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TOPIC OF THE MONTH
November 2013

INSIDE OUT POSTURING, continued. Bandhas and Lymph

BANDHAs . . . a little thing that makes a BIG difference . . .

BANDHAS Explained (the best I can):
Bandha — like so many words of yogic vocabulary, cannot be exactly translated. It means to tie, to control, to block, to hold, to join and to contract — all at the same time.

The sanskrit term bandha has been translated as a means to bond or bridge together–the pose setu bandhasana means the building of a bridge. So our bandhas are about connection – inner connection, building a bridge to take us from the outer to the inner. Ashtanga yoga pays more attention to the inner work than the outer work.

Bandhas in yoga, are more energetic than physical -- even esoteric. They move energy and matter in our body and give us lightness, help us move easier throughout our days**. On a physical level** Bandhas refer to various muscular contractions intended to influence the circulation of the blood, lymph, the nervous system, and the endocrine glands (matter). The bandhas are movers **. . . bandhas move matter . . . matter movement stimulates energy movement . . . energy movement stimulates matter movement . . .**

There are two bandhas we work with during asana, they are mula bandha (the perineal lift) and uddiyana bandha (abdominals sucking up under the ribs slightly).

Pattabhi Jois explained the bandhas as "squeeze your anus". When all else fails do just that! Many others try to explain mula bandha as a kegel exercise or a lifting of the pelvic floor or perineum, or the same muscular action as stopping the flow of urine. Many have explained uddiyana bandha as an inward upward lift of the abdomen or sucking up your abdomen under your ribs – and these are ok descriptions to help you connect with the muscular control you have of your pelvic floor and abdomen; as you find this connection and deepen it, your experience may become more energetic (or deeper) and less physical . . .

On a physical level, connecting with your bandhas requires more mental effort than physical effort, although the body will understand it much sooner than the mind will! They are a subtle, maybe constant lift — in the beginning we tend to squeeze too much . . . or not at all . . . Throughout my yogic life my bandhas and how I do them have consistently changed. Where I am now; I like connecting my bandhas to my breath:

- Take a deep exhale and feel how your abdominals naturally pull up under your lower ribs
- Gently hold that lift as you inhale -- and hold it constant as you breathe
- On your next inhale, bring the inhale from the lift of your perineum or pelvic floor or inhale with a slight squeeze of your anus
- Hold both these lifts steady and SOFTLY as you move and breathe . . .

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Connecting with your mula bandha can be perplexing. Here is more information on your bandhas. Scroll to September 2012 topic of the month: http://www.befityoga.com/philosophy-lifestyle/topic-of-the-month/

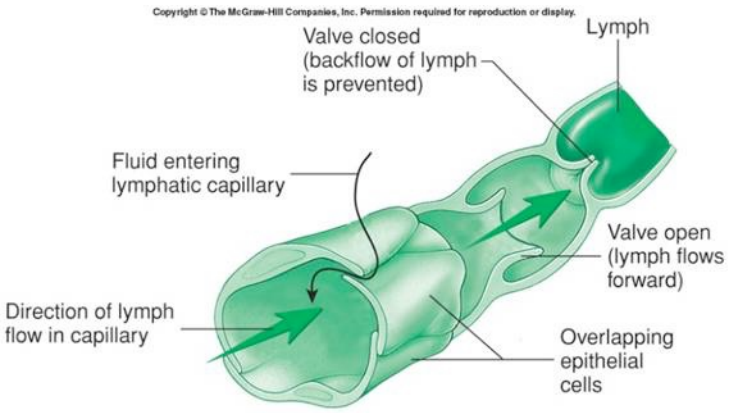
There are other methods we can use to help us make the connection. Here is a method based on Traditional Chinese Medicine :

Tongue on the Roof of your Mouth (Jiva Bandha) — and your Mula Bandha
In yoga as we are learning the breathing system we are often taught to put our tongue on the roof of our mouth, known as Jiva Bandha. On a physical level this relaxes the jaw and places it in a favorable position to release stress around the jaw**. On an energetic level this has benefit in helping you connect to your mula bandha. In acupuncture there are two master meridians in the body that originate from the pelvic floor (called the master meridians because they are in charge of all the meridians); they are called the conception or central vessel and the governing vessel.** Both meridians begin at the perineum. The central vessel travels up the front body through the soft tissue and ends on the tip of the tongue. The governing vessel travels up the back body through the hard bony tissues of the vertebrae, over the cranium and ends at the roof of your mouth. Placing the tip of your tongue just behind your front teeth completes this circuit helping us connect to the energy of the mula bandha creating a nice energetic flow, combining the soft and the hard . . .

Which is where Jiva Bandha helps to be balanced, it combines the hard and the soft as Patanjali explains in the sutras; keeping a balance in your asana practice between the work without tension — strength in a relaxed manner (Sthira Sukham Asanam YS II:46). When we practice our asana with Jiva Bandha it causes an upward pull on the back of the tongue releasing tension in our face and jaw — common tension areas.

We also can NOT breathe through our mouth when we have Jiva Bandha, so it will support your deep nasal breathing.

Practice bringing your awareness to keeping a subtle connection to your bandhas and breathing throughout most of your day. **There are many benefits to other bandhas (uddiyana and mula — the two used during asana practice), lets start with taking a look at the bandhas effect on our:**



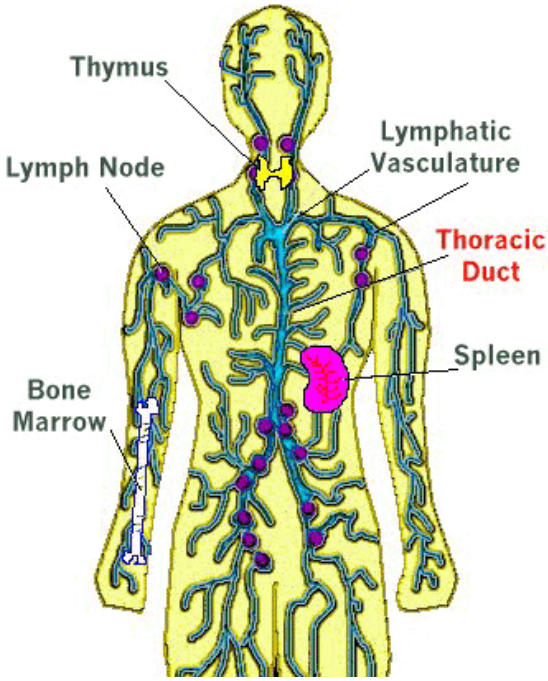
Lymphatic System

Our lymphatic system is like our body's water ways. **Lymph is the plasma in our blood** and once it leaks out of the blood, it is the fluid that circulates through our lymphatic system. It is formed from fluid that leaks out of the capillaries -- our capillaries are known as little leakers ;)

Because the arteries have pressure from the pumping of the heart, some of the fluid leaks from

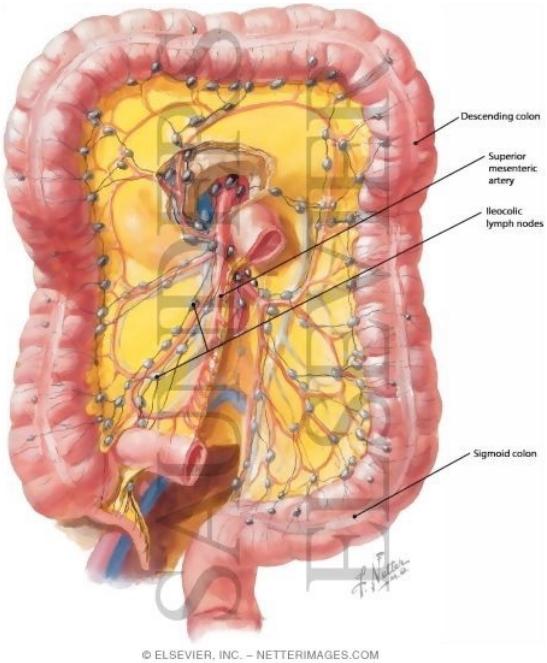
the capillaries into the spaces between the tissues in our body, the leaked fluid is called interstitial fluid or tissue fluid. The Lymph vessels "suck" up this interstitial fluid through little spaces in the vessels. This fluid contains pieces of cells, proteins, salts, waste, urea, glucose, and various substances that change composition depending on what is being leaked. This fluid is then moved along the lymphatic vessels toward our thorax.

