H. *Nature Cure: Philosophy and Practice Based on the Unity of Disease and Cure*. 2nd ed. The Nature Cure Publishing Co.; 1914.

from vapor (e.g., in steam cabinets and saunas) to ice packs (e.g., for acute pain), to colonics. This section addresses its use in the principal hydrotherapy methodologies (constitutional hydrotherapy, colonic hydrotherapy, and balneology, as well as its combined use with earth-based healing practices, such as the use of mineral-rich clays and peats, mineral and plant concentrates in regional rocks and soils (speleotherapy), and the therapeutic use of salt (halotherapy).

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TOPIC 1

Emunctorology: The Emunctories and the Nature Cure Approaches that Support their Healthy Functionⁱⁱ

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Emunctorology is the study of the organs of elimination (the emunctories) and how the emunctories function to eliminate substances that do not benefit the organism as a whole. It examines the emunctories within a complex, multi-system framework and combines the empirical practice and clinical theory of naturopathic medicine with evidence from current controlled trial research. Using this integrated approach, emunctorology provides a comprehensive study of the emunctories that encompasses:

- their functional relationships
- their interdependent role in maintaining normal physiology (homeostasis) through the elimination of waste material and toxic substances
- pathophysiology that arises if the emunctories function sub-optimally or are diseased

ⁱⁱ ⁱⁱ Adapted with permission from: “Emunctorology” in *The Foundations of Naturopathic Medicine* – (unpublished).

- clinical strategies used in modern naturopathic medicine to treat, nourish, tonify, stimulate, and sedate the emunctories in order to maintain health

The term, 'emunctory,' derives from the Latin *ēmungere* (for wiping or cleansing) and refers to any organ or duct that removes or carries waste from the body. The term's evolution to the Italian *emungere* (the verb 'to drain'), illustrates its contemporary usage and etymological relationship with the term *mucere* (to be moldy or musty), from which the English term 'mucid' is derived. 'Mucus,' ("viscous fluid secreted by the mucous membranes,"¹) derives from the root term, *meug*, (slippery, slimy) from which *emungere* also derives. 'Emunctories' are the organs or ducts (including mucus membranes) with the physiological function that involves draining or removing waste materials (mucus) from the body.

The evolution of emunctorology as an integrated system of study

Although the concept of the *emunctories* has existed in traditional and world medicine practices since the Greco-Roman Period its formalization into a distinct area of study, *emunctorology*, occurred initially at the First International Editorial Skamania Retreat of the Foundations of Naturopathic Medicine Project in 2007. When educators at this meeting were discussing the limitations of teaching the classical body systems commonly used in biomedical education, they agreed that a multi-system synthesis of the emunctories was more representative of the naturopathic approach to health and healing. During this discussion, 'emunctorology' was defined as a synthesis of the multi-organ naturopathic approach to elimination with modern

clinical and basic science. The topic is now a standard offering in the curriculae of most North American naturopathic medical schools.

As a multisystem construct, emunctorology encourages an *integrated* approach to the organs of elimination (the emunctories) that includes i) their functional relationships, ii) their role in maintaining normal physiology (homeostasis) through the elimination of waste material and toxic substances, iii) the pathophysiology that occurs with suboptimal function, and iv) the clinical strategies rooted in nature cure and now used in contemporary naturopathic practice to treat, nourish, tonify, stimulate, and sedate the emunctories to maintain health and to promote healing.

Adapted with permission from: Myers, SP; Kruzel, T; Zeff, J; Snider, P. Emunctorology: Synthesising Traditional Naturopathic Practice with Modern Science, *Integ Med*, 18(3)40-41, 2019.

An established central concept in nature cure and in contemporary naturopathic clinical theory, is that illness results from the accumulation of potentially noxious waste products. Louis Kuhne (1835-1901), the German pioneer of nature cure, referred to disease as a 'unit' comprised by the accumulation of waste and morbid matter in the system.² Re-stated using contemporary scientific terminology, Kuhne postulated that the accumulation of both toxins and abnormal organic material (including cells and cellular components) underlies all disease. The corollary to this postulate — which forms the basis for nature cure — is that the *elimination* of toxins and abnormal organic material is a central component of the healing process (as represented in the Naturopathic Medicine Therapeutic Order™). In

1882, John Edward Bromby (1809-1889), a well-known educator and clergyman, extended this concept to emphasize that wastes (including imbibed toxins, endogenous toxins, and exhausted blood corpuscles), are dealt with by the emunctories on a *constant, involuntary basis*.³ Today, we know the emunctories function (voluntarily and involuntarily) to eliminate waste produced by thirty thousand billion endogenous cells, as well as exogenous toxins absorbed from the environment. They are considered as important to maintaining health as are food and digestion.⁴

“There exists a close resemblance between the mechanism and the functions of a watch and of the human body. . . . Both a watch and a human body may function abnormally as a result of accidental injury or unfavorable external conditions, such as extreme heat or cold, etc. . . The watch may cease to vibrate in accord with the harmonics of our planetary universe for several reasons: . . (1) the wound spring has spent its force, or (2) its parts are not made up of the right constituents, or (3) foreign matter clogs or corrodes its mechanism. Similarly, there exist three primary causes of disease . . Lowered vitality. Abnormal compositions of blood and lymph. Accumulation of morbid matter and poisons.” Henry Lindlahr, *Nature Cure*,⁵, p. 24

Primary and Secondary Emunctories

Primary and secondary emunctories are listed in Table 1. As the name implies, primary emunctories provide the most efficient routes of elimination. When these are not functioning optimally, the body compensates via the secondary emunctories. The secondary emunctories are not as efficient at elimination, since this is not the main function of these organs or tissues.

Early literature about the emunctories emphasized different organs; for example, Bromby referred to the kidneys and liver as the two most significant emunctories,³ while Henry Lindlahr emphasized the importance of the skin, kidneys, and bowel as organs of elimination.² In clinical practice today, the emunctories are largely considered to function as one, interdependent system, with the terms, 'primary' and 'secondary' employed only as an organizational construct. The therapeutic modalities of nature cure focus on depuration, drainage, and detoxification of these emunctories.

Stimulating the emunctories: How do nature cure physicians stimulate the cleansing or movement of the emunctories? The oldest methods, universally used, include fasting and hydrotherapy. Such methods are mentioned in the Bible, in the Egyptian papyri, and in Ayurvedic, Chinese, and European monastic medical literature, such as those by Hildegard von Bingen.⁶

Table 1 The primary and secondary emunctories

Primary emunctories	Secondary emunctories
<p>Most efficient at elimination. These include:</p> <ul style="list-style-type: none"> • bowel • kidneys • lungs • skin <p>Poor elimination through the primary emunctories leads to chronic, systemic inflammation.</p>	<p>Less efficient at elimination. These include:</p> <ul style="list-style-type: none"> • stomach • liver • lymphatic system • pancreas • spleen and lymphatic system • prostate gland • mucosal surfaces

Interdependent Functions of the Emunctories

The basic emunctory functions have been understood for some time. For example, the overall role of the GI tract, the kidneys, the lungs, and the skin in elimination and excretion of exogenous and endogenous toxins is well known. However, more recent evidence emphasizes the *interdependence* among these organ systems and the early indicators of dysfunction or sub-optimal organ function.^{7,8,9, 10} In naturopathic clinical theory, homeodynamic mechanisms are singularly dependent on the proper functioning of *all* emunctories and that dysfunction in one affects the function of others. Dysfunction may result in a cascade of deficits, including fatigue, leaky gut syndrome, vasculitis, chronic infections, pruritis, joint pains, and migraine headaches, among others,¹¹ culminating in systemic inflammatory responses and potential dysfunction in multiple systems.

Naturopathic clinical theory regards the emunctories as intrinsic to the functioning whole, rather than as independent physiologic processes. The therapeutic modalities of nature cure focus on depuration, drainage, and detoxification of these emunctories.

Depuration, Drainage, and Detoxification: The central role of the emunctories

As discussed in previous chapters of this book, the fundamental role of nature cure modalities is to support depuration, drainage, and detoxification. Contemporary evolution of this concept into naturopathic clinical theory postulates that inefficient elimination enhances the impact of internal and external contaminants, and plays an important role in the natural history of disease progression. The following brief descriptions of various emunctories reveal their importance in maintaining homeostasis and the consequences of disruption.

Digestive tract

The microbiome includes millions of microorganisms that inhabit the human digestive tract^{12,13,14, 15} and illustrate a beneficial symbiotic relationship. This relationship is in a constant state of flux and can be disrupted, easily. The entire gastrointestinal (GI) tract includes the oral cavity, esophagus, stomach, small intestine (duodenum, jejunum, ileum); large intestine (ascending, transverse and descending colon); and rectum and anus. The tract is innervated by the enteric nervous system, located in the gut walls and consisting of two plexi: the myenteric plexus

and the submucosal plexus. Sympathetic and parasympathetic innervation can affect the enteric system along these plexi. In general, parasympathetic stimulation increases secretory activity, peristalsis, and relaxes the sphincters. Normally, the GI tract is not highly dependent on the sympathetic nervous system, but strong sympathetic activity (such as psychoemotional stress, anxiety, and depression) can inhibit peristalsis, decrease secretions, and increase sphincter tone.

Brief summary of digestion

- Begins in the oral cavity, and continues in the stomach and small intestine aided by mechanical and enzymatic means. Teeth, tongue, salivary glands, liver, and pancreas assist in food digestion. Appropriate secretion of mucus and digestive enzymes is important along the entire digestive tract, since this is the process by which the gut protects itself via the mucus barrier and by which food is broken into its useful components.
- Food is broken down and mixed by the mechanical action of the teeth, tongue, stomach, small intestine and the propulsive movement of peristalsis. Chemical digestion, mainly hydrolysis, is carried out by enzymes and ions secreted by the salivary glands. The GI tract also is nearly entirely lined with mucus cells that secrete mucus directly onto the epithelial surface. This functions both as a lubricant and as a barrier to pathogens and to auto-digestion. This mucosal layer can be disrupted by pathogenic bacteria, such as *Helicobacter pylori*, and by chronic inflammation caused

by various agents (such as gluten enteropathy and by hypo- or hyper-acidity).^{16,17,18}

- The partially digested stomach content, (chyme) empties into the duodenum. Digestive capacity is dependent on several factors, including the acidity and osmolality of the chyme, as well as mechanical distension factors. The pancreas secretes digestive enzymes and HCO_3^- ions to the chyme. Bile from the gallbladder, emulsifies fats and allows for fat absorption. Carbohydrates, proteins, and fats in food are thereby broken down into their respective components and can be absorbed and utilized.

Central functions of the emunctories

Bowel (small intestine and large intestine)

Central functions:

- Nutrient absorption by active transport and by diffusion.
- Resorption of water and ions in the small intestine. Approximately 8-9 total liters of fluid enters the small intestine every 24 hrs. Of this, about 1.5 L pass into the colon and the remainder is absorbed by the small intestine.¹⁹ This material then passes into the colon where more water and ions are resorbed. The greatest bulk of the normal bacterial flora is located in the large intestine.
- Immunoregulation. As an integral part of the innate immune system, pattern recognition receptors (PRRs) recognize non-vertebrate markers on bacteria (e.g.,

lectins), viruses, and fungi, referred to as pathogen-associated molecular patterns (PAMPs). The function of PRRs is to initiate the host immune response to an invading pathogen (expressing the PAMP).^{20,21,22,23} PRRs also recognize *endogenously-produced* peptides and glycosaminoglycans, which is critical to the development of the innate immune system and to maintaining homeostasis. Several factors (e.g., diet, poor digestion, alterations in bowel flora, stress, genetic predisposition, and suboptimal liver and pancreatic function) contribute to the activation of tissue injury response involving three families of pattern recognition receptors (PRRs).^{24,25,21,18}

Disruption: Disruption contributes to the pathology of systemic inflammation, aberrant coagulation, and continued tissue damage in sub-clinical conditions. Malabsorption syndromes with an inflammatory and toxic component (e.g., gluten enteropathy and tropical sprue) occur in the small intestine. Disorders (such as Crohn's disease, ulcerative colitis, irritable bowel syndrome, diarrhea, and constipation) occur in the large intestine, often with unknown or unclear etiologies. Naturopathic clinical theory considers these etiologies to include inflammation, an imbalance in the flora, and an increased presence of toxic metabolites. Bowel function consequently underlies the emphasis on diet and food sensitivities in naturopathic clinical theory.

The central nature of the bowel emunctory

The role of food and nutrition in the development of disease has long been recognized by naturopathic physicians.²⁶ Kruzel, 1999). Recent advances in epigenetics and genomics indicate that food not only provides nourishment, but also provides antigens that sometimes can be misinterpreted by the body's homeostatic mechanisms and leads to dysfunction or disease.^{11,27,28} Maldigestion can increase toxin levels in the intestinal tract, which may then be absorbed into the bloodstream. This can be tested through stool, urine, and serum analysis.^{29,30,31} The gut's protective mucus barrier, the gastrointestinal flora, and of the immune system have interrelated roles. These systems function interdependently and cooperatively,³² and dysfunction in one component (e.g., permeable mucus barrier, unhealthy flora) affects the others. The bowel is particularly important, from prenatal development in the womb to the end of life.³¹ Recent studies emphasize the importance of establishing a healthy neonatal intestinal microbiome and its effects on the developing immune system, and potential development of disorders such as eczema, allergic rhinitis, and inflammatory bowel disease (IBD) in later life.³³ Naturopathic physicians have long considered the gastrointestinal (GI) tract as central to maintaining overall health and vitality. As a primary emunctory, it is considered important to support the GI's role in elimination, as well as its other important functions. The other primary emunctories (lungs, skin, and kidneys) also must be supported to maintain their functions as organs of elimination in addition to ancillary functions. Evidence is increasing³⁴ that an optimally functioning GI tract and optimally functioning organs of elimination in general, must be considered as being primary to maintaining a homeodynamic physiology.

Kidneys

Central functions:

- Maintaining a constant fluid volume in the intracellular and extracellular fluid spaces.
- Homeostatic regulation of blood pressure (via the renin-angiotensin system), resorption of essential minerals and electrolytes, and acid-base balance in the body.
- As endocrine organs, the kidneys produce calcitriol, renin and erythropoietin.
- Excretion of waste products that have been modified in the liver by Phase I/II metabolism to make them more water soluble.

Disruption: Kidney function is tightly hormonally regulated by aldosterone, anti-diuretic hormone (ADH), parathyroid hormone, autocooids, and by the sympathetic nervous system. The kidneys must function cooperatively with the lungs and liver in order to maintain optimal acid/base balance in the body. A central component of naturopathic clinical care is an emphasis on proper hydration with pure water.

Lungs

Central functions:

- Principal avenue for eliminating gaseous waste products. Lungs are considered a vital emunctory due to the constant exchange of oxygen, water, and carbon dioxide occurring with every breath. Acid/base

regulation: along with the kidneys, the respiratory system tightly regulates the body's acid/ base balance within a very narrow pH range by exhalation of excess CO₂ and selective resorption of cations and anions by the kidney.

- Immune system regulation: the innate immune system of the lung utilizes PRRs (the collectins, surfactant proteins A and D), DAMPs, and PAMPs, and can facilitate both the initiation and resolution of inflammatory airway changes. This is critical to lung function and to maintaining homeostasis in the lung.³⁵

Disruption: Due to their key role in these functions, a compromise in the respiratory system can lead to serious acute or chronic problems (see Section IV, Topic 4, Topic 5). Signs and symptoms of respiratory dysfunction often are the initial symptoms noted by physicians when other emunctories are overwhelmed. For example, in people with diabetes, metabolic acidosis can be indicated by Kussmaul breathing and by an acetone odor on the breath. Patients with acute or severe liver failure often have a breath odor (*fetor hepaticus*). Changes in respiratory rate also may occur with acute illness, while the body attempts to maintain homeostasis.

Signs and symptoms of respiratory dysfunction often are the initial symptoms noted by physicians when other emunctories are overwhelmed.

Skin

Central functions:

- As the body's largest organ system, the skin provides a barrier against the external environment and is vital in maintaining homeostasis. The barrier function is maintained by producing antimicrobial peptides that function via two distinct pathways: i) by direct antimicrobial activity and ii) by initiating host defense mechanisms and a host response that precipitates a release of cytokines, followed by angiogenesis and re-epithelialization.³⁶
- Regulates body temperature, manages water loss from deeper tissues, houses sensory receptors, and synthesizes various biochemicals.
- Excretes wastes through the sweat and oil glands. Hair follicles, sweat glands, and sebaceous glands extend from the epidermis into the underlying dermis. The three primary functions of the sweat glands are excretion, thermoregulation, and anti-infective.

Disruption: The skin's discharge of toxins may manifest in several dermatological conditions that often entail pruritis (including eczema and psoriasis) or excessive sebum production (as seen in *acne vulgaris*). In further support of the concept of the interconnectedness of the emunctories, studies find the use of antibiotics in the first year of life increases the risk for atopic dermatitis by 66% in the child's second year.²⁹ More recent research supports and extends these findings to include atopic triad, food allergies and sensitivities, and potentially non-melanoma skin cancer.^{38,39}

Liver

Central functions:

- Primary organ of normal detoxification, recognizing and binding toxic moieties and preparing them for elimination from the organism.
- Performs both anabolic and catabolic functions: protein synthesis, amino acid synthesis, lipoprotein synthesis, glycogen synthesis and catabolism, gluconeogenesis, aerobic and anaerobic glucose utilization, ammonia metabolism, amino acid and nucleic acid metabolism, metabolism of xenobiotics mainly via the cytochrome P450 system (Phase I detoxification), Phase II conjugation reactions, and synthesis and clearance of hormones (e.g., T3, angiotensin, IGF-1, insulin, and parathyroid hormone). Produces bilirubin and bile production also the site of a specialized macrophage involved in host defense against intestinal pathogens.

Disruption: May include inability to process bilirubin (jaundice), abdominal fluid accumulation (ascites), fatigue, portal hypertension, bruising, hypokalemia, and kidney failure.⁴⁰ Liver cleansing or flushing protocols abound and are practiced worldwide. Many 'spring tonic' formulas are heavily permeated by liver-stimulating herbs designed to eliminate toxins and to re-regulate liver function.

Lymphatic system

Central functions:

- An additional route by which fluids, proteins, large particulate matter, and toxins are delivered to, and carried away from, the interstitial fluid and the extracellular matrix. Lymph, lymphoid tissue, and lymph nodes drain excess fluids from the interstitial spaces and permeate all organ systems (with a few exceptions such as the central nervous system), deeper portions of peripheral nerves, and the endomysium of muscles and bone. These areas possess minute perilymphatic channels through which interstitial fluid can flow.
- Filtering excess proteins, fluid and waste products from interstitial fluids due to interstitial hydrostatic fluid pressure and the lymphatic pump (dependent on skeletal musculature). If compromised, edema ensues with a concomitant accumulation of toxic wastes. Removal of excess proteins and wastes from the interstitial space is an essential function. Without it, severe morbidity and death ensue within a short period of time.^{41,42}
- Transporting medium for immune cells
- Transporting fatty acids and fats

The filtering function of the lymphatics occurs via two main mechanisms: i) the amount of interstitial hydrostatic fluid pressure; and ii) the activity of the lymphatic pump, dependent mainly on skeletal musculature (hence, the importance of physical movement in nature cure therapies). The lymphatic system is to the emunctories what

the circulatory system is to the heart. It enables adequate transportation and filtering of tissue fluid. For instance, one function of constitutional hydrotherapy is to encourage muscle contraction and relaxation, as well as blood vessel constriction and dilatation. These actions propel fluid through the lymphatics, thus supporting lymph system function and proper emunction.

Disruption: Several nature cure modalities, such as castor oil packs, hydrotherapy, exercise, massage, and herbal medicines enhance and support the flow of lymphatics around the body in order to maintain health and homeostasis.⁴³ Many herbal preparations are trophic for the liver and lymphatic systems.

Consequences of Emunctory Dysfunction

If the emunctories are overburdened or dysfunctional, there is an increased chance the patient will experience an aggravation during the healing process.⁴⁴ If a patient experiences an aggravation (or healing crisis), it often is because the emunctories are not functioning normally. In this case, the body has reached a state in which it is incapable of adequate removal of metabolic endogenous wastes and accumulated exogenous wastes. When the primary emunctories are not functioning optimally, the secondary emunctories also may respond with a generalized inflammation. Therefore, patients presenting with chronic, systemic inflammation suggests poor elimination through the primary emunctories. The

inflammatory state can present as a generalized fever with or without an inflammatory condition affecting specific emunctories (such as bronchitis, colitis, vaginitis, sinusitis, eczema or gastritis).⁴

Toxemia, nature cure, and early naturopathic practice

Early textbooks of naturopathy often focused on bowel toxemia as a primary cause of disease in humans. Many of the therapeutic protocols, regardless of the disease being treated, included improving diet and digestion, and normalizing bowel function as a central therapy. Although it's essential to discern the underlying cause of disease when possible, regulating bowel and liver function has been a central naturopathic medical practice for restoring normal function and chemical balance.

Preventing and Responding to Emunctory Dysfunction: Depuration, Drainage, and Detoxification

Depuration (emunction), detoxification, and drainage often are used interchangeably; however, as noted in previous chapters of this book, there are differences in the processes defined by these terms.

Depuration (Emunction) is a normal homeostatic process functioning to metabolize, filter, and eliminate toxins and metabolic waste products. Importantly, it is an involuntary physiological process — a 'liberation.' In its broadest interpretation, emunction involves the processing of any substance taken into the body, removing waste products

through appropriate fluid systems, and the general optimized function of all major routes of elimination. In naturopathic medical practice, emunction can be supported by clinical approaches that stimulate the innate healing process (*vis medicatrix naturae*) and that support optimal functioning of the organ systems.

Emunction is a physiologic process. Detoxification and drainage are active therapeutic approaches to eliminating perceived contamination.

Drainage is defined as, “a physiologic action that facilitates the organism to eliminate toxins, without aggression or forcing the body to eliminate beyond its’ physiologic limits.”⁴⁵ This is considered largely a function of the emunctories, because the underlying organ is viewed as toxic and must be drained before other therapeutic modalities can work optimally. Like detoxification, drainage is an external force imposed on the body to drive out impurities. The use of homoeopathic remedies to promote drainage was first developed in France where the term used translates as 'canalisation' or 'channelling' ⁴⁶ and prepared excretory organs to adequately remove toxins (thus regarded as catalyst to detoxification).⁴⁷

Homeopathic drainage remedies initiate specific functional stimulation of the organism or target organs through remedies selected via local-regional signs and symptoms or by known physiologic action.

