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Hand-Out

-Systemic Diseases Affecting the Feet-

07/15/14

Knowledge is power, and this hand-out offers you tips on how various systemic diseases affect your circulation, your nervous system, and your organs. Ultimately, your feet also become affected.

If the systemic diseases are chronic, but preventable diseases, healthy diet and exercise may help reverse the process and decrease the amounts of medications you need to take to control the symptoms.

This hand-out gives you a brief summary of each systemic disease. Feel free to review the other hand-outs from my website for further information.

Index:

1-Abusive diseases (alcohol, drugs, nicotine).....	p. 02
2-Anemia.....	p. 03
3-Arthritis (inflammatory, non-inflammatory, and others).....	p. 03
4-Diabetes (type-1, type-2, and pre-diabetes).....	p. 04
5-Endocarditis (bacterial).....	p. 06
6-Edema (dependent, non-dependent, and lymph).....	p. 06
7-Heart attack or heart failure (CHF).....	p. 07
8-Hypertension (systemic and pulmonary).....	p. 07
9-Kidney failure.....	p. 08
10-Liver failure.....	p. 09
11-Obesity.....	p. 09
12-Peripheral neuropathy (from diabetes or other sources).....	p. 10
13-Raynaud's syndrome.....	p. 10
14-Scleroderma.....	p. 11
15-Stroke.....	p. 11
16-Vascular disease (peripheral and systemic).....	p. 12
17-References and links.....	p. 14



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1-Abusive diseases (alcohol, drugs, nicotine):

Alcohol abuse: Excessive use of alcohol can affect your blood, such as the production, structure, and function of your red blood cells and white blood cells. You may develop anemia resulting in less oxygen to your tissues, inability of your red blood cells to provide nutrition, medications, and antibiotics to your tissues, and a weakened immune system causing you to increase your risk for infections. Excessive use of alcohol may also decrease your production of platelets putting you at risk for bleeding and hemorrhagic strokes. *All these factors combined put your feet at risk for cuts and bleeding, infections, wounds, and ulcers.*

Excessive use of alcohol can also damage your liver and kidneys. A damaged liver cannot produce albumin from the protein you ingest. Your muscle tissue cells, that need albumin to hold on to fluids, will instead release the fluids into the free space between the cells, called the interstitial space. The kidneys will suffer over time and decrease their function to maintain the body's fluid balance, electrolyte balance, and a healthy pH balance. Damaged kidneys can also cause inability to produce adequate urine, causing the body to retain too much fluid that can escape into the interstitial space. *Both liver and kidney damage can cause systemic pitting edema in your whole body, including your feet and lower legs.*

Drug abuse: *Different drugs affect the body differently; but, all drugs, in excess, have the ability to damage your liver or kidneys, causing the problems described.*

Nicotine abuse: Nicotine from cigarettes causes lung cancer; emphysema; hardening of the arteries; and spasms of your blood vessels at the capillary level. Chemotherapy can cause nerve damage. Emphysema causes less oxygen to the muscle tissues; hardened arteries cause hypertension; and spasms at the capillary level cause poor exchange of oxygen and nutrition to your cells, as well as poor exchange of carbon dioxide and waste products away from your cells. *The skin of the feet and lower legs becomes thin, translucent and dry. It will lack elasticity. The risk for cuts, infections, wounds, and ulcers will be high. Healing will be slow.*



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In cases of severe smoking, the platelets start forming small clots in the blood vessels. The clots eventually get bigger and bigger. *The lack of oxygen causes ischemic pain in the muscle tissues and gangrene in the extremities. Surgical attempt to restore the circulation will not benefit the person until smoking has stopped.*

2-Anemia:

If you suffer from numbness, tingling, or nerve pain in your hands and feet, it may be due to anemia, causing lack of oxygen to your nerves, and not necessarily due to diabetic neuropathy. Anemia can also cause the nails of both your hands and feet to become brittle, spoon-shaped, concave, or flat, due to lack of oxygen to your nails. If the anemia is caused by low iron-count in your blood, you may also experience swollen feet and ankles.

