INTRODUCTION: Cardiovascular & neurological diseases are among the most prevalent diseases in industrialized countries. Without question, you will encounter clients with pathologies of the blood, heart, & blood vessels as well as the brain, spinal cord, & nerves. Knowledge of cardiovascular & neurological pathologies will help you develop appropriate treatment plans.

CARDIOVASCULAR PATHOLOGIES: Cardiovascular pathologies include deep vein thrombosis, varicose veins, orthostatic hypotension, atherosclerosis, myocardial infarction, & congestive heart failure. Also included are first aid measures heart attack & a closer look at cautionary (endangerment) sites.

DEEP VEIN THROMBOSIS: Inflammation of a vein with thrombus (blood clot) formation is called deep vein thrombosis (DVT) or thrombophlebitis. Inflammation attracts platelets, where they aggregate to form blood clots (often near a venous valve). When clots dislodge, they become emboli (floating mass). Risk factors include venous stasis (most common cause) from prolonged inactivity such as being bedridden, sitting for prolonged periods (airplane or motor-vehicle travel, paralysis), or standing for prolonged periods. Other risks are injury to the venous wall by trauma (intravenous [IV] equipment), chemicals (irritating IV solutions), & local or systemic inflammatory processes, increased blood coagulability from dehydration, cancer & cancer treatments, pregnancy, & use of oral contraceptives or hormone replacement therapy. Persons who have a high BMI, smoke, & persons 60 & older have a greater risk for developing DVT. The most critical complication is pulmonary embolism, which is a life-threatening condition.

Massage Considerations for DVT: Use a universal precautions approach, especially if risk factors are present. S/S of DVT are localized swelling, warmth, redness, & pain/tenderness in the calf. If S/S are present, avoid the lower extremities (legs & thighs) during massage. Then refer the client to his or her HCP for evaluation.

VARICOSE VEINS: Varicose veins are dilated veins caused by incompetent valves. Once they are dilated, they tend to remain dilated. Varicose veins are usually located in the legs. Risk factors include venous stasis, female gender, female hormones including during pregnancy or hormone meds, family history, high BMI, & in persons over 50.

Massage Considerations for Varicose Veins: Massage may be performed over varicosities. Place the client’s legs on bolsters or pillows to raise them above the level of the heart. Use effleurage applied with an open flat hand. Avoid the area if pressure causes pain or if the client has risk factors or a history of clot formation.

ORTHOSTATIC HYPOTENSION: Orthostatic hypotension (OH) occurs from sudden postural changes (recumbent/seated to standing upright), medication use (antihypertensives, diuretics, mood stabilizers, anti-seizures), dehydration, prolonged inactivity, venous pooling associated from pregnancy, hypoglycemia, extensive varicosities, & generalized anxiety & panic attacks. The American Academy of Neurology defines OH a decrease in systole of at least 20 mm Hg or a decrease in diastole of at least 10 mm Hg within 3 min of sitting up or standing.

Massage Considerations for OH: Use a universal precautions approach, especially if risk factors are present. Remind clients to move slowly & carefully when getting up off the table or chair & be ready & willing to assist. Use a semireclining position while supine may reduce the risk of OH. Consider asking clients to remain in a vertical seated position for 3 min before they stand. During this time, you can massage the shoulders &/or discuss home care activities the clients can use after the massage.

ATHEROSCLEROSIS: Atherosclerosis is the presence of plaque within arteries. These lesions can restrict blood flow & promote clot formation. Rather than a single disease, atherosclerosis is a pathologic process that leads hypertension & other diseases, such as
coronary artery disease, carotid artery disease, cerebrovascular disease, abdominal aortic aneurysms (AAA), & peripheral arterial disease. Years are required for these to manifest; diabetes & smoking can accelerate this process.

**Massage Considerations for Atherosclerosis:** Because atherosclerosis is often related to other diseases, be sure to read recommendations for specific diseases such as MIs & stroke. Caution is advised over certain arteries. See section Cautionary Sites entry later in this handout.

