Lesson 4
Physiology of Blood and Stimulants

INTRODUCTION

The first organisms on earth are theorized to have evolved from the ocean, when it was saltier than it is today. These first single cell organisms had a salinity very similar to their environment, the great oceans. They could get their nutrients straight from their environment, while throwing their waste products back into the ocean. The function of our blood system is very similar to that of the oceans some 3 - 4 billion years ago. As time passed and life forms evolved, organisms became much more complex and multi-celled. This meant that some of the cells were not in direct contact with their environment, yet they still had to be fed and still had waste products; therefore, specialization occurred within a system to deliver the ocean to each cell – the first primitive circulatory system. Through evolving and mutating new traits, organisms could wander up on to land for short periods of time, taking part of their mother ocean with them. Sooner or later some organisms became land-based, but they always kept their mother ocean with them, as a mechanism to feed their cells and get rid of waste materials.

Our “mother ocean” now makes up the circulation systems of our
body using blood as our internal fluid. We value our mother ocean a great deal, protecting it at all costs. We strive to maintain the right amount of precious blood fluid while keeping its chemistry within a narrow variance. If the fluid content goes down, we drink fluids. If the salt content goes down, we hunt for salty flavors. If the acidity, glucose or any number of other parameters goes up or down, we try to balance it. If we lose too much of our mother ocean, we die.

Our blood is pumped around the body so it can come into the vicinity of every cell. It still has the job of delivering nutrients, may it be food stuffs, oxygen, hormone messages or others. Along with the lymphatic system, the blood circulatory system picks up the waste material for specialized detoxing and elimination in other parts of the body. (We will discuss the lymphatic system in lesson 11). Being a major link to the “mother ocean” of the distant past, we will be looking at the blood circulatory system in this lesson and the botanicals most associated with it.
Now that we have more or less seen the map of the blood circulation above, let us look at it more closely. Most would say that the heart is the center of the blood circulatory system and there is suitable reason to believe this. Some scientists argue that there are two other centers: food intake and oxygen intake centers. They would say that the heart is simply a pumping mechanism to aid in the delivery of the blood to these centers. When we consider that one of the primary functions of the blood circulation is to deliver nutrients and oxygen from the environment to the cells, it makes sense that nutrient uptake is an important part. At the same time an argument could be made that the center of the blood circulatory system is the elimination organs, as this is part of the mandate of the mother ocean also. Of course from a holistic perspective all parts are important. Parts of a system depend on each other to function smoothly as a group. If miscommunication or tension is felt in one area, all parts of this system, (as well as other systems) are affected.

Let’s look at some of the tension areas:
As you have read through this section, you might have noticed that some of the problems were due to nervous system interaction, be it the medulla or autonomic nervous system. Some problems were physiological, like peripheral resistance. As an herbalist it is good practice to look at these separately. Often imbalances arising from the nervous system are caused by “software” problems, while problems in physiology are caused by “hardware” problems. Software problems have to do with the mind and the emotions. These often come from lifestyle. Often a little lifestyle direction is needed to reduce stress. As we saw in the last lesson, something as simple as a creative hobby can relax the autonomic nervous system to change its control on the system.
You measure arterial blood pressure by wrapping a pressure cuff around the arm and inflating it until the arteries collapse and blood flow stops. You then release pressure from the cuff slowly. The first sound corresponds to when the artery is just barely open, this is systolic pressure. Upon releasing more pressure, a low muffled sound is the diastolic pressure.

**Hypertension:** even though blood pressure often increases with age, hypertension is above 140 systolic and 90 diastolic pressure.

People with 140 over 90 are considered borderline hypertensives.

**BLOOD PRESSURE CHANGES**

**Persistent capillary contraction** is usually due to uptight stress. **Persistent capillary relaxation** is often due to allergic reactions or simply being too laid back, with little motivation.