Anemia means low a count of red blood cells and a low count of hemoglobin, whereto the oxygen attaches. It's caused by lack of iron; chronic blood loss; poisons that destroy red blood cells; sickle cell anemia where the rigid crescent-shape of the red blood cells prevents them from entering the smaller blood vessels and thereby depriving them of oxygen; malaria; and the inability to absorb vitamin B-12 needed for the formation of red blood cells and hemoglobin. This last condition is called pernicious anemia.

3-Arthritis (inflammatory, non-inflammatory, and others):

Arthritis is either an auto-immune and inflammatory disease or a non-inflammatory disease caused by genetic disposition or wear and tear of the joints.

Rheumatoid arthritis is the most common kind of inflammatory arthritis, and osteo arthritis is the most common kind of non-inflammatory arthritis.



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Both kinds cause swollen joints. Both kinds have pain with activity; however, the inflammatory kind also has stiffness after rest.

Inflammatory arthritis causes bone destruction, but also misaligned fingers and toes with pointy joints. Hammertoes and bony metatarsal joints are a common occurrence on the feet and places where corns and ulcers easily develop.

Non-inflammatory arthritis causes bone growth, and the stress from a bunion is often a site where the extra bone causes the bunion to become bigger and bonier. Stress on the ankle, knee, hip, or an injury to any bone, also causes extra bone growth. If the “swollen” ankle is hard as bone, that's literally what it is.

There are many other types of arthritis besides the two mentioned above. Make sure to review my other hand-out on arthritis for more information.

4-Diabetes (type-1, type-2, and pre-diabetes):

Diabetes means that your pancreas becomes unable to secrete enough insulin, if any at all. Insulin is needed to metabolize the glucose in your blood-stream.

If your blood sugar is too high, medications, to stimulate your pancreas to secrete insulin or to help metabolize the sugar in a different way, are needed.

We are all very concerned about a high blood sugar because it damages the sensory nerves, causing diabetic neuropathy with numbness, tingling, and pain. It also damages the autonomic nerves, causing dry skin with cracks due to damage to the sweat glands. And, it damages the motor nerves that help control the shape and the arches of the foot. It also causes cataracts and kidney disease.

However, we should be equally concerned about the amounts of insulin that are needed to metabolize the high blood sugar.



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If your blood sugar is too high and large amounts of insulin are needed to metabolize the sugar, you need to know that the insulin will store the excess sugar as fat, create higher levels of your dangerous cholesterol, LDL, and cause plaque buildup in your arteries.

Insulin and elevated blood sugar cause cardiovascular disease and puts you at risk for heart attacks, strokes, high blood pressure, dementia, some cancers, and peripheral vascular disease.

This is why diabetes is also called a vascular disease and why so many diabetics end up with heart attacks, strokes, and amputated feet.

The foot amputations are due to numbness in the feet from sensory nerve damage; a collapsed foot with new and difficult-to-manage pressure points is due to motor nerve damage; dry, cracked skin is due to autonomic nerve damage; and poor arterial circulation with limited oxygen and nutrition to the feet is due to vascular disease, contributing to wounds, infections, and ulcers.

To keep your diabetic body and your diabetic feet healthy, there needs to be the same concern for reducing the need for insulin, as the need to reduce the blood sugar. This is done with diet changes, increased exercise, and learning how to avoid inflammation in your body.

Be aware that you'll develop increased blood insulin levels and insulin-resistance long before you get your official diagnosis of diabetes type-2 with a fasting blood sugar of 126 mg/dl as of 2014. Your cardiovascular diseases and nerve damage are well underway while you're pre-diabetic. You want to start making life-style changes as early as possible to preserve your good health.

Make sure to review my hand-outs on Diabetes, as well as Health, well-being, and happiness for more information.



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5-Endocarditis (bacterial):

This medical condition is a bacterial infection in the inner lining of your heart. Small clots form that can go to your lungs and give you a pulmonary embolism, also known as a PE. *The clots can also affect the circulation to your feet and cause “clubbing of the toes; splinter hemorrhages (small black lines); Janeway lesions (hemorrhagic spots) on the soles; as well as Osler's nodes (small red-purplish raised lesions that may or may not have a white center at the end of the toes).* Mix, p. 43. If you have the following findings on your feet, sometimes accompanied by malaise, chills, and fever, make sure to see a doctor.

6-Edema (dependent, non-dependent, and lymph):

Edema, or swelling, in your feet and lower legs only, is often caused by leaky valves of your veins and is called dependent edema.

If the edema is not confined to only the feet and lower legs, it is either lymph edema due to damage to a lymph node or vessel in only one extremity, or caused by heart, liver, or kidney damage, as well as other conditions.

Systemic edema often happen simultaneously with dependent edema.

Dependent edema is corrected with walking or pumping the muscles of the calf, thigh, groin, and buttock to move the venous blood along to the core of the body; or by resting with the legs up. It's prevented by wearing compression stocking that need to be applied before the edema sets in.

Systemic edema caused by a different problem in the body will not go away unless the underlying problem is corrected. The problem is often related to either heart failure, liver failure, or kidney failure, and the condition may have become chronic and can't be fixed 100%, meaning that the edema can't be reduced 100%.



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Severe interstitial edema causes unhealthy muscle and skin tissues as the capillaries are pushed away from the muscle and skin tissues, preventing a good exchange of oxygen and nutrition from the arterioles into the cells, as well as a good exchange of carbon dioxide and waste products from the cells into the venules. *Feet and lower legs with severe interstitial edema are at high risk for infections, wounds, and ulcers; as well as poor healing.*

Make sure to review my other hand-out on edema for further information.

7-Heart attack or heart failure (CHF):

Heart attacks that are not treated soon enough and congestive heart failure both cause a weakened heart muscle. A weak pumping of the heart muscle causes back-pressure on the venous system. *The result is severe swelling in the feet and legs that does not go down with rest and elevation of the legs. The degree of pitting (how deep a finger indentation stays, and how long it takes to go away) is correlating to the degree of heart damage or weakness. The swelling may become so severe that the tissue becomes rock hard and allows fluids to escape through the skin, as weeping edema. As explained in chapter 6, the excessive interstitial fluids cause poor exchange of oxygen and nutrition, as well as carbon-dioxide and cell waste at the capillary level, and the muscle tissue and skin are at high risk for wounds, infections, and ulcers. The poor venous return also causes inflammation of the skin, called stasis dermatitis, leaving the skin red and irritated. The back-pressure on the venous system also causes shortness of breath.*

8-Hypertension (systemic and pulmonary):

Pulmonary hypertension is caused by acute lung damage or emphysema from many years of smoking. It results in excessive back-pressure within the blood vessels returning oxygenated blood back to the heart. *Even though the weakness is in the lungs and not in the heart, pulmonary hypertension still causes back-*



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pressure of the venous blood and severe swelling of the feet and lower legs, like untreated heart attacks and CHF do. See chapter 7 for more details.

Systemic hypertension is often due to atherosclerosis in your arteries. It's not the hypertension, though, but rather the atherosclerosis that causes limited arterial flow; especially to your feet. Limited arterial flow to the feet cause less oxygen and less nutrition to the cells of your feet. The skin on your feet and lower legs will become thin and shiny; hair growth will cease; your feet may become cool; the skin may become pale if lifted above the heart, and dark red if on the ground; your skin will tear easily, and your feet are at increased risk for wounds, infections, and ulcers. Atherosclerosis is discussed in chapter 16 on vascular diseases. However, be aware that hypertension can cause increased risk for coronary artery disease and hemorrhagic strokes. Mix p. 45.

Taking medications to reduce your blood pressure can help prevent heart attacks and hemorrhagic strokes in the brain; however, the medications do not remove the atherosclerosis in your arteries; and your feet are still at risk for limited arterial flow. Changing your diet to primarily a plant-based diet may help remove some of the plaque over time; and a healthier diet, in general, certainly reduces the chance of further damage to your arteries. It even reduces your blood pressure.

Please see my other hand-out on Health, well-being, and happiness.

9-Kidney failure:

Kidney failure has already been mentioned in connection to abusive diseases, diabetes, and edema in previous chapters. No matter the cause for your kidney failure, it can leave you with extra fluids for your body to process; it can leave you with an imbalance of electrolytes; and it can leave you with an unhealthy pH value.



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The extra fluids, that your kidneys are unable to process, will cause generalized edema and sudden weight-gain. Please refer to chapters 6, 7, and 8 for further details.

Electrolyte imbalances and acid-base imbalances can cause a variety of problems. Your urine output may not be affected and you may not realize that you're in kidney failure.

Unexplained medical problems may be due to kidney failure. Ask your doctor.

10-Liver failure:

Liver failure can be caused by alcohol abuse; drug abuse; chemicals, toxins, and poisons; an inflamed gallbladder; hepatitis; a lot of your daily prescription and over-the-counter medications; and much more. Some times the cirrhosis turns into liver cancer.

Liver failure can cause generalized edema, also affecting your feet and lower legs. This due to your damaged liver being unable to produce albumin that is needed in your muscle cells to hold on to fluids. Without adequate albumin, fluids will seep from the muscle cells into the interstitial spaces.

See chapter 6 on Edema and my other hand-out on Edema for more information.

11-Obesity:

Obesity is not just being heavy, it's also a high body-mass-index (BMI), usually associated with elevated cholesterol, insulin-resistance, and inability to do effective physical activity. Your risk for chronic diseases is usually increased.

Your feet are affected by the pressure from the extra weight that they have to carry.



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If walking is difficult due to the weight-bearing activity, try to use a bicycle or enjoy swimming for exercise.

Make sure to review my other hand-out on Health, well-being, and happiness.

12-Peripheral neuropathy (from diabetes or other sources):

The elevated blood sugar caused by diabetes is often a reason for damage to the sensory nerves, motor nerves, and autonomic nerves. But, the nerve damage can also be caused by limited oxygen, due to limited arterial circulation, limited hemoglobin, or lung disease. Nerve damage can also happen from chemotherapy and radiation, as well as various chemicals, toxins, and chemicals. And finally, nerve damage can happen from compression of nerves in the spine and other joints.

Neuropathy can affect both the hands and feet. One of the first signs of sensory nerve damage is numbness, but it also causes tingling, and burning sharp pain. The result is unstable gait, as well as inability to feel the usual pain associated with the development of an ulcer. Motor nerve damage can cause the foot to collapse, creating new pressure points and higher chances for ulcers to develop. Autonomic nerve damage causes inability to sweat, and the skin becomes dry and brittle, cracks easily, and allows germs to enter the muscle tissues.

See chapter 4 on Diabetes and my other hand-out on Diabetes.

13-Raynaud's syndrome:

This disease is either an auto-immune disease; or it can be caused by limited blood flow; chemical exposure; a connective tissue disorder, such as scleroderma; or emotional instability. The small arteries in the hands and feet go into vasospasms in response to cold temperatures or emotional factors. The delivery of oxygen to the tissues of the hands and feet is impeded while the spasms take place.



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07/15/14

During the spasms, the skin of the fingers or toes becomes white or bluish. After the spasms, the blood flow and oxygen return, and the person experiences tingling and throbbing pain, while the skin of the fingers and toes turns bright red. It's recommended that exposures to cold be prevented. Emotional stability is also recommended; but, often easier said than done.

14-Scleroderma:

This is an auto-immune disease causing excessive collagen to be deposited into the connective tissues and making these tissues very rigid. Systemically, it affects the esophagus, intestines, heart, lungs, and skin. The skin loses its elasticity and becomes hard. Small blood vessels become blocked and prevent a good arterial blood flow.

The feet are affected with hard, shiny, and smooth skin. The nails can have a red hue and vertical ridges that split easily. Horizontal grooves are also seen on the nails. Sometimes, the skin surrounding the nails grows excessively and fuses to the nail plate. The toes may develop small ulcers that make indentations on the skin. The signs on the feet may be the first clue that you have this disease.

15-Stroke:

Strokes happen in the brain, either by a blockage of arterial flow due to a piece of plaque, or by a bleed due to a burst artery. The lack of oxygen, in either case, causes nerve cells to die in the area of the brain that's affected. The area of the body that's affected is the area that would normally get nerve signals from the part of the brain that got damaged with the stroke.

Strokes affect one side of the body. The nerves cross in the brain and always affect the opposite side of the body. The extent of damage to the extremity, or extremities, depends on the severity of damage to the nerve cells in the brain.



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07/15/14

The foot or leg can become numb, but still experience hypersensitivity to touch; can become paralyzed and unable to move on its own; and can experience spasms. Due to the numbness, pain will usually not be felt if a pressure ulcer develops. Due to the inability to move, the extremity becomes very rigid. And, due to the lack of muscle contractions, edema builds up. Therapy can sometimes rebuild some of the lost nervous system and reduce the symptoms; however, a full recovery is seldom possible after a moderate to severe stroke.

16-Vascular disease (peripheral or systemic):

If the vascular disease affects the whole body, it's called systemic vascular disease. It's called peripheral vascular disease when we refer to the way it affects the arms and hands, and especially the legs and feet. This hand-out will focus on the arterial aspect of vascular disease. My other hand-out on swelling includes the venous aspect of vascular disease.

Buildup of plaque can occur in both the inner layer of the arteries, called atherosclerosis, and in the middle layer of the arteries, called Monckeberg's arteriosclerosis. Both kinds cause the arterial wall to thicken, to lose its elasticity, and to become occluded, meaning less room for the arterial blood to pass through. And, both kinds cause the arteries to weaken and be at risk for expanding in various sections, or "ballooning" out, and causing an aneurysm, that could burst.

As for the legs and feet, the biggest concern is the lack of arterial blood down to the feet, causing limited oxygen and limited nutrition to the tissues of the feet. The result of lack of oxygen can be seen on the skin and nails. The skin becomes thin, dry, and shiny, and it easily tears. Calluses form easily, and the skin cracks easily. Growth of hair stops. The fatty tissues on the metatarsal pad of the foot atrophy, or diminish, putting that area at risk for corns, wounds, and ulcers due to the lack of cushioning of the metatarsal joints. The fatty tissues also disappear between the toes and put those areas at risk for corns, wounds, and ulcers, as well. Healing of



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07/15/14

wounds and ulcers is poor. The nails become thick, dry, and brittle. Atrophy of the bones of the toes causes the matrix of the nails to curve around, and the attached nails also start curving around.

Lack of oxygen also causes “ischemic pain” when the oxygen demand from the metabolic needs of your muscles is not met. Pain can occur when you walk and your arteries are unable to provide adequate oxygen to your muscles. You have to stop and rest before you can continue. This is what we call “two block claudication.” The pain can also occur at night when you try to rest. When the muscles are at rest and not pumping your arterial blood around, severe occlusion of the arteries in your legs causes “rest pain” from lack of oxygen. Your nerves are also deprived of oxygen, and you may experience burning, tingling, and/or stabbing pains.

Once the occlusion of your arteries has happened, the quickest way to restore the arterial circulation is with surgery.

A plant-based diet may have the ability to remove some of the plaque in your arteries; but, this is a slow process that can't fix the problem quickly enough if you're at risk for an amputation. However, diet is very important in preventing occlusion of your arteries.

Limiting smoking is also an important preventive measure. Smoking can injure the lining of your arteries and change the functions of your platelets. Both put you at risk for vascular disease and occluded arteries.

Diabetes is a vascular disease and it increases your risk for arterial disease.



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17-References and links:

My biggest inspiration to this hand-out has been “The salon professional's guide to Foot Care,” by Godfrey Mix, DPM, published by Milady SalonOvations in 1999.

I've also read up on a lot of information in my medical-surgical book from my days in the college of nursing, “Medical-Surgical Nursing, 5th edition,” by Phipps, Cassmeyer, Sands, and Lehman, published by Mosby in 1991,

Make sure to review the other hand-outs from my website for further information. They have been mentioned throughout the chapters of this hand-out.

My hand-outs offer tips you can use to manage various systemic diseases and conditions at home. They even offer tips you can use to prevent the various systemic diseases from happening if the reason(-s) is/are due to your life-style.