**CARDIOVASCULAR MEDS:** Anticoagulants, antiplatelets, arrhythmics, angiotensin-converting enzyme (ACE) inhibitors, angiotension receptor blockers & alpha-receptor drugs, beta-blockers & calcium-channel blockers, vasodilators, diuretics, & lipid-lowering drugs. Massage related side effects are bruising, OH, increased urination, & headaches. Watch for severe/ persistent muscle weakness & joint pain related to lipid-lowering drugs. If mild, no problem. If severe &/or persistent, this is a potential DANGEROUS side effect. Refer to HCP ASAP for medical evaluation.

**MYOCARDIAL INFARCTION:** Myocardial infarction (MI), or heart attack, is sudden disruption of blood flow to the myocardium caused by a blood clot or hemorrhage from a broken blood vessel. Tissue supplied by the affected vessel is often damaged. Damaged tissue is replaced by fibrotic, noncontractile tissue, which becomes a permanent scar on the heart. According to the AHA, approximately 715,000 people in the U.S. have a heart attack each year. Sudden death occurs in approximately 25% of cases. Those who do survive (75%) have an increased risk of a second MI, stroke, blood clots, or aneurysms. Congestive heart failure (CHF) develops in many MI survivors.

**MI S/S:** Left-sided chest pain described as crushing, burning, squeezing, tightness, heaviness, or fullness (this pain is not relieved by rest or nitroglycerin); discomfort in other areas of the upper body, such as the left arm, shoulder, neck, or jaw, shortness of breath; profuse sweating, fatigue, or dizziness; nausea & indigestion (more common in females); & anxiety, fear, or foreboding.

**MI First Aid Measures:** A heart attack requires immediate medical attention. The acute care principle is time is muscle — heart muscle, in this case. If the client complains of chest pain that lasts more than a few min, especially with S/S listed above, call 911. If the victim becomes unconscious &/or nonresponsive, he or she may be sudden cardiac arrest & may die unless the heart returns to its normal rhythm so take action. Use an AED if available. If you are alone, call 911 & get an AED yourself. If you are not alone, call 911 & send someone to get an AED. Use the AED as directed. Early use of AEDs is associated with better survival rates. AED stands for automated external defibrillator. If you are trained in CPR & an AED is UNavailable, follow proper protocols. If you are not trained in CPR & an AED is UNavailable, follow the steps below if the victim is an adult (AHA classifies adults as persons over age 8). Ideally, the victim is laying on a firm surface, such as the floor or the ground. CPR is applied best over skin.

1. Place the heel of one hand on the center of the victim’s chest. Place other hand on top of the first hand with fingers interlaced.

2. Push down into the victim’s chest hard & fast. Press into the chest at least 2 inches & allow time for it to rise before each compression. Be sure your elbows are locked & your shoulders are directly over your hands. Do not break contact between compressions. Your rate should be approximately 100 per min. This is the same rhythm as the Bee Gee's song “Stayin’ Alive” or Cyndi Lauper's song “Girls Just Want to Have Fun.”

3. Continue compressions until (1) the victim starts breathing, (2) EMTs or an AED arrives, or (3) you pass out from exhaustion.

**Massage Considerations for MI survivors:** If your client has had an MI, ask when it occurred & how well recovery is proceeding. If the MI is recent & the client is still weak & debilitated, a slow gentle massage of short duration is indicated. If the client is further
along in recovery & has regained most of his or her strength, a massage with moderate pressure is indicated. If the client has completely recovered & has regained all of his or her strength, a more vigorous massage can be performed depending on the client’s therapeutic goals. See other assessment tools under CHF.

**CONGESTIVE HEART FAILURE:** The term congestive heart failure (CHF) refers to the inability of the heart to pump blood to meet the body’s demands. CHF is not a single disease; it is a syndrome or complication of other diseases, such as hypertension, coronary artery disease, COPD, or DM, or previous MIs. The term **congestive** is used to describe what happens as one or both sides of the heart fail; blood backs up, or congests, lungs, liver, other organs, & legs.

