

Circulatory System

The circulatory system, through the medium of the blood, works to maintain homeostasis, which is the tendency to maintain a stable internal environment

Massage can help or impair this system.

Delivery of nutrients and oxygen	If cells do not receive blood they die as in stroke, heart attack, pulmonary embolism, renal infaction and decubitus ulcers
Removal of waste products	Waste includes carbon dioxide and noxious compounds. If blood and lymph supply is limited, affected cells can drown in their own waste products
Temperature	Blood vessles dilate when it's hot and constrict when cold. Also, prevents hot places (heart, liver, working muscles) from getting too hot. Helps to maintain a stable environment
Clotting	Occurs when a rough place develops in the endothelium of a blood vessel, causing a chain of chemical reactions that results in the spinning of tiny fivers that catch cells to plug

		any gaps. Sometimes a curse rather than benefit.
	Protection from Pathogens	Defends against hords of microorganisms that try to gain access to the body's internal environment.
	Chemical Balance	Supplied with enzymes and other buffers that keep pH balance within the safety zone.

part 1

[Back](#)

[Next](#)

The Blood

Includes Red Blood cells (Erythrocytes), White Blood cells (Leukocytes) and Platelets (Thrombocytes)

All are produced in the red bone marrow.

Red Blood Cells

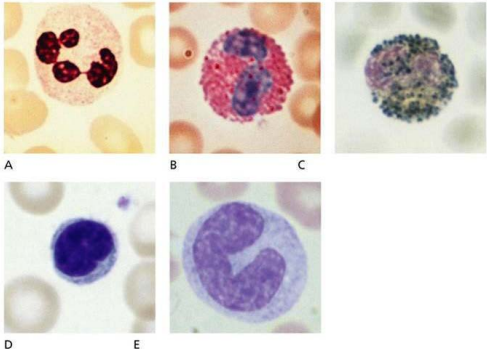
- Produced and dying at 2 million per second
- Comprise 98% of blood cells.
- Life span is about 4 months
- Deliver oxygen to cells and carbon dioxide to lungs

White Blood Cells

- Not really white, they're clear
- Different type fight different type infections
- in different stages of development
- Types include: neutrophils, basophils, eosinophils, monocytes and lymphocytes

Platelets

- Fragments of huge cells born in red bone marrow.
- Usually smooth, but become spiky and sticky when stimulated
- Travel system looking for leaks or rough places in blood vessels. When found,



Varieties of White Blood Cells
A. Neutrophil; B. Eosinophil; C. Basophil; D. Lymphocyte; E. Monocyte

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they create a clot.

part 1

[Back](#)

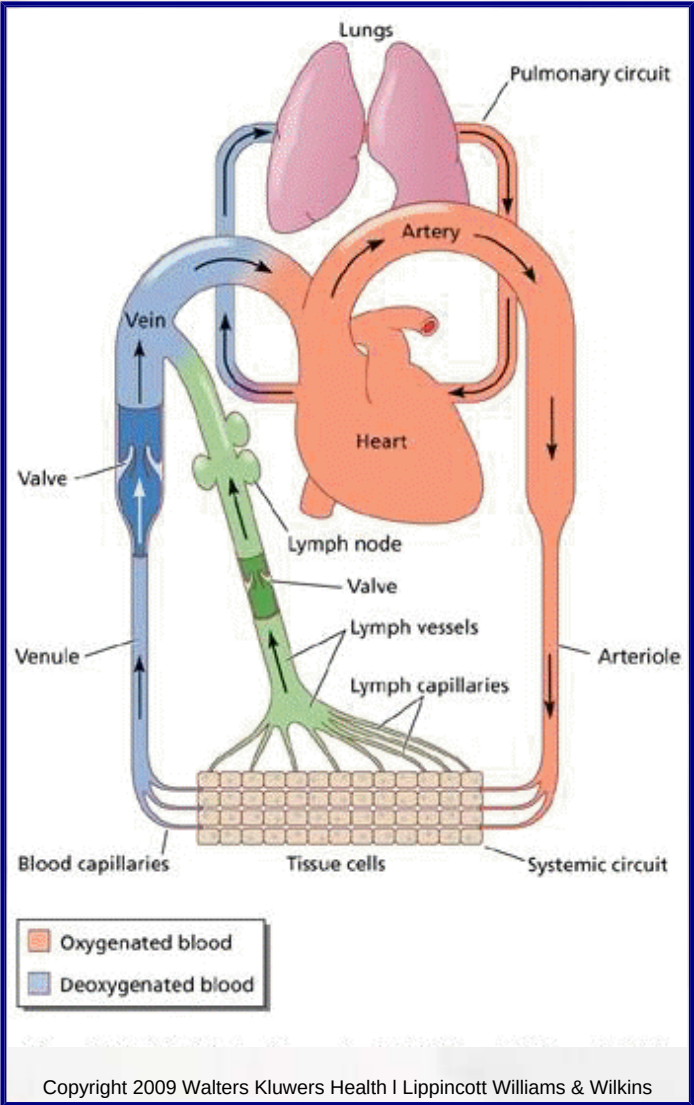
[Next](#)

The Heart

Divided into left and right halves by the septum; right half pumps to the lungs and left half pumps to the rest of the body.

Each half divided into top and bottom; small top chambers are called atria and is where blood from lungs and body returns; lower chambers are called ventricles.

Muscles of the atria are thinner and weaker; ventricle muscles are thicker and stronger



part 1

[Back](#)

[Next](#)

Blood Vessels

Arteries/Arterioles = Vessels **leaving** the heart

Veins/Venules = Vessels **going toward** the heart

Capillaries = Vessels that **connect** Arteries and Veins

Circulatory System consists of 60,000 miles of tubing

Arteries and Veins consist of 3 layers:
Internal layer (tunica intima) of epithelium
Middle layer (tunica media) of smooth muscle
External layer (tunica externa) of tough connective tissue.

Capillaries are delicate variations thereof and as such are much more delicate and easy to damage

part 1

[Back](#)

[Next](#)

Blood Disorders

- Anemia
- Embolism, Thrombus
- Hematoma
- Hemophilia
- Leukemia
- Malaria
- Myeloma
- Sickle Cell Disease
- Thrombophlebitis, Deep Vein Thrombosis

[Back](#)

[Next](#)

part 1

Anemia

Insufficient oxygen-carrying capacity ; Often a symptom or complication rather than freestanding problem

Demographics

3.4 million people in the United States

Mostly women

People with chronic diseases: cancer, infection, bone marrow suppression

Etiology

Idiopathic anemia

No identified cause, massage may offer temporary improvement

Nutritional anemia

Some deficiency; massage won't have much affect
Cautions for pernicious anemia

Iron deficiency anemia

Needed to form hemoglobin
Most common in women: need twice as much iron as men; get fewer calories
Pregnant women especially
Folic acid deficiency anemia
Needed to form RBCs
Water soluble: any excess can't be stored

Pernicious anemia

Inadequate Vitamin B₁₂: not enough in diet (vegans) or poor access in stomach (lack of intrinsic factor)
Can lead to central nervous system (CNS) damage, anemia
Other nutritional deficiencies

Copper, protein, others

Aplastic anemia

Suppressed bone marrow activity

Shortage of all blood cells

Autoimmune problem, renal failure, folate deficiency,
viral infection, radiation, some toxins

Myelodysplastic anemia: similar problem, related to
leukemia, myeloma

Secondary anemias

Complication of other disorders

Ulcers

Kidney disease

Hepatitis

Acute infectious disease

Leukemia, myeloma, lymphoma

part 1

[Back](#)

[Next](#)

more **Anemia**

Signs and Symptoms	Massage
Pallor	Depends on cause
Dyspnea	May offer temporary improvement; probably not long term
Fatigue	Won't reverse etiology of most types of anemia
Rapid heart rate	Cautions: heart rate; pernicious anemia may change sensation
Intolerance to cold	Sickle cell and malaria are discussed elsewhere

part 1

[Back](#)

[Next](#)

Embolism, Thrombosis

Embolism: traveling clot ; **Thrombus:** lodged clot

Etiology

Platelets flow through circulatory system; activated by any rough spot or inflammatory chemicals
Clots form at sites of damage, areas of slow, irregular blood flow
Emboli travel until vessel is too small

Pulmonary embolism

From a clot that forms on venous side of systemic circuit
650,000 pulmonary emboli/year
200,000 deaths
Often related to deep vein thrombosis (DVT), complications of trauma, orthopedic surgery

Risk factors for pulmonary embolism

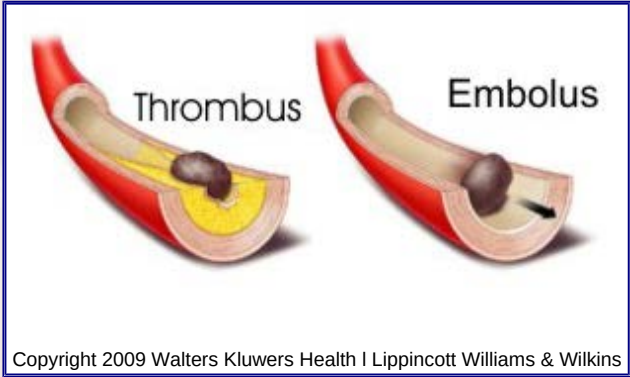
Other types of cardiovascular disease, recent trauma, bed rest, surgery, pregnancy, recent childbirth, overweight, smoking, birth control hormones, hormone replacement therapy
Number 3 cause of death in hospital setting

Signs and symptoms of pulmonary embolism

Usually none till after damage has occurred
Dyspnea, chest pain, coughing with bloody sputum
Can look like heart attack

Demographics

3.4 million people in the United States
Mostly women
People with chronic diseases: cancer, infection, bone marrow suppression



Complications of pulmonary embolism

Increased risk of another event

Loss of lung function → right-sided heart failure

Treatment

Thrombolytics, anticoagulants

Surgery if necessary

Prevention

Identify risk

Low-dose presurgical anticoagulants

Elevation of legs

External compression of legs

Early ambulation

Arterial embolism

Complication of atherosclerosis

Could also be from bacterial infection, atrial fibrillation, rheumatic heart disease

Emboli are usually clots

Can also be plaque, bone chip, bubble, knot of cancer cells

When septum is intact

All venous emboli travel to lungs

Arterial emboli can go anywhere except the lungs

Coronary artery (heart attack)

Carotid/ cervical artery (stroke)

Renal artery (renal infarction)

Femoral artery (muscle infarction)

Other

part 1

[Back](#)

[Next](#)