Detoxification is an external force imposed on the body to stimulate the emunctories to eliminate toxins, thus removing toxic accumulation. It utilizes methods that often surpass the body's physiologic processes, while drainage works only within the parameters of physiology and does not attempt to 'force' the body to excrete toxins.

Detoxification involves dietary and lifestyle changes that reduce toxin intake and improve elimination. Avoiding chemicals (from food or other sources), refined food, sugar, caffeine, alcohol, tobacco, and many drugs helps minimize the toxin load. Drinking extra water and increasing fiber by including more fruits and vegetables in the diet also are steps in the detoxification process. It also can involve stimulating and supporting liver function to remove or reduce (if removal is not possible) toxic exposure. As a therapeutic modality, detoxification also employs supplements (nutritional, medicinal), specific herbal medicines, or physical stimulae that enhance or upregulate the function of tissues, organ systems, or the organism to eliminate the recognized toxin.⁴

During patient evaluation (regardless of whether detoxification or drainage is being considered), naturopathic physicians assess the level of toxemia, or **toxic load**, present at the time. This information is considered when formulating the treatment plan, since detoxifying a patient too rapidly can create additional problems.⁴⁸ Assessing phase I and phase II hepatic detoxification pathways also may be needed to develop an effective

treatment plan.⁴⁹ The number of recently described polymorphisms in the cytochrome P450 detoxification system⁵⁰ emphasize the importance of this assessment, since it has been shown that not all foods benefit all individuals. Some individuals, for example, are sensitive to sulfates and sulfites in food, and ingestion of these compounds may predispose them to dysbiosis.⁵¹ As with all treatment approaches, detoxification programs are individualized to achieve maximum success.

Guéniot's 4 clinical definition of primary and secondary emunctories is based on the order of intervention in the drainage process. He theorized five stages in which the primary emunctories are involved in healthy physiological toxin elimination:

1. Release of toxins from the cell into the extracellular matrix.
2. Toxins arrive at the liver and dispatched toward an effective route of elimination.
3. The bowel (involving the biliary system) removes the 'glue' toxins (lipids and hormones).
4. The kidneys eliminate 'crystal' toxins via the urine.
5. The skin and mucous membranes remove dissolved and volatile toxins via sweat, vaginal discharge, bronchial phlegm, or nasal discharge.

Illustrating the primacy of the emunctories: Multiple Organ Dysfunction Syndrome (MODS)

In 1992, multiple organ dysfunction syndrome (MODS) was proposed as a diagnostic category by consensus from the American College of Chest Physicians and the Society of Critical Care Medicine. It was defined as, “the presence of altered organ function in an acutely ill patient such that homeostasis cannot be maintained without intervention.”⁵² The Systemic Inflammatory Response Syndrome (SIRS), from which MODS can evolve, was defined at the same conference as characterized by fever, leukocytosis, tachypnea, and tachycardia. Although these syndromes are at the extreme end of homeostatic dysregulation, they provide insight into the mechanisms by which the emunctories support homeostasis and overall health. Early studies of MODS⁵³ indicated the GI system could be considered the ‘motor’ for the development of MODS in trauma or critically ill patients. Oxidative damage due to reperfusion was seen as the proximate cause of the ensuing ‘cytokine storm.’ Central to the development of SIRS and MODS is a disordered immune response that begins in a GI system with suboptimal function or damage.³⁴ The GI system is conceptualized as composed of three essential components [intestinal epithelium, normal bacterial flora, and the mucosal immune system]⁵⁴ involved in cross-talk. The integrity of all three components is necessary for optimal GI function. For example:

- Intestinal flora that are compromised by excessive use of antibiotics or by poor nutrition, which disrupts microbial signaling pathways (the cross-talk), thus disrupting the mucosal immune system and the integrity of the intestinal epithelium.³²
- A mucosal immune system that develops in a sterile environment (without the evolutionarily necessary exposure to endotoxins or through use of vaccination protocols that do not mimic environmental exposure), This adversely affects GI function and leads to an increase in atopic disorders, asthma, allergies, and food sensitivities.⁵⁵
- Epithelial tight junctions damaged by cytokines, immunoactive T cells, mast cells or eosinophils, or by exogenous agents such as pathogens, alcohol, or NSAIDs compromises the function of the intestinal barrier, and may predispose individuals to a wide range of inflammatory or autoimmune disorders including celiac disease, IBDs, leaky gut syndrome,⁵⁶ food allergies or sensitivities, and diabetes, as well as stress, autistic spectrum disorders, and affective disorders.^{57,17, 33,58}

The Importance of the Emunctories as an Interconnected and Interdependent System

The interconnections established between the GI system, the immune system, the inflammatory response, and intestinal flora are not the only examples of reciprocal relationships. Asthma, for example, is considered a systemic inflammatory disorder with sequelae beyond the

respiratory emunctory, and extending to the bowel and skin emunctories. These sequellae include bowel disorders, such as IBD, atopic dermatitis, cognitive effects, behavioral and psychiatric disorders, chronic rhinosinusitis, gastroesophageal reflux disease (GERD), and cardiovascular effects.^{59,60}

Chronic kidney disease (CKD) also includes inflammatory features and is associated with hypertension, anemia, GI dysfunction, bone and mineral disorders, various skin lesions, neuropathies, and a decreased overall quality of life. Underlying causative disorders may include diabetes, metabolic syndrome, essential hypertension, atherosclerosis, renovascular disease, various nephrites and vasculites, urinary tract obstructions, chronic urinary tract infections, gout, sleep apnea and COPD.⁶¹

For naturopathic physicians, these often multi-directional complications involving various emunctories imply that the emunctories, if not directly causative, are at least implicated in the mechanisms underlying dysfunction (disease). Therefore, emphasis is placed on maintaining optimal excretory functions.

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TOPIC 2

Colon Hydrotherapy

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Colon hydrotherapy is a gentle, internal bath of the colon (large intestine) which helps cleanse the colon and rebalance microflora. Because the procedure affects one of the primary emunctories (the bowel), colonic hydrotherapy ranks high in the Naturopathic Medicine Therapeutic Order™ by removing disturbances and helping establish optimal conditions for health. Likewise, treating the ‘whole in the middle’ (the emunctories),ⁱⁱ is the starting point for re-establishing the basis for health. It has been an integral part of nature cure practice, particularly in residential and in outpatient clinics, where it is a valuable adjunct to detoxification protocols involving fasting, cleansing diets, constitutional hydrotherapy, and other packs and compresses. Some practitioners

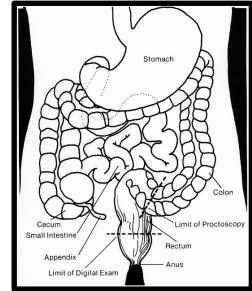


Fig. 1 Re-establishing the basis for health is a central concept in nature cure and is the starting point for the Naturopathic Medicine Therapeutic Order.™ The emunctories are the starting point for for this approach.

Illustration source: National Cancer Institute, [http://commons.wikimedia.org/public domain](http://commons.wikimedia.org/public_domain), <https://picryl.com/media/rectal-exam-illustration-818d8f>

ⁱ *In memoriam*: Milo Dean Siewert, who passed away in 2012.

ⁱⁱ A favorite phrase of **Harold Dick, ND** (1921-1994) who was well known for treating patients with difficult cases using a combination of dietetics, constitutional hydrotherapy, homeopathy, and botanicals.

consider cleansing the bowel to be equally important as cleaning the teeth.¹

Historical use of colon cleansing practices

Colon hydrotherapy is rooted in ancient therapies that pre-date most contemporary naturopathic modalities.

Throughout history, cultures around the world have used enemas to cleanse and to heal the body. The ancient Sumerians and Egyptians, for instance, first used enemas on a regular basis to cleanse their systems, (as described in the Ebers papyrus, a 14th c. document detailing their medical practices). Records indicate Egyptians used enemas (also called ‘clysters’ from the Greek *Klyster*, or enema), probably around (484 – 425 BCE). In the second century CE, Galen used seawater, oil and honey enemas followed by herbal enemas. The enema also was prescribed by Avicenna, the great Arabic philosopher and physician, in his *Canon of Medicine*. References to the use of the clyster are found in Europe dating from the late 1300s to the early 1900s. During the nature cure movement of the early 1900s, many forms of hydrotherapy were introduced to the United States.

Various methods and equipment continued to be used until the late 19th century, when the use of colon hydrotherapy and enemas by the medical community slowly dwindled, because laxatives and other pharmaceuticals became more commercially available. Colon hydrotherapy was rejuvenated in the US by John

Harvey Kellogg, MD,² who provided nutrition advice and enemas in his treatment program. In the 1917 *Journal of American Medicine*, Dr. Kellogg reported that of 40,000 total cases of ‘gastrointestinal disease,’ he used surgery to treat only 20 (equating to one case in 2000).

The colonic procedure

Colon hydrotherapy (or ‘colonic’) is similar to the enema, because it uses water to cleanse the colon. However, the colonic equipment has several advantages over the simple enema bag. The colonic allows a greater volume of water to be used, thereby increasing the amount of material cleansed from the colon during a single treatment. In general, enemas reach only the lower portion of the large intestine, leaving fecal material higher up in the colon. Since the cecum is often the main site of dysbiosis or parasitic infection, it is important to be able to evacuate that area, as well. Using a closed system allows sufficient water to enter the colon, to reach the cecum, and to achieve a ‘cecum flush.’

Colon hydrotherapy uses a rectal speculum, an instrument with an inlet and outlet portal. This allows water to be introduced slowly into the colon and then released without removing the instrument and avoiding water retention in the colon. In contrast to an enema (in which the fluid is introduced via a rectal catheter and retained for a short time in the distal colon and then emptied from the bowel into the toilet), water is introduced slowly and removed via

the outlet portal during a colonic. This process is then repeated a number of times, reaching higher up the colon to comfortably cleanse the entire bowel. The transparent outlet tube enables the operator to observe the nature of the effluent. Water pressure for a colonic is 1.5-2.0 psi (about half the pressure of a barium enema). This mild pressure also exercises the smooth muscles in the walls of the colon.

Evolution of colonic equipment

Many types of apparatus were used throughout the early history of colon hydrotherapy.³ Although the procedure was classified as 'colonic lavage' or 'colonic irrigation,' it was mostly of the enema type, which is effective only up to the descending colon. It wasn't until about 1980 that the 'closed' colonic hydrotherapy system was designed by George Holt.⁴ This instrument includes two lines — a small one for water to enter the colon and a larger one for waste outflow, with the in- and outflow continuing until the entire colon (ascending, transverse, descending, sigmoid, and rectum) is gently, but completely, emptied.

Advocates of the enema, such as Kellogg, Dierker, and Vattenborg, began to experiment with safer and more sophisticated ways to cleanse the colon. From this experimentation, came the modern-day colonic hydrotherapy unit. Many of the early machines were gravity-fed systems, some with graduated glass cylinders which allowed the practitioner to mix a formulated solution that was then introduced into the colon. Currently, most colonic equipment is one of two basic styles: open system or closed system. Closed systems use disposable speculums and tubing which eliminates potential cross-contamination between patients. Water temperature and pressure are easily adjustable to attain various hydrotherapeutic goals.

In the US, the Medical Device Amendment Act (1976) requires manufacturers of colon hydrotherapy equipment to register with the Food and Drug Administration, and the UK enforces Water Regulations that govern the use of equipment and effluent disposal. There is no such requirement in the European Union.

A colonic treatment requires 30-40 minutes and helps loosen and remove accumulated waste. Once the instrument is inserted, it becomes a closed system; therefore, there is no leaking or odor. The procedure is generally painless, but may involve mild discomfort for some patients when inserting the speculum or when old waste material moves through the colon.

Water temperature can be adjusted during colonic treatment, either to relax or to tonify the colon. The colonic technician also should employ manual massage to the abdomen between fill cycles to increase peristalsis and to aid evacuation of hardened stool.

Some colonic systems allow patients to control water flow, once the speculum has been inserted. Since it is possible to over-fill the colon with water, thereby carrying bacteria-laden water into the small intestine, it is essential that a trained hydrotherapist administers the treatments to ensure patient safety. Colonic hydrotherapy equipment used should be registered according to applicable standards in the jurisdiction in which it is being used (in the US, with the FDA) and should include disposable

speculums and tubing, (or technicians should sterilize the speculums before use, depending on regulatory requirements).

Treatment frequency

The bowel is not entirely cleansed after one colonic treatment. The colon has a mucous coat (Fig 2), much like a second lining, which is not removed in the treatment, but which can increase and

retain remnants of fecal material (food, old cells, etc.) that then become hard and encrusted. Patients benefit most from a series of treatments, usually one week apart. If more aggressive detoxification is

needed initially, a patient may improve more rapidly with two colonics per week for two weeks. Depending on the condition, the colon may then require further

treatments at 2-, 3- or 4-weekly intervals. Spacing the treatments at weekly intervals allows the body's natural elimination to continue without risk of dependency. Because colonic hydrotherapy can rinse away good bacteria along with the bad, it is important to replace

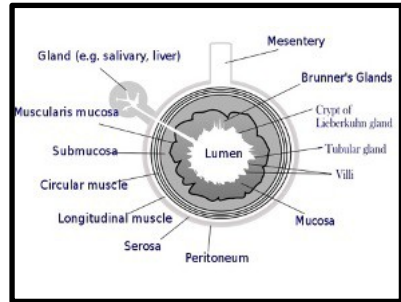


Fig. 2 The mucous coat lining the colon wall is not removed by colon hydrotherapy, but can become encrusted if it retains remnants of fecal material not completely removed by the colonic. For this reason, a series of colonic treatments is recommended for optimal cleansing.

Source:

healthy flora with a highly concentrated probiotic supplement after each treatment.

The number of colonics required to achieve bowel cleansing varies among physicians, internationally, and is based on individual patient factors.⁵

Tolle totum: the system-wide connections of the gut and its importance to overall health

Gut flora

The gut is the largest repository of bacteria in the human body, and overgrowth of pathogenic bacteria and yeasts in the colon can overwhelm the body's normal healthy flora. Gut flora (or microbiome) is composed of more than 500 species of bacteria and comprises more than 40-50% (3-4 lbs) of the normal stool. There is increasing recognition of the importance of balanced gut flora for maintaining health.⁶

Gut flora also produce some of the B vitamins, vitamin K, and short-chain fatty acids (SCFA), a food used mainly by colonocytes. They also help with bile acid metabolism. Since the process of food breakdown, mainly by fermentation, produces various gases (principally hydrogen, carbon dioxide, and methane), most bloating is generated from within the colon.

The gut also plays an important role in immune defence via gut-associated lymphoid tissue (GALT), a type of mucosal-associated lymphoid tissue (MALT). Studies now indicate

the muscosal lining of the gut serves not only as a barrier, but also participates in crucial immunomodulatory functions,⁷ thus contributing to the control of homeostasis and immunity.

Bowel motility

The muscles of the large intestine include tape-like anterior muscles, posterior longitudinal muscles, and many circular muscles that propel water and waste through the bowel when stimulated by the autonomic nervous system (ANS). The sympathetic division of the ANS slows this motility and closes the anal sphincters, while the parasympathetic division of the ANS increases motility and relaxes the sphincters. The enteric nervous system (ENS), a collection of neurons embedded in the lining of the gastrointestinal tract, is the most important nervous system affecting the large intestine and contains more neurons than the spinal cord.⁸ The ENS can function independently of the autonomic nervous system, and thus also affects bowel function independently, which may be one reason why changes in the large intestine can be difficult to manage. The ENS also produces and stores the neurotransmitter, serotonin, in the bowel. Serotonin affects bowel motility, in addition to emotion, appetite, sleep, and other functions. Various organs, derivatives of the primordial bowel, can be influenced by the enteric nervous system — particularly the gall bladder, liver, and pancreas.

Translocation of gut bacteria

Translocation of gut bacteria allows pathogenic bacteria to reach vital organs, such as the mesenteric lymph nodes (MLN), spleen, liver, kidneys, and blood.⁹ Pathogenic bacteria also create toxins, such as nitroreductase and azoreductase, that increase the risk for colon cancer.¹¹ Other chemicals are absorbed from the colon into the lymph and bloodstream, and are carried to other parts of the body where they affect distant organs: ammonia and phenols are toxic to brain cells; indole is associated with bladder tumors; skatole damages RBCs and the hemoglobin molecule; hydrogen sulphide can increase gut permeability; and histamine is associated with hypotension, arrhythmia, headaches, and depression. Pathogens in the microbiome are associated with various disease states while a healthy microbiome provides several benefits.^{10,11,12,13,14,12}

Stools as an indicator of health

The Bristol Stool Form Scale (Figure 3) is an outcome measure used for studies of the gastrointestinal tract.¹⁵ The scale provides guidelines for stool formation (e.g., sausage-shaped indicates good stool; hard lumps indicate constipation; watery, fluffy with no solid pieces, indicates diarrhea). Clinical experience indicates that a smooth consistency shows good balanced microflora, while rough texture shows unbalanced microflora requiring possible intervention with prebiotic and probiotic supplements.

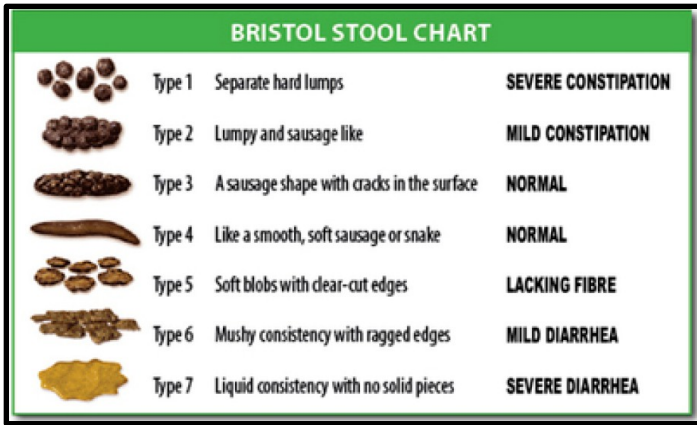


Fig.3.The Bristol Stool Chart is a tool for visual assessment of stool and indicator of overall health. Developed in 1997 by Kenneth Heaton, MD at the Bristol Royal Infirmary, Bristol, England.

Retrieved from: https://simple.wikipedia.org/w/index.php?title=Bristol_stool_scale&oldid=9849695

Therapeutic value and contraindications

There is varied opinion among naturopathic doctors regarding the therapeutic value of colon hydrotherapy, including some concern it may disturb normal colon flora.¹⁶ It is now understood, however, that there is a thin mucus coat, almost a second lining, composed of polysaccharide (a food for colon bacteria) that is not damaged in colon hydrotherapy treatment. Therefore, adequate bacteria remain to repopulate the colon and the improved, cleansed environment provides a better medium for beneficial bacteria to grow. When strong laxatives are used to clear the bowel prior to procedures (such as colonoscopy), a full complement of bacteria is re-

established within two days, without the introduction of probiotics.

Use in Traditional World Medicines

Ayurvedic medicine, which has been practiced in India for approximately 5,000 years, continues to use *basti* (enemas) as an important part of *Panchakarma* – a system used to cleanse and heal the body. Basti are used to balance *vata* (wind element) in the body. Vata is believed to be the root of all chronic disease, and by pacifying vata one can control or eliminate chronic disease. Enemas are used not only to treat constipation and the common cold, but also to treat disorders, such as chronic low back pain, sciatica, rheumatism, arthritis and gout, that are difficult to treat via other methods. (Lad, 1998) In Ayurvedic practice, constipation is a condition of vata imbalance and can be ameliorated using treatments that pacify vata. Since treating the underlying cause is a key principle of naturopathic medicine, doctors may recommend dietary supplements (such as the Ayurvedic herbal combination, triphala) to prevent patients from becoming dependent upon laxatives, enemas, or hydrotherapy.

Contraindications

Contraindications for colon hydrotherapy include congestive heart failure and/or severe heart disease, severe hypertension, severe hemorrhoids, carcinoma of the colon, acute diverticulitis, renal insufficiency, active ulcerative colitis or Crohn's disease, and severe liver disease. The procedure is contraindicated in children younger than ten years of age and in women with complicated pregnancy.

Training and regulation

Colon hydrotherapy is an adjunct therapy and training is restricted mainly to those who already are practicing in natural therapeutic and medical fields with an understanding of its role as part of a treatment regimen. In the US, most states do not regulate colon hydrotherapy. Several US schools now offer certification programs in colonic hydrotherapy.

In the UK, the [Association of Registered Colon Hydrotherapists](#) (ARCH) provides professional support for colon hydrotherapists, to ensure appropriate training standards, to monitor and inspect ARCH-regulated schools and clinics, and to promote public safety via ARCH membership. Likewise, similar organizations exist in Australia ([Australian Colonic Hydrotherapy Association, Inc.](#)), in Canada ([Canadian Association for Colon Therapists](#)), and internationally ([International Association for Colon Hydrotherapy](#)).

Research and use in naturopathic practice

Research continues to show that the action of the gut is increasingly important to overall good health¹⁷ and cleansing the colon also is becoming more important. A UK retrospective study¹⁸ showed the procedure to be successful among the public, with no adverse events reported from clinicians. Additional research is needed to demonstrate the clinical observations of colon hydrotherapists.

In naturopathic practice, colonic hydrotherapy is useful for removing disturbances to health, for tonifying weakened systems, and for establishing healthful conditions. In contrast to use of laxatives, only, (which do not support peristalsis or healthy repopulation of the colon), colonics help establish healthful conditions in which beneficial microflora can flourish, supporting peristalsis by strengthening gut muscle tissue, and detoxifying the system to remove health disturbances and to promote a healthy terrain.

Colon hydrotherapy: one tool for a healthy terrain

Colon hydrotherapy is used in many countries and is becoming increasingly recognized both by GPs and by specialists. It is a beneficial part of a general treatment plan for many patients. Diseases in which a toxic system plays a role (such as cancers and rheumatoid arthritis) benefit from detoxifying the bowel. Increasing numbers of patients, for example, are being referred for colonic hydrotherapy as a part of a heavy metal chelation program or 'depuration protocol.'¹⁹ A series of treatments can benefit patients with GI problems, such as chronic constipation, diarrhea, irritable bowel syndrome, colitis, candidiasis, spastic colon, bloating, flatulence, fatigue, skin problems, headaches, some cases of ulcerative colitis and Crohn's disease, and allergies and sensitivities.^{20,21,22,5}

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TOPIC 3

Physical Culture: The important role of movement in stimulating drainage

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& Leş Moore, ND, MSOM, LAc

Defining ‘physical culture’

In the 21st century, exercise is considered an essential health habit and is routinely recommended to the public by the medical community. It most often is separated into cardiovascular activity and isometric (strengthening) activity, and debate still ensues regarding ‘how much’ and ‘how long’ both forms of activities are ideal for health.¹

In the 19th and early 20th centuries, nature cure doctors referred to exercise as ‘physical culture,’ and also considered it fundamental to health. Although the earliest use of the term ‘physical culture’ was in Adolphus Vongnieur’s *Treatise on the Bane of Vice* in 1787, the term was used in reference to physical growth and maturation, rather than movement.² In the 19th and early 20th centuries, the term had broad implications beyond ‘exercise’ alone, and was used to refer to a lifestyle that incorporated activities with any form of regular movement.² Influenced by the ‘health reform’ movements of the mid-19th and early 20th centuries, early ‘nature camps,’ such as Benedict Lust’s Yungborn (in the US) and Lindlahr’s Elmhurst sanitarium considered exercise a central component for physical

wellbeing and encouraged hiking in nature among its daily routines.^{3, p. 25} Owing to its usage in magazines of the time, ‘physical culture’ became used to refer to, “a set of holistic health practices that encompassed nutrition, fresh air, proper digestions, adequate sleep, and the other tenets of what Americans in earlier times had referred to as the “laws of Health.”^{2, p. 37} J. H. Kellogg’s Battle Creek sanitarium, for example, is described as having had, “... ballrooms with a full-time orchestra and choir for nightly dances and muscials; elsewhere on the vast campus were stables housing teams of horses, carriages and sleighs; an army of bicycles at the ready for rides through the San’s labyrinth of wooded trails; a deer park; and manicured fields for all kinds of sporting games.”⁴

Public interest in exercise increased throughout these decades and in some cases was referred to as ‘movement cure.’² In the 1850s, organized gyms were established, such as Dr. George Taylor’s ‘Movement Cure’ gym and, according to historian, Jan Todd, “decades of movement cure therapies”^{2, p.3} arose in both England and in the US. When Diocletian Lewis (1823-1886), a homeopathic practitioner and founder of the Normal Institute for Physical Education, used ‘physical culture’ for the subtitle of his monthly magazine in 1860, the term became increasingly used to refer to fitness, exercise, and the pursuit of health. Soon afterward, in 1863, the increasing popularity of physical culture inspired health journal publishers, Fowler and Wells, to retitle “The Water Cure

Journal and Herald of Reforms” to the “Herald of Reform and Journal of Physical Culture.”^{5,6}

The increasingly popular idea of organized gyms at this time (1860s) also evolved the physical culture concept into ‘health lifting’ and, consequently, to the ideal of the ‘strong man’ (Fig. 1) that eventually populated circus acts of that time. Those who practiced ‘physical culture’ became known as ‘physical culturists’^{2, p.6} to distinguish them from these body builders

and the practice of ‘health lifting.’

It was during this time that naturopath, Bernarr Macfadden

(Fig. 2), formalized movement and daily activity into the idea of *routine* exercise at gymnasiums.⁷



Fig.1 The Strong Man by Honore Daumier (1808); French painter, sculptor, and printmaker.

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The influence of Bernarr Macfadden

Throughout the last 40 years, many physical culture systems have become popular in Western cultures, including Indian yoga and Chinese qigong. These are important and effective physical culture systems, and are used therapeutically in their respective medical systems (Ayurveda and classical Chinese medicine). In the United States, a unique physical culture system evolved that emphasized breathing, movement, meditation, and visualization, including breathwork and therapeutic exercise for both the musculoskeletal system and for internal organs. Bernarr Macfadden (1868–1955), one of the most influential figures in the history of US physical culture, systematized physical culture and influenced its practice around the world.⁸, p.189

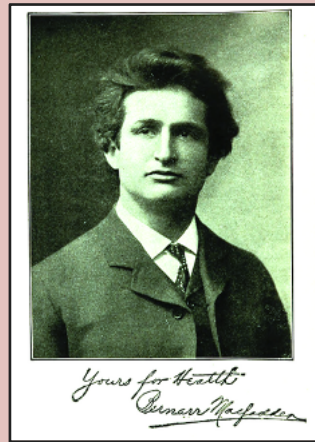


Fig. 2 Bernarr Macfadden, 1900.

Source: public domain, <http://commons.wikimedia.org/>

Prior to becoming a naturopath, Macfadden was a professional catch wrestler. He was interested in diet, nutrition, fasting, and hydrotherapy, but believed the most important aspect of health was physical culture, which he made the centerpiece of a medical system he called 'physcultopathy.' Benedict Lust considered Macfadden the 'big brother' of naturopathy and considered physcultopathy equivalent to naturopathy. Stanley Lief (1892-1963) restored himself to health while studying with Macfadden and subsequently became one of the leading naturopaths in the UK.² A prolific writer and publisher, Macfadden produced the Encyclopedia of Physical Culture and the eight-volume Encyclopedia of Health, and Benedict Lust's later books. Macfadden's magazine, Physical Culture, included work by the American Heavyweight Champion wrestler, Martin Burns (1861-1937),

and helped ignite the early bodybuilding movement. Later physical culturists, including Jack LaLanne, Charles Atlas, and Paul Bragg, were trained and influenced by Macfadden.

Macfadden's system of physical culture was intricate, detailed, and scientific, with exercises for the skeletal system, muscular system, glands, and internal organs. His breathing exercises were integral to his healing system and he considered 'correct' breathing a key component of optimal health.

Les Moore, ND, MSOM, LAc

It is not surprising that nature cure doctors adopted such a comprehensive definition of the term, 'physical culture.' It is a usage that reflects the holistic epistemology of their practice and clinical theory. However, as the worldview and consequent practices of the medical community evolved into a more reductionist and Cartesian approach throughout the 20th century,⁹ so, too, did concepts of exercise, training, and sports. In the early 20th century US, for example, 'physical culture' evolved to 'physical education' or 'physical training.'

Today, use of the term 'physical culture' is more widespread in Europe than in the US,² but remains defined as a *lifestyle* with which individuals strive to achieve maximum physical development through weight (resistance) training, aerobic exercise, mental discipline, and a healthy diet.¹⁰ Todd and colleagues (at the University of Texas, Austin) define it as, "...a term used to describe the

various activities people have employed over the centuries to strengthen their bodies, enhance their physiques, increase their endurance, enhance their health, fight against aging, and become better athletes.” 2, p. 7

The role of movement in detoxification

“Next to overeating, lack of exercise in the natural way is one of the leading causes of weakness and ill health.” 11,

S²² To further clarify his intention, he emphasized that this did not imply ‘gymnastic exercises’ (e.g., weightlifting, boxing), hard physical labor, or use of any specialized exercise apparatus, since these “over-stimulate and overdevelop the muscular structures at the expense of the vital organs and of the brain and nervous system.”^{11, S²³}

Rather, Lindlahr’s focus — the ‘natural way’ — lay solely on using movement to stimulate the ‘vital organs’ and to promote “...the elimination of waste and morbid materials through the skin, kidneys, bowels and the respiratory tract.”

¹¹ To this end, in *Practice of Natural Therapeutics*, Lindlahr outlined a specific program of ‘systematic,’ non-strenuous exercise and breathing – nothing strenuous or stressful – as well as simultaneous ‘psychological’ exercise.

Research throughout the 20th and 21st centuries has clarified, increasingly, the ‘eliminative’ functions to which Lindlahr (and others of his time) referred. Kollath’s ‘Flow Equilibrium’ model (Fig. 2) is one such explanation, highlighting the importance of what he referred to as the

'transit mesenchyme' (fascia) in drainage. Similarly, late 20th-21st century research has elucidated the role fascial tissue plays in musculoskeletal function, proprioception, and nociceptive signaling throughout the human body^{12,13}, and the beneficial role movement plays in maintaining fascial health.^{14,15}

The flow equilibrium and toxemia

In 1950, German bacteriologist, Werner Kollath (1892-1970), introduced the 'Flow Equilibrium' to illustrate the important role of fascial tissue in maintaining a balance between assimilation and elimination (Fig 2). The model illustrates how adequate circulation and drainage depend on the regulation of waste products through the transit mesenchyme (i.e., fascia or connective tissues). Naturopathic soft-tissue treatments, such as neuromuscular technique and lymphatic drainage (Chaitow, L, et al 2008), are directed to removing obstructions to functions of the flow equilibrium. When drainage of these tissues is obstructed, Kollath described the 'slow, imperceptible decline in the health of the cell owing to poor nutrition' as the basis for many chronic diseases.

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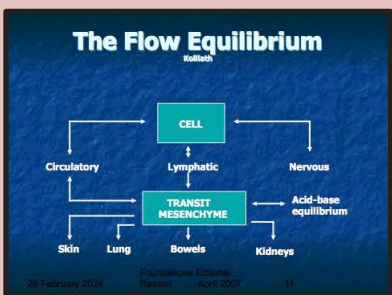


Fig. 3 Kollath's Flow Equilibrium. Source: Roger Newman Turner, 2024

Throughout most of the 20th century and into the 21st, the public perception of 'exercise' has favored intense, strenuous, aerobic and muscle conditioning, that is undertaken at specific times and in specific locations. Yet, programs somewhat more closely aligned with the idea of physical culture have slowly gained recognition in the US (e.g., public health campaigns, such as Take the Stairs¹⁶ or Moving Matters¹⁷); however, these still lack the nature cure emphasis on the essential drainage functions so central to healing and health.

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TOPIC 4

An Historical Overview of Breathing Therapy in the Evolution of Naturopathy

Sussanna Czeranko, ND

The importance of breathing to sustain life is undeniable. Correct breathing has been of interest to healers for millennia. Appropriate breathing to promote health is a fundamental component of naturopathic practice and philosophy. Although instruction in breathing exercises is not currently in the curriculum of many naturopathic medical schools, the practice of correct breathing has long been at the core of the therapeutic repertoire of nature cure.

Although instruction in breathing exercises is not currently in the curriculum of many naturopathic medical schools, the practice of correct breathing has long been at the core of nature cure therapeutics.

Indeed, as testament to the importance of breathing in the lexicon of non-invasive, naturopathic therapies and tools, the father of naturopathic medicine, Benedict Lust (1872-1945), introduced breathing techniques to the profession. Lust's publications of the early 20th century, for example, contain advertisements for Sri Swami Sivananda yoga, in which controlled breathing is a fundamental aspect. Not only did Lust permit such promotion in his journals, but he also influenced the introduction of yoga in America when Yogendra Mastamini (founder of the Yoga

Institute in India and in the US)¹ visited the US from 1919-1922.² Evidence of Lust's influence continues today: the efficacy of controlled breathing is increasingly studied and adopted by many healthcare practitioners.^{12, 1}

Nasal breathing and breathing fresh air were supported by early nature cure proponents. Naturopathic doctors considered oxygen to play a vital role in cleansing and circulating the blood³ and maintained that those who were 'mouth breathers' would, "waken in the morning with open, dry mouth, foul-smelling breath, persistent hoarseness, sometimes headaches and a loss of appetite."^{4, p. 317} The dangers of mouth breathing were first documented in the 1830s by George Catlin, an ethnographer and painter who traveled throughout North and South America, studying more than two million indigenous people.⁵ These populations had extremely low infant mortality compared with developed societies. Catlin noted, "From the Bills of Mortality which are annually produced in the civilized world, we learn that in London and other large towns in England, and cities of the Continent, on an average, one half of the human race die before they reach the age of five years, and one half of the remainder die before they reach the age of twenty-five, thus leaving but one in four to share the chances of lasting from the age of twenty-five to old age."^{6, p. 4}

Yogic breathing also was familiar to early naturopathy. It involved "... the science of pranayam [that] starts with the

proper control of the diaphragm and the respiratory muscles, which bring[s] the maximum degree of lung expansion in order to absorb the greatest amount of the life-giving energy from the air.”^{7 p. 235} There were some differences between breathing guidelines taught by Sivananda and his followers and those advocated by naturopaths of the time. Variations in approach, duration, frequency and technique appeared in the work of naturopathic doctors, including Lindlahr, Bragg, and Macfadden, who combined yogic breathing with aerobic exercise movements and emphasized exertional effort with the breathing exercise. Even so, when considering diaphragmatic breathing, the exercises espoused by both groups are identical. The yogic directive, below, illustrates this continuity in approach:

Sit erect by keeping the spine, neck, and head in a straight line. Now relax the abdominal muscles. Do not raise your chest and do not bend forward. Now take a long breath while allowing the diaphragm to descend without raising the chest and shoulders. When the diaphragm contracts and its dome-shaped center becomes flattened, it thereby pushes the abdominal contents and makes the abdomen expand.^{7 p. 235}

“To breathe means to live and to live means to breathe.”

Swami Vishnudevananda, 1960

Lindlahr’s recommendations for breathing

In his seminal book, *Nature Cure*, Henry Lindlahr (1862-1924), emphasized that correct breathing could be attained by following conscious mental attitude, corrective

movements, and proper standing position.⁸ He outlined 16 exercises to re-establish increased lung capacity and to develop proper breathing habits. Lindlahr also noted the dangers of fashionable women's corsets upon proper breathing, pointing out their restrictive design and propensity to lead to shallow breathing. Shallow breathing, he contended, led to the creation of secretions that, "created inflammation in lung tissue and a fertile soil for accumulation of disease-producing bacilli and germs,"⁸, pp. 331-2 a concept of particular importance at a time when mortality and morbidity from tuberculosis and pneumonia were high. Lindlahr cautioned against mouth breathing, insisting that correct breathing was done through the nose. In his view, the nose was designed to filter impurities, dust, and dirt from inhaled air and to warm its temperature. He recommended breathing open air and designed exercises to be performed outdoors. Exhalation was to last twice as long as inhalation, in order to maximize oxygen distribution to tissues and to rid the body of carbon dioxide.

Lindlahr recommended breathing habits to promote optimal oxygenation throughout the body and to support overall health: i) correct posture, to support ideal function of all body organs, including those imperative to breathing; ii) diaphragmatic breathing, to support inhalation, exhalation and digestion via a strengthened diaphragm; and iii) rhythmic breathing, to regulate electromagnetic balance throughout the body.

Lindlahr's exercise to stimulate action of the diaphragm requires lying flat on the floor and relaxing all the muscles

in the body. The patient then “. . . inhales deeply with the diaphragm only, raising the wall of the abdomen just below the ribs without elevating either the chest or the lower abdomen.”^{8, p. 337} The guidelines further specify that the patient “. . . take about four seconds to inhale, then exhale in twice that length of time, contracting the abdomen below the ribs.”^{8, p. 337} In yogic breathing, it often has been noted that focus is given to the 1:2 ratio of inhalation time and exhalation time, a principle Lindlahr also incorporated into his breathing exercises.

In these exercises, Lindlahr left the ‘alternate breath’ exercise until last and extolled the yogis of India for their mastery of it. To perform the alternate breath, he explained that the patient should inhale through one nostril while closing off the other with a thumb. The exercise involves inhaling and exhaling through the left nostril at a 1:2 ratio, then alternating sides. Although Lindlahr presented one version of the alternate breath, the yogis developed several versions of this exercise. Lindlahr respected yogic breathing exercises; however, he also was a product of western European culture and warned that “dangers” of these exercises included abnormal psychic conditions, leading to “clairvoyance, clairaudience, mediumship, and obsession.”^{8, p. 341}

Among the numerous yogic breathing guidelines and approaches, deep diaphragmatic or abdominal breathing is the technique most widely promoted. The practice of

diaphragmatic breathing instils ‘rhythmic breathing’ — the secret to controlling the nerves and creating calmness, generating vital force, and prolonging life.⁹ p. 480

Other breathing recommendations and techniques

Earl C. Rice, ND included body movements to be used with breathing. He emphasized completely exhaling all air in the lungs after each breath by contracting the abdominal muscles. He developed 20 breathing exercises that, “. . . strengthened every organ [and] also exercise[d] the abdomen internally.”¹⁰ p. 938

Bernarr Macfadden (1868-1955), who popularized many nature cure principles, also was a proponent of breathing therapy. Macfadden was internationally famous during his lifetime, but almost unknown today. He was a flamboyant personality, millionaire publisher, and life-long advocate of physical fitness, natural food, outdoor exercise, and the natural treatment of disease. He was known as the ‘Father of Physical Culture’ and was nicknamed ‘Body Love Macfadden’ in 1951 by *Time* magazine.¹¹ Macfadden was a staunch proponent of physical fitness and wrote several books about the effects of breathing on health. He inspired millions of people around the world to live healthful, vigorous lives. He was branded a “kook and a charlatan” by many, was arrested on obscenity charges, denounced by the medical establishment, and campaigned tirelessly against “pill-pushers,” processed foods, and prudery.¹² He influenced many students who advocated nature cure

practices — for example, his protocols for respiratory diseases included hydrotherapy (such as application of cold neck packs), as well as fresh air and general exercises that included deep, abdominal breathing.¹³

Macfadden considered poor breathing practices to include shallow breathing, mouth breathing, and chest breathing.^{14, pp. 1075-7} His recommendations for correct breathing included forcibly and thoroughly emptying the lungs, breathing through the nose, and inhaling to fill the lower lungs, then middle, then upper lungs (or apices) with the spine or back completely erect.^{14, pp. 1077-79} In his book, *The Encyclopedia of Health and Physical Culture*, he outlined ten breathing exercises to perform while standing, another ten while sitting, and five exercises to perform while reclining.^{14, pp. 1081-85}

Paul C. Bragg, ND, PhD (1895-1976) one of Macfadden's colleagues, advocated natural approaches to health and, with his daughter, Patricia, ND, PhD, modeled an approach to breathing based on Macfadden's work. The Braggs advocated breathing with both the nose and mouth to increase oxygen intake. In their work, *Super Power Breathing: For Super Energy, High Health and Longevity*,¹⁵ the Braggs observed that oxygen starvation was the underlying cause for many illnesses, and attributed healthy breathing to deep, diaphragmatic breathing as developed in India thousands of years ago. The Bragg Super Power Breathing Exercises included seven techniques that

incorporated breathing and breath retention (as in yogic breathing), movement, and good posture. The Braggs also taught deep-breathing exercises to alleviate not only symptoms of certain diseases, but also their cause(s). In their view, shallow breathing was the cause of premature aging and deep breathing involved the expansion of the diaphragm and, along with the seven exercises they espoused, was designed to improve the function of many organ systems.¹⁵

The Braggs observed that oxygen starvation, due to shallow breathing, was the underlying cause for many illnesses, and attributed healthy breathing to deep, diaphragmatic breathing. Deep breathing involved the expansion of the diaphragm and was designed to improve the function of many organ systems.

Edwin J. Dingle, FRGS (1881- 1972) a cartographer, Fellow of the Royal Geographic Society, and founder of the Institute of Mentalphysics (1914), also was a proponent of breathing therapies. After 21 years studying Tibetan spiritual practices and yoga in China, India, and Tibet, he returned to the US and adapted his discoveries for Western populations, as 'Revitalizing Breath' exercises. The Revitalizing Breath involved tensing the muscles of the buttocks and straightening the spine, and then further tensing the arms and legs during the breathing exercise. Upon inhalation and exhalation, the abdominal muscles were also tensed. The key to success in Dingle's breathing

was to retain the breath for several seconds. Dingle's claim was that physical health was dependent upon correct breathing.¹⁶

Jesse Mercer Gehman, ND (1901-1976), who succeeded Lust as president of the American Naturopathic Association,² advocated cold bathing to stimulate the inspiratory center in the brain and thus encourage deeper breathing. Gehman believed that the invigorating sensation following a plunge into cold water first thing in the morning was secondary to additional oxygen inspired which helped cleanse the lungs. He advocated a cold splash or shower to stimulate the lungs.¹⁷

The message of these various practitioners was clear and continuous: diaphragmatic breathing instills health and increases oxygen in the lungs and chest, while shallow breathing limits oxygen intake.

Breathing techniques to address specific conditions

Asthma

Although the clinical literature of the early 20th century demonstrated an interest in breathing as an essential methodology of disease prevention and health promotion, it was not a principal treatment for respiratory ailments, such as asthma. In his article, "Bronchial Asthma and Hay Fever," **Eugene A. Bergholz, MD** (1904-1942), who operated The Bergholz clinic and sanitarium in Milwaukee, Wisconsin, observed that diet and allopathic medications

were the naturopathic cure for asthma. Significantly, breathing exercises in this early literature were not mentioned as having any influence on either asthma or hay fever. The cause and etiology of asthma were understood to be solely an allergic response. The rationale of naturopathic treatment was to follow a raw fruit and vegetable diet with lightly steamed, starchless vegetables, along with various hydrotherapeutic practices, to regenerate the body's defenses and to eliminate allergens. The recovery time with the best scenario was 3-4 months if the asthma was mild.

Konstantin Buteyko, MD (1923-2003) also developed breathing techniques as a therapy for asthma. The Buteyko Breathing exercises have demonstrated dramatic resolution of asthma symptoms, including reduction of medications to relieve and to prevent symptoms.¹⁸ This method involves six breathing exercises incorporating diaphragmatic breathing. Contrary to the Braggs' supposition that oxygen deprivation was the cause of illness, Buteyko postulated that low CO₂ levels are responsible for many of today's diseases. He further demonstrated that the Böhr Effect and hyperventilation were the basis for his theories. Buteyko maintained that when people hyperventilate (or breathe more than is physiologically necessary), they expire more CO₂ than the body can produce. Atmospheric air contains approximately 20% O₂ and 0.03% CO₂. Buteyko theorized that in healthy people, tissue O₂ level is 14% and the lungs concentrate

CO₂ to 6%. Consequently, the body must concentrate its CO₂ by 200%, whereas O₂ is plentiful. When CO₂ levels decrease due to hyperventilation, smooth muscles contract and induce bronchospasm, respiratory alkalosis develops, and mast cells produce more mucous. For a person with asthma or other respiratory problems, these symptoms can cause significant distress.

The Böhr Effect implies that the more you breathe, the less oxygen is available for your tissues, which leads to hypoxia. The Buteyko Breathing Method rests on the premise that people who experience physical and/or psycho-emotional stress have a tendency to hyperventilate, therefore losing too much CO₂. A decrease in CO₂ increases the affinity between hemoglobin and O₂. So, despite the deep breaths taken by someone experiencing breathing difficulties, there still remains a feeling of breathlessness and chest constriction. The Buteyko Method teaches patients to increase CO₂ via several exercises that incorporate diaphragmatic breathing and breathing less air. These exercises relax the smooth muscles around the airways, return the body to a normal pH level, and allow hemoglobin to deliver O₂ to the tissues.

This breathing method teaches an objective opposite to that promoted by early naturopathic doctors. While the early naturopaths taught that deep breathing increased O₂ to the body's tissues and copied yogic breathing exercises which increased expiration time to rid the body of CO₂,

Buteyko taught that deep breathing led to *low* CO₂ levels and therefore profoundly affected the availability of O₂ to body tissues.

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TOPIC5

The Benefits of Appropriate Breathing: A naturopathic perspective of breathing pattern disorders (BPD) and widespread general health influences

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Naturopathic medicine bases its primary care on the self-regulatory functions the human body/mind relies on for survival. Whatever terms are used to describe the healing process is immaterial — *vis medicatrix naturae*, homeostasis, self-regulation — the principle remains the same. Encouraging both health enhancement, as well as recovery from ill-health, involves either augmenting the systems and processes responsible for defence and repair, modifying the factors involved in overload of these systems and processes, or both. Given such opportunities, the body has a tendency to heal itself or at least to partially recover from its dysfunctions and diseases.

Within the patient assessment process, respiratory function and dysfunction offer an area of diagnostic focus that can provide an appreciation of the patient's current degree of self-regulatory efficiency. Making sense of the individual's revealed and invisible qualities and deficiencies requires an ability to assess and evaluate current levels of compensation, adaptation, and decompensation.

Therapeutic objectives within naturopathic medicine usually can be summarized as being directed at enhancing adaptation and repair functions and/or lightening the adaptive load. In naturopathic medicine, and increasingly in integrated and holistic health care provision, the principles of homeostatic self-regulation, together with knowledge of what disrupts it, and how this leads to ill-health, is central to clinical management.^{1,2,3}

Much naturopathic assessment involves attempts to place patients and individual symptoms into a comprehensive context, and to evaluate the adaptive load in order to identify which factors are currently resulting in the individual that represent a failure of adaptation and a breakdown of self-regulatory efficiency as manifested by the presenting symptoms. Within this assessment process, respiratory function and dysfunction offer an area of diagnostic focus that can provide an appreciation of the patient's current degree of self-regulatory efficiency. To understand effective adaptation and self-regulation, we must be aware of the overlapping relationships that exist between the intimate biochemical, psychosocial, and biomechanical influences on health.

Despite physiological and psychological commonalities among humans, unique inherited and acquired tendencies, propensities, and attributes mark each person's idiosyncratic characteristics. Interactions among these features and the equally unique burdens, problems,

challenges, demands, and activities individuals experience in daily life (toxic, postural, emotional, etc.) provide the complex context for the challenge that confronts naturopathic and other health care providers: assessing an individual's state of health and disease. Making sense of the individual's revealed and invisible qualities and deficiencies requires an ability to assess and evaluate current levels of compensation, adaptation, and decompensation. Unfortunately, few patients and few physicians realize that over-breathing can be a long-term habitual pattern (though most would recognize acute hyperventilation) or that such breathing pattern disorders (BPDs) are responsible for a wide array of physical and psychological symptoms.^{4, 5,6,7}

Definitions

Breathing Pattern Disorders is an umbrella term used to describe a broad range of dysfunctional breathing patterns. Not all of them present as immediately symptomatic, and not all are acute.

Hyperventilation Syndrome (HVS) is the pathological extreme of a Breathing Pattern Disorder (BPD) with an acute manifestation of symptoms. It occurs when ventilation exceeds metabolic demands, resulting in symptomatic hemodynamic and chemical changes.

'**Over-breathing**' describes the phenomenon (action, or behavior), but does not qualify its intensity. It is sometimes found as a synonym for hyperventilating (lower-case noun or verb as opposed to the Syndrome), but can be asymptomatic initially (unless chronic), and very visible, whereas hyperventilation is symptomatic⁸ and may not always be immediately visible on visual observation. Neither are the same as HVS, which is a diagnosis falling within the broader category of BPD.

Syndrome (from the Greek syn+dramein, meaning to co-contribute) is not a pathology in itself, but a condition attributable to a collection of factors. Therefore, it is possible for an individual to suffer from a BPD or from HVS due to one or more factors discussed below. Like ME/CFS or fibromyalgia, the underlying causes may be complex and interdependent, or even idiopathic. There is a strong mental health component associated with BPD, as is discussed later in this chapter.

Hypocarbica/hypocapnia a deficiency of CO₂ in the blood below the normal reference range of 35mmHg, resulting from hyperventilation, leading to respiratory alkalosis.^{9,10}

Hypoxia a reduction of oxygen supply to tissue below physiological levels, despite adequate perfusion of the tissue by the blood.

The focus of this chapter is BPD, since those with acute HVS symptoms are likely to seek emergency medical attention. Mention of HVS in this context should not be assumed to represent any claim to treat HVS. These terms are not, and should not be considered as synonymous. Care should be taken when discussing them interprofessionally and within the clinical encounter, since each has specific connotations.

Table 1 Common symptoms associated with BPD

System	Symptoms	Suggested causes
Cardiovascular	Chest pain, angina, palpitations and arrhythmias, tachycardia, lightheadedness, syncope, altered ECG* features.	Reduced arterial blood flow, altered excitability of cardiac muscle SA and AV nodes, reduced cardiac output, peripheral
Gastrointestinal	IBS. Dysbiosis. Lower chest and epigastric discomfort, esophageal reflux, heartburn, bloating/distension, increased hiatal hernia symptoms, dry mouth, increased swallowing rate, belching.	Smooth muscle constriction due to respiratory alkalosis affecting intestinal tract; altered intestinal pH; aerophagia, increased swallowing rate, mouth breathing.
Neurological Emotional, Psychological	Headache, numbness and tingling (mainly extremities and perioral), positive Trousseau’s and Chvostek’s signs , photophobia, hyperacusis, lowered pain threshold; altered motor control, impaired core stability, dizziness/ giddiness, ataxia and tremor, blurred and tunnel vision; anxiety and panic, phobias, irritability, depersonalization, detachment from reality, impaired concentration, cognition, increased fatigue levels, insomnia, hallucinations.	Cerebrovascular constriction due to smooth muscle constriction affecting vertebral and carotid arteries; reduced O ² delivery (Böhr effect), neuronal excitability due to alkalosis & sympathetic arousal; hypocalcemia, lowered magnesium levels.
Respiratory	Breathlessness; restricted sensation around thorax; chest tenderness, sighing/yawning; pain due to obvious overuse of upper chest, accessory breathing muscles (e.g., scalenes).	Overuse and fatigue of accessory and primary breathing muscles ; under-oxygenation due to smooth muscle constriction.
Muscular	Stiffness and aching, increased trigger point activity, weakness and stiffness in limbs, cramping, carpedal spasm, tetany, easy fatigue.	Hyper-excitability of motor nerves, muscle fatigue, calcium / magnesium imbalance; under-oxygenation due to smooth muscle constriction. Böhr effect.

*AV, Atrioventricular; ECG, electrocardiogram; SA, sinoatrial.

Respiration: where biochemistry, emotion and biomechanics meet

Respiratory function displays a more obvious interplay of biochemical, psychosocial, and biomechanical features than most other areas of human physiology. This intrinsically biomechanical function, involving activities of thoracic, spinal, pelvic, and abdominal features, has a direct

and potentially profound influence on emotion, mood, cognitive function, autonomic and cardiovascular function, the biochemistry of the blood and bodily tissues, and on pain perception and motor control. The effect of this complex interplay of influences on health, disease and dysfunction is illustrated by examining various breathing disorders.

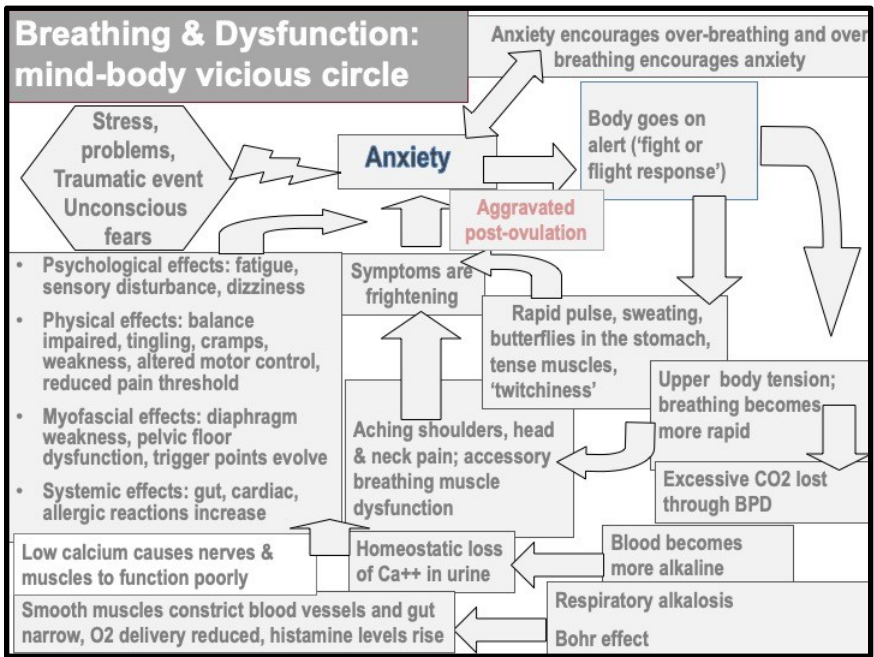


Fig. 1 Disrupted breathing patterns precipitate a cascade of physiological, and psychological effects.

Source: Chaitow, Bradley, & Gilbert. *Multidisciplinary Approaches to Breathing Pattern Disorders*. Churchill Livingstone, 2002. Used with author's permission.

The complex, interrelated effects of breathing throughout the body include: emotion, mood, cognitive function, autonomic and cardiovascular function, biochemistry of blood and bodily tissues, pain perception, and motor control.

The Buffalo study

Before beginning this review, it is helpful to consider the overall findings of a 29-year prospective study (the ‘Buffalo’ study), of a randomly selected sample of 554 men and 641 women, aged 20-89 years, from all listed households in Buffalo, New York.¹¹ Baseline measurements (1960/61) were taken of pulmonary function based on forced expiratory volume in one second (FEV1) expressed as normal % predicted (FEV1%pred). Sequential analysis of participants who survived at least 5, 10, 15, 20 and 25 years after enrollment showed that FEV1%pred (adjusted for age, body mass index (BMI), systolic BP, education level, and smoking status) was inversely related to all-cause mortality, in both men and women, and also to ischemic heart disease mortality. Report authors concluded, “these results suggest that pulmonary function is a long-term predictor for overall survival rates in both genders and could be used as a tool in general health assessment.”^{11 p. 656} More recent work supporting this finding has developed in the two decades since this follow-up study.^{12,13}

How common are BPDs?

Hyperventilation is an extreme breathing pattern disorder, with acute episodes of hyperventilation. It represents only

about 1% of all cases and is far outnumbered by chronic breathing patterns.⁴ Chronic hyperventilation leads to hypocapnia (reduced levels of carbon dioxide in the blood), which alters the blood's normal pH (7.4) toward a more alkaline state. This leads to myriad respiratory, cardiac, neurological, or gastrointestinal symptoms, without any clinically apparent overbreathing by the patient.

In the United States, as many as 10% of patients in a general internal medicine practice are reported to have hyperventilation syndrome (HVS) and/or breathing pattern disorders (BPD) as a primary diagnosis.¹⁴ Studies show that, relative to men, women have a higher rate of respiration and a greater tendency to respiratory alkalosis, which is exaggerated during the luteal (progesterone) phase of the menstrual cycle.¹⁵ During the post-ovulation phase, CO₂ levels decrease \pm 25%. Any additional physical and/or psychoemotional stress may then increase ventilation in a body already depleted of CO₂.^{16,17} Research shows overbreathing to be a key feature not only in the etiology and exacerbation of premenstrual symptoms, but also in pain perception of patients with fibromyalgia, possibly via a reduced pain threshold resulting from progesterone-stimulated hyperventilation.^{18,19,20} Dunnett, *et al.*²¹ found that diagnoses of fibromyalgia by rheumatologists using standard criteria might be positive or negative, depending upon the phase of the patient's menstrual cycle. Hyperventilation syndrome (HVS) and breathing pattern

disorders (BPD) are generally female dominated, with a female:male ratio ranging from 2:1 to 7:1, and with extensive implications for general health.²²

Breathing Pattern Disorders Represent *Dysfunction*, not Disease

Keep in mind that BPDs represent dysfunctional *usage* and not *disease*, such as chronic obstructive pulmonary disease (COPD). An illustrative comparison would be the relationship between poor posture compared with ankylosing spondylitis. However, there is apparent overlap and studies show many people with BPD have been misdiagnosed with asthma:

Thirty percent of asthma cases are known to be induced by emotion or exercise, and many symptoms are common to hyperventilation and to asthma: intermittent, labored breathing; relief from bronchodilators (transient in hyperventilation); exercise; cough; fear, anxiety and panic. It is thus a matter of individual preference whether the clinician calls such cases asthma or hyperventilation. The distinction is important. Treatment of hyperventilation cures the patient. The asthmatic is condemned to a life of medication.^{23,24}

Why do people hyperventilate?

Several conditions or physical states produce metabolic changes that precipitate hyperventilation as an appropriate response. Therefore, it is essential to identify or to exclude organic causes of increased breathing rates, since these may lower arterial oxygen saturation (PaO₂), and/or elevate arterial carbon dioxide (PaCO₂) levels. These conditions include:

- respiratory: asthma, chronic obstructive pulmonary disease (COPD), pneumonia, pleural effusion, pulmonary embolus, pneumothorax
- cardiovascular: acute & chronic left heart failure, right heart failure, tachy-arrhythmias²⁵
- anemia
- premenstrual luteal phase (due in part to high levels of progesterone)^{26,27}
- pregnancy (due in part to high levels of progesterone), but especially in the last trimester^{26,28,29,27}
- renal: nephrotic syndrome, acute and chronic kidney failure³⁰
- endocrine: diabetes with ketoacidosis, pregnancy, progesterone therapy
- metabolic: liver failure
- pharmaceutical: aspirin, caffeine, amphetamine, nicotine.³¹ p. 118-9 In some cases, even normal dosages can trigger hyperventilation in sensitive individuals,³² while in others, chronic use and higher dosages or nicotine withdrawal seem to be the triggering factors.^{33,34}

Adaptive functions of HVS

As with many symptoms (such as inflammation), hyperventilation may sometimes have a self-regulating potential. As an extreme example, critically ill brain-trauma patients who have a negative nitrogen balance, may have advanced muscle wasting, partially due to decreased muscle protein synthesis. Studies investigating the

relationship between pH and protein metabolism suggest that alkalosis might enhance protein synthesis.³⁵

In less critical cases chronic respiratory alkalosis can sometimes have a homeostatic effect, as seen in adaptation to high altitudes. In contrast, when hyperventilation causes unwanted symptoms, the fluctuation of PCO₂ and the resulting degree of alteration to pH levels are such that adaptation becomes impossible. As a consequence, rapid CO₂ loss leads to respiratory alkalosis. A return to normal levels can take several hours or days.^{36,37,38} Thus, an unpleasant symptom can also be beneficial to the economy and self-repair of the body, a clear example of self-regulation in action. In such a situation, suppressing the symptom — by having the patient attempt to control, or ‘normalize’ his or her breathing pattern, for example — would reduce protein synthesis and retard tissue repair.

Habit

Setting aside special situations in which rapid breathing offers physiological benefit, there remains a vast population in which no such physiological benefit applies. While the specific triggers of hyperventilatory breathing may vary, its chronicity is eventually thought to be established mainly due to habit, possibly beginning very early in life.^{23,39}

On the basis of his respiratory physiological analysis of 1735 patients, Lum concluded, “Neurological

considerations can leave little doubt that the habitually unstable breathing is the prime cause of symptoms. Why they breathe in this way must be a matter for speculation, but manifestly the salient characteristics are pure habit.”⁴, p.3

He explains the known effects of hypocarbia at the neuronal level and its subsequent impact on intracellular pH and neuronal electrical activity as leading to an excitation phase, which can be followed by a progressive depression phase whose symptoms may range from mild dizziness to stupor if hyperventilation is not corrected. A moderate association between over-breathing and psychogenic non-epileptic seizures has also been reported.⁴⁰ Further effects on the autonomic system also are noted, following the excitation–depression pattern, explained as a pattern of ‘hypocarbic stress.’^{41,10} Regarding the establishment of habit, Lum and others have noted the close connections between hyperventilation and the broad spectrum of psychophysiological symptoms that appear to have both a heritable and habitual (sometimes termed ‘behavioral’) basis that is now well established through psychophysiological and psychosomatic research.^{42,39,43,44,45,46}

Once this habit becomes established, a physiologic tolerance to low levels of CO₂ also is established.⁴⁷ Most breathing retraining focuses on increasing the individual's tolerance threshold for CO₂ through conditioning exercises (which decrease the rate of PaCO₂ increase). Courtney⁴⁸ explains, “The stimulus to breathe is primarily

regulated by the individual's response to CO₂ by chemoreceptors in the medullary breathing centre. This ventilation response to CO₂ tends to become fixed, and individuals seem to maintain their own particular levels of ventilation. People can [however] be trained to decrease their ventilation response to CO₂.” If an individual can develop BPD ‘habits’ by means of inappropriate conditioning, then these same habits should be capable of being modified by more appropriate conditioning.⁴⁹

Why are BPDs generally unrecognized?

Breathing pattern disorders generally remain unrecognized, because chronic HVS can present with respiratory, cardiac, neurological, or GI symptoms, without any clinically apparent over-breathing by the patient.^{23,43,44} Thus, BPDs often are missed or misdiagnosed as over-anxiousness by healthcare professionals.^{50,43} the Principles of Naturopathic Medicine that focus on identifying and treating the root cause of dysfunction (*tolle causam*) and treating the whole person (*tolle totum*) — especially when considered in the context of the broader shift toward whole-person healthcare across the spectrum of primary care^{51,52} — equip naturopathic doctors with the broad perspective required to incorporate BPD awareness into practice and to accurately identify patients with BPDs.

How widespread is HVS or BPD?²⁴

- 5-10% of general medical outpatients are thought to experience HVS. Because of the range of somatic symptoms, the risk for misdiagnosis is high.
- 8% of adults without asthma have Breathing Pattern Disorders (BPD), of which symptomatic hyperventilation is the most common)²⁴
- Approximately 50% of patients with panic disorder, and 60% of patients with agoraphobia, manifest hyperventilation as a symptom, whereas only 25% of patients with HVS manifest panic disorder.⁵³

Biochemistry of BPDs

As shown in Figure 1, an increased ventilatory rate, (as prevails with hyperventilation) — during which the rate of carbon dioxide (CO₂) exhalation exceeds the rate of its accumulation in the tissues — produces respiratory alkalosis (characterized by decreased CO₂ and increased pH). Alkalosis induces vascular constriction, decreasing blood flow as well as inhibiting transfer of oxygen from hemoglobin to tissue cells (due to the Böhr effect).^{54,28}

The Böhr effect states that an increase in alkalinity (decrease in CO₂) increases the affinity of hemoglobin (Hb) for oxygen (O₂). The Hb molecule is therefore less likely to release oxygen in tissues that have become increasingly alkaline due to over-breathing.⁵⁵ Increased O₂-Hb affinity also leads to reductions in serum calcium and red cell phosphate levels.^{56,57,58} As the renal system strives to compensate for alkalosis, intra-cellular Mg²⁺ consequently

decreases, which leads to muscle fatigue, dysfunction (e.g., cramp), and evolution of trigger points.⁵⁹ Resulting physiologic changes include hypoxia, cerebral vasoconstriction, coronary constriction,⁶⁰ blood and extracellular alkalosis (increased pH), cerebral glucose deficit, ischemia (localized anemia), buffer depletion (bicarbonates), bronchial constriction, gut constriction,⁶¹ calcium imbalance, platelet aggregation, magnesium deficiency, hypokalemia (plasma potassium deficit); and muscle fatigue, spasm (tetany), and pain.⁴⁷

The role of nitric oxide and respiration

Nitric oxide (NO) is a potent vasodilator that inhibits platelet adhesion, activation, and aggregation.⁶² Addition of exogenous NO reverses vasoconstrictive effects of hypocapnia⁶³ and augments the vasodilatory effects of hypercapnia (excess CO₂ resulting, for example, from hypoventilation).⁶⁴ Normal nasal breathing stimulates nitric oxide production in the para-nasal sinuses. This suggests that the natural production of NO may be enhanced through improved function of the cranial/sinus system.⁶⁶

When assessing for chronic hyperventilation, ask patients about:

- feelings of constriction in the chest shortness of breath
- accelerated or deepened breathing
- inability to breathe deeply
- feeling tense
- lightness around the mouth
- stiffness in the fingers or arms
- cold hands or feet
- tingling fingers

- bloated abdominal sensation
- dizzy spells
- blurred vision
- feelings of confusion or losing touch with their environment

Nitric oxide (NO) plays a complex homeostatic role in respiratory and venous function, but appears to be unaffected by hyperventilation.⁶⁶ Depending on concentrations, NO may enhance certain physiological processes, such as regulation of vascular and bronchial tone, but may induce pathology (such as the processes underpinning cardiovascular and pulmonary diseases when imbalanced).^{67,68}

The HVS — hypoglycemia connection

Feelings of faintness, cold sweats, weakness, and impaired concentration are common to both hypoglycemia and to hyperventilation.⁴¹ During over-breathing, both EEG and cortical function deteriorate when glucose values decrease below 100 mg/dL (64.8-104.4 mg/dL normal laboratory reference range). Three minutes of hyperventilation has mild physiologic effects within a blood glucose range of 85-90 mg/dL, but when blood glucose decreases to 70-75 mg/dL (still within normal range) gross EEG disturbances are noted.⁶⁹

Fluctuating blood glucose levels (even within the normal blood glucose range) may trigger HVS/BPD symptoms. The potentially debilitating combination of cerebral hypoxia

and cerebral hypoglycemia, resulting directly from deregulated breathing chemistry, can result in profound psychological and behavioral changes, as listed previously in this chapter. Therefore, following a dietary pattern that helps maintain stable blood glucose levels is particularly relevant for patients who experience panic attacks or seizures.³¹

Potentially catastrophic symptoms

Angina-like symptoms can occur in people with and without coronary artery disease, as a result of constricted blood vessels due to excessive exhalation of carbon dioxide during episodes of imbalanced breathing. These stress-induced changes can occur during hyperventilation and frequently have nothing to do with clinical heart disease. In fact, up to 90% of non-cardiac chest pain may be induced by hyperventilation (HVS) and other breathing pattern disorders (BPD).⁷⁰ It is, therefore, important to investigate chest pain associated with HVS/BPD, in order to exclude heart disease as a diagnosis and to initiate breathing rehabilitation.⁴⁴ Many individuals with HVS/BPD experience severe and genuinely distressing symptoms, and represent a considerable medical expense when more serious pathology is excluded.²⁵

Colonic spasm, IBS, and BPD

Symptoms attributable to hyperventilation also are common among patients with Irritable Bowel Syndrome (IBS). Studies^{61,71,72} have been conducted to assess the

effects of hyperventilation on colonic tone and motility, and to discover if hypocapnia is critical to elicit this response. Results show that hypocapnic hyperventilation (low CO₂ blood levels) unlike eucapnic hyperventilation (normal CO₂ blood levels) increases colonic tone and phasic contractility in the transverse and sigmoid regions. These findings are consistent with inhibition of sympathetic innervation to the colon, or direct effects of hypocapnia on colonic smooth muscle, or both.

BPD, pelvic floor dysfunction, and associated symptoms

There is a clear connection between respiratory function, pelvic floor dysfunction, and sacroiliac joint (SIJ) stability, particularly in women.⁷³ Excessively highly-toned or excessively lax pelvic floor muscles may compromise spinal support. This leads to increased obliquus externus activity, which alters pelvic floor muscle activity and possibly to urinary incontinence and/or to interstitial cystitis.^{74,75} Pelvic floor muscles actively assist lumbo-pelvic stability, as well as urinary and fecal continence.⁷⁶ A motor control deficit, which can be disturbed in incontinent individuals, and which is commonly influenced by the effects of BPD (such as hyperventilation), negatively influences pelvic floor muscles.⁷⁷ Hodges⁷⁸ demonstrated that after approximately 60 seconds of over-breathing (hyperventilation), the postural (tonic) and phasic functions of both the diaphragm and transversus abdominis are

reduced or absent, with major implications for spinal stability and pelvic floor functionality.

Rehabilitation of motor function benefits pelvic floor, diaphragm, and sacroiliac function, when applied to individuals with SI joint pain,⁷⁹ which suggests existence of a complex inter-relationship between spinal and sacro-iliac stability, as well as among a variety of pelvic floor/organ problems (including urinary incontinence and/or interstitial cystitis), all of which are influenced by respiratory function.

It is important to note that all such symptoms are more likely to occur in deconditioned individuals. Symptoms resulting from over-breathing in deconditioned individuals include muscle aches (even at low levels of exertion); restlessness; heightened sympathetic activity; and increased neuronal sensitivity. These individuals also may be unable to undertake or to sustain levels of activity or effort common to their age and gender, due to constriction of smooth muscles in the gastrointestinal or respiratory tracts, and/or vascular structures.⁵

The biomechanical effects of BPD

The most obvious effect of overuse of accessory breathing muscles (upper trapezius, scalenes, sternomastoid, and intercostal) in upper-chest breathing patterns, is the inevitable level of hypertonicity and trigger point evolution in those muscles. This often results in stiffness and pain in the neck, head, upper thoracic, and shoulder regions^{80,81}

Breathing pattern disorders also can result in disturbed balance. Since maintaining equilibrium is a primary role of functionally coordinated muscles that act in task-specific patterns, it is dependent upon normal motor control.⁸²

Abnormal breathing patterns, such as hyperventilation, also lead to elevated reports of somatic symptoms, including disorientation, and there is evidence that the central changes accompanying hyperventilation also may influence balance. Healthy individuals exhibit a substantial increase in sway following voluntary hyperventilation, and this postural instability seems to be linked to peripheral and central changes in somatosensory function.⁸³

There is overlap between emotional states (e.g., anxiety) and dysregulated balance, that has profound effects on musculoskeletal function. When examining the neurological link between balance control and anxiety, Balaban and Theyer note: "The parabrachial nucleus is a site of convergence of vestibular information processing, and of somatic and visceral sensory information processing, in pathways that appear to be involved in avoidance conditioning, anxiety, and conditioned fear."⁸⁴, p.

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Klein⁸⁵ reports that hyperventilation (and resultant alkalosis) is capable of triggering anxiety and/or panic (and associated balance control changes) when the associated symptoms of alkalosis are interpreted by the individual as representing a danger (as is commonly the case). Many

studies have shown that breathing rehabilitation can normalize or improve disturbed balance.^{86,87 88,89}

Low-back pain and complex physiologic and functional changes

Low back pain often involves altered muscle-length relationships, postural changes and muscular imbalances, as well as variable locations of the individual's center of mass and of pressure.⁹⁰ In the presence of such changes, speed and intensity of muscular contractions are commonly altered⁹¹ — deep, segmentally-related muscles lose both contraction speed and intensity, while larger, multi-segmental muscles experience over-activity and tonic contraction.^{92,93} Consequently, patients with low-back pain move differently, compared with healthy individuals.⁹⁴ Increased anxiety levels, caused or aggravated by disordered breathing patterns such as hyperventilation, are capable of amplifying most of these changes.⁹⁵ Thus, motor system responses change under conditions of pain and anxiety, due to modified cerebral processing that is influenced by breathing pattern changes.

The Effect of BPD on Neuronal Excitability: A review of the research

- Mogyoros⁹⁶, p. 317 states: “The thresholds of human sensory and motor axons are altered during hyperventilation..... These results suggest that hyperventilation has a rather selective action on the threshold channels.”
- Seyal, *et al* note that hyperventilation increases the excitability of both cutaneous and motor axons, and that in experimental animals, HVS increases excitability of hippocampal neurons. Their research,

involving healthy humans, demonstrates that hyperventilation increases the excitability of the human corticospinal system.⁹⁷

- Respiratory alkalosis, resulting from low PaCO₂, which is almost always the result of hyperventilation, automatically lowers calcium ion levels in the plasma, precipitating hyperirritability of motor and sensory axons.
- Combinations of inflammatory mediators, together with altered tissue pH, effectively speeds sensitization more markedly than chemical mediators alone.
- Fluctuations in PaCO₂, resulting from over-breathing, can have a destabilizing effect on the autonomic nervous system, leading to sympathetic dominance, with patients often in a state of arousal.
- Mean urinary excretion of adrenaline in hyperventilators may up to three times greater than normal.
- These changes tend to reduce motor control efficiency and increase perceived pain levels. Lum⁴ reports: “During moderate hyperventilation, loss of CO₂ ions from neurons stimulates neuronal activity, causing increased sensory and motor discharges, muscular tension and spasm, speeding of spinal reflexes, heightened perception (photophobia, hyperacusis) and other sensory disturbances.”

Reduced core stability

As noted earlier, there is evidence of specific changes in key core stabilizing muscles during periods of over-breathing.⁵⁹ This has been observed to be particularly obvious where needs for postural stability and accelerated breathing occur simultaneously (for example while shovelling snow, as described in one study that simulated that action).⁹⁸ In such circumstances, stability is sacrificed in

favor of enhanced respiratory function, putting spinal structures at particular risk.

Thus, balance, pain threshold and perception, as well as musculoskeletal function (motor control), all may be modified negatively in response to over-breathing. Musculoskeletal rehabilitation approaches involving core stability exercises, will be markedly hampered by chronically unbalanced breathing patterns.

Psychological and emotional effects of BPD

Anxiety and apprehension are closely associated with altered breathing patterns, and breathing pattern disorders are, in turn, exaggerated by anxiety and apprehension.⁹⁹ Among people diagnosed as having panic disorder (DSM-5 300.01 (F41.0)) there is a significant subset who chronically over-breathe.¹⁰⁰ The body's reflexive fight, flight or freeze response is the evolutionary alarm pattern triggered by the limbic system in response to perceived threat.¹⁰¹ While it is well established that hyperventilation and resulting alkalosis can trigger anxiety and/or panic, this is fundamentally a two-way process: rapid breathing precipitates anxiety and feelings of apprehension, and anxiety increases breathing rate.^{85,102}

Symptoms ranging from fatigue to cardiovascular, cognitive, gastrointestinal, and neurological problems may be caused or strongly influenced by over-breathing.

Naturopathic strategies

Breathing rehabilitation and education should be a foundational naturopathic approach in all conditions involving anxiety, panic, and phobic behavior, in conjunction with appropriate psychotherapy. Because respiratory alkalosis and the Bohr effect directly influence gastrointestinal, cardiovascular, neurological, and musculoskeletal systems, the effects of over-breathing can be widespread and severe. Breathing rehabilitation meets the basic naturopathic requirement of being a physiologically safe approach that offers an opportunity for self-regulation to operate more efficiently.

Docere: Breathing rehabilitation and education are fundamental requirements when assisting self-regulation for conditions associated with respiratory alkalosis, in addition to other safe and appropriate methods. Since breathing pattern disorders directly influence pelvic-floor function, a wide range of conditions, such as stress incontinence, interstitial cystitis, and pelvic pain, also may benefit from therapeutic treatment that includes breathing rehabilitation.

Recognizing the problem

How can doctors recognize a patient's current level of homeostatic efficiency, adaptation, and decompensation? Are there reliable biological — or other — markers indicative of a patient's current degree of vulnerability? As noted above, $F_{ev1\%pred}$ (predicted forced expiratory volume) provides instant information about an individual's

pulmonary efficiency status (and, by implication based on the Buffalo study, of long-term survival potential.¹¹

Much research that attempts to identify a reliable biological marker of the human stress response focuses on salivary cortisol concentration as a convenient biomarker.^{103,104} New technologies also allow rapid non-invasive, physiological measurement of stress, including end tidal carbon dioxide, heart rate variability, and alpha brainwave analysis. These approaches allow evaluation of internal processes that can then be explained and often displayed to the patient. In addition, questionnaires, such as the Nijmegen Questionnaire, help identify and categorize an individual's level of distress and functionality. This is an easily administered, non-invasive test of high sensitivity, (up to 91%) and specificity (up to 95%), and is an internationally validated¹⁰⁵ method to diagnose chronic over-breathing, which is arguably the most common cause of deregulated blood chemistry. When the questionnaire produces a positive indication of hyperventilation, it also identifies coexisting symptoms, such as muscular pain, anxiety, breathing discomfort, and gastrointestinal and nervous system changes.¹⁰⁶

Primum non nocere: Considerations when working with tests to determine respiratory status

- Many HVS tests require bulky or sophisticated equipment. Some are difficult to perform (e.g., airway resistance), and some are invasive (e.g., blood gases).

- It may be appropriate to employ tests to exclude respiratory and cardiac disease, including peak expiratory flow rate (PEFR), chest x-ray, and ECG.
- If chest pain is a presenting symptom, an exercise ECG may be used to rule out cardiac pathology.
- Peak expiratory flow rate (PEFR) measurement provides a simple, quick exclusion of significant respiratory restriction.
- The hyperventilation provocation test (HVPT) involves the patient being asked to voluntarily over-breathe to create symptoms. This approach should be monitored using ECG.
- The arterial blood gas test is invasive and painful (requiring arterial puncture), but is appropriate when a diagnosis of acute hyperventilation is required.
- End-tidal CO₂ (PET CO₂) is measured with a capnometer if chronic HVS is suspected. This test relies on continuous sampling through nasal prongs with the mouth occluded. Most people with chronic hyperventilation have a PET CO₂ at or below 30 mmHg, and delayed recovery after over-breathing.
- The “think test” may be initiated 3-4 minutes into the recovery period, with the patient being asked to recall a painful emotional experience in which symptoms developed. If the PET CO₂ decreases 10mmHg, the test supports hyperventilation.¹⁰⁷

Beales¹⁴ summarized the problems of managing patients with multiple vague symptoms, where there is no obvious organic cause:

Katon and Walker (Katon & Walker, 1998) estimate that 14 common physical symptoms are responsible for almost half of all primary care visits. Yet over a one-year period, only about 10%–15% of these symptoms are found to be caused by an organic illness. Abdominal pain, chest pain, headache, and back pain are commonly found to be medically

unexplained. Primary care physicians find patients with medically unexplained symptoms frustrating, and these patients tend to be frequent attenders, who account for a disproportionate amount of healthcare resources. Consequently, they are also common among frequent attenders in secondary care where they present in most specialties. Reid et al. (2001) examined the records of the 361 patients who attended outpatients most frequently (i.e., the top 5%). In 208 of the 971 consultation episodes, after full investigation, their symptoms were medically unexplained.

When working with new patients, watch for the following signs and symptoms of HVS:^{108,31}

- restlessness (type A, 'neurotic')
- 'air hunger,' sighing
- rapid swallowing rate
- poor breath holding time (30 seconds considered 'normal')
- rise of shoulders on inhalation
- obvious paradoxical breathing ('hi-lo' test)
- visible 'cord-like' sternomastoid muscles
- rapid breathing rate (this may not be obvious)
- symptoms including muscular stiffness & aching (particularly neck and shoulders), fatigue, brain-fog, IBS, "chronic everything" (i.e., chronic pain, anxiety, panic, phobias, cold extremities, paraesthesia, photophobia, hyperacusis, "can't take a deep breath")
- positive Nijmegen test, capnometry evidence
- chronic BPD/HVS symptoms

Tests for respiratory status

- Many HVS tests require bulky or sophisticated equipment.
- Some are difficult to perform (e.g., airway resistance), and some are invasive (e.g., blood gases).
- Tests to exclude respiratory and cardiac disease include peak expiratory flow rate (PEFR), chest x-ray, and ECG.
- If chest pain is presenting symptom, exercise ECG may be used.
- Peak expiratory flow rate (PEFR) measurement provides a simple, quick exclusion of significant respiratory restriction.
- Hyperventilation provocation test (HVPT) involves the patient being asked to voluntarily over-breathe to bring on symptoms. This should be monitored using ECG.
- Arterial blood gas test is invasive and painful, (arterial puncture) but is appropriate where a diagnosis of acute hyperventilation is required.
- End-tidal CO₂ (PET CO₂) is measured (capnometer) if chronic HVS is suspected. This uses continuous sampling through nasal prongs with the mouth occluded. Most chronic hyperventilators have a PET CO₂ at or below 30mmHg, and delayed recovery after over-breathing.
- The 'Think' test may be initiated 3 to 4 minutes into the recovery period— the patient being asked to recall a painful emotional experience where symptoms developed. If the PETCO₂ drops 10mmHg, the test supports hyperventilation.

Breathing retraining

Nixon and Andrews⁵ suggest that recovery from BPD depends upon, “Due attention to the restoration of proper sleep, the modulation of arousal, the recovery of natural breathing, a salutary balance of rest and effort, and the

subject's achievement of self-regulation and autonomy.” Clinical experience suggests breathing retraining requires a combination of elements for best results:

- understanding the processes — a cognitive, intellectual, awareness of the mechanisms and issues involved in breathing pattern disorders
- retraining exercises that include aspects that operate subcortically, allowing replacement of currently habituated patterns with more appropriate patterns
- biomechanical structural modifications that remove obstacles to desirable and necessary functional changes
- time for these elements to merge and become incorporated into moment-to-moment use patterns

Naturopathic strategies to improve core stability

- Breathing rehabilitation and education as a foundational approach in all conditions involving chronic pain and dysfunction.
- Postural rehabilitation, along with education about patterns of use, if indicated.
- Appropriate manual and movement approaches applied to identified musculoskeletal (soft tissue and/or osseous) dysfunctions, as well as to thoracic structures, as part of rehabilitation.

Chanting

The respiratory (and cardiovascular) effects of the rosary prayer (*Ave Maria*) and recitation of a yoga mantra were assessed by Bernardi, *et al.*¹⁰⁹ Results were similar for both methods, showing a slowing of respiration to

approximately 6cpm, and synchronization of all cardiovascular rhythms and Traube-Hering-Meyer oscillations, representing blood pressure, heart rate, cardiac contractility, pulmonary blood flow, cerebral blood flow, and movement of cerebrospinal fluid. More recent research into the neurophysiological mechanisms underpinning such effects suggests that the primary influence is neurological, with increased delta-wave oscillations being recorded during Buddhist chanting. Similar EEG results have been found in meditation and Qi Gong practices. While the authors state that the changes observed cannot be attributed to cardiac or respiratory activity, they confirm the positive respiratory and cardiovascular effects of the earlier study.¹¹⁰ These positive influences on autonomic activity, may offer great benefits toward normalizing sympathetic arousal and abnormal neural function resulting from BPD.

The importance of breathing and breathing retraining is becoming increasingly recognized within many fields of medicine. For example, breathing techniques are being used to decrease heart rate variability and to improve health-related quality of life in patients receiving hemodialysis, post-surgical rehabilitation from abdominal surgery,¹¹¹ included among clinical guidelines for managing dyspnoea and quality of life in cancer patients,¹¹² pediatric non-pharmaceutical asthma management,¹¹³ dysfunctional breathing as a correlate of postural orthostatic tachycardia (POTS),¹¹⁴ and in tackling

breathlessness in the context of long COVID.¹¹⁵ Addressing breathing disorders is just one of several areas in which biomedical practice is aligning with holistic principles through the rapidly growing emphasis — in the biomedical context — on whole-person health care. Given the place of this concept as one of the core principles of naturopathy (*tolle totum*), this is a welcome, all the more since it comes complete with a rich research base, aims based on bioethical principles that reflect the basic tenets of nature cure, and structured evidence-based guidelines.^{51,52,116} Breathing, along with circulation, is one of the core natural rhythms of the human organism, and the research presented here clearly demonstrates the intimate interconnection of such physiological processes with mental and psychological parameters. The mind-body connections drawn by early proponents of naturopathy, and especially the emphasis placed by early advocates of nature cure on correct breathing as a means of improving overall health has been corroborated by the extensive research cited in this chapter. This provides a solid basis on which to continue efforts at closer integration of naturopathic principles within general healthcare, since, as biomedical practice comes full circle, there is much room for fruitful exchange, and it is needed since a significant communication gap remains regarding biomedical awareness of naturopathic work, globally.^{52,117}

Specifically, as noted previously regarding breathing pattern disorders, it is the whole-person approach and

root-cause focus that allow a skilled practitioner to discern when such a systemic problem may be present, and to apply their specialized training to address it. Thus, a firm understanding of the patho- and psychophysiological factors involved along with diagnostic, therapeutic, and re-education options from a naturopathic perspective, make this a particularly valuable area for clinical practice.

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Topic 6

Medical Hydrology: Using hydrotherapy and balneotherapy for healing

Les Moore, ND, MSOM, LAc

The history of medical hydrology

Water has been used in healing therapies for centuries. The use of water for healing is an art and science unto itself, and internationally is known as **medical hydrology**.

Medical hydrology has an incredibly rich history.

References and historical records document that water was used for healing in Biblical times and by the ancient Greeks and Romans.^{1,2} Hippocrates, the first to systematize the knowledge of healing into the practice of medicine, applied water, diet, exercise, manipulation, and herbs for healing. In his treatise on the use of fluids, he established rules for treating acute and chronic diseases by water.³ These instructions were followed by hydropaths in the 19th century and, together with subsequent developments, place hydrotherapy among today's orthodox and scientific treatment methods.

Galen, Paracelsus, and Asclepiades also used water therapeutically. Galen was an able and judicious advocate of cold-water baths, and advised cold effusions upon the head while the body was immersed in warm water. Asclepiades, the philosophical founder of the Methodic

school, popularized balneology throughout the Roman empire using diet, massage, exercise, and baths. Prominent followers included Cornelius Celsus, and Caelius Aurelianus. Cornelius Celsus, known as the Latin Hippocrates, prescribed water frequently for acute and chronic disease.⁴ Caelius Aurelianus developed the abdominal compress of wet sponge for individuals with hypochondriasis.⁵ The modern history of medical hydrology begins with Sir John Floyer (1649-1734), an English physician who published several works about hydrotherapy. The practice continued to grow actively throughout the 19th and early 20th centuries.⁶

The terminology of medical hydrology

Hydrotherapy: application of water in any form, either externally or internally, to treat disease and to maintain health.

Hydrotherapy: the 'water cure' which arose from the empirical tradition and involved treatment of all diseases by use of water, especially cold water.

Balneology (also called balneotherapy): the science of baths and their therapeutic uses.

Crenology (also called crenotherapy): the science and use of waters from mineral springs.

A brief glance at the early growth of medical hydrology

Many individuals, including those listed below, contributed to the practice of hydrotherapy and its evolution into what is now known as balneology or medical hydrology.

Year	Event
1697	<u>Sir John Floyer</u> an English physician, authored <i>An Enquiry into the Right Use and Abuses of the Hot, Cold, and Temperate Baths in England</i> . He later authored, <i>An Essay to Prove Cold Bathing both Safe and Useful</i> (1702) and co-authored <i>Psychrolousia, or the History of Cold Bathing: Both Ancient and Modern</i> with Edward Batnard in 1715.
1799	<u>Vincent Priessnitz</u> did more to popularize hydrotherapy than any other person (Boyle & Kirchfield) and designed various technical modifications of hydrotherapy. He used cold water therapy in his practice and provided technical modifications, some of which still are used in contemporary practice.
1821	<u>Sebastian Kneipp</u> advocated the Kneipp Cure, a form of hydrotherapy involving application of water through various methods, temperatures, and pressures.

- 1824** **Theodore Hahn** (1884-1883) advocated hydrotherapy in his practice
- 1845** **Mary Gove Nichols** founded a water cure establishment in New York City and became was a leading contributor to *The Water-Cure Journal*. She helped establish the American Hydropathic Institute in 1851.
- 1850** **William Horsell** and **Russell Trall** authored Hydropathy for the People: With plain observations of drugs, diet, water, air and exercise.
- 1867** **Johannes Werner Gunst** opened the Melbourne Hydropathic Institution in Australia.
- 1879** **Otis Carroll** introduced constitutional hydrotherapy.
- 1901** **John Harvey Kellogg** authored *Rational Hydrotherapy: A manual of the physiological and therapeutic effects of hydriatic procedures and the technique of their application in the treatment of disease.*
- 1908** **Simon Baruch** authored The Principles and Practices of Hydrotherapy.

Today, the science of balneology has expanded tremendously from the empirical tradition established by many practitioners, including, Wilhelm Winternitz, Russell

Trall, Theodore Hahn, Louis Kuhne, Solon Massey, F.C. Foster, James Caleb Jackson, Benedict and Louisa Lust, Frances Hare, Henry Lindlahr, Harold Dick, Leo Scott, and John Bastyr. Knowledge and research in medical hydrology is increasing and is reported by medical specialty societies, such as the International Society of Medical Hydrology and Climatology, and the American Society of Medical Hydrology and Spa Medicine.

The science of balneology and its role in stimulating self-healing

Throughout the past four centuries, the science of balneology has evolved into a medical specialty in Europe and Japan, where medical schools offer special courses in balneotherapy to physicians and nurses. Clinicians and researchers believe mineral springs facilitate healing in several ways.^{7,8,9,10,2} Balneotherapy is indicated for treatment of several **chronic conditions**, including:

- autonomic nervous system dysfunction
- chronic gynecological problems
- circulatory (especially moderate or mild hypertension)
- gastrointestinal
- addictions
- peripheral circulatory diseases
- rheumatic diseases
- stress-related conditions
- skin conditions
- smoking cessation
- chronic mild respiratory diseases
- metabolic (especially diabetes, obesity, and gout)

It also is used for rehabilitation: for example, to assist stroke recovery, spinal paralysis, functional recovery of central and

peripheral neuroparalysis, treatment paralysis after cerebral surgery or orthopedic surgery, chronic rheumatic diseases,¹³ sequelae of traffic accidents and sports-related injuries, and cancer recovery. Balneotherapy is helpful before and after surgical procedures, such as hip replacement and knee surgery, as well as to prevent diseases, occupational conditions, and to increase physical strength and general immunity.^{14,8,15,16,17,9}

Balneology can be used alone as a therapeutic agent, but often is combined with other therapies, such as massage therapy, acupuncture, pelotherapy/fango therapy, physical therapy, physical culture, and aesthetic therapies.

Physiologic effects of mineral spring bathing

The therapeutic effects of balneology derive from two features of the water: i) water temperature and ii) its mineral composition.¹⁰ Trace amounts of minerals from mineral baths (such as carbon dioxide, sulfur, calcium, magnesium, and lithium) are absorbed by the body and affect various organs and systems. Healing effects can include immune system stimulation, leading to enhanced immunity; production of endorphins; and normalized endocrine gland function.

Direct application of mineralized waters (especially those containing sulfur) can have a therapeutic effect on skin diseases, including psoriasis, dermatitis, and fungal

infections. Some mineral waters also are used to promote healing of wounds and other skin injuries.^{11,12}

Therapeutic effects of sulfur

Hydrogen sulfide gas is strongly antibacterial and stimulates the mucous membranes, promoting expectoration. Breathing the vapors of sulfur springs can help relieve problems with nasal and respiratory passages, including chronic bronchial catarrh.

Historically, sulfur springs have been used to relieve a variety of health problems, including liver, digestive, and urinary problems; chronic metallic poisoning; scrofula; venereal diseases such as syphilis; gynecological problems; skin diseases; diseases of the respiratory tract; and rheumatism. The therapeutic value of sulfates depends on their presence in one or more of the following chemical compounds:¹²

- calcium sulfate — soothing to the body, overall; stimulates secretion of bile and aids digestion; used clinically to treat kidney and metabolic disorders
- sodium sulfate — stimulates bile secretion and aids digestion; improves problems associated with the liver and the bile ducts
- magnesium sulfate — stimulates bile secretion and aids digestion; soothes and tightens skin while allowing the skin to retain moisture

Although each mineral spring has a unique mineral composition, the interaction and synergy among each mineral continues to be investigated. Research shows mineral spring compositions affect the immune system and the neuropeptidergic system. Sulfur is immunomodulatory¹¹ and sodium chloride is anti-inflammatory.^{19,8,9}

Clifton Sulfur Springs, located in Clifton Springs, New York, was founded by Henry Foster, MD, in 1849. It utilized local sulphur springs water and, by 1854, became known as the Clifton Springs Water Cure. By 1871, it became the Clifton Springs Sanitarium Company. Numerous therapies were offered in addition to salt baths, including homeopathy, hydrotherapy, physical medicine, and spiritual and mental health care. In the 1990s, it became the Clifton Springs Hospital & Clinic, and has re-instituted many of its original therapies.¹⁸ Key components of its water include:

- calcium carbonate
- magnesium carbonate
- sodium sulfate
- calcium sulfate
- magnesium sulfate
- sodium chloride
- calcium chloride
- magnesium chloride
- hydrogen sulfide gas
- carbonic acid gas

Therapeutic effects of chloride

Chloride helps regulate fluids both within and external to the body cells, facilitates digestion of food and absorption of nutrients, and facilitates nerve impulse transmission to and from the brain.¹⁹ Saline waters are indicated for treating arthritis and other rheumatic disorders; central nervous system and peripheral nerve diseases; post-traumatic, orthopedic, and postoperative disorders; and gynecologic diseases. Chloride springs are indicated for treating pediatric conditions (such as hypotrophy, respiratory infections, and enuresis), as well as for other conditions, (such as central and peripheral nervous system diseases, skin problems, gynecologic disorders, post-surgical therapy for joints, post-accident trauma) and often are combined with physical therapy.^{9,15,1}

Research in balneotherapy

Empirical and scientific evidence demonstrates the effectiveness of hydrotherapy and balneotherapy for a variety of conditions,²⁰ and has confirmed positive effects of these therapies on physiological and biochemical functions, in addition to thermal, mechanical, and chemical effects that assist the healing process.²¹ General physiologic effects of medicinal mineral waters include, elevation of thermal pain thresholds with sulfur springs and enhanced absorption of beneficial electrolytes with magnesium springs.²² Clinical effects of medicinal mineral waters include analgesic effects with sulfur springs, muscle

relaxation with sodium chloride, and decreased risk for renal stone formation with bicarbonate and magnesium.^{7,9,12,6,1}

The future of balneotherapy and hydrotherapy

The healing tradition of balneotherapy is being maintained globally throughout Europe, Japan, Israel, Australia, and other countries. The challenge is to continue to research its mode of action²³ and to accumulate data regarding its therapeutic efficacy and effectiveness,^{24,25} to incorporate balneotherapy more comprehensively into the future of health care.

Selected resources in medical hydrology

- [American Institute of Hydrology](#)
- [American Medical Spa Association](#)
- [Balneology Association of North America](#)
- [International Society of Medical Hydrology and Climatology](#)
- [Spanish Society of Medical Hydrology](#)
- [World Federation of Hydrotherapy and Climatotherapy](#)

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TOPIC 7

Therapeutic Uses for Earth's Elements: Pelotherapy, speleotherapy, and halotherapy

Sussanna C. Czeranko, ND

The Earth has provided its inhabitants with healing materials from time immemorial. Throughout the evolution of nature cure and naturopathic medical practice, restorative earth elements, such as peloids, have provided an invaluable therapeutic component. The term, 'peloid,' was first coined in 1934 by S. Judd Lewis, MD, and adopted by the International Society of Medical Hydrology and Climatology as a generic term referring to all forms of external applications of mud and related materials derived from the earth.¹ The generic term was developed to standardize the many different names used around the world for this therapy (e.g., fango, peat, boue, gyttja, liman, moor, and schlamm).² Peloid therapy shares a parallel history with naturopathy and has always been a respected $\frac{3}{4}$ albeit recently underutilized $\frac{3}{4}$ therapy in the naturopathic toolchest.³

Use of pelotherapy in nature cure

Since the 1800s, therapies employing peat, or mud (*moor* in German) and clay have been central to balneotherapy and to naturopathy. Paracelsus (1493-1541) also experienced the effects of moor and referred to the 'moor drinking cure,' which was chiefly prescribed for gastrointestinal complaints, as well as for liver and gall

bladder problems. He also differentiated the various peloids, ascertaining that some helped increase appetite, while others reduced fevers.⁴

Peat was used by the early naturopathic doctors in North America who were greatly influenced by the European balneotherapists and nature cure practitioners. Of the many tools championed by nature cure advocate, Adolf Just, were the 'earth bandage' and 'earth compress' used to treat inflammation of wounds. Earth, moistened with water, was applied directly to wounds and secured with linen cloths to hold the bandage in place. Earth bandages also were applied around the abdomen of women to assist with labor (an approach equivalent to Sitz baths).⁵ The earth compress was similar to the Priessnitz water compress, except that earth was used, instead of water.

Peloid formation

Understanding peloid formation helps elucidate their therapeutic properties. Peloids are formed by decaying vegetable matter, microbial agents, water, and surrounding rock, throughout thousands of annual cycles of vegetation growth and decay (humification). Mud and peat are differentiated by their organic and mineral constituents. Muds have a high mineral content, and peat and moors are rich in organic compounds.

The curing of all wounds and all skin troubles is accomplished through moist earth in the shortest possible time without any pain and any distress whatever. For every injury of the skin, wounds of cutting, stabbing, burning, shooting, etc., for every boil or ulcer, every inflammation, stings and bites of animals, blood-poisoning, for all skin diseases, cancer, lupus, tetter,ⁱ dandruff, eruptions, leprosy, for broken bones, etc., the affected locality ought to be bandaged with moist earth or moist clay.

Adolf Just, 1903, p. 107

While in search of the philosopher's stone (a medicine valued by alchemists), Paracelsus realized how the transforming powers of the hundreds of bog plants culminated in the medicinal properties of the peloid found in peat bogs. Peat and moor bogs contain elements (and possibly organic materials present in decaying vegetation) that provide the chief therapeutic qualities of the peloids. The therapeutic properties are dependent upon algae and certain microflora found in the peat bogs;⁶ however, not all moor or peat bogs produce equally potent healing peloids. The spectrum of naturally occurring peloids ranges from negligible (as in peat moss used in horticulture) to the remarkable healing properties found in the Neydharting Moor (Austria). Neydharting peloids are known to include more than 300 different bog plants. Many of these plants have been used for centuries as medicinal

ⁱ An old English term referring to vesicular skin diseases, such as ring worm, herpes, and eczema. ([Merriam-Webster Medical Dictionary, 2024](#))

herbs⁴ and are composed of various organic substances such as, waste products of celluloses and lignins, pollen, and other compounds. The humic acids formed by the degradation of dead plant matter such as lignins, have an action similar to that of estrogen.⁷

The most important organic constituents in peat are lipids (sometimes called bitumen), in the form of resins and waxes; humic substances, such as humines, fulvic acid, and humic acids; and carbohydrates, such as pectins, hemicelluloses, and cellulose. The lipid composition is very complex, since it depends upon peats, plant constituents, and the degree and conditions of humification.⁷ Once humification of the vegetation occurs, anaerobic conditions both produce and preserve the peat and the moor.

Therapeutic peloids contain varying ratios of organic and inorganic components. Inorganic minerals leach from surrounding earth into the peloid beds. Organic components are derived from the humus. Well-humified peat may contain more than 30% of humic acids, but only a small percentage of fulvic acids (i.e., humic acids with a lower molecular weight and higher O² content).⁷ The most therapeutically active organic components of peloids are humus and biologically active components, humic acid and its esters, folic acids, and humines.

These active components:

- penetrate the skin by diffusion or pinocytosis (especially humic acids)
- absorb rheumatic factors (binding of harmful substances by humines)
- normalize hormonal activity (binding by humines)
- improve blood circulation
- stimulate metabolism⁷
- prevent viral and bacterial activity (humic acids)

The structure of peat consists of micropores within a cellulose structure that allows water to be held within cavities where either hot or cold temperatures are maintained for prolonged periods. Peloids are poor heat conductors and their convection is virtually negligible.⁹ Therefore, waters containing peat cool much more slowly than regular tap water. Because peat provides high heat retention, heat treatments using peloids are better tolerated than the same treatment using tap water. If a peat bath is 38°C, for example, it will feel like a tap water bath at 35°C. The temperature of peloid baths, however, varies among countries and physicians. The general rule is for the baths to range from 37°C-42°C, with baths at the lower range for cardiovascular and rheumatic diseases, and at higher temperatures for influenza, cancer, and for gynecological and orthopedic treatments.⁷

The most widely used system for determining the degree of decomposition is the vonPost scale. The degree of decomposition (the H-value) is indicated on a scale of 1-10,

where H-1 means totally un-decomposed plant material and H-10 represents completely decomposed peat. In practice, the degree of decomposition is determined by squeezing freshly harvested peat with your hand and examining the compressed peat and water. This method is useful for assessing moss peat, but is less suitable for sedge and woody peat. Peloids between H-6 — H-10 H are rich in phytochemicals, acids, minerals, and many organic compounds. The proportion of humic acid increases with increasing humification and a larger H factor on the von Post scale.¹⁰

Peloids with high organic content must be stored in a moist state. Peat and moor peloids are bioactive only if in a moist state, because the organic substances become inert and irretrievably lost when dried. Subsequent addition of water cannot restore the therapeutic properties of peloid.¹¹ Mineral peloids, however, can be dried and still be therapeutically active. Other peloids must be conditioned and matured for long periods of time before they can be used. Muds are mixed with mineral waters and algae to increase their use as a medicinal peloid. The optimum pH for peat is 3.5-5.5.

Therapeutic uses for peloids

Since the 1800s, pelotherapy has been used throughout Europe to treat:^{12,13,8}

- rheumatic diseases, including gout

- cardiovascular diseases: peripheral vascular diseases, Raynaud's disease, phlebitis, and arteriosclerosis
- gynecological disorders: dysmenorrhea, leucorrhea, infertility, endometriosis, and menopause
- dermatological conditions: eczema, acne, hematoma, atopic dermatitis, psoriasis, ulcers, and fungal infections (mud helps restore pH balance, soften the skin, remove metabolic waste products, and prevent inflammation; left in their natural state, peloids also have exhibited anti-fungal properties.
- sports medicine: acute and chronic strains, sprains, myalgia, sciatica, and post-workout soreness
- pulmonary conditions: tuberculosis, pneumonia, and bronchitis^{14,15}
- digestive conditions: peloids have been shown to be powerful antibacterial agents and to favorably influence gut flora⁴
- other conditions, including fever, infections, fatigue, diabetes, epilepsy, cancer, toxicity, environmental sensitivities, allergies

Research into the therapeutic properties of peat for many diseases has increased throughout the 20th century. Much of the current research about peloids has occurred in Russia and Eastern Europe. The elegance of the historically powerful use of peloids in manifesting the Earth's healing bounty is increasingly evidenced by contemporary research and clinical application. Western medical cultures have not uniformly engaged in expanding this research.

Within naturopathic medicine, pelotherapy exemplifies the profession's respect and stewardship for traditional therapies, and for natural materials that stimulate and support the body's own healing potential.

Within naturopathic medicine, pelotherapy exemplifies the profession's respect and stewardship for traditional therapies, and for natural materials that stimulate and support the body's own healing potential.

Speleotherapy and Halotherapy

Speleotherapy (salt cave treatment) uses natural salt caves primarily to treat respiratory diseases and atopic conditions. Natural salt caves provide a closed environment with a unique microclimate; consequently, speleotherapy originated in areas of the world with naturally occurring salt deposits (*speleas*, in Greek, meaning cave). Speleotherapy has been used since the time of Hippocrates and Plinius, and has been practiced since the early 19th century in old converted salt mines in Eastern Europe, the Baltic States, and Russia. Slovakia has many well-known examples of such cave facilities.

Speleotherapy is commonly practiced in many areas of the world, often within specialized speleotherapy hospitals. In Karst, Slovakia, several of the 3,850 regional caves are accessible to the public. The Bystrianska Cave, near the village of Bystra, is widely known among those interested in speleotherapy and halotherapy. A hospital complex built in the salt caves located at Topalka Lake in Hungary.ⁱⁱ The

ⁱⁱ Svetozar Dluholucky and Viera Rajeanova, World Pediatric Congress, 1997.

Ukrainian Allergologic Hospital is a speleotherapy clinic that treats more than 2000 adults and 1000 children, annually. The clinic has operated for more than 30 years, treating all forms of bronchial asthma, other chronic nonspecific lung diseases. Salt therapy is thriving in countries such as Poland (Wieliczka), Germany (Teufelshöhle), Romania (Praid, Tg.Ocna, Seiged, Sovata, Slanic, Ocna, Carpathians), Austria (Hallen, Solzbad-Salzeman), Hungary (Tapolca), Slovenia, Armenia, Belarus, Bulgaria, Russia (Berezniki, Perm region), Azerbaijan (Nakhichevan), Kirgizia (Chon-Tous), and the Ukraine (Solotvino, Artiomovsk, Donietsk). While not well known in the United States and Canada, this therapy is provided by the public healthcare system in many other countries (e.g., Hungary, Romania, Slovenia, Russia). Romanian venues include the seven salt lakes of Sovata. The 52 salt lakes of Ocna Sibiului (in the southwest Transylvanian province), have been the site of longitudinal studies of treatments for infertility, metabolic diseases, and skin diseases.

Halotherapy uses a controlled air environment (dry aerosol microparticles of salt and minerals) to simulate the natural salt cave microclimate (*halos*, in Greek, means 'salt') in a constructed salt cave (halochamber). Halochambers have been used in Europe since the mid-19th century¹⁶ and gained wider use North America throughout the later 20th century. Dry sodium chloride aerosol is the major curative component in both treatments, along with other important environmental factors, such as maintenance of comfortable temperature and humidity, and a hypo-bacterial and allergen-free atmosphere saturated with aero-ions to enhance the therapeutic effect.

Interest in halotherapy began when Feliks Boczkowski, a mid-18th-century Polish health official, observed the absence of lung disease among salt mine workers in his jurisdiction.¹⁷ In 1843, he documented his findings in a book about the salutary effects of salt dust (*O Wieliczce Pod Wzgleciem Historyi Naturalnej: Dziejow I Kapielia; About the Breathing of Salt Dust*). His colleague and eventual successor, M. Poljakowski, eventually established a salt spa in Velicko near Krakow, which is still operating, today. During WWII, salt mines in Eastern Europe were used as bomb shelters. Health officials at that time noted that individuals who spent protracted periods in these shelters experienced marked improvement in respiratory conditions, such as asthma.¹⁸ After WWII, 'salt sanatoria' emerged throughout Europe. In such venues, salt aerosol was instrumental in treating chronic respiratory diseases (notwithstanding any ongoing parallel conventional medical treatments) and side effects were not observed.

As part of a broader, sustained effort to move away from expensive drug therapies and accompanying side effects, Russian physicians in the former USSR became world leaders in developing and testing new and increasingly effective physical therapies, such as halotherapy. This impetus was enhanced by early observations of increasing microbial and tumor resistance to pharmacological treatment. In recent years, many clinical trials have been conducted using halotherapy as a treatment for asthma, COPD, and chronic bronchitis and sinusitis. Results have

indicated that HT is not only an effective primary treatment, but is also valuable as a concomitant adjuvant therapy aimed at the contemporary field of upper and lower respiratory tract diseases.^{19,20}

Benefits of halotherapy

- reduced snoring and improved sleep
- increased resistance to colds & flu by clearing nasal passages and improving sinus drainage
- reduced bronchospasm by humidifying bronchial secretions, thereby facilitating elimination of residual tar from smoke, phlegm, allergens
- improved quality of indoor air via bactericidal properties
- eliminates dust, cigarette smoke, odors, mould, and mites
- normalizes skin autoflora in most patients
- enhances humoral and cellular immunity in patients with chronic lung diseases
- diminished IgE activity in patients with asthma

The halochamber is a controlled environment in which an air salinizer creates forced ionization of the chamber's microenvironment by salt sublimation. The technology, approved in Canada as a Class 1 Medical Device, uses a natural process of salt crystallization to generate salt micro crystals less than 5µm in diameter. These minute, natural salt crystals (which cannot be seen with the naked eye) can penetrate deeply into the lungs.

Clinical studies of halochambers show that the inhaled saline has bactericidal, mucokinetic, hydrophilic, and anti-inflammatory properties that reduce lung inflammation and thereby reduce edema in the mucosal lining of the respiratory system. Obstruction of the airways is reduced as mucous, residual tar, and other foreign allergens also are evacuated. Reduced snoring is a widely observed effect of this therapy; edema of the nasal mucosa, the oropharynx and soft palate are decreased; nasal and sinus passages become relaxed; and drainage is enhanced. This same effect occurs in the eustachian tubes, reducing ear infections caused by edema. This leads to enhanced drainage and aeration behind the tympanic membrane. Pregnant women with asthma or other respiratory diseases have used this therapy with considerable success in Eastern European halochambers without harm to the fetus. Halotherapy has been shown to be useful for improving residential and other living and working environments, and to be beneficial effects for treating several conditions, including:^{28,29}

- asthma and chronic bronchitis
- COPD (chronic obstructive pulmonary disease)
- allergic rhinopathy (hay fever)
- cystic fibrosis
- sinusitis
- ear infections
- smoker's cough
- various acute or chronic respiratory diseases

Mechanisms of action in halotherapy

According to Russian medical researcher, Alina V. Chervinskaya, PhD, the main effective factor is a curative breathing environment saturated with dry sodium chloride aerosol at a mass concentration varying from 0.5-11 mg/m³ and particle size of 1-5 µm. Chervinskaya and colleagues have confirmed in several studies that particle size is optimal for penetration in all areas of the respiratory tract. Dry sodium chloride aerosol has a considerable level of negative particle charge (6-10 nK/m³). The inner surfaces of airways have a slight positive charge. Negatively-charged particles of dry sodium chloride aerosol move in the lumen of respiratory tract and settle more intensively, in comparison with neutral particles. The negative charge also increases aerosol stability. Thus, dry aerosol curative action is much more effective when compared with a moist atmosphere.

Use of a dry aerosol enables optimal temperature and humidity to be maintained in the halochamber. This, in turn, helps avoid common reactions in patients when moist aerosols are used; namely, respiratory tract mucus, edema, and bronchial spasm. The dose of sodium chloride received by the patient during a one-hour halotherapy session is less than the dose received while inhaling moist sodium chloride aerosols.

Halochambers and halotherapy devices

Respiratory diseases are increasing in frequency, and the naturopathic community shares the challenge of developing effective responses. Respiratory diseases contribute significantly to morbidity and mortality in every hemisphere. Addressing the diluted, palliative and related side effects of current drug treatments, speleotherapy/halotherapy is a physical therapy that is drugless, non-invasive, and natural. Halotherapy addresses concerns about potential side effects of current drug treatment and is increasingly seen as an important alternative to treatments using corticoids or steroids, which may be especially injurious to children. Halotherapy can be a powerful tool in this critical work and accessibility has been greatly enhanced in recent years by technology that enables practitioners to reproduce the salt cave environment, safely and economically.²⁷

Halotherapy: Mechanisms of Action^{29,28}

- mucolytic
- antibacterial
- anti-inflammatory
- immunomodulating
- desensitizing

Sodium chloride aerosol has a bactericidal and bacteriostatic effect on respiratory tract microflora, and stimulates alveolar macrophage reactivity, which facilitates increased phagocytic activity. Cytobacteriological research of bronchial and nasopharyngeal content of patients with

asthma, chronic obstructive bronchitis, and cystic fibrosis shows that halotherapy promotes an increase in alveolar macrophages, thereby assisting reduction of pathogenic microorganisms.^{29,28,20} Its inhibitory effect on growth and vital capability of microorganisms is accompanied by their loss of adaptation to changed conditions. Owing to the loss of fluid, this adaptation results in the enhancement of their hydrophobic properties facilitating attachment to epithelial cells. However, the activation of microbial adhesion does not occur, due to the increased electrophysiological functional activity of the epithelial cells. Moreover, epithelial cells have enhanced resistance to colonization under the effect of dry sodium chloride aerosol. This indicates its favorable action on the protective properties of respiratory tract cells and activation of non-specific resistance.

Today, halotherapy is an acknowledged modality for naturopaths. As of 2023, there were approximately 2,000 halochambers in use throughout North America.³⁰

Halochamber construction

The salt-covered walls of the halochamber simulate a salt cave environment. A nebulizer produces a dry sodium chloride aerosol (DSCA) containing the dominating amount of 2-5 mkm particles that are emitted into the chamber in a concentration controlled by a computer algorithm (Table 1).

Table 1 Composition requirements for salt used in halotherapy chambers.

Chemical composition of salt	% (mass)	Chemical composition of salt
Na, not less than	97.70	Fe ₂ O ₃ , not more than
Ca-ion, not more than	0.50	Na ₂ SO ₄
Mg-ion, not more than	0.10	Water insoluble sediment, not more than
SO ₄ – ion, not more than	1.20	Moisture in rock-salt, not more than
K-ion, not more than	0.10	pH of NaCl solution

Temperature and humidity in the halochamber are controlled via a computer and monitored to maintain temperature at 18-22°C and humidity at 45-55%. The walls, ceiling, and sometimes the door are covered with a special salt coating, that acts as a buffer to atmospheric humidity and maintains an aseptic environment.

Halochamber treatment often is provided in one-hour daily sessions, throughout a treatment course of 12-25 days. The duration of each course and parameters of aerosol medium depend on nosology, clinical features, and phase of the patient's disease, and are prescribed by the physician.

The hypoallergenic and hypobacterial environment is constantly maintained in the halochamber treatment room. There are no pathogenic organisms (*staphylococci*, *streptococci*) in this environment. During a halotherapy

session, there may be 90–200 saprophytes in 1m³ of air. According to the World Health Organization, air is considered sterile if the concentration is up to 300 saprophytes/1m³. At the end of the session, the concentration of microbes in the air returns to its initial level within 10–20 minutes.

Through an accelerating agenda of international research (including numerous articles specifically about saline inhalation therapy), and through an increasing frequency of conferences and symposia, the benefits of speleotherapy and halotherapy are becoming more widely known outside Europe and Russia. It is important to note that the work of Dr. Rabago and Dr. Chervinskya is representative of a rapidly expanding interest among medical researchers in this field. Research continues actively, often concerning specific diseases.^{21, 22, 23, 24, 25, 26, 20} For naturopaths new to this modality, particular attention can be focused on the methodological, and clinical strength and breadth of such studies as a foundation from which to investigate the therapeutic potential of halotherapy.

Overall, halotherapy is a natural, risk-free therapeutic modality that can be utilized readily in controlled clinic applications that are convenient for patients. While practitioners caution that halotherapy is not a substitute for medical treatment and should be used only as adjunct therapy to improve quality of life (especially by reducing intake of antibiotics, corticoids, and steroids), there also are

more generalized benefits. Annual hospitalizations and frequency of respiratory disease attacks, for example, have declined among patients using halotherapy.²⁸

More than Modalities – the Timeless Relevance of the Nature Cure Philosophy in the 21st century

The central nature cure tenets (deuration, detoxification, and drainage) to restore the body's homeodynamic balance directly address the numerous chronic conditions attributed to 3 of every 5 deaths, globally.¹ Yet, the relevance of this central philosophy extends also to non-communicable conditions. In 2019, the first pandemic to ravage the global community since the onset of HIV/AIDS (1981) occurred when the coronavirus (Covid) led to approximately 35 million deaths worldwide.² As the epidemic waned in 2023 (with a fluctuating incidence since then), it has become clear that the condition has left many surviving patients with long-term fatigue, dyspnea,³ dry cough due to pulmonary fibrosis,⁴ and many other difficulties, such as postural orthostatic tachycardia syndrome (POTS).⁵ In addition to its impact on the immune system, the virus is known also to affect the circulatory, musculature, urinary, reproductive, gastrointestinal,⁴ nasopharyngeal,⁶ and nervous systems. Intensive research is discovering that the variety of long-term symptoms are due to the 'cytokine storm' response from both the innate and the adaptive immune systems.⁴ Consequently, many recent treatments have developed around pharmaceutical approaches to alter the immune system sequelae.⁴

In search of therapies to address this seemingly intractable illness, few researchers have addressed the condition from a multi-system perspective.⁴ To meet the overwhelming demand for rehabilitation services,³ many in the medical community are reconsidering 'non-mainstream' therapeutic approaches to assuage long-term symptoms, to provide multidisciplinary and individualized treatment strategies, and to manage the medico-economic impact of treatment.³ This has led to research and to investigative programs concluding that

botanicals,^{7,8,9} halotherapy,^{10,11,12} hydrotherapy,^{13,3} and breathing retraining¹⁴ may effectively address long-term symptoms. Studies of sulfurous thermal waters, referred to as 'spa' (salus per aquam therapy or crenotherapy) have demonstrated the effectiveness of natural mineral waters in reducing inflammatory markers and associated post-covid symptoms.^{15,3,6} These results are attributed to the antiviral, antioxidant, and anti-inflammatory properties of the sulfur, magnesium, calcium, and potassium content^{3,6} used in mud treatments, showers, baths, inhalations, or combined with heat or hydrostatic pressure. Research has demonstrated the effectiveness of these therapies not only for treating long-covid symptoms, but also in providing prophylactic effects against SARS-cov-2 (severe acute respiratory syndrome coronavirus 2).¹²

Additional results are reported by the [European Respiratory Journal](#) (2021), the [Lancet](#) (2022), and the [Journal of Clinical and Experimental Investigations](#) (2020). Programs by the [Global Wellness Institute](#) (2021) and the [World Halotherapy Association](#) (2020) are bringing increased research and practice of these modalities to the public.

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TOPIC 8

Water Therapies and Peat: Evolution as a therapeutic modality

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The Earth is a myriad of diverse landscapes, climates, and natural resources. Every place on our planet differs from another place in its water, weather, and landscape. These complex geographic and geological conditions that together constitute 'climate,' have long been recognized as having an important influence on certain diseases and their symptoms.¹ Within this environmental framework, the long history of balneotherapy has evolved. Balneotherapy emerged in different regions of the world when healers employed geological characteristics [water, geological formations] specific to their geographic area for the therapeutic benefit of local populations. Climate, therefore, influenced both the prevalence and the treatment of diseases. At the turn of the 20th century, for example, tuberculosis was still a deadly disease and it was common for those with TB to travel to places with mountainous or sunny climates that were conducive to healing.² Balneotherapy often was utilized at that time to address several serious health issues, such as the widespread incidence of tuberculosis in North America.³

“From time immemorial the internal and external use of water has been considered one of the most valuable therapeutic aids.” Charles Ransom, 1906 ⁴, p. 117

The practice of balneotherapy, as distinct from hydrotherapy

Balneotherapy involves the interaction of people with their particular environment, climate, water, and land resources as they seek to address their health needs. Water comes to us through rain, is transported via lakes and waterways, and collects as precious ground water, manifesting as ponds, springs, and earth wells. The chemical composition of water used for healing often is much more than two molecules of hydrogen and one molecule of oxygen. Indeed, water obtained from springs has unique properties that cannot always be replicated by the addition of chemicals. Balneotherapists from early 20th-century England, for example, observed that superior results were obtained when natural mineral waters were used, rather than artificially-created mineral waters.⁵ pp 6-7

Water is the most economical medical agent available. Its effectiveness is undeniable and its therapeutic use ubiquitous.⁶ Understanding the therapeutic use of water is important to understanding the history and development of the naturopathic profession, and the histories of naturopathy and balneotherapy share common stories. For generations, balneotherapy (sometimes known as balneology) stood alongside many modalities and

therapies considered clinically relevant today, including nutrition, homeopathy, and botanical medicine. Although balneotherapy as a modality central to naturopathic medicine is less well known today, it was a key component of naturopathic medicine in the early 20th century. One hundred and fifty years ago, ‘water cure’ therapies prevailed and were favored by those seeking health care. Water cure resorts or ‘sanitaria’ (a term coined by John Harvey Kellogg, MD, and meaning, “a place where people learn to stay well”) offered patients therapies in diet, exercise, proper rest, correct posture, and fresh air. Dr. Kellogg’s first sanitarium in Battle Creek, Michigan, accommodated 700 patients in 1888 and, at its zenith in 1928, enlarged to a 15-storey building with 1500 beds (Fig. 1). Sanitaria gained their reputations via water cure therapies and naturopathic medicine. Sanitoriums, by contrast, were facilities built to house patients with TB in open-air venues.



Fig. 1 Main building of the Battle Creek Sanitarium, including the 1928 tower addition.
Source: color postcard, circa 1938, The Willard Library collection c Public Domain, Wikimedia Commons <http://commons.wikimedia.org/>

It is important to understand these beginnings and why balneotherapy later evolved in North America. Benedict Lust, seeking a cure for tuberculosis (TB), and Henry Lindlahr, wanting to rid himself of diabetes, brought

Sebastian Kneipp's water cure knowledge and clinical acumen back to North America to create the rich fabric and traditions of naturopathic medicine. In its earlier manifestations, Lust, Lindlahr, and Kellogg, among others, imported balneotherapy as a medical application of natural mineral waters, herbal baths, gases, and peloids.ⁱⁱⁱ However, throughout the next century, particular challenges arose regarding the contemporary understanding, definition, lexicon, and taxonomy of balneotherapy.⁷

Early naturopathic doctors used the most common modalities of balneotherapy, such as bathing, drinking, inhalation, irrigations, packs (local application of peloids and compresses), dry peloid therapy (e.g., with sand), gas baths, and local application of gases. Hence, at its outset, balneotherapy in North America embraced natural elements (water, earth, fire, air) as part of the healing process. An account of the therapeutic benefits gained from bathing at a facility such as Hot Springs, Virginia, published in the *Philadelphia Medical and Surgical Journal* (1804) by Rev. Dr. Ashbel Green, gives us a glimpse into this naturopathic milieu. Dr. Green commented, "These springs are chiefly useful in the cure of rheumatism and gout and other local affections of the nervous system. They are also highly useful in a number of cutaneous eruptions, and are frequently beneficial to persons of a bilious temperament.

ⁱⁱⁱ Peloid: mud prepared and used for therapeutic purposes. (Merriam Webster, 2023)

The cures they have effected in the gout and rheumatism are almost incredible.”⁸ p. 109

Both balneotherapists and naturopaths knew the importance of treating the cause of disease using these modalities in order to successfully treat the case.⁵ p. 4 They also complemented these elements with a regimen of diet, exercise, proper rest, correct posture, and fresh air, within the ambience of natural, pristine, tranquil landscapes. A typical treatment at the bathhouses in Hot Springs, Virginia, entailed:

... the tub bath, which may have a temperature not exceeding 104°F. In each bath room, [sic] a spout delivers water at 104° F, and at a pressure of from 14-18 pounds. The effect of this is strongly stimulating, and, in many cases, is employed directly before the full bath. Following this the customary procedure is a hot pack in a hot sheet and flannel blankets, followed by cool sponging or a cold douche and an alcohol rub. The entire process occupies from half to three quarters of an hour and is succeeded by rest in the recumbent position for half an hour or more. The best time to take these baths is before breakfast or during the forenoon, although many prefer the late afternoon, experience showing that perspiration is then freer. Massage may or may not be added to the treatment.⁸ p. 112

Early balneotherapists sought sources of mineral water from deep underground springs, lakes, the sea, or the ocean. Temperature of the water was an important factor in treatment protocols. Temperatures of hypothermal water ranged from 20-32°C; thermal water ranged from 32-40°C; and hyperthermal water temperatures exceeded 40°C.⁹ p. 10 Various gases, such as radon and carbon dioxide, were

incorporated with treatment protocols. Peloids including peat, mud and sand were also part of treatment regimens.

The number of mineral springs on record in the United States by 1901, almost a century after Dr. Green wrote his account of the Virginia hot spring, was 8,843.¹⁰ Yet, these facilities often were not designed with a comprehensive treatment protocol embracing the components of diet, exercise, rest, and fresh air. In fact, as the following description illustrates, ambience, climatology, and water cure therapies often were defeated by patterns of indulgent repast and inactivity:

It is truly affirmed that there are natural springs in the United States, excelled by none elsewhere, and yet treatment is often unsatisfactory at these resorts. Take Saratoga as an example; is it not healthful and agreeable so far as summer climate is concerned, and are not the waters of Saratoga remarkable in their variety and curative effects, if judiciously used? Unfortunately, in the latter consideration, we find a problem difficult to solve.

The average American who goes to Saratoga even for a "cure," will not, or cannot, secure a suitable dietary regime while drinking the waters, nor will he rise and retire early, and walk a prescribed time each morning between his tumblerfuls of spring water. Later, is he satisfied to have his breakfast consist merely of a roll and cup of coffee; or are beefsteak, omelette, fish, griddle cakes, and maple sugar considered somewhat indispensable to be followed with the enjoyment of a high-flavoured [sic] cigar, and his feet planted high up, as he sits on the piazza in a quiet, torpid condition? Later, perhaps, a cocktail precedes a too abundant lunch, followed at seven or eight o'clock in the evening by a dinner with sauces, sweets, and champagne. Later still, and again the patient seats himself on the piazza and listens to the orchestra. After a time he becomes tired of this

recreation, and seeks the stuffy, ill-ventilated billiard or ball room, and finally retires at twelve or one o'clock.¹¹ p. 236

Although more than 8,000 mineral springs existed in the US in 1901, many did not include a comprehensive protocol of diet, exercise, rest and fresh air.

In more therapeutically-focused venues, balneotherapy included medical application of natural mineral water, gases, and peloids, as well as equivalent agents and herbal baths containing relevant amounts of substances understood to be effective for preventing or treating diseases or for rehabilitation.¹² (Included in the repertoire of balneotherapy and naturopathic treatments in the sanatoria at the time were carbon dioxide, also known as Nauheim or effervescent baths. These earned a well-merited reputation in the treatment of the most serious types of disease (such as heart disease), both then and now.^{13, 14,15, 16}

North American balneotherapists attempting to treat such conditions looked to Nauheim, Germany, for valuable models. In Nauheim, a natural spring heavily charged with carbon dioxide and a large capacity to hold in solution a large amount of calcium chloride had become famous for treating heart disease.¹⁷ In North America, in due course, the carbon dioxide bath was soon cited in textbooks of therapeutics as a standard treatment for chronic heart disease.¹⁸ Kellogg, himself, achieved excellent results by

simulating the effervescence of the Nauheim waters in his own clinic.¹⁹ Today, carbon dioxide baths continue to be used in Europe for successful treatment of cardiovascular disease, diabetes, and peripheral neuropathies, while in North America they have been all but abandoned.

Balneotherapy modalities on both sides of the Atlantic eventually evolved to include bathing or water immersion, drinking cure, inhalation, irrigations, packs, sun baths, air and gas baths, and mud, peat, and sand baths. Several associated modalities also emerged with balneotherapy to generate a medley of natural therapies utilizing the best elements of sea, sky, and earth to treat medical conditions. The use of tap water for therapeutic purposes became specialized as 'hydrotherapy,' which employs the physical properties of water, including temperature, hydrostatic pressure, buoyancy, viscosity, and electrical conductivity.

Medical climatology

Medical climatology evolved as an application of the climatic factors that are natural or simulated to prevent or to treat disease. Thalassotherapy emerged as a unique therapy gained by bathing at the seaside and breathing its salt air properties. Speleotherapy appeared as a method using the specific and unique properties of the underground space inside salt caves to treat chronic and allergic respiratory diseases. Halotherapy evolved from speleotherapy as a treatment in a controlled air medium

that simulates the natural salt cave microclimate. The Earth's myriad landscapes, climates, and natural resources continue to provide extraordinary opportunities for healing, restoration, and vitality. The popular resurgence of 'forest bathing' to support both physical and mental health, is one such example.

Definitions

- **Medical climatology:** application of climatic factors to prevent or to treat disease.
- **Thalassotherapy:** bathing at the seaside in salt air for therapeutic purposes.
- **Speleotherapy:** using salt caves to treat chronic allergic and respiratory conditions.
- **Halotherapy:** using salt air in a controlled environment for therapeutic purposes.
- **Hydrotherapy:** the use of tap water for therapeutic purposes through its physical properties, temperature, hydrostatic pressure, buoyancy, viscosity, and electrical conductivity.

Worldwide clinical and therapeutic interest in balneotherapy is increasing. The precious, irreplaceable mantle of the Earth is now becoming valued for its rich healing resources and opportunities. The International Society of Medical Hydrology and Climatology (ISMH) designs, plans, and coordinates scientific research in the fields of health resort medicine and spa therapy for prevention, treatment, and rehabilitation programs. A

primary objective of the ISMH is to prepare international monographs and to develop guiding principles, directives, and standards in balneotherapy. Recent research is revealing the efficacy of balneotherapy for improving symptoms of many conditions, ranging from skin disorders and rheumatic diseases to cardiovascular problems.^{16,20} This research also is showing the effectiveness of balneotherapy at modulating many components of the immune system^{15,21} thus aligning with the second fundamental criterion of Nature Cure: “Stimulate self-healing processes using measures that are not suppressive or weakening” (see Zeff, 2024, “The Fundamental Principles of Nature Cure Methodology”).

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TOPIC 9

Constitutional Hydrotherapy

Letitia Dick-Kronenberg, ND

Constitutional hydrotherapy (CHT) is a therapeutic system of sequentially applying hot and cold wet towels to the chest and subsequently to the back, in conjunction with electrical muscle stimulation (EMS) via a surging sine wave current. This specific method decreases ROTS (reactive oxygen toxic species) in blood evaluation (indicating a decrease of inflammation);¹ drainage of bile, lymph, and digestive enzymes; influx of leukocytes (WBCs) into the circulation; and balancing of blood chemistries in order to detoxify, purify and rebuild the blood, and to enable the *vis medicatrix naturae* to heal the body. ^{2,3,4}

CHT detoxifies the body at a cellular level by stimulating hormone and enzyme metabolism, and immune responses. It is not a spa 'feel-good' treatment, but rather a clinically significant and scientifically proven therapy that utilizes the body's ability to heal and to repair by restoring homeostasis to the entire organism.

History of CHT Development

Constitutional hydrotherapy was developed by Otis G. Carroll, ND, (1879-1962) who combined the water-cure therapeutics practiced by Vincent Priessnitz (1799-1852) and Father Sebastian Kneipp (1821-1897), with modern electrical therapeutics to create a more specific, powerful,

and succinct constitutional treatment. It is referred to as ‘constitutional hydrotherapy’ to distinguish it from other hot/cold contrast applications and because Dr. Carroll noted, “it will change the very *constitution* of each cell” [editors’ emphasis].⁶

The objective of CHT is to enhance blood flow and to stimulate lymph flow through the abdominal organs and in the solar plexus (celiac plexus). Dr. Carroll theorized that this therapy increases cellular metabolism, oxygenation, digestion and nutrition assimilation, and elimination of toxins from the body.⁵ Once circulation of blood and lymph is stimulated by application of temperature contrasts, the purified fluids are directed to the injured organ or system via the sine wave current.

As a child, Carroll was cured of juvenile rheumatoid arthritis in approximately 1915 by the ‘water cure’ at the Chicago clinic of Henry Lindlahr, ND, and Alex Ledoux, a medical doctor in New Orleans, Louisiana.⁷, pp. 183-92 Later, as a licensed **sanipractor** in Spokane, Washington, Carroll learned the nature cure therapies of Kneipp from Lindlahr, Lust, and Ledoux, and brought these healing practices to the north-western United States. He streamlined the hours of hot and cold applications of the Kneipp water cure into a more succinct therapy by coupling hot and cold wet applications with sine wave electrical muscle stimulation (EMS) to specific spinal reflex areas in order to enhance the therapeutic effect. These adjustments also made the therapy accessible to patients who could spare only limited

time for daily therapy, rather than many days away at a sanatorium.

Today, CHT is used routinely as an outpatient therapy, but also may be used for inpatient care. It has been used within house calls to care facilities, hospitals, and patients' homes since its inception in the 1920s.

Hydrotherapy use in psychiatry In the early 20th century, hydrotherapy was one of the first somatic therapies widely acknowledged to be effective in the field of psychiatry, especially for treating psychosis. Cold water sheet 'packs' were used to treat agitated patients and warmer packs were used to treat frail patients. Each treatment usually lasted for several hours. Patients were wrapped in wet sheets with a blanket wrapped around the sheets. If patients resisted, another sheet was sometimes added over the blanket and tied to the bed to secure the patient. Patients experienced several phases of cooling and warming. Sometimes, a rubber sheet was wrapped around the wet sheets to enhance warming.

Continuous baths were used for similar purposes. Patients were placed in a hammock that was lowered into a tub. A canvas sheet covered the tub and the patient's head was placed through a hole in the canvas. Attendants regulated water temperature and flow. Treatments lasted from a few hours to days. In the 1940s-1950s, these methods eventually were replaced by electroconvulsive therapy (ECT) and by antipsychotic drugs.

Reference: Braslow, JT. History and evidence-based medicine: lessons from the history of somatic treatments from the 1900s to the 1950s, *Mental Health Services Res.*, 1:4, 1999, pp. 231-240.

Amy N. McBride, MS, MAP

Functional principles of CHT

The art of constitutional hydrotherapy is to adapt it to address specific concerns or a patient's disease manifestations. Understanding the following functional principles of CHT enables doctors to achieve this, effectively (Fig 1).

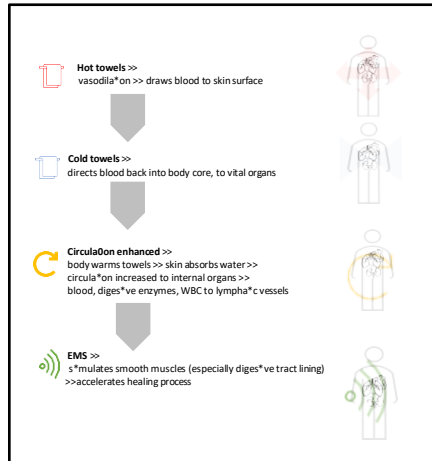


Figure 1 The functional principles of constitutional hydrotherapy.

The hot towel

application draws blood to the surface of the skin via vasodilatation, opens skin pores, and induces perspiration. However, if left on longer than five minutes, it will cause vasostasis.⁸

The cold towel application induces blood flow from the already dilated superficial skin vessels into the body core and to the vital organs.² As the cold towel is warmed by blood recirculation back to the skin, the pores absorb ¼ -½ cup of water into the tissues. The sole purpose of the cold application is to pull blood back from the body core, which will warm the cold towel. If the towel is made too cold with ice, the patient can't warm the towel and the therapeutic effect is lost.

The flux of hot/cold stimulates circulation through internal organs, causing increased blood oxygenation, increased digestive enzyme production, and movement of white blood cells into the lymphatic vessels, especially in the intestinal mucosa.⁹

Electrical stimulation with sine wave therapy accelerates the treatment. Carroll found that CHT utilizing a long series of hot/cold applications could require several hours to complete and might be more beneficial and efficient, clinically, if combined with electrical stimulation of the smooth muscle of the digestive tract. Electrical stimulation moves lymph through tissues, thus increasing leukocyte counts in targeted areas.^{10,11}

An unpublished barium study conducted by Harold Dick, ND, at Western States Chiropractic College, found that electrical stimulation causes gall bladder contraction, resulting in bile liquefaction and elimination, with consequent hepatic decongestion. Since one-third of the blood volume pumped with each heartbeat is filtered through the liver, decongesting the liver enhances blood purification and liver function. In addition to pumping the lymphatic channels, the electrical stimulation causes smooth muscle contraction in the gut, promoting increased blood flow and bowel tone. Since the body is composed mostly of water, it responds to this electrolyte movement. The sine wave stimulation to the injured area then pulls the oxygenated, nutrified blood to that area.⁴ Studies show

electrical stimulation creates a variety of effects at a cellular level.^{12,13,14}

Detoxification, Depuration, and Drainage: The electrical stimulation used in CHT precipitates contraction of the smooth muscles lining the gut. This increases blood flow and bowel tone, thereby sending oxygenated blood to targeted area(s).

The terminology of hydrotherapy:

Five physiologic effects of water temperature

Different water temperatures can either increase or decrease the rate of blood flow through an organ or area of the body, and can increase or decrease the total blood volume in an organ or system, according to whether the area is anemic or congested. Knowing these effects can guide hydrotherapy applications for individual patients.

Revulsive effect

- increases the rate of blood flow through an organ or area of the body
- achieved mainly via contrast hydrotherapy (alternating hot / cold compresses, baths, showers, or sprays)
- ideal primarily for treating situations presenting as congestion (e.g., alternating hot/cold compresses over the face to treat sinus congestion)

Derivative effect

- moves blood from one area of the body to another
- best obtained through **prolonged use of either cold or heat**, depending on whether one wants to draw blood into an area (hot application) or to drive blood out of an area (cold application)

- example: prolonged heat application to the feet (as with a hot footbath) will decrease congestion in the head by drawing blood to the feet

Spinal reflex effect

- the spinal reflex arc mediates changes to a remote area, due to intense hot or cold application in a local area
- reflex relationships throughout the body have been mapped¹⁵

Collateral circulation effect

- a type of derivative effect
- local circulatory effects occur on deep, rather than superficial, collateral branches of the same artery (rather than distal)
- both superficial and deep areas are supplied by the same artery

Arterial trunk reflex

- a type of general reflex effect
- prolonged cold applied over the trunk of an artery produces contraction of the artery and its branches distal to the application
- prolonged hot applications have the opposite effect, producing dilatation in the distal arterial bed

Adapted with permission from: Aimee Huyck and Kate Broderick, "Hydrotherapy," in *The Textbook of Natural Medicine*, 4e, eds. Joseph E. Pizzorno and Michael T. Murray (Churchill Livingstone, 2013)

General CHT Protocol

Constitutional hydrotherapy treatments are tailored to each patient and are based on careful examination of the patient's symptoms, and heart and bowel tone. The objective of the therapy is to enhance blood flow and to stimulate lymph flow through the abdominal organs and in

the solar plexus (celiac plexus). The protocol for standard constitutional hydrotherapy is shown in Box 1. There also are basic variations that are clinically effective. Treatments sometimes may be tailored to patients' individual needs, according to the patient's cardiovascular and digestive tone, and individual symptoms. Attending to the fundamental details of the procedure helps ensure the best therapeutic effect for the patient.

To achieve a beneficial therapeutic response for CHT:

- Use tap water at 40-45°F for the cold application. Do not use ice water, which will chill the patient and prevent the patient's body heat from warming the cold/wool application.
- Ensure the towels are heated to 130-140°F (do not microwave the towels – this dries them out and gives inconsistent heat).
- Ensure the towels extend from the patient's collar bone to hip bones (i.e., over lungs *and* solar plexus) in order to stimulate lymph flow in the solar plexus.

Box 1. General Protocol for Constitutional Hydrotherapyⁱ

Total procedure time: 1 hour

- Towels 60% or more cotton for ideal absorption
- Sine-wave electrical muscle stimulationⁱⁱ (EMS) unit, including two 4"x4" sponge pads
- Vellux[®] blanket (Vellux[®] is a synthetic soft fabric that repels water, retains body heat, and is easily washed.)
- Flannel patient gownⁱⁱⁱ

Basic Preparation Procedure^{iv}

- **Before beginning the procedure**, review the patient's symptoms and wellbeing. Assess the patient's heart and bowel tone.
- **Record the therapy sequence** on a 'hydro card' (Figure 2).
- **Ensure patient wears a flannel gown** with the opening to the front of the body (bras should be removed for the procedure).
- **Prepare warm towels:** place towels in water at 130-140°F.
- **Prepare cold towels:** place towels in cold tap water at 40-45°F.
- **Moisten** two 4"x 4" sine-wave sponge pads with hot water, then wring out.

Procedure

16. Place patient in a supine position on the therapy table, cover the patient with the Vellux[®] blanket, with the wool blanket over this. (The weight of the wool blanket helps the wet towels retain full contact with patient's skin).
17. Wring out two hot towels. Ensure the towels are thoroughly wet and hot. Wring the towels tightly to avoid dripping water on the patient or floor. The towels should make the patient only mildly damp — not soggy.

ⁱ These instructions are for general, clinical education. Do not attempt to perform this procedure without clinical training.

ⁱⁱ Patients may undertake home hydrotherapy without EMS.

ⁱⁱⁱ A flannel gown is warmer for the patient.

^{iv} These are basic steps to be undertaken by the doctors and/or technicians involved.

18. Fold the towels so that when laid upon the patient's chest and abdomen, there are 4 layers of towels (i.e., both towels are folded in half and stacked to make 4 layers).
19. Open the patient's gown enough to bare the chest/breasts while the towels are applied. Ensure the towels cover the body from the collar bone to the hips. Do not wrap the patient's gown over the towels.

Note: for patients who have breast drains, chest tubes, or IV shunts, tape a plastic cover (e.g., a plastic baggie) over the area with non-abrasive paper tape to keep the area clean and dry. This does not hinder therapy.

20. Drape the Vellux® blanket over the patient and cover with the wool blanket. Add a second wool blanket if the patient requests more warmth.
21. Leave on the hot towels for **5 minutes**.
22. After 3-4 minutes, begin preparing additional towels in this order:
23. Wring out one cold towel and fold to create 2 layers.
24. Wring out one hot towel and fold into 2 layers.
25. **At five minutes**, briefly re-warm the patient: apply the fresh hot towel to the stack of two hot towels already on the patient by gently flipping the fresh hot towel onto the patient's abdomen/chest and removing the two spent hot towels.
26. Place the one remaining fresh cold towel on top of the new hot towel, and gently flip over the stack, leaving the cold towel on the patient's abdomen/chest and removing the hot towel. Re-cover the patient with the Vellux® and wool blanket(s).
27. Begin EMS application:
28. Freshly re-warm the 2 sine-wave sponge pads. Squeeze water out of the sponge pads and connect them to the sine-wave EMS unit.
29. While the patient remains in a supine position with the therapy towels on the front, gently turn the patient to place the sine-wave

sponge pads on the patient's back at approximately T4-T6 spinal levels. Place blankets loosely on top of the patient so the patient can move freely.

Adjust the EMS unit:

30. Set the EMS unit on surge setting for **10 minutes**. Clinician adjusts the intensity of the stimulation as directed by the patient, to patient's tolerance.
31. Cover the patient once again with the Vellux® and wool blankets, and perhaps another blanket, if desired. The sine-wave intensity should be strong enough so the doctor can feel the patient's internal muscles contract when a hand is placed on the upper epigastric region. This should still be comfortable to the patient. A stronger current is contraindicated, as it may make the abdominal muscles sore or strained.
32. **After 10 minutes:** turn off the EMS machine. Remove the warmed towels (which now are cold).
33. Reposition the sine wave pad:
 - **one pad on the back** at approximately T-10 and centered midline on the spine.
 - **one pad on the front** of the body, just above the navel and below the rib cage, midline.
34. Ensure close contact between the front pads and the skin by placing a small beanbag on top of the blankets over the pad. This helps complete the electrical circuit and creates electrical stimulation.

Note: if the beanbag is too heavy for a patient who is nauseated or who has a tender abdomen, place the patient's hand over the pad and blankets to achieve good skin contact. Cover the patient with the blankets. The patient's arms can remain outside the blankets, if desired.

35. Turn on the EMS machine and adjust the sine-wave intensity to the patient's tolerance. Leave the machine on this sine-wave setting for **10 minutes**.

36. Turn off the EMS machine and remove the pads. Instruct the patient to turn over to a prone position having slipped his/her arms out of the flannel gown (leaving the gown on the therapy table as a sheet.)
37. Wring out 2 hot towels and apply to patient's back, with four layers of towels covering from the shoulders to the hips. Place the Vellux® and wool blankets over the patient. Leave on for **5 minutes**.
38. Wring out one cold towel (and fold into 2 layers) and one hot towel (and fold into 2 layers). Place the fresh hot towel on top of the two hot towels stacked on the patient. Gently flip over the stack of towels, leaving the fresh hot towel on the patient and removing the spent hot towels from the stack. Leave on for a few moments while readying for 'the flip.'
39. Place the cold towel over the new hot towel and flip the stack of towels, leaving the folded cold towel on the patient's back. Remove the hot towel from the stack and cover the patient with the Vellux® blanket, a wool blanket, and another blanket, if desired. Leave on for **10 minutes**. (At this stage, patients may fall asleep. For this reason, we keep the lights dimmed low, provide gentle music, and encourage minimal talking or noise. This is the parasympathetic healing state.)
40. After 10 minutes, remove the cold towel (which by now has been warmed by the patient's body). Rub down the patient with a dry hand towel before providing the patient with a robe and directing the patient to the dressing area. Ensure the patient is roused and adequately awake to walk and get dressed.
41. Clean the therapy area and supply clean linen towels, and therapy table for the next patient.

Procedure Summary

1. 5 minutes with 2 hot towels (4 layers) to the chest/abdomen. Cover with the Vellux® blanket.
 2. Briefly re-warm the patient with the 'hot flip:' 1 hot towel placed on the cooled towels and flipped.
 3. Apply the cold towel (2 layers) to the top of the hot flip, then flip the set again, leaving the cold on the chest/abdomen for 10 minutes. Cover with the Vellux® blanket, with additional wool blanket(s) on top.
 4. Apply sine-wave to T5-T6 on back during this same 10-minute timeframe.
 5. Remove towels, then apply sine-wave to T10 on back and on front upper epigastric region for 10 minutes; no towels are applied at this time.
 6. Patient turns over to prone position.
 7. 5 minutes with two hot towels to the back. Cover with blankets.
 8. Repeat 'hot flip' from Step 2.
 9. Apply the cold towel as in Step 3, leaving the cold on the back for 10 minutes. Cover with blankets.
 10. Dry off patient.
-

Other uses for EMS during CHT treatment

Electrical muscle stimulation (EMS or sine wave) also can be used as adjunct physical therapy for joint and muscle injuries. An additional 10-minute setting of *constant* sine wave current (a ‘tetanizing current’) through the injured area at the end of the CHT helps restore newly oxygenated and vitalized blood to the area to speed healing.

Different therapy units are used during CHT, depending upon the patient’s needs. Standard therapy calls for only the EMS–sine wave current set on a surge setting. Adaptations to this may include:

- adding the EMS with a constant current on an injured area, over the biliary tract, or over the appendix area
- using a diathermy unit (e.g., ultrasound) rather than EMS (for pneumonia)
- using a high-frequency unit on the abdomen to promote anti-inflammatory benefits in women with uterine or ovarian problems and also for men with prostate concerns

CHT protocols for various clinical conditions

Pregnancy

Sine wave EMS is safe and effective for pregnant women and may be prescribed regularly in the first to second month of pregnancy to detoxify the mother and to prepare the uterus for a strong pregnancy. The therapy also is effective for morning sickness (first trimester), which is a sign that the liver is congested and the blood needs depuration (purification). At this time, a series of 10-15 CHT are prescribed. CHT also is used at any time during pregnancy to treat back pain, muscle cramps, as well as

chronic high or low blood pressure or blood sugar problems. At approximately 8 months gestation, another series of 10-15 hydrotherapies may be prescribed to prepare the woman for an easier delivery with decreased bleeding and complications.^{4,8}

Pneumonia

A diathermy current is preferable for patients with pneumonia. Short-wave diathermy via the chest and upper back draws white blood cells to the area. When applied for 10 minutes, this can create an artificial fever, deep in the lung tissue, which kills viral and bacterial contagion, redirects lymph to mobilize leukocytes, and cleans the tissue. This therapy includes the following steps:

1. Hot towels to chest/abdomen for 5 minutes
2. Cold towel to chest/abdomen for 10 minutes
3. Diathermy through the chest for 10 minutes
4. Hot towels to back for 5 minutes
5. Cold towel to back for 10 minutes

Sinusitis without fever

1. Hot towels to chest/abdomen for 5 minutes
2. Cold towel to chest/abdomen for 10 minutes
3. Sine-wave current to T4-T5 for 10 minutes
(concurrent with step 2)
4. Sine-wave current to T10 and upper-epigastric for 10 minutes
5. Hot towels to back for 5 minutes
6. Cold towel to back for 10 minutes
7. Diathermy to face for sinus infection for 10 minutes

Clinical pearl:^v A Case of MRSA Osteomyelitis

A few years ago, a woman was brought to me with her right leg swollen twice the size of her left, and she was scheduled to have it amputated. She was 76. She had developed MRSA osteomyelitis in her leg, and a year of antibiotics had not worked. I treated her using daily hydrotherapy with sine wave and a tetanizing^{vi} sine current through the leg at the end of each treatment. In combination with dietary change, homeopathy, and botanical medicine, we reversed the disease and saved her leg. The treatment course involved daily CHT for 5 months.

Jared Zeff, ND

Contraindications¹

General contraindications

- **Organ transplant:** It may be a contraindication to treat any patient who has had an organ transplant. In theory, CHT stimulates the immune system, which may potentially precipitate organ rejection. Some kidney transplant patients have been successfully treated, but CHT should be used with caution in organ transplant patients.
- **Pacemaker or implanted heart defibrillator:** The diathermy radio wave potentially can affect the sensitive frequencies used in heart patients. This can be

^v These clinical pearls are based on empirical data gathered by naturopathic physicians in clinical practice.

^{vi} Short-wave diathermy creates heat in the targeted tissue through small pulses of electromagnetic energy.¹⁵ Sine wave refers to a surging EMS sine wave through muscle tissue. Tetanizing refers to a constant sine wave current through the area of concern.

dependent on the type of pacemaker used, so consult with the patient's cardiologist and with the pacemaker manufacturer as a precaution.

Contraindications for short-wave diathermy

- **Fever:** do not use diathermy for patients with fever, unless you wish the fever to increase. The fever will increase artificially, which can be problematic in certain cases.
- **Metal or silicone implants:** these will heat internally and either burn normal healthy internal tissue around metal implants, or may cause silicone implants to melt or degrade. Any metal clips in the chest due to open-heart surgery can heat internally and burn internal tissue.

Charting

Dr. Carroll developed a hydrotherapy charting card which still is in use, today (Figure 2). This chart serves as:

- a record of the therapy used for tracking patient visits and progress
- a communication device written by the doctor to tell the hydrotherapist how to perform the therapy
- a log of the steps or

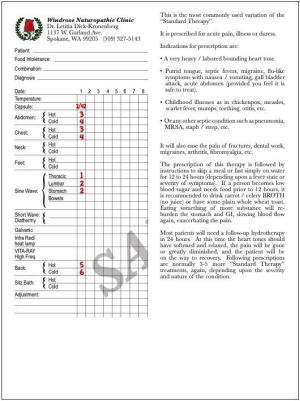


Fig 2. Sample therapy charting card.

sequence of the CHT, so the therapist can apply the treatment quickly after the patient is checked in by the attending doctor

- a tracking record for counting the series of treatments
- a record documenting physical therapy for an accident or injury

Fasting Used in Combination with CHT

Constitutional hydrotherapy may be used as an adjunct therapy along with fasting. In brief, fasting removes toxins from the blood and into the lymph, and CHT helps open the emunctories to facilitate toxin removal.

In nature cure practice, a water fast often is used when a patient has pain or a fever. This is based on individual clinical judgement, and fasting a patient on water for one day, four days, seven days, or 14 days may be necessary (Lindlahr's Law of Sevens). (Note, this is not a juice fast, which is contraindicated during a healing reaction.)

The Law of Sevens¹⁶

It is said in a four-day fast, there is one day of cleansing, during which toxins move from the blood into the lymph and are eliminated via the bile and large intestine. In a seven-day fast, there are four days of cleansing. In the first three days, toxins still move from the gut into the blood, but on the fourth day (and subsequent days), toxins reverse and leave the body via blood transfer to the gut for elimination.

Example: Fasting for pain

A water fast may be prescribed for a patient experiencing an aggravation of rheumatoid arthritis during the healing process. The body, through the *vis medicatrix naturae*, is eliminating toxins via a discharge of heat, pain, and discoloration (rubor, dolor, calor). In response, the patient is given a '42 cocktail'^{17vii} and constitutional hydrotherapy is begun with the EMS sine-wave current on T4-5. Daily CHT is provided during the fast to facilitate hydration, promote liver detoxification and lymphatic drainage, and to stimulate gut motility.

The patient is directed to fast on only water until the pain is gone. The patient returns daily for CHT and the heart tone is monitored. If the patient becomes light-headed or exhibits signs of low blood glucose, the fast may need to be broken early. If the patient has a heart arrhythmia, then the electrolytes are not in balance and the fast is broken using a high potassium broth of carrot and celery. If the heart tone is labored and heavy, and the patient still is in pain, another '42 cocktail' (made with two Carroll herbal capsules) is administered and the subsequent altered CHT may be given for a second day.

After the fourth day of water fasting and daily CHT, the pain should be greatly diminished. If the heart tone is easy and

^{vii} 00 capsules containing 2 parts wormwood (*Artemisia absinthum*) to 1 part Cape Aloe (*Aloe socotrina*).

non-labored as well, the patient may break the fast with the carrot/celery broth.¹⁷

Fasting in a febrile state

Fever frequently occurs with an acute infection, such as otitis media in a child, or a septic wound infection in an adult. Fever also may be a healing reaction in an adult. The purpose of fasting is to help the body conserve the energy required to fight infection (the Law of Conservation of Energy). Constitutional hydrotherapy opens the emunctories to allow the vis to focus on healing the infection.

A water fast proceeds until the fever breaks (when the patient's temperature is below 99°C for a minimum of six hours). If there is no nausea, vomiting, or fever at that time, and the patient is hungry, the patient is given a carrot/celery broth. If this settles well and the fever remains below 99°C, then the patient can proceed with eating the cooked vegetables from the broth. If all is well and the patient is still hungry, then protein can be added to the diet. Usually, homemade chicken soup with barley is a good choice. Even a plain organic hamburger patty or steak is an ideal meal at this point (protein and iron to support recovery). After this, the patient may follow a regular diet, of course eliminating any food intolerance or allergy to maintain a low inflammatory level in the metabolism.

During the first four days of a water fast, there may be a bowel movement, daily. During the fifth through seventh days there may be no bowel movement. This is normal. After seven days, there may again be a bowel movement daily. If the bowels are not moving daily at that point, a '42 cocktail'¹⁷ may be necessary to stimulate elimination.

As always, the fast is broken with a high-electrolyte broth, such as carrot/celery. This is consumed before any other food is introduced back into the diet. It provides kidney support, by preparing the kidneys to manage protein in the diet once again. If the patient is rushed into solid foods, the body will be stressed. This may create a relapse of symptoms or a digestive congestion resulting in biliousness and headaches.

Continued use of CHT: from nature cure to current naturopathic practice

Since the 1920s, constitutional hydrotherapy has been used to treat many conditions. Clinical experience suggests it has enormous potential for treating both acute and chronic diseases, and can be useful when antibiotics fail or become obsolete in antibiotic-resistant infections. It is readily accessible in areas where resources may be limited by economic factors.¹⁸

Constitutional hydrotherapy is effective therapy for depuration, drainage, and detoxification, because it supports the body's own methods of healing. Contrasting

water temperatures open the emunctories, while targeted EMS ferries accumulated congestion from the body.

CHT embodies the six principles of naturopathic practice and should be given due consideration by current clinicians and students. As we know from other naturopathic modalities, the simplest approach often is the strongest when it comes to the healing power of nature — the *vis medicatrix naturae*.

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