**Massage Considerations for CHF:** Assess health & vitality. How quickly a client’s breathing pattern returns to normal after changes in activity levels is an indicator of vitality. Other indicators are muscle strength (sarcopenia [age-related muscular atrophy] & grip strength), self-reported fatigue, regular physical activity, & walking speed. In general, vital & robust clients can receive more vigorous & longer massage. Weak & frail clients receive a slower, gentler, rhythmic & shorter massage. SOB also indicates the need for a semireclining position & to limit or avoid the prone position. Address any other medical conditions in the treatment plan.

**CAUTIONARY SITES:** Cautionary sites are areas where deep vigorous techniques & prolonged deep pressure should be cautiously applied or avoided altogether because the area also contains superficial blood vessels &/or nerves. Inappropriate techniques or prolonged pressure can dislodge plaque, clots, damage compromised vessels, or stimulate reflexes that cause nausea & fainting. Two areas containing cautionary sites are the throat & abdomen. Use a universal precautions approach.

**Throat:** Avoid deep vigorous massage & prolonged deep pressure in throat as it contains SCM, carotid artery, & vagus nerve. There is currently increasing prevalence rates of asymptomatic CAD especially in individuals over age 65, who use tobacco products, have atherosclerosis, DM, hypertension, have sleep apnea, are obese, or who are sedentary. 30% to 50% of strokes are related to CAD. Working on SCMs O’s & I’s do not pose same risks. Pressure may also stimulate the vasovagal response which may cause a sudden drop in BP & HR leading to nausea, dizziness, & fainting. Massage chair use also poses a risk for vasovagal response.

**Abdomen:** Avoid deep vigorous massage & prolonged deep pressure in abdomen as it contains the proximal attachments of the psoas & the abdominal aorta. There is currently increasing prevalence rates of asymptomatic AAA especially in males, individuals over age 65, who use tobacco products, or have atherosclerosis. Working distal attachments of the psoas does not pose same risks.

**NEUROLOGICAL PATHOLOGIES:** Neurological pathologies include autism, migraine headaches, anxiety & depression, Alzheimer & Parkinson diseases, herniated & bulging disks, neuropathy, & seizure disorders. Also included are first aid for stroke & seizures.

**Meds for Mood Disorders:** Antianxiety, sedative, & hypnotic drugs, antidepressants, & antipsychotics. Massage related side effects are OH, drowsiness, & anxiety. Watch for lithium toxicity. While not common, lithium toxicity does occur. If you observe or if your client claims to be experiencing tremors, muscle weakness, lack of coordination, or blurred vision, this may indicate a serious side effect. Refer your client to his/his HCP ASAP for medical evaluation.

**Autism:** Autism is a syndrome of social withdrawal & obsessive behavior. This behavior usually becomes apparent in the second or third year of life. There are several types of autism ranging from mild to severe. Asperger syndrome is the most common form & a mild form of autism. Autism is also called pervasive developmental disorder.

**Massage Modifications for Autism:** Sessions should be brief (10 to 15 min) & structured (because of recent research findings, unstructured routines may not be well received). Techniques are applied with an open flat hand & even pressure. If the child appears intolerant, discontinue massage & try again another day. In many cases, teaching massage to the parents or caregivers is best. This will make massage more accessible & give the parents or caregivers another tool to communicate affection.
MIGRAINE HEADACHE: Migraine headaches are severe recurrent cerebrovascular headaches. They are often completely incapacitating & accompanied by symptoms, such as visual disturbances & nausea. These headaches are often triggered by hunger as well as certain foods (carbohydrates, iodine-rich foods, cheese, chocolate), alcohol (usually red wine), bright lights, loud noises, hormonal changes (menstrual, ovulation, contraceptives), atmospheric changes, & the time following physical or emotional stress. Migraine headaches, called attacks, can last from several hours to several days, & usually has a long recovery period.