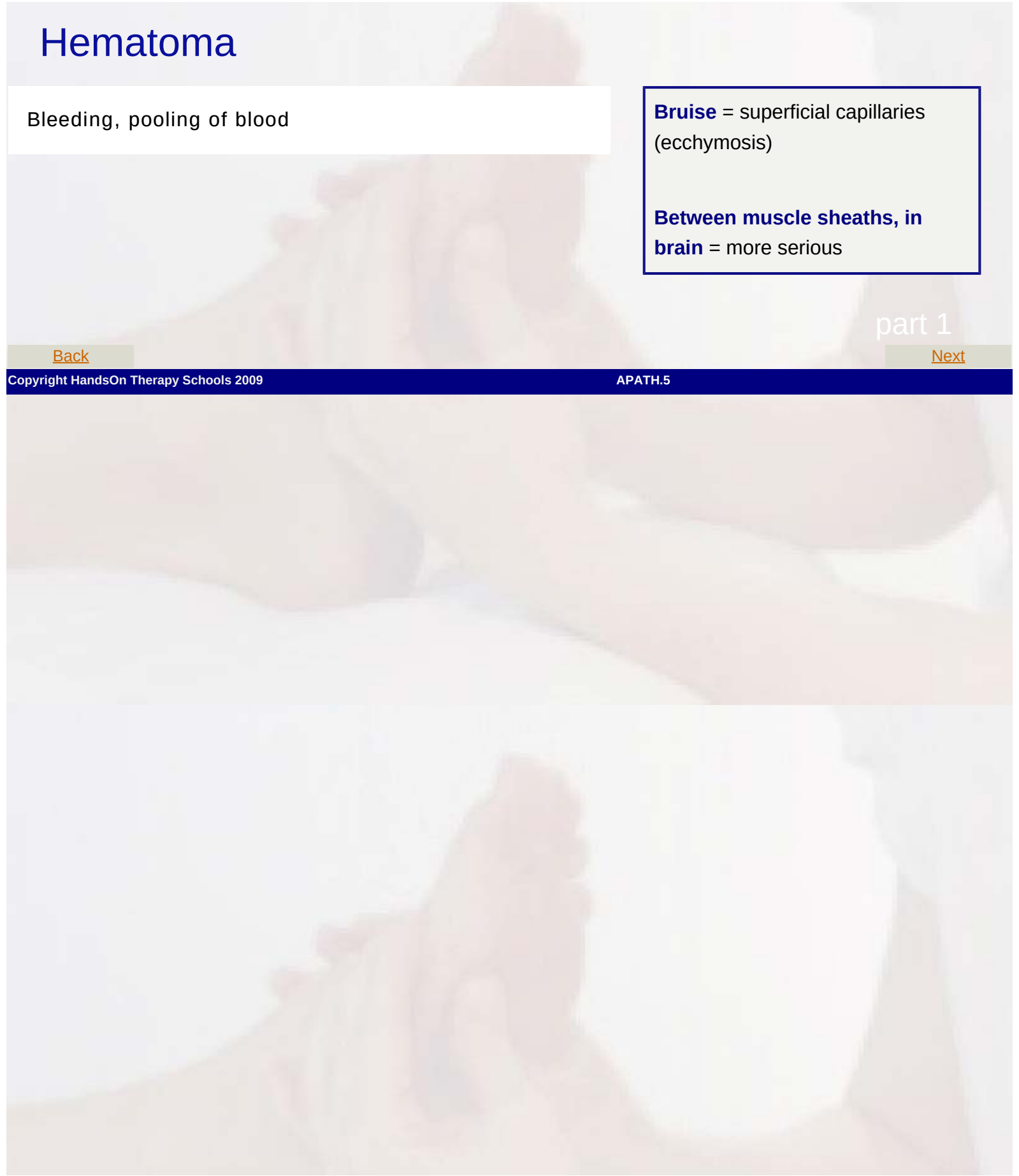
more Embolism, Thrombosis

Signs and Symptoms	Treatment	Massage
May be silent May involve sharp tingling pain, tissue damage and death	Prophylactic anticoagulants	Rigorous circulatory massage is contraindicated for clients who tend to form clots Cautions with anticoagulant medications

part 1

[Back](#)

[Next](#)



Hematoma

Bleeding, pooling of blood

Bruise = superficial capillaries (ecchymosis)

Between muscle sheaths, in brain = more serious

part 1

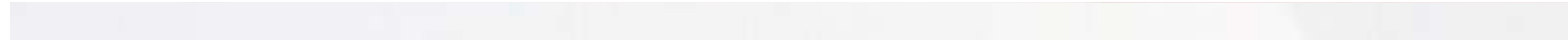
more Hematoma

Signs and Symptoms	Treatment	Massage
Bruises reddish/purple, black/blue when acute Yellow/green when subacute Larger intermuscular bleeds Inflammation with discoloration Heat, pain, usually in fleshy areas	Bruises nothing, or hot and cold Subungual hematomas may have to be aspirated Intermuscular bleeds should be watched Compartment syndrome Myositis ossificans	Locally contraindicated while acute and painful Work gently, use hydrotherapy, stay within tolerance

part 1

[Back](#)

[Next](#)



Hemophelia

Genetic disorder ; Absence of various clotting factors

Etiology

Hemophilia A (80% of cases)

Deficiency in clotting factor VIII

Hemophilia B (also called Christmas disease) (15% of cases)

Deficiency in clotting factor IX

Other: much rarer than A or B

Person with hemophilia has difficulty forming solid, long-lasting clots

Don't bleed faster, do bleed longer than others

Rated as mild, moderate, severe

Severe hemophilia = 60% of diagnoses;
<1% normal clotting factors

Demographics

About 18,000 men in the United States

About 400 new cases/year

Carried on X-chromosome: women are carriers who pass it to their sons

About one-third of cases are spontaneous mutations

It is possible but rare for women to have hemophilia

part 1

more Hematoma

Signs and Symptoms	Complications	Treatment	Massage
Signs at birth: umbilical cord bleeds excessively	Leading cause of death in children with hemophilia is intracranial bleeding	Supplement clotting factors	Rigorous mechanical massage is contraindicated
Early childhood: infant/toddler accidents	Bleeding into joint capsules with inflammation and extensive damage	Can be done at home now, prophylactically or after injury	Energetic work appropriate and helpful for stress, pain relief
Bruising, hematomas, nosebleeds, hematuria, joint pain from bleeds into capsule	Hemophiliac arthritis Ankles, knees, elbows Muscle and nerve damage Infected blood products Vaccinate for hepatitis A, B Resistance, hypersensitivity to synthetic clotting factors	Careful exercise, weight control	

Leukemia

White blood ; Cancer of bone marrow

Etiology

Myeloid or lymphoid cells from bone marrow

Bone marrow produces multitudes of non-functioning WBCs

Can be acute (aggressive) or chronic (slow-growing)

Usually acquired genetic mutations

Exposure to toxins, radiation

Untreated leads to death from excessive bleeding, infection

Four main types

AML: acute myelogenous leukemia

CML: chronic myelogenous leukemia

ALL: acute lymphocytic leukemia

CLL: chronic lymphocytic leukemia

Demographics

35,000 diagnoses/year

22,000 deaths

Leading cause of death by cancer in children; more common in adults

208,000 patients in the United States

part 1

[Back](#)

[Next](#)

more Leukemia

Signs and Symptoms	Diagnosis	Treatment	Massage
Bone marrow dysfunction	Blood tests, bone marrow biopsies, spinal tap	Depends on what cells have been affected Chemotherapy	Rigorous circulatory massage may be too demanding
Suppressed production of normal blood cells	Crossover with lymphoma	Four stages	Other types of work may be helpful
Fatigue, anemia		Induction	
Easy bruising, bleeding		Consolidation	
Chronic infections		CNS prophylaxis	Work as part of health care team
		Maintenance therapy	
		Radiation therapy if unresponsive to chemo	
		Bone marrow transplant	
		Biologic therapies	
		Treatments can exacerbate symptoms	

part 1

[Back](#)

[Next](#)

Malaria

Vector-borne infection of blood cells ; Four species of protozoa

- Plasmodium ovale
- Plasmodium vivax
- Plasmodium malariae
- Plasmodium falciparum

Spread by Anopheles mosquitoes

Demographics

Worldwide: 500 million/year

1.5 million to 3 million deaths/year,
average age = 4 years old

90% of cases in sub-Saharan
Africa

No longer common in the United
States : 1,000–2,000 diagnoses a
year (mostly travelers)

Etiology

Life cycle of Plasmodium

- Human is bitten by female mosquito
- Immature parasite introduced to bloodstream
- Travels to liver, grows 6–9 days
- Reenters bloodstream
- Invades healthy RBCs
- Feeds on hemoglobin
- Replicates
- Infected cells rupture, releasing parasites
and toxins
- P. falciparum can be fatal
- Transmitted through blood, mother to child

part 1

[Back](#)

[Next](#)

more Malaria

Signs and Symptoms	Diagnosis	Prevention	Massage
Physical symptoms	Some parasites becoming resistant to chloroquine	Prophylactic medication	Contraindicated while acute
Often missed in the United States	Important to treat fully	Mosquito nets, insecticide, etc.	Get information on kidney, liver damage to make other choices
Blood smears		Vaccine in development	
Other tests in development		Bacille Calmette-Guérin (BCG) has many problems	

part 1

[Back](#)

[Next](#)

Myeloma

Cancer of bone marrow, specifically maturing B cells

Etiology

Normally, only a few B cells in bone marrow before they migrate to lymph tissue

Usually spine, pelvis, ribs, skull

While B cells mature in bone marrow, they undergo a DNA mutation

Proliferate into tumors

Secrete cytokines that block osteoblast activity, stimulate osteoclasts ; Bone thinning, holes

Produce faulty antibodies

Monoclonal immunoglobulins (M-proteins)

Fragments can show in urine: Bence Jones proteins

Progress can be tracked through urinalysis

Kidneys can sustain damage

(Tumors outside bone = *plasmacytomas*)

Three types of myeloma

Multiple myeloma

Solitary myeloma

Extramedullary plasmacytoma

Demographics

16,700 diagnoses/year

58,300 current patients

11,000 deaths/year

Usually diagnosed around age 70

Older black men more than other groups

more Myeloma

Signs and Symptoms	Diagnosis and Staging	Treatment	Massage
Silent early	Urinalysis	Watchful waiting	As with other blood cancers, support rather than challenge stability
Bone pain, fractures	Bone marrow biopsy, aspiration	Chemotherapy, bone marrow stem cell transplantation	Work for immune support, pain relief
Anemia, infections, bleeding	Blood test		
Kidney problems	Radiography, magnetic resonance imaging (MRI)		High risk of fractures
Amyloidosis	Stages I–III		

part 1

[Back](#)

[Next](#)

Sickle Cell Disease

Autosomal recessive genetic condition ; Production of abnormal hemoglobin

Etiology

Recessive gene: one copy = SC trait, not disease

Two people with SC trait have 25% chance of passing it on to each child

SC trait has no health consequences

SC disease: hemoglobin is abnormal, RBCs have sickle shape ; Lifespan of RBC = 10 days

Three variations

SS form (most common)

SC form

S-beta thalassemia

Demographics

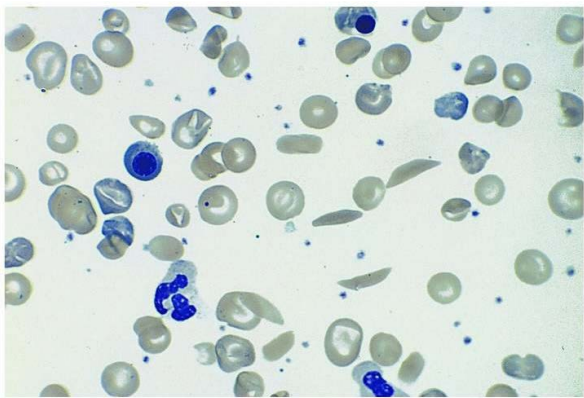
SC gene most common in blacks, Hispanics, Mediterraneans, from Middle East

2 million people with SC trait in the United States

72,000 have SC disease

8,000 births/year

500 deaths/year



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part 1

[Back](#)

[Next](#)

more Sickle Cell Disease

Signs and Symptoms	Complications	Treatment	Massage
Inadequate oxygen-carrying capacity	Sickle cell crises: infarctions	Work to limit severity, frequency of SC crises	Rigorous exercise <i>not</i> recommended
Fatigue	Hand-foot syndrome	Over-the-counter (OTC) pain medication, hot pack	Circulatory, mechanical massage contraindicated
Shortness of breath	Organ damage	Heavier painkillers	Reflexive, energetic may be helpful
Pallor	Infections (lost spleen function)	Prophylaxis for pneumonia	Warm packs, gentle stroking for pain
Jaundice, splenomegaly	Gallstones		
Other complications	Vision loss		
	Acute chest syndrome (looks like pneumonia)		
	Others		
	Delayed growth, chronic skin ulcers at lower legs, priapism		

Aortic Aneurysm

Veins have become obstructed with clots ; Usually calves, thighs, pelvis

Thrombophlebitis = lesser, greater saphenous veins

DVT = popliteal, femoral, iliac veins

Demographics

Often unrecognized, untreated

DVT may happen 2 million times

Diagnosed in 600,000

200,000 deaths

Up to 5% population may have a DVT at some point

Etiology

Thrombi = stationary clots; can fragment and travel

Usually to lung → pulmonary embolism
(exception with patent foramen ovale; cross over to arterial side)

Virchow triad

Injury to endothelium

Hypercoagulability

Venous stasis

Possible triggers

Physical trauma

Varicose veins

Local infection

Reduced circulation

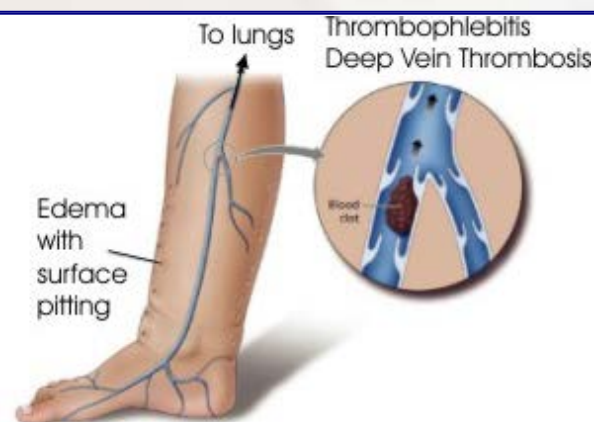
Immobility

Pregnancy and childbirth

Certain types of cancer

Surgery

High-estrogen birth control pills or hormone replacement therapy



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Other factors: cigarette smoking,
hypertension, paralysis, and some genetic
conditions

Clot forms; sudden movement or change in position
causes debris to break off and travel

part 1

[Back](#)

[Next](#)

more Thrombophlebitis, Deep Vein Thrombosis

Signs and Symptoms	Diagnosis	Treatment	Massage
May be obvious with signs of inflammation	Ultrasound: fast, noninvasive, high chance of false positive	Thrombolytics to break clots; anticoagulants to prevent future ones	A client with diagnosed blood clots is not a good candidate for circulatory massage
Sometimes distal edema	Venography: more accurate, slower, more risk of damage	Risk of bleeding	Signs may be indistinct, misleading
Chronic problem → skin rashes, ulcers	MRI: fast, noninvasive, accurate, expensive, not available everywhere	Pneumatic compression, support hose for DVT	
With infection: fever, malaise		Superficial thrombophlebitis: hot packs, analgesics, gentle exercise	
DVT more dangerous, higher risk of serious damage ; May show pitting edema		Vena cava filter	

part 1

[Back](#)

[Next](#)

Vascular Disorders

Aneurysm
Atherosclerosis
Hypertension
Raynaud Syndrome
Varicose Veins

[Back](#)

[Next](#)

part 1

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Aortic Aneurysm

Bulge in blood vessel wall or heart ; Usually at aorta or in brain. If an aneurysm ruptures, extensive bleeding can happen

Demographics

Most patients are men 60 years or older

About 15,000 deaths/year

Etiology

If walls of high-pressure arteries lose elasticity, they can bulge

As aneurysm grows, walls get thinner

Usually happens at thoracic or abdominal aorta or base of brain

Sometimes the whole ventricle of heart can bulge

Factors

Compromised smooth muscle

Smoking

Congenitally weak arterial wall muscle

Inflammation

Untreated syphilis

Trauma

Types of aneurysms

Saccular

Fusiform

Berry

Dissecting



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more Aortic Aneurysm

Signs and Symptoms	Diagnosis	Treatment	Massage
Sometimes silent	Blood makes specific sound (bruit)	Endovascular or open surgery	Circulatory massage requires too much adaptation
May press on other structures	Palpable in thin people	Replacement graft, Dacron substitute, stent	A client with a diagnosed aneurysm may get benefit from reflexive, energetic work to lower blood
Dysphagia, chest pain, hoarseness, coughing (thoracic aorta)	Ultrasound, computed tomography (CT), MRI	Small bulges may not need immediate repair	
Throbbing lump near umbilicus	Complications		
back pain (abdominal aorta)	Pressure on nearby structures		
	Blood clots		
	Rupture, hemorrhage		
	Ruptured cerebral hemorrhage is fatal 50% of time		
	Ruptured aortic hemorrhage is nearly always fatal		

Atherosclerosis

Subtype of arteriosclerosis

Hardening of arteries due to plaque

Damage causes spasm, blood clots

Diameter is occluded

Coronary artery disease (CAD) = atherosclerosis at coronary arteries

Etiology

Multifactorial process ; Influenced by gender, age, race, diet, others

Basic progression

1. Endothelial damage

Carbon monoxide; high levels of low-density lipoproteins (LDLs) and triglycerides; high iron

Occurs most readily at branches or sharp curves

2. Monocytes arrive, move in, become macrophages

3. Macrophages take up LDL.

Become foam cells: beginning of plaque

4. Foam cells infiltrate and damage smooth muscle tissue.

Secrete growth factors that cause smooth muscle cells to proliferate

Release enzymes that damage arterial walls, promote clotting

5. Platelets arrive

Secrete growth factors

Form clots

Cause vascular spasm
Unchangeable risk factors

Heredity, genetics

- Gender
- Age
- Kidney disorders

Modifiable risk factors

- Smoking
- High cholesterol levels
- High blood pressure
- Sedentary lifestyle
- Diabetes

Other Risk Factors

- C-reactive protein
- Homocysteine
- Others: BMI, fibrinogen, lipoproteins, stress management...

part 1

[Back](#)

[Next](#)

more Atherosclerosis

Signs and Symptoms	Diagnosis	Treatment	Massage
None early: 50% occlusion before dysfunction (angiogenesis, adaptability) Later: poor stamina, shortness of breath, complications Complications High blood pressure Aneurysm Arrhythmia Thrombus or embolism, peripheral vascular disease Angina pectoris Stable angina pectoris Unstable angina pectoris Heart attack	Angiogram, CT, blood tests, echocardiogram, ultrasound, ankle-brachial index	Diet and exercise Drugs Lower blood pressure, cholesterol, platelet activity Surgery Bypass, angioplasty, endarterectomy	Determined by client's resilience: is it safe to exercise rigorously? Adjust for medications as needed

Hypertension

High Blood Pressure: Consistently above 140/90

Etiology

Blood pressure variables

- Pressure inside vessels
- Pressure outside vessels
- Blood volume
- Vessel diameter

Types of high blood pressure

- Essential: 95%
- Secondary (temporary complication)
- Malignant hypertension: diastolic rises very quickly —medical emergency

Blood pressure readings

- Risk of damage to vessels begins when systolic > 115, diastolic > 75
- A measurement is based on two or more readings at different office visits

Category	Systolic	Diastolic
Optimal	<120	<80
Prehypertension	120–139	80–89
Hypertension		
Stage 1	140–159	90–99
Stage 2	160+	100+

Demographics

65 million people in the United States

1 in 3 adults

Men > women until menopause, then men = women

African Americans more than other races

Age: -half of people 60 years or older have hypertension

Other factors

- Obesity, smoking, high cholesterol, atherosclerosis, water retention
- Genetic predisposition

more Hypertension

Signs and Symptoms	Treatment	Massage
Silent killer	Of 65 million with hypertension in the United States	Depends on health, resilience of client
Shortness of breath; headache/dizziness; swelling of ankles; sweating, anxiety	63.4% know	Massage can lower blood pressure and stress
Complications	45.3% treat it at all	
Edema	29.3% treat it successfully	Get info on kidney, heart problems
Atherosclerosis	70% of people with hypertension don't control it well enough to prevent complications	No deep abdominal work
Stroke		
Enlarged heart, heart failure		
Aneurysm	DASH diet	
Kidney disease	Exercise	
Vision problems	Medication	
	Diuretics, vasodilators, beta-blockers	
	Medication causes side effects; high blood pressure has no symptoms	

part 1

[Back](#)

[Next](#)

Raynaud Syndrome

Primary Raynaud disease: vasoconstriction in extremities (also nose, ears, lips) ; Secondary Raynaud phenomenon: complication of underlying disorder

Demographics

Primary: mostly women 15–40 years old

Some kind of Raynaud syndrome may affect 5–10% of general population

Etiology

Arterioles spasm

Temporary episodes, can become permanent

Chemical components: tunica intima secretes chemicals that affect vasospasm, viscosity of blood

May be related to hyperreactivity to cold, stress

Causes (primary)

Stress (sympathetic response), cold, mechanical irritation

Slow onset, less severe than secondary

Both hands and feet often affected

Causes (secondary)

Arterial diseases: diabetes, atherosclerosis, Buerger disease

Autoimmune connective tissue diseases: scleroderma, lupus, rheumatoid arthritis

Sensitivity to some drugs: beta-blockers and ergot compounds

Neurovascular compression: carpal tunnel syndrome, thoracic outlet syndrome, crutch use



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part 1

[Back](#)

[Next](#)

more Raynaud Syndrome

Signs and Symptoms	Treatment	Massage
Usually bilateral	Depends on cause	Depends on cause
Cycle of colors	Quit smoking, avoid vasoconstrictors, soak in warm water, dress for weather, protect hands when working in cold, etc.	Primary indicates massage
White		Secondary: be guided by underlying disorder, general health
Blue		
Red	Deal with stress: biofeedback, massage	
Episodes last < 1minute to several hours	Medication to dilate blood vessels, counteract norepinephrine	
Secondary can be extreme and long lasting: atrophy, ulcerations, skin and nail damage	Surgery: sympathectomy	

part 1

Varicose Veins

Varix= twisted

Valves in superficial veins collapse, vein is stretched, distorted ; Can happen at anus (hemorrhoids), esophagus, scrotum, legs

Etiology

In the leg

Small veins pick up blood from internal muscle capillaries

Run on superficial aspect, feed into larger veins that perforate leg muscles

Muscle contraction/relaxation moves blood from superficial to deep and up legs

Damage to valves in superficial veins

Wear and tear

Standing all day

Mechanical obstruction ; Knee socks, brace, pregnancy

Systemic problems: kidney, liver congestions

Structural anomalies

When a valve is damaged

Blood adds pressure on the next valve down

Veins become twisted, ropy

Demographics

Women > men

Progesterone weakens vein walls

History of pregnancy

Half of people 50 years or older



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part 1

[Back](#)

[Next](#)

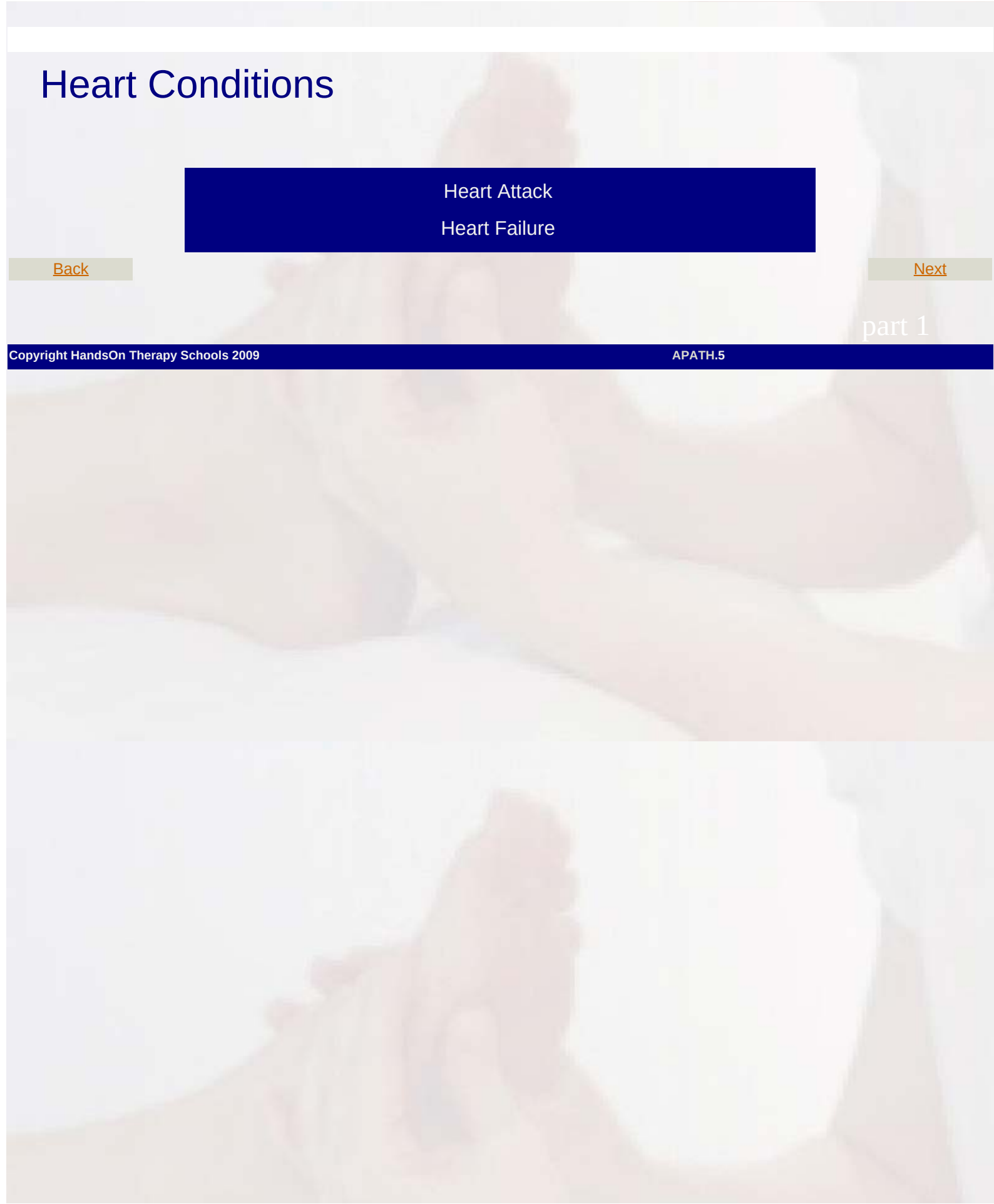
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Signs and Symptoms	Treatment	Massage
Lumpy, bluish wandering lines	Support hose, elastic bandages	Local contraindication
Protrude from skin	Avoid long periods on feet, rest with feet up	Heavy massage distal also contraindicated
Back, medial aspect of calf and thigh	Avoid constricting clothes	
Itching, throbbing pain	Surgery	For mild cases: avoid deep, sharp pressure
Complications	Vein stripping	Telangiectasias okay for massage
Varicose ulcers	Ambulatory phlebectomy	
Leg cramps	Other	
Blood clots (melt easily)	Sclerosing injections	
Risk of DVT, especially with sudden onset or change in size	Laser	
	Radiofrequency	

part 1

[Back](#)

[Next](#)



Heart Conditions

- Heart Attack
- Heart Failure

[Back](#)

[Next](#)

part 1



Heart Attack

Damage to cardiac muscle from ischemia ; Muscle tissue doesn't repair; replaced by scar tissue

Damaged area = infarct

Heart attack = myocardial infarction

Etiology

Usually blockage in coronary artery impedes blood flow

Could be clot, debris that travels from elsewhere

Prolonged coronary spasm (drug overdose)

New plaques more likely to break off than old ones

Cardiac cells die of ischemia

Can't contract with coordination

May trigger fibrillations

Ventricular fibrillation → high risk of sudden death

Seriousness determined by size, location of infarct

May impair muscle function

May damage conduction system

Demographics

Number 1 cause of death in the United State

1 million heart attacks/year
(1:5 deaths)

500,000+ deaths/year

13 million survivors alive today

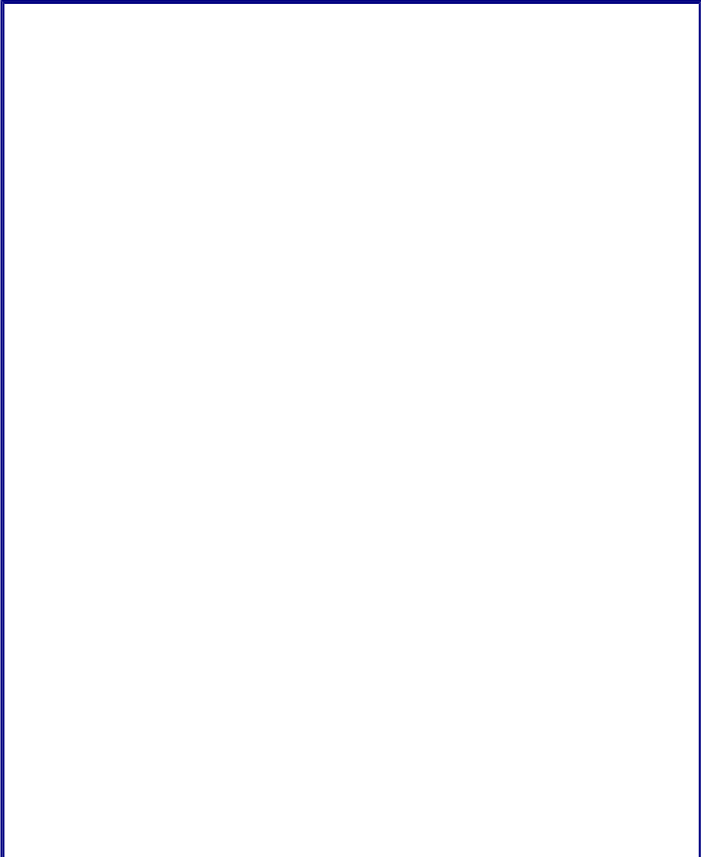
Risk profile

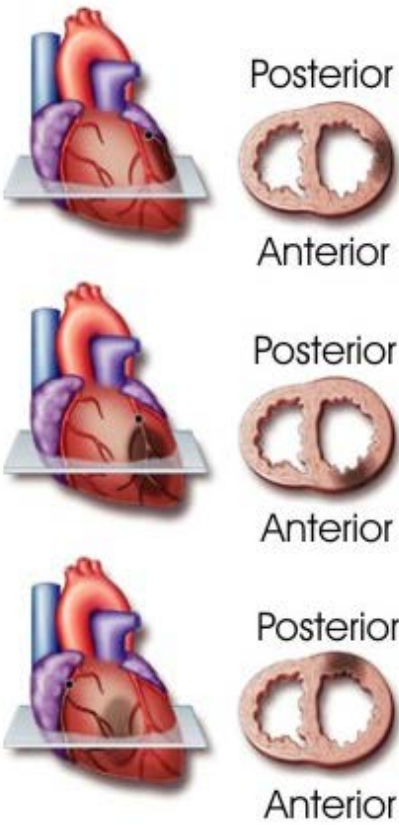
Sedentary, hypertension, high cholesterol, smoking, overweight

Male 45+, Female 55+

Family history

Female 35+ who takes birth control pills





● Coronary artery occlusion
■ Zone of infarction

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part 1

[Back](#)

[Next](#)

more Heart Attack

Signs and Symptoms	Diagnosis	Treatment	Massage
Pressure, pain in the chest	Hard to identify ahead of time	Identify location of blockage, break it up as soon as possible	Depends on resilience, ability to adapt to changes
Spreading pain	Angiogram for high-risk patients	Thrombolytics	
Light-headedness, nausea, sweating	Other tests	Percutaneous transluminal coronary angioplasty	
Others: shortness of breath, nausea, anxiety, weakness, fainting, palpitations, cold sweat, stomach/abdominal pain	High speed CT	Oxygen, pain management	
Angina pectoris (chest pain)	Contrast echocardiogram	Later care: anticoagulants, nitroglycerin, observation, evaluation	
<i>Stable angina</i>	Blood test for C-reactive protein	Lifestyle changes	
6.5 million have it	MRI for plaque		
400,000 diagnoses/year			
Triggered by extra effort			
<i>Unstable angina</i>			
Sudden onset of severe chest pain, no trigger			
Reliable predictor			
Dynamic process			
Blockage may accrue over hours			
Early intervention			

can limit
damage

Complications

- Embolism
- Atrial and ventricular
fibrillations
- Aneurysm
- Heart failure
- Shock

part 1

[Back](#)

[Next](#)

Heart Failure

Progressive loss of heart function ; Not cardiac arrest

Etiology

Heart pumps 2,000 gal/day

If resistance develops, heart compensates

Heart grows (cardiomegaly)

Ventricles become stiff, inelastic

Stress hormones boost short-term function, damage in long-term

Heart may fibrillate → circulatory system collapse

Heart failure usually related to other cardiovascular disease

Can be related to congenital weakness with heart muscle or valves

Types of heart failure: systolic v. diastolic

Systolic heart failure: left ventricle is enlarged; can't push hard enough

Diastolic heart failure: both ventricles are enlarged and inelastic

Types of heart failure: left side v. right side

Left-sided heart failure

Resistance in arteries (atherosclerosis, etc.)

Back up of fluid in lungs: pulmonary edema, shortness of breath, cough

Right-sided heart (cor pulmonale)

Resistance in lungs (emphysema, pulmonary embolism, pulmonary edema)

Demographics

3 million in the United States have heart failure

400,000 new diagnoses/year

Mostly among survivors of heart attacks, CAD, aneurysm, etc.

Men > women till age 75; then men = women

African Americans two times more than others

1 million hospitalizations/year

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Back up of fluid into legs or lowest structure

Can also cause liver, kidney damage

Biventricular heart failure

part 1

[Back](#)

[Next](#)

more Heart Failure

Signs and Symptoms	Diagnosis	Treatment	Massage
Depends on which side of heart is dysfunctional Shortness of breath, low stamina, edema, chest pain, indigestion, arrhythmia, distended vessels in neck, cold sweaty skin...	Observation, auscultation Radiography for cardiomegaly Electrocardiogram May be rated I–IV or A–D	Depends on location, severity Rest, change in diet, modify physical activity Medication Beta-blockers, digitalis, diuretics, vasodilators Surgery: repair damaged valves, mesh bag, transplant	Heart can't keep up with needs; massage shouldn't challenge any further Energetic/reflexive work may be helpful

part 1

[Back](#)

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