As we have seen, there are five contributing factors we should consider for Blood Pressure Change, but in reality peripheral resistance and elasticity of arterial walls is by far the most common. Both elasticity and peripheral resistance can be caused by emotional or mental difficulties (software), but are more often caused by body malfunction (hardware problems). We can often find nutritional roots to these problems. We start with correcting the diet, but of course work with the herbs that will balance the circulation. I must remind you of the importance of paying attention to the ratio, not just lowering systolic without diastolic. Having too little blood in the head is not only disturbing to the patient, but can cause damage if gone unchecked for a long time.
There is lots of controversy over if blood pressure and/or blood cholesterol play a role in heart attack.

I have written a blog on this, if you are interested:

**High cholesterol ‘does not cause heart disease’: Statins are a ‘Waste of Time’**

**Pulse diagnosis** is useful for gathering more information about a person’s tension levels. By reading (palpating) the pulse, you can tell a lot about the person. Four pulse descriptions from traditional Chinese medicine (TCM) are:

1. Thin (wiry) pulse, is a tense person.
2. Full and sluggish pulse, is a person that needs tone.
3. Imperceptible pulse needs slow building tonics
4. Bounding pulse needs to be relaxed

A basic book on Traditional Chinese Medicine (TCM) will describe such pulse diagnosis in detail (see Kaptchuk, *Web without a Weaver* or Wiseman et al., *Fundamentals of Chinese Medicine*).

**Cardiovascular Index** is useful to aid in determining if a cleanse can be done first or blood pressure ratios worked on first.

**Blood Distribution** is often a matter of balance. All parts of the body need the mother ocean, but not too much or too little. Through proper counseling and herbal therapy, circulation distribution can usually be balanced fairly easily. Since in the North American culture we often see circulatory problems caused by tension and peripheral resistance, we often need herbs that will relax and cleanse at the same time. There is an herbal from the Orient that is excellent for this.

**Reishi** (a.k.a. Ling Zhi, *Ganoderma lucidum*) is what I consider the best for high blood pressure, cholesterol, arterial elasticity and as a heart tonic. More information can be found in my book:
Reishi Mushroom: Herb of Spiritual Potency and Medical Wonder.

The Heart is a very special organ, since it controls the flow of the ‘mother ocean’. Because of this, it has its own master control system or ‘network’, more or less isolated from the rest of the body. This network is a group of specialized cardiac muscle cells designed for starting each heart contraction and for rapid and coordinated spread of excitation. This network is called the *conduction system*.

Components of the Conductive System

1) Sinoatrial Node (SA or Pacemaker)
2) Atrioventricular Node (AV Node)
3) Atrioventricular Bundle (AV Bundle or Bundle of His)
4) Right and Left Bundle Branches
5) Conduction Myofiber (Purkinje Fibers)

The SA (a small mass of cells embedded in the right atrial wall near the opening of the superior vena cava) depolarizes (contract) spontaneously at a rate of 100 times a minute. The activity of this pacemaker is modified by input from the autonomic nervous system, slowing it to 75 beats while the body is at rest and speeding it up if the body is undergoing activity. All of the heart muscle cells, including the conductive system, are connected to each other by cytoplasmic strands called gap junctions. These gap junctions make it easy for electrical impulses to spread between adjacent cells. Immediately after a heart cell depolarizes, the cells around it depolarize. In this manner, a wave of excitation and contraction spread over the entire heart. The SA has the fastest intrinsic rhythm and therefore sets the pace.

If the rate is not regular, we call it a heart palpitation or arrhythmia. This is a common problem to see. I often get calls in my office from people worried about heart palpitations, or race away heart. There is usually no immediate problem with this condition. The biggest problem is that of fear. A person gets scared when their heart races for no known reason, and they feel they are having a heart attack. Rest assured this is most likely not the case. As one of my mentors once told me “... heart palpitations don't bother a person until they are over 150 years old.” In other words, they are of no medical concern. They are often caused by some underlying function such as a *Candida* yeast infection or emotional stress. The Candida yeast produces a group of chemicals that can trick the SA into changing its rhythm. Emotion or extreme mental activity can also cause a problem here. We talked in earlier lessons how Chinese medicine
describes energy flow in the form or Qi (chi, chee). One of these forms of Qi is called Shen Qi (Spiritual mind). Shen Qi resides primarily in the heart area. If a person creates too many circular arguments in their own head, this can create disturbed Shen Qi. The result will be heart palpitation or heart arrhythmia. Sometimes these situations of run-away heart are basically like doing aerobic exercises without moving. It doesn’t mean a weak heart. In fact, it often means the heart is strong and it is the part of the body that can handle the discharging of the stress, therefore is chosen for the outlet.

In a twenty-year study done on people taking pharmaceutical medication for this problem, versus people on no medication, it was found that the participates with no medication had significantly lower incidence of heart and circulatory problems, then the medicated ones did. Again the best herb to calm this situation is Reishi, in the above dosage. You still need to find the underlying cause. If it is a yeast (Candida) problem, where mushrooms have to be avoided, don't worry about the Reishi. Even though it is a mushroom, it is an exception to the rule. Not only can it be taken in cases of yeast infection, it will aid in ridding the body of the yeast.

I have post a three-part blog on Cardiovascular health. The individual part can be found as follows:

1. Cardiovascular Disease part 1 – Where do we Start?  

2. Cardiovascular Disease part 2 – Disease of the Arteries  

3. Cardiovascular Disease part 3 – Avoiding Heart Failure  
   http://www.drterrywillard.com/cardiovascular-disease-part-3-avoiding-heart-failure/

**STIMULANTS**

Stimulant herbs generally stimulate the blood system. Of course, if they are used with other herbs specific to a particular area, they stimulate blood supply to that area. Stimulants are often used as part of a formula to assure adequate blood supply to specific areas. When the center of gravity of the formula is directed to an area, a small amount of a stimulant will assure blood supply to that part. Some
botanicals have the stimulant action as a minor part of the therapeutic action, with another action being more prominent. This would be similar to a formula where the stimulating effect will be directed to a target area.

It is interesting to note that most of the strong stimulants come to us from tropical areas. In these areas hot spices are a part of the daily diet. Because of the hot climate it seems that people in these parts of the world are a little more relaxed and 'laid back'. These spices aid in stimulating the system for people in the tropics. Sometimes this is good and sometimes this is bad. If the system is already too hot, you don't have to heat it up more. Of course if the system is cold, heating it up is appropriate. The Chinese have a simple way of determining this. If the tongue is red or has a yellow 'fur' on it, the body is too hot. If the tongue is pale, blue and or has white fur on it the body is cold, then hot spices are good. This isn't always true as other factors might be involved, but it is a great general guideline.

One can further observe that we find more direct stimulants in the tropics, while the stimulants in the more temperate zones are more diffusive, such as wild Ginger. A little bit of reflection will show us why. In the temperate zones people need to heat up their limbs more often, especially in cold weather, while in the tropics, overall stimulation is often necessary.

Even though most stimulants are hot by nature not all are hot. Some of the mints, which are stimulants, have a cooling nature to them.

**Botanicals that influence the Cardiovascular system**

**Cayenne (Capsicum minimum)**

We would have to say that this is one of the best stimulants in the herbal materia medica, so much so that many practitioners rely on this for almost all stimulant action. This is probably an over simplification on their part, as many other botanicals have wonderful stimulant qualities, however Cayenne is fantastic.

Not only can cayenne equalize blood pressure, it is one of the best herbs to lower cholesterol. Even more importantly, it can lower the ratio of LDL to HDL cholesterol. Cayenne can also lower blood levels of triglycerides as well as decrease platelet aggregation.

<table>
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<tr>
<th>Cholesterol Categories:</th>
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<tbody>
<tr>
<td>LDL- Low Density Lipoproteins, “bad cholesterol”</td>
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<tr>
<td>HDL- High Density Lipoproteins, “good cholesterol”</td>
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Cayenne has been shown to increase the production of substance P, which lowers the incidence of allergies and is known to dilate the arteries.