Massage Modifications for Migraine Headache: Because of the pain intensity & nausea, massage should be postponed until the client has completely recovered. Additionally, a client experiencing a migraine is not likely to want a massage. After the migraine headache, however, massage can lessen the frequency & intensity of migraines between attacks. A relaxation massage with concentration on scalp, suboccipitals, neck, & shoulder muscles is recommended.

ALZHEIMER DISEASE: Alzheimer disease is a progressive neurodegenerative disease that produces a typical profile of mental deterioration that affect processes of thinking, memory, & communicating. This disease usually begins in later middle life with urinary incontinence, gait disturbances, & mental decline that gradually progress (wet, wobbly, & wacky). Some cases are address with a ventriculoperitoneal shunt.

Massage Modifications for Alzheimer Disease: Tailor massage to the stage of disease, with very few adjustments needed in earlier stages to significant modifications in later stages. Later-stage adjustments may include a gentle, slow massage of short duration, or giving hand or foot massage depending on the client’s physical condition & ability to communicate. Be willing to adjust the massage according to the client’s wishes, which might change abruptly. Many persons with Alzheimer become agitated when confronted about confabulations or confusion, especially if they are constantly reoriented. Consider asking family members or friends of the client how to best handle these situations.

PARKINSON DISEASE: Parkinson disease (PD) is a progressive neurodegenerative disease that produces a syndrome of abnormal movements called parkinsonism. Neurons deteriorate in a section of the midbrain called the basal ganglia, particularly in the substantia nigra. These neurons produce dopamine, a neurotransmitter that regulates voluntary movements, emotions, mood, & motivation. 50% of persons with PD experience depression; 20% of persons develop dementia. PD is one of the most common neurologic disorders of elderly adults, affecting approximately 1.5 million people in the U.S.

Massage Modifications for PD: Activities such as rolling over from a supine position to a lateral or prone position can be challenging. Use a position that the client can easily maneuver, such as seated or lateral recumbent. The massage may reduce rigidity, although only temporarily.

HERNIATED & BULGING DISKS: A herniated disk is protrusion of the nucleus pulposus (gelatinous inner component) through a tear in the annulus fibrosus (tough, outer covering). This protrusion can exert pressure on spinal nerve roots, causing radiculopathy. A bulging disk is less severe because the nucleus pulposus is contained within the annular wall.

Massage Modifications for Herniated & Bulging Disks: Pay close attention to the client’s pain level. If your client is in severe pain, postpone massage until pain is less severe. Otherwise, avoid techniques involving spinal twisting/torquing.

RADICULOPATHY & NEUROPATHY: Radiculopathy is compression of a spinal nerve root caused by a herniated or bulging disk or other structure such as a bone spur or tumor. Radiculopathy is associated with paralysis form a SCI or sciatica. Neuropathy is compression or degeneration of a peripheral nerve branch from hereditary, nutritional deficiencies, metabolic issues, alcohol abuse, drugs including chemotherapy, infection, or autoimmune disease. Both have similar S/S including pain, numbness, tingling, prickling, burning, & muscle atrophy. Double crush syndrome is the presence of both radiculopathy & neuropathy.
**Massage Modifications:** Obtain both written & verbal consent. If granted, use firm, gentle pressure applied with an open flat hand. Check in with the client as you work. If the lower extremities are effected, the client may be prone to additional nerve injury at pressure points (behind the knee, front of the ankle). For this reason, use a soft rather than stiff bolster in these areas.