Lymph nodes are filters of our body, they lie along the lymphatic vessels -- lymph nodes have white blood cells (produced in the bone marrow and the thymus), as the interstitial fluid passes through the lymph nodes the fluid is filtered and any bacteria is destroyed by the white blood cells within the lymph nodes.



The cleaned fluid is then transported via the lymph vessels to the thoracic duct (a large duct behind the sternum --It is the largest lymph vessel in the body, being about 16 in (41 cm) long and 0.25 inch (0.6 cm) wide) from there the interstitial fluid goes up to the left subclavian vein where it is dumped back into our blood (through the heart) for use (our right head, neck, chest and arm lymph fluid is delivered directly to the right subclavian vein). **The best way our body can get the fluid from the thoracic duct upward to the subclavical vein is through our breath (due to pressure changes)! Deep thoracic breathing is especially** beneficial in moving this cleaned lymph fluid.

The lymph system also transports long-chain fats (unsaturated fats) from the small intestine to the veins (via the thoracic duct) for blood transport . . . small and medium chain triglycerides (saturated fats - like in coconut oil), are able to be absorbed through the intestinal walls with other nutrients. Thus fats such as coconut oil put less of a burden on the lymphatic system and are much easier to digest. We do need some long chain fatty acids (unsaturated fats) -- but much less compared to short and medium chain fatty acids (saturated fats). Too many long chain fatty acids burden our lymphatic system. **See excerpt below on fats**



Lymph has a very important job in our body, but it does not have the heart to pump it, it is moved by breathing, walking, intestinal activity and muscle action**. Lymph fluid moves much slower than blood -- and it relies on our body movements -- as muscles tighten, lymph vessels are squeezed and lymph is pushed along its path.** The slight internal pressure the bandhas puts on the lower

abdomen is just enough to support lymphatic flow – 80% of our lymph system is in our gut. Yoga postures themselves also move lymph.

Glymphatics! The "newcomer" in lymphatics.

Our Brains have an Immune System! And it's quite "malleable" . . .

The link between toxins, our immune response, and the brain is not completely clear, but it is receiving some attention lately. In a report titled "*Structural and functional features of central nervous system lymphatic vessels*", by Louvea et al made an announcement about basic anatomy we should have known by now . . . The brain has a lymphatic system — given the term glymphatic system. This glymphatic system connects to our immune system — the lymphatic system of our bodies.

We used to think the brain was "privileged" and somehow toxins did not effect it so much. We now know toxins in our environment effect our brain at a much greater rate than we realized previously. We thought that chemicals were only dangerous in big doses . . . Even small doses of chemicals, which can synergize together to wreak havoc in dose ranges as low as parts-per-billion ranges. We still don't consider many chemicals we are exposed to on a daily bases a toxic burden on our body that is leading to many diseases. Toxins not only effect our brain more than we realized, they also greatly effect our endocrine system — our hormones. This is one of the causes of the increase in auto-immune diseases we are seeing.

The authors of the lymphatics paper state:
"The discovery of the central nervous system lymphatic system may call for a reassessment of basic assumptions in neuroimmunology and sheds new light on the etiology of neuroinflammatory and neurodegenerative diseases associated with immune system dysfunction."

What this means? **Our brains lymphatics system, aka the glymphatic system, drains into the lymphatic system in our bodies. If we have a sluggish lymphatic system (this is common!) it will effect the brains ability to detoxify into the lymph system of the body causing toxins to remain in the brain.**

The glymphatics do most of their brain detoxing at night when we sleep. Ayurvedic doctors recommend side sleeping to best drain the brain glymphatics — other experts suggest back sleeping (with a pillow under your knees) is better for deeper sleep and alignment of the body during sleep … Sleep is so important in our health I would say whichever way you sleep best is the best way for you to sleep!

And while we are on the topic of the brain . . . there is more evidence that your brain is malleable and changes continually in response to your lifestyle. This concept is called **neuroplasticity** (Neuroplasticity is the ability of your brain to change and adapt in response to our experiences.)

It used to be thought that your brains was static except during young critical development stages. We now know this is not true. Your brain has the remarkable ability to re-organize pathways, create new connections and new neurons throughout our lifetime — Functional plasticity is your brain's ability to move functions from one damaged area of the brain to another undamaged area — structural plasticicty is the ability of your brain to change shape as you learn something new.

The point is we have much more control over our body, mind, and brain than we realized.

We used to think the human brain could not generate new neural cells, cells would die and no new cells could generate leaving us dumber and dumber . . . guess what?! It has been proven that certain areas of your grain can regenerate new cells — called neurogenesis — and create new neural pathways.

Environment plays an essential role in these processes. This applies to emotional states as well; if you have a history of anxiety, your brain becomes wired for anxiety. If you develop tools to feel calm (yoga:) more of the time, those anxiety pathways are pruned away. Use it or lose it has a good connotation here!

Your brain is influenced by lifestyle, diet, exercise, attitude and emotions, sleep patterns, your level of stress

As neurologist David Perlmutter explains:
"We interact with our genome every moment of our lives, and we can do so very, very positively."

This is just another way the ancient wisdom of Traditional Chinese Medicine (TCM) and Ayurveda have stood strong and correct for a millennia. This does not mean that just because something is ancient we should believe it . . . It does however encourage us to look deeply into current techniques that do not serve us. Researching the science behind food and medicine has proven fascinating for me and fun to see how ancient yoga techniques hold up time and time again to the science :)

I-BE-YOUNGER (Abhyanga) **Ayurveda and Lymph**
Our lymphatic system is a big part of our immune system. In western medicine you are not taught lymphatic massage until you are diagnosed with cancer. In Ayurveda I learned about abhyanga (oil massage for the lymph system) to PREVENT cancer . . . Congestion of the lymphatic system is at the root of most diseases according to Ayurveda.

Furthermore, Ayurveda refers to lymph as the "elixir of youth" that everyone seeks. The study of lymph in ayurveda is called rasayana. Rasayana is also the study of longevity and rejuvenation. The word rasa means lymph, juice, flavor, taste, emotion, nutrient fluid, melody, plasma, breastmilk, satisfaction … Ayana means study. Rasayana also means the study of our longevity juice.

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An interesting fact in ayurveda about lymph is that it is a nutrient fluid that takes on the charge of the environment — if we are upset, our lymph fluid carries this throughout the body and shares it with our gut bacteria — these gut bacteria do their job with that "mood" attached. Our gut bacteria then during their process of helping us with digestion, immunity, mood, energy, and hormones to name a few, will carry that mood deep into our tissues. These are the molecules of emotion I have spoken about before.

Ayurveda uses a technique called **abhyanga** (oil massage) to move lymph. The lymph vessels lie just below the skin -- you do not need hard pressure to move the lymph. After you shower use oil (sesame or coconut depending on the season) rub oil into your skin using long strokes on your bones toward your heart and circular motions around the organs and joints.

Here are a couple tell tale signs your body will give you if your lymph is stagnant:

1. Do you have bags or puffiness under your eyes? Stagnant lymph effects our appearance!
2. Do you have sensitive breasts? Breast are meant to be massaged . . . especially if you have tender breasts premenstrual, massaging your breasts with oil will make you feel better and help to move your lymph leaving you feeling better and less bloated during this time.
3. Puffiness, redness, swelling anywhere on your body are also signs of stagnant lymph. Hands and fingers are especially vulnerable areas to puffiness indicative of stagnant lymph.

If you do have these symptoms, try this:

- Yoga postures and deep breathing :) (remember deep breathing is how the cleaned lymph fluid gets from the thoracic duct to the subclavical vein).
- Exercise in general is a great way to keep your lymph system healthy.
- Daily abhyanga (massage) as I stated above, or Skin brushing with a brush, or silk gloves.
- Sip warm water throughout the day
- Citrus fruits contain a flavanoid called diosmin that moves and decongests lymph, in the winter when our lymph system is more likely to be stagnant is when citrus is in season, so eat your citrus.
- An herb called manjista that is a blood purifier and lymph mover
- Eat lots of vegetables to help alkalinize your lymph fluid

Of interesting note here . . . Lymph comes from the name Lympha. Lympha is the ancient Roman deity of fresh water. The farmers prayed to the Lymphae for fresh rain. Yoga intends for us to recognize our oneness; as we pollute our waterways and rainwater it is only natural that we now find more cancers and diseases in human bodies from polluted lymph water. Yoga philosophy teaches us that the universe as the macrocosm is mirrored in us as the microcosm. As we get smart and stop polluting our Earth's waterways we will find our body's waterways to become healthier too . . . and vice versa, as we clean up our own waterways the Earth's may be come cleaner too :)
In Greek, Lymph means pure, clear stream :)

THIS LITTLE FACT ABOUT FAT Digestion & YOUR LMYPHATIC SYSTeM HAS STIRRED A LOT OF INTEREST, SO WE PAUSE HERE TO APPLY THIS KNOWLEDGE TO OUR EVERYDAY LIVES and learn a little about fats:

Fat on our body is not straight from the fat in our diet. At one time we thought this might be the case, but as we learn more about foods and how our body works, we begin to understand not all fats are the same in our body. And furthermore fat plays some very important roles in our body. With all kinds of new research and data its time to update what we know about fats:

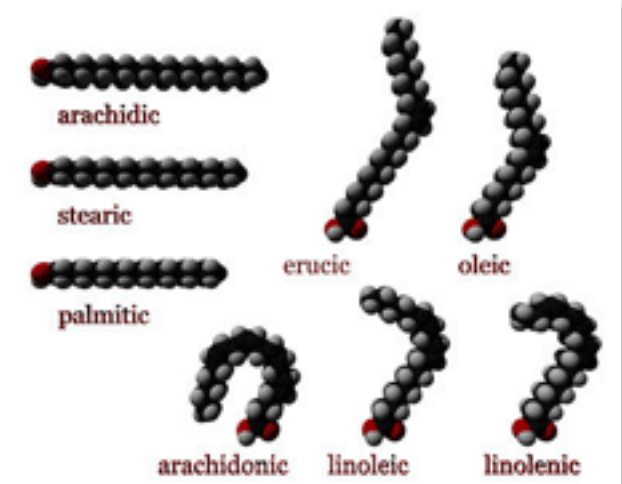

Figure 2. 3-D Models of different fatty acid types. Arachidic, stearic and palmitic acids are saturated. Erucic and oleic fatty acids are monounsaturated and arachidonic, linoleic and linolenic are polyunsaturated fatty acids.

Butter, Ghee, lard, and coconut oil are medium and short chain fatty acids -- they are saturated. They turn solid at room temperature. Their molecular layout is short and straight, their carbons are fully loaded with hydrogens giving them stability (why they are called saturated, they are saturated with hydrogens) -- and why butter or beef fat is solid at room temperature -- this is why they give our cellular walls stability.
Saturated fats are important for strong cellular walls.

Long chain fatty acids are unsaturated (meaning they have lost one or more pairs of hydrogen molecules, so not all their carbon molecules are saturated with hydrogen —and therefore they behave differently in our body). There are two types of unsaturated oils; polyunsaturated and monounsaturated. Polyunsaturated oils stay liquid. Monounsaturated oils are liquid at room temperature and start to slightly solidify when refrigerated.

Polyunsaturated fats are corn, soy, safflower, canola, cottonseed, and margarine (margarine is plasticized by the way).

- Canola is not even a real oil -- it is made from the rapeseed -- however the rapeseed is genetically modified to try to make it more like olive oil . . . they had to lower the euric acid content of the rapeseed. A Canadian figured out how to do this; hence the CAN of canola, the O stands for Oil (from the rapeseed) and the LA stands for Low Acid . . . Canola is NOT a natural oil therefore not fit for human consumption . . .

Much of this research has been known since the 70s -- again it has been a game of convincing authorities such as the FDA, AHA, Congress, etc. about our mis-understanding of fats. Finally though it is coming out.

Much of my information comes from the book: *Know Your Fats: The Complete Primer for Understanding the Chemistry of Fats, Oils and Cholesterol by Mary G Enig, PhD.*
Another good reference: The oiling of America by Mary Enig, PhD and Sally Fallon from the Weston A. Price Foundation Saturday January 1, 2000 last updated April 7, 2009. Link to full article: http://www.kokonutpacific.com.au/pdf/the-oiling-of-america.pdf#congress

Longer chain fatty acids from foods such as corn, soy, cottonseed (well not a seed), and safflower are hard to digest and to break down into energy -- so our body prefers to just store them as fat

instead. These are the fats that the lymphatic system has to pick up and carry placing a burden on our lymph and its ability to detox. While some of these are good for us, we need very little of them. —after all how much corn would you have to eat to get a half cup of oil?

- Long chain fatty acids in the form of polyunsaturated fatty acids are also very unstable, they go rancid quickly and have a very short shelf life. Especially for cooking -- Polyunsaturated fatty acids are susceptible to breaking down and forming "free radicals" which can be very toxic to cells -- and worse, when the polyunsaturated fats are reused again and again (for example, as they are in fast foods eateries that repeatedly fry foods in the same oil numerous times), makes them even more dangerous. The more they break down, the more oxidative damage there is at a cellular level, forming more free radicals. The free radicals make their way through the body pillaging at every turn. Their damage takes a toll on everything from cell membranes, to DNA/RNA strands, to blood vessels (which can then lead to plaque accumulation). The harm adds up over time in the organs and systems of the body and can cause significant impact, including premature aging, skin disease, liver damage, immune dysfunction, and even cancer.

- These fats use up a lot of anti-oxidants in our body to combat the free radicals they create.

Here is an excerpt from "The Oiling of America":

- The irony is that these trends have persisted concurrently with revelations about the dangers of polyunsaturates. Because polyunsaturates are highly subject to rancidity, they increase the body's need for vitamin E and other antioxidants. Excess consumption of vegetable oils is especially damaging to the reproductive organs and the lungs—both of which are sites for huge increases in cancer in the US. In test animals, diets high in polyunsaturates from vegetable oils inhibit the ability to learn, especially under conditions of stress; they are toxic to the liver; they compromise the integrity of the immune system; they depress the mental and physical growth of infants; they increase levels of uric acid in the blood; they cause abnormal fatty acid profiles in the adipose tissues; they have been linked to mental decline and chromosomal damage; they accelerate aging. Excess consumption of polyunsaturates is associated with increasing rates of cancer, heart disease and weight gain; excess use of commercial vegetable oils interferes with the production of prostaglandins leading to an array of complaints ranging from autoimmune disease to PMS. Disruption of prostaglandin production leads to an increased tendency to form blood clots, and hence myocardial infarction, which has reached epidemic levels in America. (Ref: A general review of citations for problems with polyunsaturate consumption is found in E R Pinckney, and C Pinckney, The Cholesterol Controversy, 1973, Sherbourne Press, Los Angeles, pp127-131)

- Vegetable oils are more toxic when heated. One study reported that polyunsaturates turn to varnish in the intestines. A study by a plastic surgeon found that women who consumed mostly vegetable oils had far more wrinkles than those who used traditional animal fats. A 1994 study appearing in the Lancet showed that almost three quarters of the fat in artery clogs is unsaturated. The "artery clogging" fats are not animal fats but vegetable oils. (Ref: C V Felton, et al, "Dietary Polyunsaturated Fatty Acids and Composition of Human Aortic Plaques," Lancet, 1994, 344:1195)

- Foods containing trans fat sell because the American public is afraid of the alternative—saturated fats found in tallow, lard, butter, palm and coconut oil, fats traditionally used for frying and baking. Yet the scientific literature delineates a number of vital roles for dietary saturated fats—they enhance the immune system, (54) are necessary for healthy bones, (55) provide energy and structural integrity to the cells, (56) the liver, (57) enhance the body's use of essential fatty acids. (58) Stearic acid, found in beef tallow and butter, has cholesterol lowering properties and is a preferred food for the heart. (59) As saturated fats are stable, they do not become rancid easily, do not call upon the body's reserves of antioxidants, do not initiate cancer, do not irritate the artery walls. Refs: 54) J J Kabara, The Pharmacological Effects of Lipids, J J Kabara, ed, The American Oil Chemists' Society, Champaign, IL, 1978, 1-14; L A Cohen, et al, J Natl Cancer Inst, 1986, 77:43, 55) B A Watkins, et al, "Importance of Vitamin E in Bone Formation and in Chrondrocyte Function" Purdue University, Lafayette, IN, AOCS Proceedings, 1996; B A Watkins, and M F Seifert, "Food Lipids and Bone Health," Food Lipids and Health, R E McDonald and D B Min, eds, Marcel Dekker, Inc. New York, NY, p 101 56) J F Mead, et al, Lipids: Chemistry, Biochemistry and Nutrition, Plenum Press, 1986, New York 57) A A Nanji, et al, Gastroenterology, Aug 1995, 109(2):547-54; Y S Cha, and D S Sachan, J Am Coll Nutr, Aug 1994, 13(4):338-43 58) M L Garg, et al, The FASEB Journal, 1988, 2:(4):A852; R M Oliart Ros, et al, Meeting Abstracts, AOCS Proceedings, May 1998, p 7, Chicago, IL 59)L D Lawson and F Kummerow, "B-Oxidation of the Coenzyme A Esters of Vaccenic, Elaidic and Petroselaidic Acids by Rat Heart Mitochondria," Lipids, 1979, 14:501-503

Medium and short chain fatty acids like butter, ghee, and coconut oil digest easy and INCREASE our METABOLISM. Scientific literature delineates a number of vital roles for dietary saturated fats—

- As I mentioned in the lymph information; they digest easily as they can squeeze through the intestinal walls with the other nutrients (remember long chain fatty acids can't fit and have to be transported by the lymph system).
- They enhance the immune system, are necessary for healthy bones, provide energy and structural integrity to the cells, they protect the liver, and enhance the body's use of essential fatty acids (omegas-3 & 6).
- Stearic acid, found in beef tallow and butter, has cholesterol lowering properties and is a preferred food for the heart.
- As saturated fats are stable, they do not become rancid easily, do not call upon the body's reserves of antioxidants, do not initiate cancer, do not irritate the artery walls.

Olive Oil and Nuts are long chain MONO-UNsaturated fats. Because your tissues are made up mostly of saturated and monounsaturated fats, your body requires more of these than polyunsaturated fats.

- Oleic acid is a monounsaturated omega-9 fat found in olive oil. These long chain fatty acids are digested through the process of lipolysis, the breakdown of fats and oils into glycerol and fatty acids — this requires bile acids and lipase to break them down in the intestine so that they can be absorbed into the lining the intestinal wall. After they are absorbed they are reformed into triglycerides and eventually travel through the bloodstream until they are used or stored away in fat cells.
- Olive oil is touted for helping to remove waste from the body (in other words, help you go to the bathroom) as it calls on the Gall Bladder to secrete more bile into the small intestines -- it is the bile that helps your colon remove waste.

The main dietary PolyUnsaturated Fats that we need are omega-3 and omega-6 fats. Although your body does need these, it needs them in relatively small quantities compared to short and medium chain fatty acids.

- Healthy omega fats are long chain fatty acids and necessary for brain and nerve function. Due to the fact they turn rancid easily -- get your long chain fats from whole foods in their natural state: nuts, seeds, hemp, avocado, cold water fish, grass fed organic animals and dairy.

- GRASS FED meat and dairy is imperative. We now know grain fed cows are not near as healthy as grass fed cows; cows digestion is not meant to digest grains so it causes great digestive upset to the cows which makes them produce less favorable meat and dairy. Grain fed cows lack CLA. Grass fed cows meat and dairy is more nutritious as it contains more:
  - CLA (conjugated linoleic adic) an essential fatty acid (made from omega-6s) that help the body increase metabolic rates, boost the immune system and keep cholesterol levels in check.
  - Beta Carotene, Vitamin E, some B vitamins and minerals that are absent in grain fed beef
  - More omega-3s and a better ration of omega-6 to omega-3

Here are some specific answers to specific oils I have been asked about:

Cooking oils: Coconut oil, ghee, and butter. Avocado and macadamia nut oils are some of your best for high temp cooking and frying. If you eat lard and beef tallow, they are also good for cooking.

Peanut Oil - peanut oil is a good Monounsaturaed fat HOWEVER it is highly prone to rancidity and mold and therefore NOT recommended for use. Many times the peanuts mold before they are even pressed.

Almond Oil - In India, almond oil can be bought freshly cold pressed from vendors which is called 'sweet almond oil' as the taste is much sweeter than conventional almond oil. It's used as a health food and is swallowed directly or stirred in hot milk and given to children before exams! It's meant to make them more intelligent. It's also considered a remedy for weak eyesight. Almond oil is also excellent for your skin and hair and for reducing bags under eyes.
Being a Monounsaturated oil, like olive oil (and sesame) it is ok as a salad dressing, light sautéing, or adding at the end of the cooking cycle for flavor.

Sunflower oil - hard to process and requires heat which kills most the good in it. It is a polyunsaturated fat which can be unstable and has many omega-6s but not omega-3s. In the processing for food it is bleached and deodorized leaving it tasteless, odorless, and boring . . . It is possible to find organic cold pressed and refined sunflower oil — this sunflower oil is nice for your skin — but I would not use it internally.

Sesame Oil - is Poly and Mono Unsaturated oils, it is also best used for light sautéing, salad dressings, or added at the end of the cooking cycle for flavor. It has many nutrients and is good for you. It is especially good for your skin, teeth, gums, and nostrils (as nasya oil). It is exceptionally good at pulling toxins from our body.

Avocado Oil - is good for cooking and has a high smoke point. I also use it for making mayonnaise as it does not have much flavor. It is also great applied topically for your skin.

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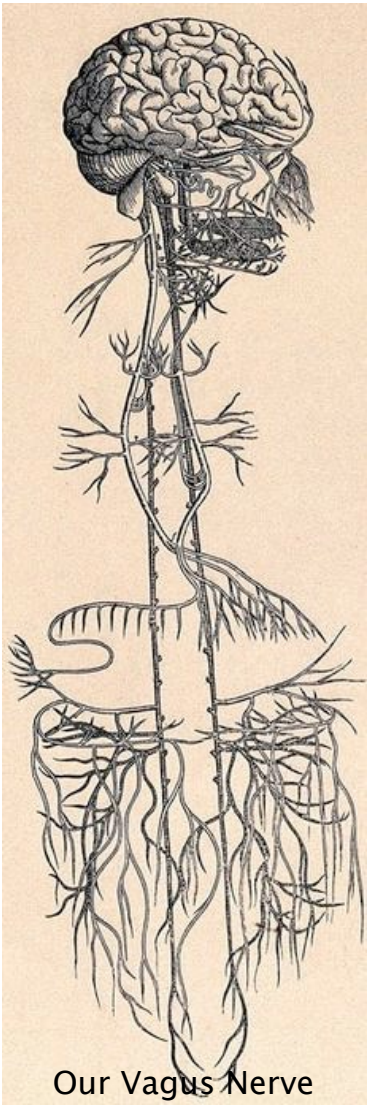
Macadamia Nut Oil - is turning out to be a powerhouse oil! It has a high mono-unsaturated fat content (probably the highest) mostly oleic acid, and is testing at a relatively high smoke point of 400^0 F, is resistant to oxidation, makes good mayonnaise, and is also a powerhouse for skin uses due to is Omega7 (palmitoleic acid) and squalene (a naturally occurring anti-oxidant present in skin). It is extremely low in Omega6s and very high in anti-oxidants. A definite oil to add to your collection.

THE LONG AND THE SHORT OF IT
Eat a little more of saturated (coconut oil, butter, ghee, lard, beef tallow) and the most monounsaturated (olive oils, nuts, etc.) fats; cook with saturated fats only and use monounsaturated fats for salad dressings, low heat sautéing, or adding flavor to a dish at the end of cooking. Monounsaturated fats are also very good topically used on your skin (as is coconut oil). Eat polyunsaturated fats only in their natural food forms they come in (fish, nuts, seeds, etc.)

Bandhas and your **Nervous System and your Vagus Nerve**

Of very interesting new science regarding heart attacks and our nervous system; we have all heard how important for our health it is to keep our stress levels low, science is just now starting to point to how important this is. I have been following some research suggesting that heart attacks are not a result of blocked arteries. Turns out the body's intelligence is a step ahead of us . . . many times before a bypass is even performed, the body has already built new blood vessels to the heart tissue that had impaired blood flow. And research has shown that most heart attacks do NOT occur where blocked arteries are!
http://articles.mercola.com/sites/articles/archive/2014/12/17/real-cause-heart-attacks.aspx


Our Vagus Nerve

Turns out the series of events that lead to a heart attack are more closely related to your nervous systems than your arteries; for a heart attack to occur:

- First comes a "weakness" or a decrease in the healing effects of our parasympathetic nervous system — the side of our nervous system that is responsible to help us "rest and digest" or "chill and rebuild". For example, perhaps you get easily stressed and have a hard time releasing stress.
- Next comes an increase in sympathetic nervous system activity — usually a physical or emotional stressor.
- This increase in sympathetic activity cannot be balanced because of chronic parasympathetic suppression. The result is an uncontrolled increase of adrenaline — which directs the myocardial cells to break down glucose using aerobic glycolysis — This step shunts the metabolism of the heart away from its preferred and most efficient fuel sources, which are ketones and fatty acids to sugars.
- As a result of this sympathetic increase and glycolysis, an increase in

- lactic acid occurs in the myocardial cells; this happens in virtually 100 % of heart attacks. A result of the increase in lactic acid in the heart muscle, acidosis occurs preventing calcium from entering the cells making them unable to contract . . . viola . . . a heart attack . . .

(References on the above: Scheuer, J, et al. (1965) Coronary Insufficiency: relations between hemodynamic, electrical, and biochemical parameters, Circulation Res 17:178-189.
Schmidt, PG, et al. (1978) Regional choline acetyltransferase activity in the guinea pig heart, Circulation Res 42:657-660.
Katz, AM (1972/1972) Effects of ischemia on the cardiac contractile proteins. Cardiology 56: 276-283.)

If heart disease is fundamentally caused by a deficiency in the parasympathetic nervous system, then the solution is obviously to nurture and protect that system, which is the same as saying we should nurture and protect ourselves. Nourishing our parasympathetic nervous system is basically the same as dismantling a way of life for which humans are ill-suited — spending days in fake air, fluorescent lights and stressed out . . .

We need to think of our parasympathetic nervous system as a muscle and strengthen it! Which is what we are doing when we practice yoga and even exercise. We are putting our body through a stress, but between breathing deep and stimulating our parasympathetic nervous system with our bandhas we are not setting off the stress response — literally raising the bar on what we can do without getting stressed out.

Ashtanga Yoga's use of the bandhas is a tool we have to help us stay connected to our parasympathetic nervous system, the mula bandha stimulates our pelvic splanchnic nerve (as does Janu Sirsasana B and Supta Kurmasana) which happens to be connected to the parasympathetic nervous system (You can read more on this nerve on the inside out look at Janu Sirsasana and Kurmasana/supta kurmasana) . . . and uddiyana bandha puts pressure on our Vagus Nerve . . . Deep diaphragmatic breathing - with a long, slow exhale as you pull in your abdomen connecting with the uddiyana lift - is also key to stimulating the vagus nerve.

On Your Vagus Nerve
Stimulating the vagus nerve has the relaxation response -- slowing heart rate and blood pressure, especially in times of stress or performance anxiety. **When we breathe deep with the inner support of our bandhas it puts pressure on the vagus nerve, which relaxes the nervous system. This is soothing to the nervous system, enhancing body & mind control.**

Vagal Nerve Stimulation by keeping a tone in your bandhas may be one of the reasons some people have a little more grace under pressure.

- Equanimity is a core tenet of many ancient philosophies and religions. Equanimity is defined as "Mental calmness, composure and evenness of temper, especially in a difficult situation." Equanimity has its biological roots in the vagus nerve and is synonymous with grace under pressure.

Of specific interest here is how we can use our abdominals to apply pressure on the vagus nerve -- and how this helps us control our stress levels. As we work with our whole body, health is not only an optimally functioning body -- but also our emotions and how we deal with our predicaments (which impact our bodily health!). The vagus nerve can play a major role in giving us grace under pressure by activating our parasympathetic nervous system.

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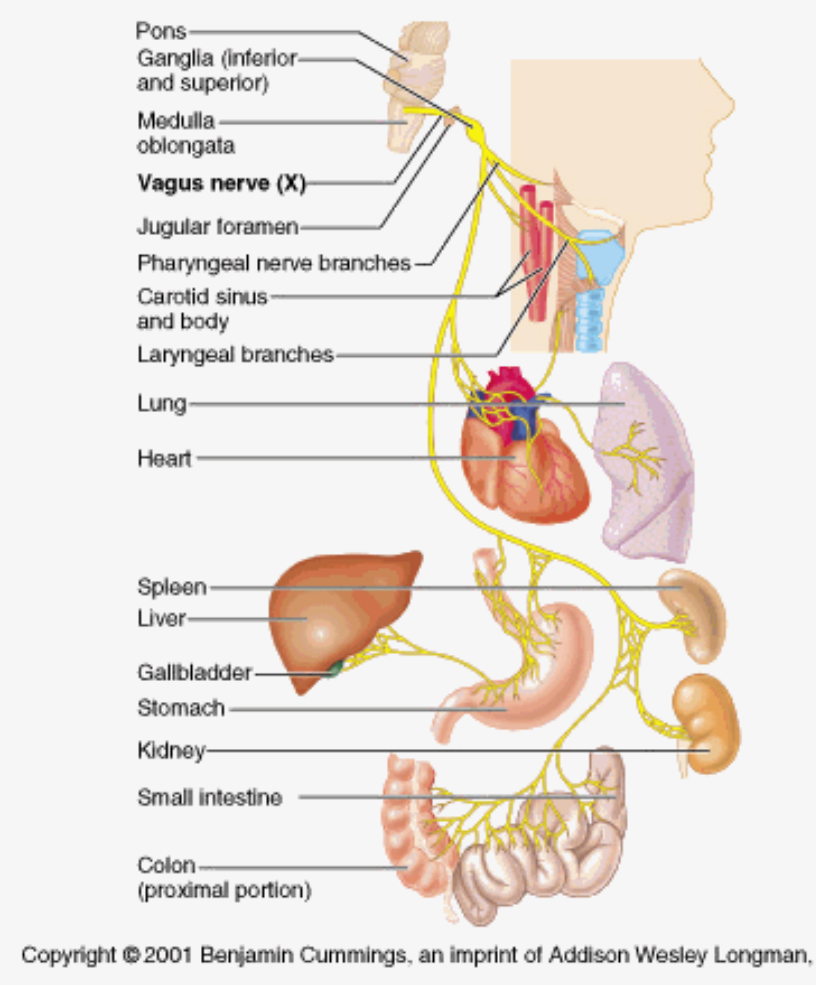
Part of the benefit of practicing yoga or exercise is that it raises the bar so to speak; when we exercise or do yoga it is a bit of stress on us, in yoga we use are breathing and bandhas to not get stressed — to keep our composure. So we are able to work harder but not set off the stress alarms — and over time this can translate to us better responding to a situation as we can tolerate a little more before our stress alarms go off. This is grace under pressure.

The vagus nerve is a major nerve in our body that goes from our brain stem to our gut; vagus means "wandering", it 'wanders' from our brain to our colon and regulates many functions:

- Helping to regulate the heart beat
- Keeps us breathing!
- Controlling certain muscle movements of the mouth and digestion
- It helps regulate digestion
- Transmitting a variety of hormones through the body
- Contracting the muscles of the stomach and intestines to help process food (peristalsis)
- Timing digestion and the release of various chemicals and hormones for digestion, for example insulin and pancreatic juices.



The vagus nerve, passing through the neck and thorax into the abdomen comes in contact with most every major system in our body;

- starting with our senses — the vagus nerve gets in contact with all 5 senses. (remember in the janu Sirsasana series how I spoke about fake sugars and your senses? Via the vagus nerve if you sense food coming the pancreas is stimulated to start the release of insulin before food even enters your mouth)
- The vagus nerve innervates your tongue,
- voice box,
- muscular control of our mouth,
- the esophagus,
- our lungs,
- heart, spleen, liver, gall bladder, stomach, kidneys, small intestine, and colon.

Lastly the vagus nerves sends back information to the brain and spinal cord about what is being digested and what the body is getting out of it. Remember 80% of communication between out brain and vagus nerve is gut to brain! Whew. What would we do without our vagus nerve?

And furthermore exciting new research has also linked the vagus nerve to improved brain function and repair of brain tissue, and to actual regeneration throughout the body. For example, Theise et al.

(Theise, N.D., and R. Harris. 2006. Postmodern biology:(adult) (stem) cells are plastic, stochastic, complex, and uncertain. Handb Exp Pharmacol (174):389-408.) have found that stems cells are directly connected to the vagus nerve. Activating the vagus nerve can stimulate stem cells to produce new cells and repair and rebuild your own organs.

Vagus nerve stimulation (VNS) therapy using a pacemaker-like device implanted in the chest is a treatment used since 1997 to control seizures in epilepsy patients and has recently been approved for treating drug-resistant cases of clinical depression. Making news lately is our gut-brain connection -- and how many of our emotions originate from our gut (you know that gut feeling?), this connection is our vagus nerve.

Activating your vagus nerve
There are many ways to activate the vagus nerve and turn on the relaxation response. When you take a deep breath and relax and expand your diaphragm, your vagus system is stimulated, you instantly turn on the parasympathetic nervous system, your cortisol levels are reduced, and your brain heals.

- One of the easiest ways to activate your vagus nerve is to breathe slowly and deeply with support of the bandhas especially on the exhale. I have said many times 'the optimum breath rate for most of your day is a 5 second inhale and a 5 second exhale'.

As you do this, your muscles will relax, dropping your worries and anxieties. The oxygen supply to your body's cells increases and this helps produce endorphins, the body's feel-good hormones. (Tibetan monks have been practicing this to modulate the effects of stress for decades. They don't practice these ancient techniques to improve their memory, fight depression, lower blood pressure, or heart rate, or boost their immune systems . . . although all of those happen.)

Activating your vagus nerve may also be done by one of the vagal maneuvers:

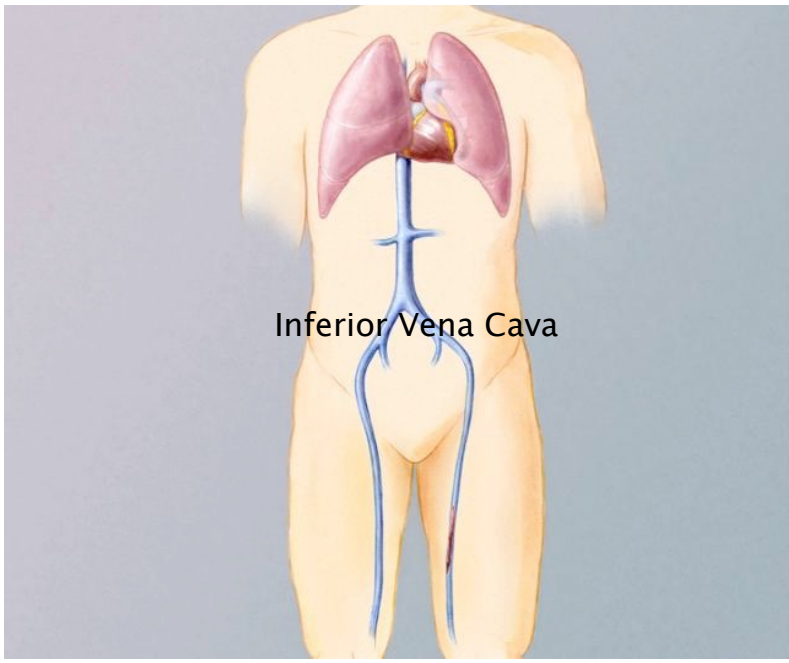
- Holding your breath for a few seconds
- dipping your face in cold water
- Gargling
- coughing
- tensing your stomach muscles as in "bearing down"

Healthy vagal tone is indicated by a slight increase of heart rate when you inhale, and a decrease of heart rate when you exhale. A higher vagal tone index is linked to physical and psychological well-being. A low vagal tone index is linked to inflammation, negative moods, loneliness, and heart attacks. Deep diaphragmatic breathing—with a long, slow exhale pulling in your bandhas/abdominals to put pressure on the vagus nerve — is key to stimulating the vagus nerve and slowing heart rate and blood pressure, especially in times of stress.

Having studies prove stimulation of the vagus nerve is effective in keeping it functioning optimally is encouraging. Since we stimulate other nerves (as in the Janu Sirsasana series) and many different organs and systems in our body with our heel or our bandhas to make them function better, having some proof that all this poking around is effective is encouraging :) **See links and info on studies on last page of this document**

Cardiovascular system

Breathing with bandhas helps the venous blood return toward the lungs, venous blood is blood that has been circulated and the O2 removed. The vena cava are large veins that return deoxygenated blood from the body, into the heart. They both (Inferior and superior) empty into the right atrium. The inferior vena cava collects this blood from our body below the diaphragm, this blood has to be pushed against gravity, upward toward the lungs, so sometimes is slower to circulate -- thus effecting our cardiovascular system. When you breathe with bandhas the contraction of the abdominals helps to propel the venous blood upward to the heart and lungs where it can be purified and recirculated better and quicker.



Yoga Postures Move Venous blood

Our voluntary muscles -- skeletal muscles -- are the best way to move our venuous blood in our veins. Whenever we make any kind of movement, our muscles contract and relax. Contracting muscles can push on blood vessels, just like a muscular person in a tight t-shirt can stretch their shirt during muscular contractions. Every time the muscles push against the blood vessels (from the outside...they press against the tunica externa), they propel the blood within the veins. The walls of veins are thinner and more prone to being squished than the walls of arteries. Veins can get squished rather easily (this is both good and bad -- a vein can easily be over-squished causing damage to the valves which will result in varicosing). Speaking of valves, we don't have to worry about blood being propelled the wrong way, valves prevent that. Any pressure toward the heart propels the blood on its path . . .

Contraction of skeletal muscles is the primary means by which blood returns to the heart. Inverting also moves the venuous blood back to your heart :)

Here is a nice explanation of how muscular action helps venous blood return to the heart: Skeletal muscles push the blood from: http://faculty.stcc.edu/AandP/AP/AP2pages/Units18to20/vessels/venous.htm

Cute website on our heart pumping blood and venous return: http://www.veinaccesstechnologies.com/id14.html

Breathe behind your heart . . . A common phrase I use when I teach, if you have connection with mula and uddiyana bandha your breath will no longer be dropping into your belly, it will instead be expanding the ribs and thorax. This type of breathing encourages better blood circulation and deeper lung gas exchanges, giving your body more oxygen with each breath. The lower lobes of your lungs has larger capillaries–thus more blood with more oxygen; deep thoracic breathing gets you more oxygen in each breath.

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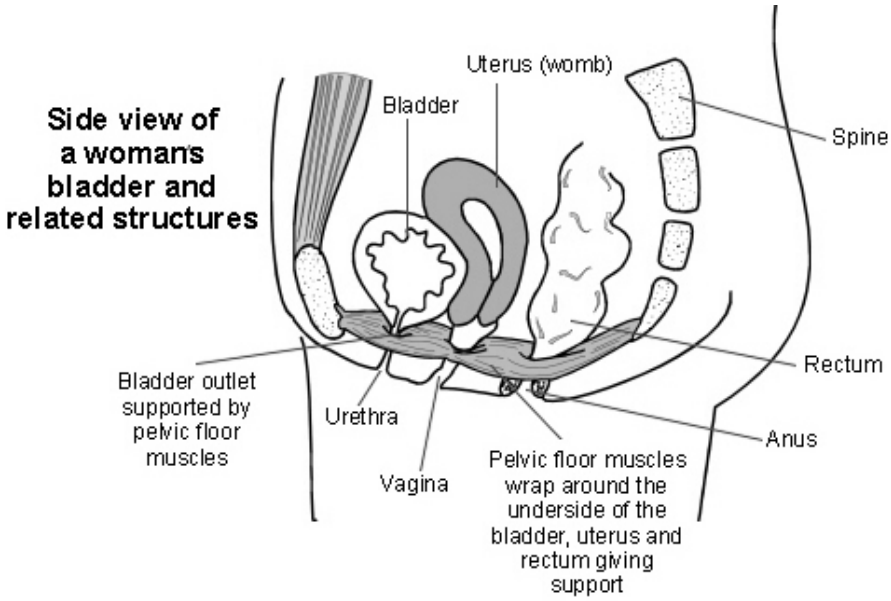
Digestive System

Your digestion and elimination rely greatly on the pelvic floor (mula bandha). The pelvic floor muscles must go through a series of contraction and relaxing in a coordinated way to allow you to go to the bathroom and move waste through your digestive system. If your pelvic floor muscles are weak or damaged, your body is more likely to have irregular/not complete bowel movements. No one wants this . . . This is one of the reasons why mula bandha has been called "the destroyer of decay".

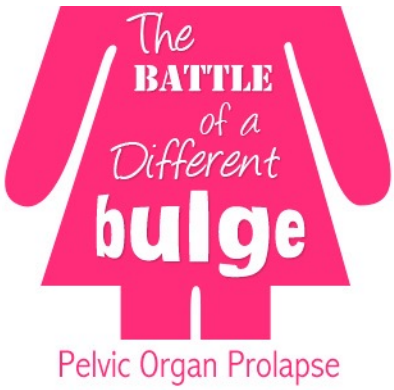


The pressure on the intestines from slightly holding your bandhas in is like an abdominal massage helping to move trapped air out and stimulate the peristalsis effect (wavelike muscular contractions) of the small intestines -- helping food to move along its way . . . and nutrients squeeze through the intestinal walls to the blood. The Gastroenterological Society of Australia says exercise strengthens the muscles of the abdomen and stimulates the intestinal muscles to move contents through the digestive system.
And keeping a little good tension in your abdominals stimulates your agni or digestive fire, helping your body digest, assimilate, and then rid itself of toxins.

Ayurveda says that 85% of our health depends on our digestion, this is because no matter how well you eat, if your digestion is weak you will not be able to break down the food you eat and absorb the nutrients from it.

Pelvis, Spine, and Internal Alignment

Physiologically bandhas provides muscular support for pelvis and spine, and support our organs. Our bandhas deter the effects of gravity and aging by keeping our organs from prolapsing –- as we age gravity effects our organs and without muscle tone in our abdomen the organs will lean out of place. When this happens the organs do not operate as efficiently, and the body needs to protect the organs since they are not in their usual spot where they would be protected. Your body protects the organs by contracting muscles to support and protect, which can leads to tightness and imbalance. As I mentioned earlier 'hierarchy of protection' is where your body protects an organ or nerve -- if you try to push through this tightness you could create injury. Keeping tone in your abdomen with your bandhas provides support for the organs to operate better and will do more for your waist line than



any diet!

Pelvic Organ Prolapse is more prominent in women than men, childbirth and surgery (hysterectomy) make these muscles weak, and leave you at a higher risk of pelvic organ prolapse.

Our bandhas lift the lower abdominal organs up off the pelvic floor releasing pressure on the pelvic floor. The most common organs to prolapse are:

- bladder
- urethra
- uterus
- vagina
- small bowel
- rectum

When these organs prolapse they start to either fall out of the vagina (uterus) or bulge into the vaginal wall and press it out of the vagina (bladder).

The most common symptom of organ prolapse is incontinence**.**

- Incontinence is also due to weak and or tight pelvic floor muscles, therefore we need the combination of awareness of maintaining tone along with flexibility in the pelvic floor. Mula Bandha and Full Squats are one of the best ways to maintain the correct mix of strength and flexibility of your pelvic floor.

Surgery is commonly performed for prolapsed organs, however if you use your bandhas as preventative maintenance you can deter organ prolapse. **Mula bandha especially is beneficial to women!**

Here is a good paper on organ prolapse**:**
http://www.healthlinkbc.ca/kb/content/major/tv1000.html

Bandhas and your mind . . . meditative mind

While talking about bandhas at my studio, someone came up to me after class and said “I have a problem connecting with my bandhas -- it distracts me from trying to keep my mind clear.” I said “hmmm can you keep your mind clear? If so you are quite the buddha! Most of us can not keep our mind clear, at best we can choose one focal point to bring the mind back to. Bandhas are an excellent focal point for your meditative mind.”

Ashtanga yoga being intended to pull all 8 limbs of yoga (from Patanjali’s yoga sutras) into a single practice provides us tools to deal with the meanderings of the mind; during practice you are directing your mind toward breathing, bandhas, and moving and breathing synchronicity (vinyasa). This ties up your mind so you can not be thinking about projects, work, co-workers, who said blah blah blah to you, our childhood, etc. These thoughts take our energy -- energy our body needs for engaging our anti-oxidants to fight the free radicals, for our spleen to kill the bad bacteria in our blood, for our cells to take up O2 and other nutrients. Instead you focus on internally healing --

moving blood, lymph, and matter through your body. In this way you DIS-CONNECT from the energy drain of all the stories and past experiences the mind likes to dwell on that are of no use.

Many places to connect

Use your yoga practice to strengthen your abdominals and therefore the connection to your bandhas, tapping into this powerful area in our body is as easy as learning how to use your core muscles; here are several places in the practice that are good bandha connectors:

One of my favorite places to strengthen that connection: Uttana Padasana (in closing), as you move from matsyasana to uttana padasana:

- press your lower back toward the floor rotating your pelvis posteriorly (some need to adjust their head to do this, usually the adjustment is lowering your chin just a little),
- Lower your legs until you feel your abdominals working strongly to NOT let your lower back arch upward. If you are pleasantly challenging your abdominals you will only want to hold this pose for 5 breaths!

To exit uttana padasana using bandhas and abdominals:

- Lower your legs slightly more, but keep them off the floor. INHALE lift your head.
- Place your hands by your ears, EXHALE lift your legs up and over into chakrasana.

Here is another way to help you connect with using your bandhas -- SKIP VINYASA **! :) and instead:**

- Pick your legs up off the floor and switch them, for example in Janu Sirsasana A
- Or better yet, ground your hands in front of your hips, lift up (as in between boat poses) and switch your legs, you can try this in Janu Sirsasana B. I call this a mid-air transfer :)

It may be easier to take the vinyasa . . .

And more ways to use your bandhas and increase your connection to them:
When we lift up to exit out of bhujapidasana and supta kurmasana -- the vinyasa out has us pick up to titthibasana, then tuck back to bakasana. This requires you to pick yourself up, lift your hips up with the strength of your core and sit lightly on your own arms:

- if you can not do it, start by trying bakasana -- feel the difference between “sitting” on your arms VS. engaging your bandhas -- tipping forward slightly, lifting your hips up, pulling your heels up to your gluteals, and feeling the lightness the bandhas give you. Try it both ways and see if this helps you connect with the inner lifting.

Also, lying down to supta samastithi just before we enter closing you can do in such a way to tap into your core;

- seated in dandasana with your hands off the floor roll down slowly one vertebrae at a time from sitting to supine.
- Or sitting up from a supine position you can reverse it

And then lifting up to sarvangasana

- Lying supine -- again lift your hands one inch off the floor so you do NOT press on them to roll up; point your toes, exhale press your lower back to the floor, using the power in your core only, lift up to shoulderstand one vertebrae at a time.

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Feeling the Magic - Every now and then on a hop up in Surya Namaskar or a jump through in vinyasas you catch the lift -- float up or through effortlessly. For me, when I catch a little of that magic this happens:

- On my last breath in down dog I exhale deeply and suck my abdomen up under my ribs, holding that uddiyana lift I inhale and jump. (Holding the lift while you inhale and jump is the key -- many people will hold their breath as they hold the abdominal lift, so pay attention to INHALE as you hold the bandha.)

USE YOUR POWER

Our human energy powerhouse is in our gut, many of our cultures recognize this, for example the taoist qi or chi, the Japanese ki, the Egyptians call it ka, and the Hawaiians call it ha (breath) or mana. In yoga we refer to our energetics as Prana or Shakti. Our bandhas of which 2 of the most used bandhas originate in our gut, help us tap into this energy.

From the yoga perspective the point of the bandhas is to awaken and control these subtle yet powerful energies in our body. Being conscious of this energy and making the mental effort to stay connected with it throughout most our day will have amazing benefits to your energy levels, your attitude, and your health. Little movements all day long can help connect you to the power of your bandhas:

- Stand up and put on your socks . . .
- If you have steps, run up them
- Squat down instead of bending over to get things from the floor, etc.
- There are many everyday functions we do that we can add the lift of the bandhas to for a healthier body and better supported spine and pelvis, just pay attention and find them!

Just like your breath, your bandhas can go with you wherever you go Do your bandhas subtly and gently throughout most of your day . . . well except after 9pm then you can relax and just let it all hang out . . .

The bandhas are more about THE INNER EXPERIENCE . . . If you can relate to this little cartoon the Bandhas will give you a better experience of your practice.

THIS SECTION IS JUST FOR VERIFICATION IF YOU WANT TO FOLLOW UP THE RESEARCH:

Here is a link from research in psychology today about vagal tone: http://www.sott.net/article/257716-The-Neurobiology-of-Grace-Under-Pressure-7-habits-that-stimulate-your-vagus-nerve-and-keep-you-calm-cool-and-collected
Published on February 2, 2013 by Christopher Bergland in The Athlete's Way

Want to learn more about your vagus nerve? http://www.caam.rice.edu/~cox/wrap/vagusnerve.pdf

Here is some further research on how yoga and exercise effect the vagus nerve and lower stress -- just for verification (not necessary to read this if you believe the above!) :

Cardio-respiratory activity, strength training, and yoga stimulate vagal tone and harmonize hormones and neurotransmitters linked to grace under pressure. Aerobic activity stimulates healthy vagal tone due to the inherent diaphragmatic breathing of rhythmic cardio-respiratory exercise. Strength training with an emphasis on a robust exhale as you push the weight will stimulate vagal tone.

Yoga increases vagal tone, too. In a 2012 article published in Medical Hypotheses, researchers from Boston University School of Medicine (BUSM), New York Medical College (NYMC), and the Columbia College of Physicians and Surgeons (CCPS) presented evidence that yoga may be effective in treating patients with stress-related psychological and medical conditions such as depression, anxiety, high blood pressure and cardiac disease.

The researchers hypothesize that stress causes an imbalance in the autonomic nervous system (parasympathetic under-activity and sympathetic over-activity) as well as under-activity of the inhibitory neurotransmitter GABA. According to the researchers, low GABA activity occurs in anxiety disorders, post-traumatic stress disorder, depression, epilepsy, and chronic pain. The hypothesis advanced in this paper could explain why vagal nerve stimulation (VNS) works to decrease both seizure frequency and the symptoms of depression.

"Western and Eastern medicine complement one another. Yoga is known to improve stress-related nervous system imbalances," said Chris Streeter, MD, associate professor of psychiatry at BUSM and Boston Medical Center, who is the study's lead author. Streeter believes that "This paper provides a theory, based on neurophysiology and neuroanatomy, to understand how yoga helps patients feel better by relieving symptoms in many common disorders."