There are many famous formulas for colds/flus that employ Cayenne in them. The formulas are often very effective if taken at the beginning of a cold/flu, but will often make them worse if used after the cold/flu is in a hot stage. As we have said cayenne is quite hot energetically. At the first stage of a cold/flu the problem often arises from the body trying to ward off cold. This can be seen by a clear or whitish running catarrh. Later on in many colds/flus, the mucus changes to a yellowish-green color. This is indicating that the body is fighting a deeper infection. Yellow mucus means that the body (or that part of the body) is too hot. Taking cayenne would be like turning up the heat in a room that was already too hot. It would therefore be contra-indicated in this situation. Hot spices are good at the first cold stage, but not at later hot stages of a cold/flu.

Anti-inflammatory action of capsaicin suggests an antioxidant action that may interfere with oxygen radical transfer mechanism common to lipoxygenase and cyclooxygenase pathways. Used externally as an antispasmodic, cayenne can be used to release muscular pain (especially in the shoulder, arm, and spine). It can also be used for rheumatism, arthritis, frostbite and chronic lumbago (Lower back pain). Some practitioners feel its use internally is contraindicated (as well as most of the nightshade family) in conditions of rheumatism and arthritis, however this is only sometimes true.

Cayenne pepper sprays have become a common means of self-defense. It was originally developed to protect a person from attacking bears. It has proven to be a relatively safe mechanism of protection, but there have been over 600 deaths associated with its use. People most at risk are large framed men over 250 pounds, under the influence of drugs or alcohol.
A formula I recommend as an all round stimulant is:

**Cayenne plus formula**

(Equal Parts)

**Cayenne**
- stimulant, aiding in regulating blood pressure

**Ginger root**
- peripheral stimulant, reduces peripheral resistance, lowers cholesterol.

**Prickly Ash Bark**
- strong direct (heart) stimulant and heart support.

**Virginia Snake Root**
- direct (heart) blood circulation tonic.

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**Bonus Video On Cayenne**

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**Ginger (Zingibar officinale)**

This single herb has definitely become one of my favorites. I often suggest it as a nice refreshing tea, sometimes mixing it with hot apple cider or lemon juice and maple syrup. This tea is excellent for warming a person up on winter days. For over ten years I operated a clinic in Vancouver, B.C., which has very rainy, damp winters. I found this tea to be an excellent prevention from flus in the area. Many people drink it throughout the winter with amazing results. We also use it to warm up poor circulation, clear out some forms of rheumatism and for menstrual cramps. The standard formula is 2 - 10 slices of ginger root, boiled in 2 - 4 cups of water for five to ten minutes. The variation is for taste preference, as some people find ginger spicy. I usually start a person on the low dosage, having them increase it gradually as they get used to the taste.
Ginger's carminative action should not be underestimated especially after those big meals. The cholesterol lowering aspect of ginger is excellent, with the additional feature of lower platelet aggregation. Ginger also has anti-bacterial action, especially in the intestinal tract, as well as for trichomonads in the vagina (trichomonads refer to an order of anaerobic protists, included along with other parabasalids). Because of ginger's positive action on the lung, and its mucus defusing quality, we can use ginger for a deeper level of yellow mucus than we can with cayenne pepper. We find that fresh ginger is usually more effective than dried ginger.

Even though earlier texts have stated that ginger is to be avoided during pregnancy, it has been confirmed that not only is it acceptable to take, it is the best herb for overcoming nausea during pregnancy.

Anti-inflammatory activity of ginger is as functional as ASA without the analgesic activity. This has given more evidence of the Chinese use in rheumatism and arthritis. The action ginger can have on reducing migraines seems to follow the same course. Its effect seems to be slightly different than feverfew, as ginger does not inhibit serotonin release the way feverfew does.

The antipyretic and thermogenic activity of ginger is quite interesting. Ginger has been shown to lower fever, most likely due to the inhibition of prostaglandin synthesis. It does not lower temperature in individuals who have no fever. On the other hand, we find ginger to be quite warming if given when a person is cold. Studies have suggested that it is the pungent agent that stimulates the thermo-regulatory receptors. This is probably due to zingerone’s ability to evoke catecholamine secretion from the adrenal medulla (in vivo), thus inducing a warming action. This only accounts for short term action although long term effects do happen and must be due to another mechanism.

As mentioned above, ginger is known to kill vaginal trichomonads in vitro. It also significantly inhibits the growth of bacteria (both Gram -positive and -negative), have antifungal action and anti-rhinoviral activity. Antioxidant effect of ginger is comparable to synthetic antioxidants, usually contributed to gingerol and zingerone. They
have been shown to scavenge superoxides and hydroxyl radicals in vitro, as well as inhibit lipid peroxidation.

**Bonus Video On Ginger**

**Wild Ginger (Asarum sp.)**

Since writing the text for this course, I have had more opportunity to use wild ginger, and contrary to what is found in the text, I find the wild ginger much stronger than Jamaican ginger. I still use more Jamaican Ginger because of its availability. Both the leaf and the root of wild ginger can be used, with a small proportion of the root being quite effective.

**Bonus Video On Wild Ginger**

https://www.youtube.com/watch?v=SAKEanqMNvg

**Horseradish (Cochlearia armoracia)**

Besides being an excellent sinus remedy if you can get a person to take it, Horse radish is also very effective for killing microorganisms. It is good for digestion, and acts as a moderate diuretic that dissolves calculus.

**Bonus Video On Horseradish**

**Clove (Eugenia caryophyllata)**

This herb is very soothing to the digestive tract, especially useful as a carminative. The Antibiotic action of cloves works on a large spectrum of bacteria, fungi and even viruses. Cloves also have antiparasitic function on roundworms. Cloves are soothing with a stimulatory action to the uterus.

If you have ever had a tooth ache that clove oil has aided, you will never want to be without clove oil again. As a spice, cloves can deliver therapeutic influence to the diet. Many cultures have used cloves to prevent the formation of gas and to reduce the spoiling of
food stuff. Cloves are a major ingredient in many carminative, stomachic and tonic formulas. This herb has been useful for toothache, dental caries, nausea, flatulence, indigestion, disinfectant, warts, worms, polyps and spasms.

**Peppermint** (*Mentha piperita*)

Peppermint is not only a famous drinking tea; it has all kinds of medicinal values. In addition to what is in the text, peppermint has been shown to have a wide range of antimicrobial actions including viruses and fungi. A mechanism behind peppermint action on the GI is the stimulation of the vagus nerve. This stimulation has been shown to stimulate bile flow, while relaxing the sphincter muscle of the esophagus. It has been shown to increased bile secretions about nine times above normal, while also improving component ratios in the bile. As we pointed out earlier, this stimulant is one that has a cooling nature; it is really considered to start off warming and then changes to cooling. These qualities make it an excellent remedy to use in the hot stages of a cold/flu, fevers, sore throats and the like. Peppermint oil has antimicrobial as well as antiviral properties and is active against Newcastle disease, Herpes Simplex, Vaccinia, Semliki culture, and fungus.

**Reishi** (*Ganoderma Lucidum, G. Sinense*)

This is one of the herbs I used most in my practice, as a mycellium or a 15:1 extract of the fruiting body. As we have stated, it is an adaptogen (aiding in a wide range of problems), but I use it mostly to calm down the nerves, emotions and to help with sleeping problems. I find it specific for virus infections (especially HIV), Chronic Fatigue Syndrome, many types of cancer, heart problems, circulation problems and sugar problems.

**Bonus Video On Reishi**

**Hawthorn** (*Crataegus Oxycantha*)

Even though this herb is not a stimulant as such, we have included it in this lesson due to its cardiac tonic action. Hawthorn has been shown to increase the oxygen supply to the heart, increase enzyme metabolism in the heart muscle, act as a mild dilator of heart muscles and as a peripheral vasodilator. Hawthorn also has a cardio protective effect due to its ability to decrease oxygen demand of cardiac tissue. Hawthorn has been shown to prolong ERP, thus
reducing risk of arrhythmias.

Hawthorn has also been shown to have anti-oxidant properties due to the flavonoids and procyanidins. It also has a mild to marked sedative action.

This herb along with Fujian green tea is heavily used in the Orient as a weight loss tea. This tea not only helps in weight loss, it emulsifies fats, including cholesterol, in the body.

**Bonus Video On Hawthorn**

**Hawthorn**

*(Crataegus oxyacantha)*