**SEIZURE DISORDERS:** Seizure disorders are characterized by episodes of uncontrolled & excessive electrical activity in the brain. This activity results in a sudden change in behavior called a seizure. Seizures can be triggered by physical stimuli, loud noises, bright or flashing lights, odors, or stress. The event is described as a lightning storm in the brain. A seizure may be subtle & consist of abnormal sensations (partial seizure [previously called a petite mal seizure]), or it may produce overt involuntary repetitive movements & loss of consciousness (generalized seizure or tonic-clonic seizure [previously called a grand mal seizure]). According to the Epilepsy Foundation, seizures affect approximately 3 million people in the U.S. each yr & 10% of the population will experience a seizure in their lifetime. Epilepsy is a term used to describe recurrent seizures. **Tonic-Clonic Seizure S/S:** These are the most intense type of seizures & produce an intermittent contract-relax pattern in muscles called a convulsion. There are often two phases of a tonic-clonic seizure, the tonic phase & the clonic phase. During the tonic phase, muscle tone increases & generalized muscular contractions begin. A cry may be heard as abdominal & thoracic muscles contract, forcing air out of the lungs. This phase lasts approximately 10 seconds. The clonic phase is the classic presentation of alternating muscular contraction & relaxation. These contractions gradually subside in several minutes. Your client with a seizure disorder is more likely to have a seizure if he or she has stopped taking his or her prescribed medications.

**Massage Modifications for Seizure Disorders:** If your client has a seizure disorder, ask how the condition is being managed. If the client is under medical supervision, massage can proceed. Next, ask about any known triggers, & avoid them during the session. For example, certain odors can trigger a seizure; therefore certain essential oils may be contraindicated. Clients who have seizure disorders are more likely to have one if they stop taking anti-seizure meds.

**Seizure First Aid Measures:** If your client appears to be having a seizure, follow these steps. Every situation will be different.

1. **Stay calm.** If possible, time the length of the shaking phase of the seizure.

2. Gently place the person on the floor (if possible).

3. Place a cushion or soft jacket under the person’s head to keep it inclined to prevent the head from banging the floor while he or she is shaking. Roll the person onto his or her side. This will allow saliva to fall out of the mouth instead of collecting in the back of the throat & possibly blocking the airway, causing him or her to choke.

4. Remain with the person until the seizure has ended.

After the seizure has ended, help the person back to normal awareness by asking a few simple questions, such as what his or her name & the location is. Use a calm & reassuring voice. The post-seizure period is called the postictal state & can last from several minutes to several hours. Be sure your client is safe. If he or she has bit their tongue or cheek, those areas may be sore. If the person experienced incontinence, be sensitive, helpful, & provide assistance if needed. The person may feel sore, fatigued, confused, complain of a headache, & have no memory of the event.

**Call 911 if:**

1. It is the person’s first seizure or if you do not know.

2. If the seizure lasts more than 5 min, immediately repeats, or if the person cannot be awakened after the seizure.

3. If the person is injured or vomits during the seizure.
4. If the person has a medical condition such as diabetes, heart disease, congestive heart failure, or is pregnant.

Inform EMS how long the seizure has lasted & the symptoms exhibited.

Don’ts are:

• Do not restrain the person; this may provoke an aggressive response.

• Do not put anything in the mouth.

• Do not give the person water, food, or medicine until the seizure is over & he or she is alert.

STROKE: A stroke, also called a cerebrovascular accident or brain attack, is a sudden disruption of blood flow to the myocardium caused by a blood clot or hemorrhage from a broken blood vessel. According to the CDC, approximately 795,000 people in the U.S. have a stroke each year. One case in four is a recurrent episode.

Stroke S/S: Unilateral muscle weakness, speech difficulty (slurred or garbled speech), difficulty understanding others, & movement difficulty. The person may experience unilateral sensations of numbness, tingling, or burning. Dizziness (vertigo) or seizure activity may also occur. Severe strokes may cause coma, loss of consciousness, or even death.

Stroke First Aid Measures: A stroke requires immediate medical attention. The acute care principle is time is brain. It is important to know the signs of stroke. To learn & remember these signs & what to do, use the acronym F-A-S-T:

FACE. Ask the person to smile. If one side of the face drops, it is a sign of stroke

ARMS. Ask the person to raise both arms. If one arm drifts downward, it is a sign of stroke.

SPEECH. Ask the person to repeat a simple phrase, such as “Is it sunny outside?” If speech is slurred, it is a sign of stroke.

TIME. If any of the aforementioned signs are observed, call 911. The quicker they get to the hospital, the more likely that treatment will be able to completely reverse the stroke's effect.

REFERENCES:
