

Queen of Hearts & Jack of Backs Assessing Cardiac and Back Issues



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Disclosures

The following NMDP/Be The Match faculty and planning committee staff have no financial disclosures:

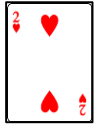
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Learning objectives

At the conclusion of this session, attendees will be able to:



Examine normal heart and back/spine anatomy.



Identify common heart and back related conditions that can increase donor risk.



Analyze case studies to incorporate NMDP donor criteria in the evaluation of cardiac and back issues.

Donor Assessment

Unrelated
Volunteer Donor

Asked to
undergo medical
procedures with
known risks

With no medical
benefit to
themselves

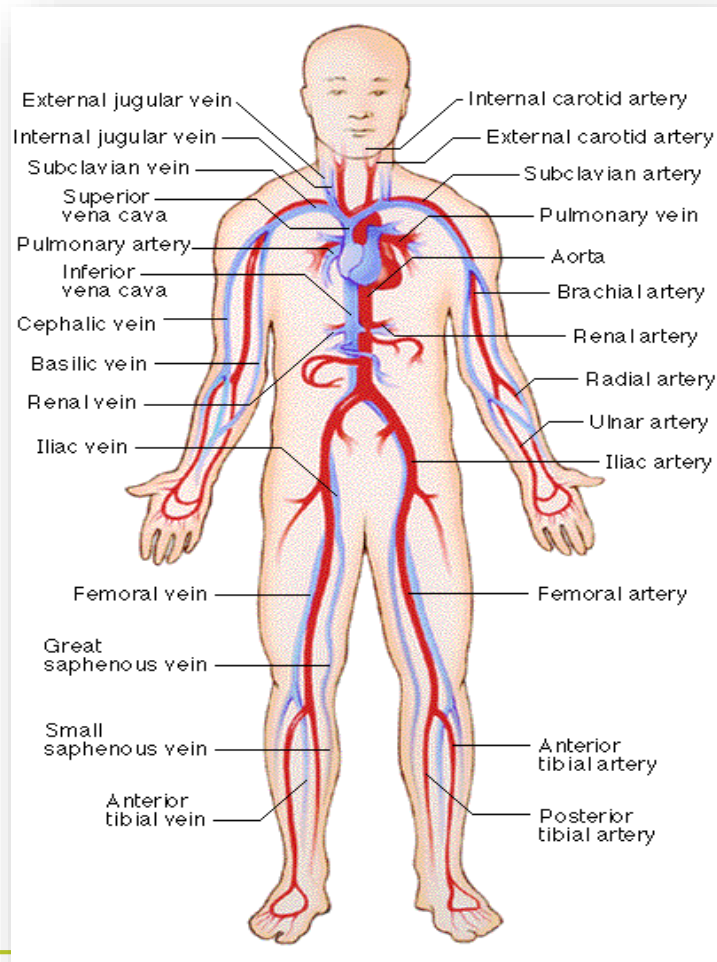
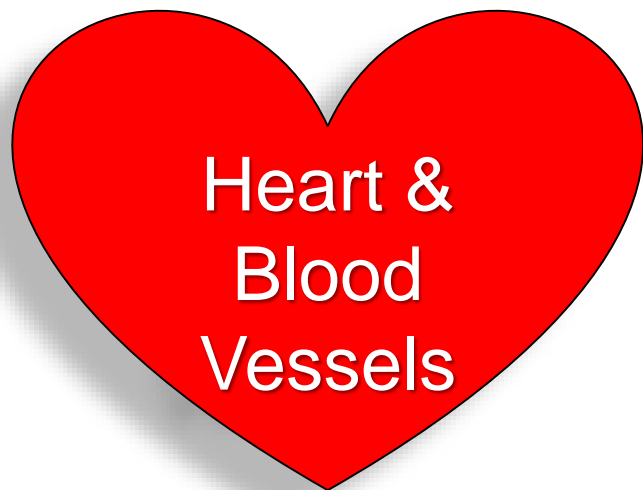
Suitability Inquiries to DMS

CARDIAC ISSUES 5%
BACK / NECK / SPINE ISSUES 19%

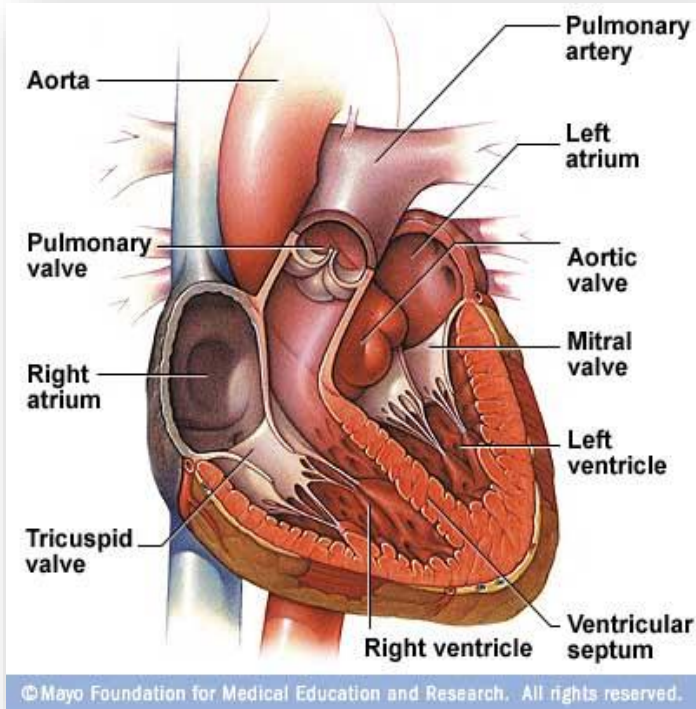
GOAL

Ensure donor's safety

Cardiovascular System



Anatomy of the Heart



Adult Heart

Size ~5" long, 3" wide & 2" deep

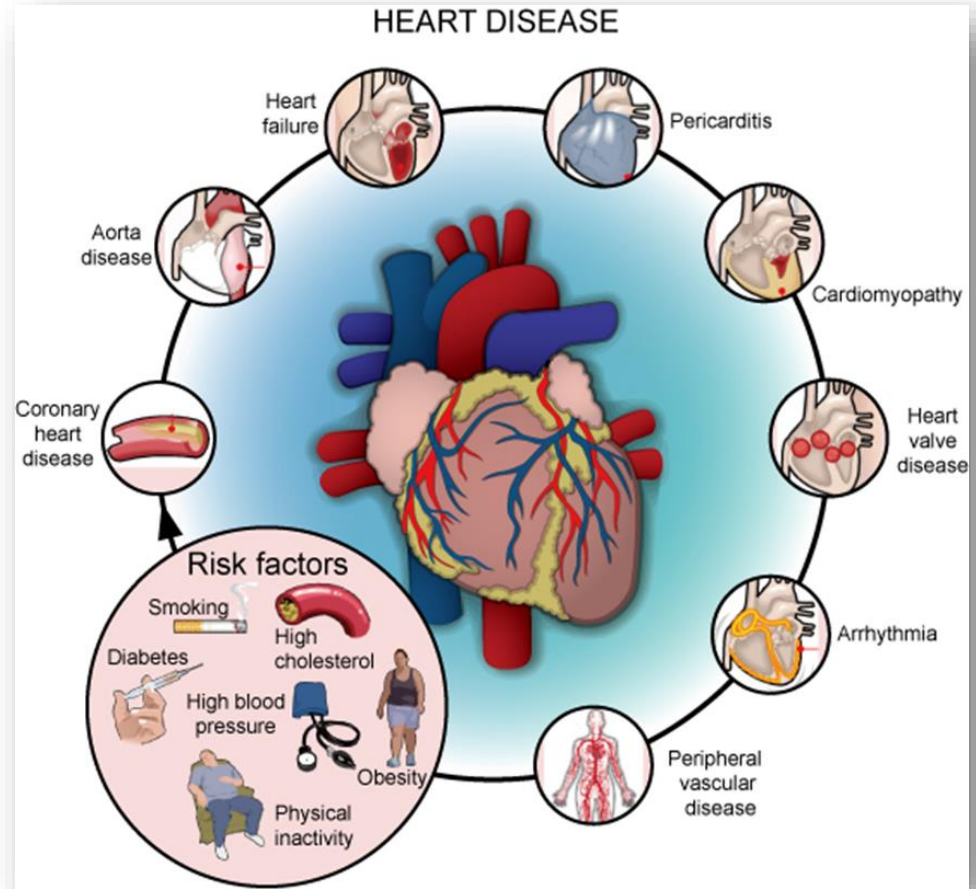
Weight ~ $\frac{1}{2}$ - $\frac{3}{4}$ lbs

Pumps ~5 qts of blood every min

Average heart beats
115,000 times each day!

Heart Disease

- 25% of all US deaths in 2008
- Leading cause of death for men and women
- Many conditions are preventable



Common Heart Problems Affecting Young Adults

- Range of causes
- Common in all ages
- Most common cause of sudden death

Arrhythmia



- Hypertrophic cardiomyopathy leading cause of death for people under 30 yrs
- Abnormally thick muscle and pumps poorly

Heart Muscle Disease



- Unknown causes
- Range of defects
- Commonly experience obstruction of blood flow or abnormal flow

Heart Defects



Symptoms

Blood Vessel Disease

Chest pain, chest tightness, chest discomfort; shortness of breath; pain or numbness in legs or arm; pain in the neck, jaw, throat, or upper abdomen

Abnormal Heart Rhythm

Fluttering, racing or slow heart beat, chest pain, shortness of breath, lightheadedness, dizziness, or fainting

Heart Defects

Pale gray or blue skin color; swelling in the legs, abdomen, around the eyes; shortness of breath, swelling in legs, hands or feet; fatigue

Weak Heart Muscle

Breathlessness on exertion or rest, swelling in legs, ankles, feet, fatigue, irregular heart rate, dizziness

Heart Infection

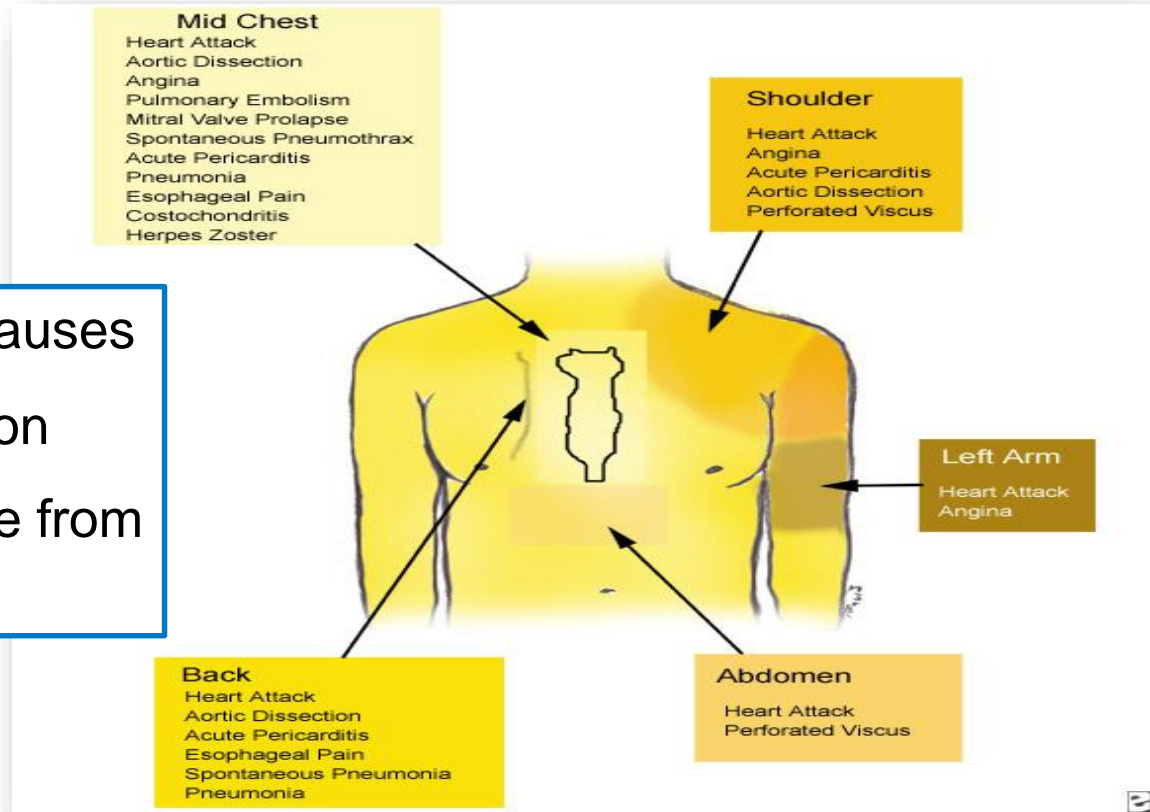
Fever, shortness of breath, fatigue, swelling in legs or abdomen, change in heart rhythm, dry persistent cough, skin rash

Valvular Disease

Fatigue, shortness of breath, swollen feet or ankles, chest pain, fainting

Chest Pain

- Can have many causes
- Requires evaluation
- Doesn't have to be from cardiac issue



Heart Murmurs

- Extra or unusual sound heard during heartbeat
- Range from very faint to very loud; sometimes sound like a whooshing or swishing noise
- Most are harmless (innocent)
- Sometimes indicates a heart problem, esp if other signs or symptoms of heart problem are present
- Innocent murmurs common in healthy children **A child or adult with an innocent murmur has a normal heart.**

Murmur Grades		
Grade	Volume	Thrill
1/6	very faint ,not heard in all positions	no
2/6	Soft ,heard in all positions	no
3/6	loud ,no thrill	no
4/6	Loud ,with palpable thrill	yes
5/6	heard with the stethoscope partially off the chest	yes
6/6	heard with the stethoscope completely off the chest	yes

- Most abnormal murmurs in children are due to [congenital heart defects](#) - heart defects present at birth.
- In adults, abnormal murmurs are most often due to heart valve problems caused by infection, disease, or aging.

Evaluation

History & Physical

- **Listen** to heart & lungs, abdomen, groin area
- **Look** for enlarged veins in neck or swollen feet
- **Check** BP in both arms
- **Look** into eyes at blood vessels
- **Ask** about symptoms such as SOB or chest pain
- **Review** medications
- **Assess** risks such as weight and activity

Laboratory Tests

- Comprehensive metabolic panel (CMP)
- Creatine phosphokinase (CPK)
- Lipid profile (LDL-C, HDL-C, cholesterol, triglycerides)
- hs-C-reactive protein
- Troponin, CK-MB, BNP
- Blood gases

Cardiac Tests

- EKG
- Holter Monitor
- Stress Test
- Electrophysiology Studies
- Tilt Table
- Cardiac Imaging Tests
 - Chest X-ray
 - Coronary Angiography
 - Echocardiogram
 - Cardiac CT
 - Cardiac Magnetic Resonance Imaging
 - Cardiac Nuclear Scan
 - Cardiac Catheterization

Anesthesia Risks

- Risk of serious injury or death during anesthesia is about same as the risk when going for a car ride.
- Unusual for healthy patients to have serious complications from anesthesia.
- **BUT** many health problems may increase the risk of complications such as smoking, lung disease, heart disease, kidney failure, and obesity.

Stress from anesthesia and surgery can unmask previously undiagnosed heart disease.



Anesthesia and Heart Disease

What are risks of general anesthesia for those with CV disease?



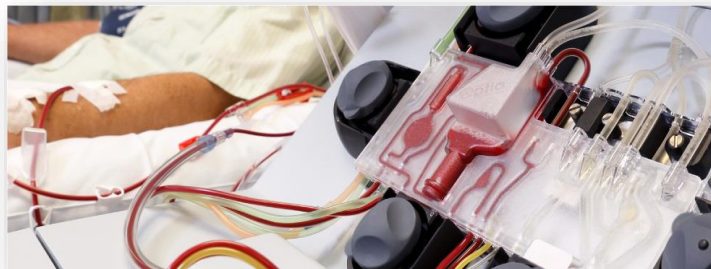
- Increase in blood pressure
- May also be associated with a higher risk for myocardial ischemia – which could lead to a heart attack.

Persons with heart disease have CV complications from general anesthesia and surgery more often and more severely than persons without heart disease.

Regional anesthesia (epidural or spinal) can lower blood pressure and cause myocardial ischemia. The risk is greater with spinal anesthesia.

American Heart Association

Risk with Heart Disease and PBSC Collection



- Large fluid exchange
- Potential electrolyte imbalance
- Increased clotting potential secondary to Filgrastim

NMDP Experience with Cardiac Issues

Donor	Product	Event Summary
#1 52 yo M	PBSC 2016	Day of collection pulse 138. EKG revealed Afib. Proceeded with collection with heart monitor. Treated with meds & oxygen. Seen by cardiologist. Admitted post collection. Electrical cardioversion successful to NSR. Discharged 3 days later.
#2 52 yo FM	PBSC 2010	2 wks post-collection reported intermittent SOB; continued and seen by cardiologist. Holter monitor showed occ PVCs; prescribed metoprolol and cardiac studies; ablation was planned.
#3 32 yo FM	PBSC 2008	While advancing wire for line placement tip briefly entered right ventricle causing PVCs. HR climbed to 166. No response to meds. Developed SVT. Treated again and responded to meds. Cardiac tests WNL. Donated without incident.

NMDP Experience with Cardiac Issues, cont

Donor	Product	Event Summary
#4 37 yo FM	PBSC 2007	C/o chest pain, palpitations, nausea after Day 1 collection; EKG showed small changes to Q waves. Admitted to cardiology. Serial cardiac enzyme testing showed progressive minimal troponin elevation. Pain relieved by nitro. Cardiac testing ruled out underlying disease. Chest pain determined to be related to filgrastim and leukocytosis (WBC $62 \times 10^9/L$). Complete recovery within 1 month.
#5 46 yo M	PBSC 2006	2 days post-collection reported increased chest pain, SOB and difficulty with deep inspiration. Cardiology consult. Testing WNL. Five days later reported tightness and tingling in arm. Admitted for observation. Again tests WNL. Possible viral infection or significant anxiety/panic attack. Complete recovery within 8 days.

NMDP Experience with Cardiac Issues, cont

Donor	Product	Event Summary
#6 38 yo FM	PBSC 2005	Reported sudden onset sharp chest pain 4 days post-collection. Rated 10/10. Seen in ER. Testing WNL. Pain treated and discharged. Returned to ER later that night with severe pain again. Admitted for observation. Diagnosed with early onset pericarditis. Etiology thought to be viral. Discharged 4 days. Full recovery in 2 mos.
#7 35 yo FM	PBSC 2005	Morning after collection reported brief episodes of sharp retrosternal chest pain which recurred following morning. Admitted for evaluation. Discharged next day. Underlying cause unknown. Complete recovery within 7 days.

Highlight of Common CV Conditions

- Arrhythmia
- Heart Block
- Mitral Valve Disease
- Pericarditis
- Aneurysm



Arrhythmia

Very common with > 3 million cases in US yearly

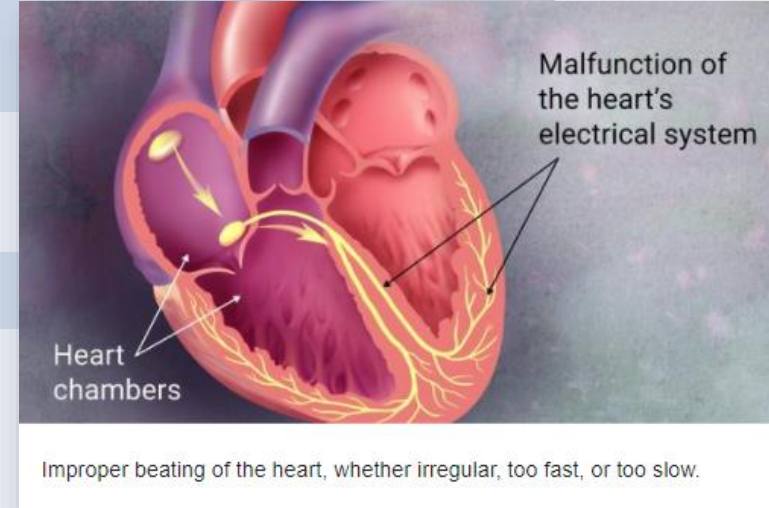
Occurs when electrical impulses in the heart don't work properly

Heart rate may go too fast (tachycardia), too slow (bradycardia) or irregular rate

May not have symptoms but can report fluttering, chest pain, fainting, dizziness

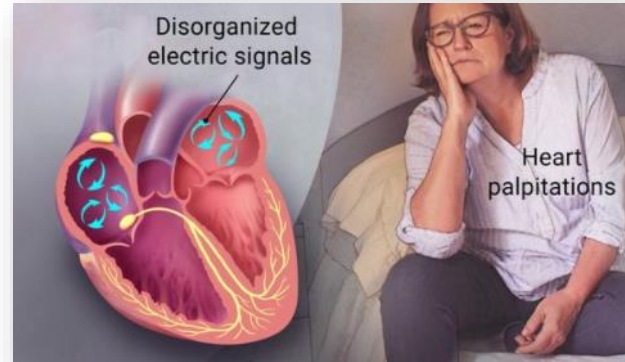
Some are harmless but some are not

Treatable with anti-arrhythmic meds, medical procedures, implantable devices, and surgery



Atrial Fibrillation

- Caused when upper chambers (atria) beat out of coordination with lower chambers (ventricles)
- Common with >200,000 US cases yearly
- Lab tests or imaging often required
- Chronic – can last for years or be lifelong
- Can occur any age but most common >40 yrs
- May have no symptoms but could include palpitations, SOB, fatigue
- Treatment includes drugs, electrical shock (cardioversion) and minimally invasive surgery (ablation)



Donor Risk:

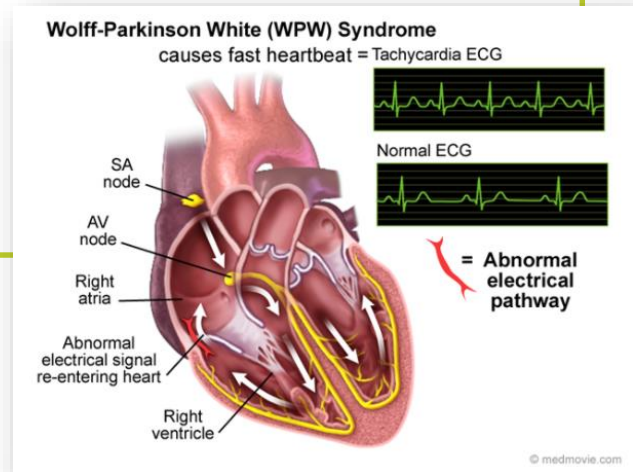
- Makes it harder for heart to pump blood effectively.
- If blood moves too slowly likely to form clots which can travel to brain and cause stroke.
- Often treated with blood thinner to prevent clots and med to keep heart from going too fast.

Wolff-Parkinson-White Syndrome

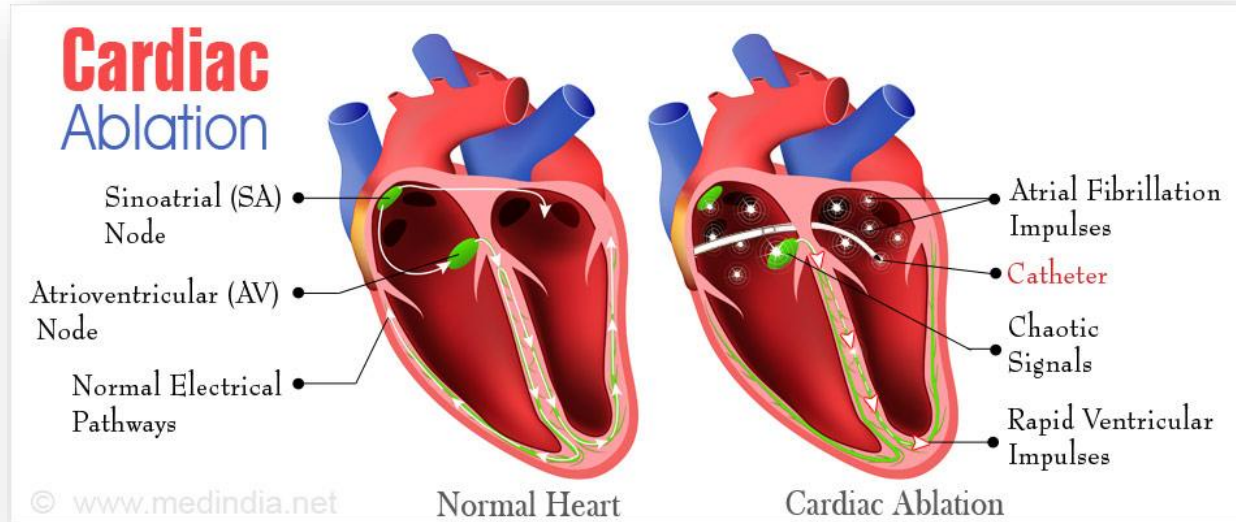
- Caused by extra electrical pathway between atria and ventricles
- Can occur at any age
- Symptoms usually abrupt and can include palpitations, chest discomfort, and fainting
- Treatment ranges from observation to catheter ablation or medications

Donor Risk:

Very rare but can have sudden death from chaotic irregular beating (atrial fibrillation) in upper chambers which can degenerate to ventricular fibrillation and death



Cardiac Ablation



In cardiac ablation, a form of energy renders a small section of damaged tissue inactive.

If successful, this puts an end to arrhythmias that originated at the problematic site.

Cardioversion

Any process that aims to convert an arrhythmia back to sinus rhythm.

Chemical Cardioversion

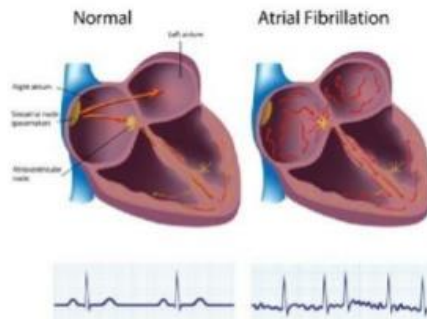
Medications to return convert to sinus rhythm

Electrical Cardioversion

Electrical current when there is a pulse but unstable, or chemical cardioversion failed or is unlikely to be successful.

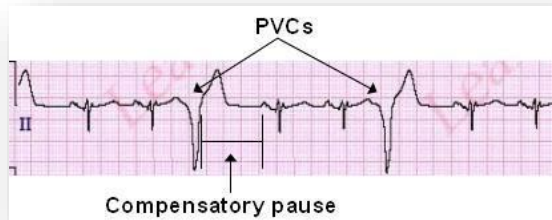
Atrial Fibrillation-Special considerations

- Cardioversion is used for rhythm control.
- Not all cardioversion is successful and, at one year, 50% redevelop AF
- Medical treatments and cardioversion are of similar efficacy (unless permanent AF).
- Cardioversion of AF is associated with increased risk of thromboembolic disease (TED)
- Anticoagulation is required for at least three weeks before and at least four weeks afterwards



Premature Ventricular Contractions

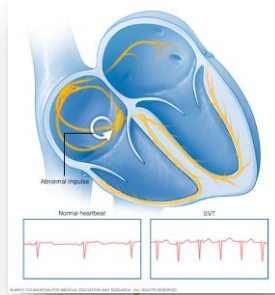
- PVCs are VERY COMMON – occur in most people
- Extra, abnormal heartbeats beginning in atria; disrupts regular rhythm
- Symptoms include “fluttering” sensation
- If otherwise healthy – generally no reason to be concerned
- Can occur from medications (asthma meds), alcohol or illegal drugs, increased adrenaline (caffeine or anxiety)



Donor Risk:
No real risk for normal PVCs

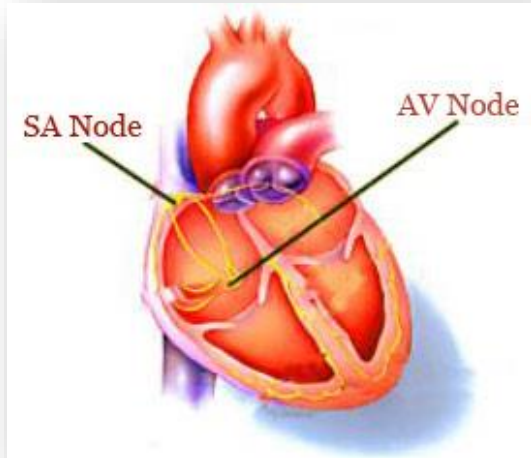
Supraventricular Tachycardia (SVT)

- Abnormally fast heartbeat (>100 BPM)
- Includes many types of rhythm problems originating above ventricles
- May come & go with normal HR; can last minutes to days
- Symptoms include SOB & palpitations
- Generally not life threatening unless other heart disorders
- Can occur from heart failure, thyroid or chronic lung disease, too much alcohol/caffeine, drug use (cocaine / methamphetamines), OTC meds (asthma and cold / allergy)

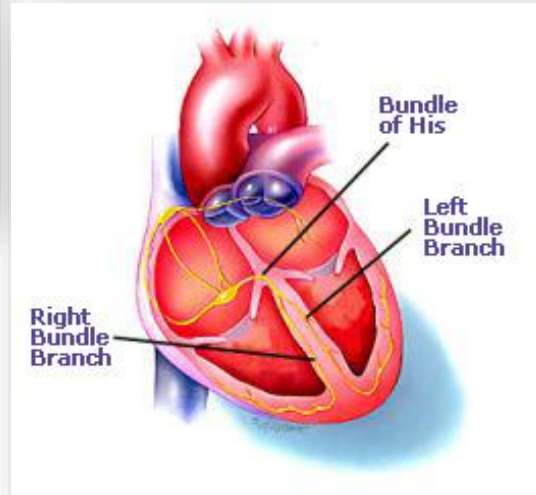


Donor Risk: Significant SVT can lead to fatal ventricular tachycardia

Heart Block and Bundle Branches



A structure called the **Bundle of His** emerges from the AV node and divides into thin, wire-like structures called bundle branches that extend into the right and left ventricles.



Heart Block is a type of bradycardia (too slow heartbeat) that also is called atrioventricular, or AV block.

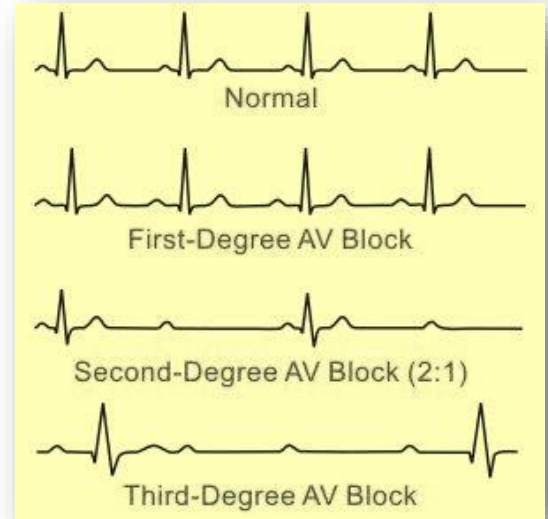
Heart Block

Signal from upper chambers (atria) is impaired or doesn't transmit
(Does not mean blood flow or blood vessels are blocked)

First Degree: rate & rhythm normal; nothing wrong with heart; no treatment

Second Degree: electrical impulses delayed more and more until heartbeat is skipped; may cause dizziness or other symptoms

Third Degree: (complete) most often caused by heart disease or drug toxicity



Donor Risk: Second Degree can lead to complete heart block
(First degree block usually an incidental finding on EKG.)

Bundle Branch Block

Delay or obstruction along the pathway that electrical impulses travel to make the heart beat

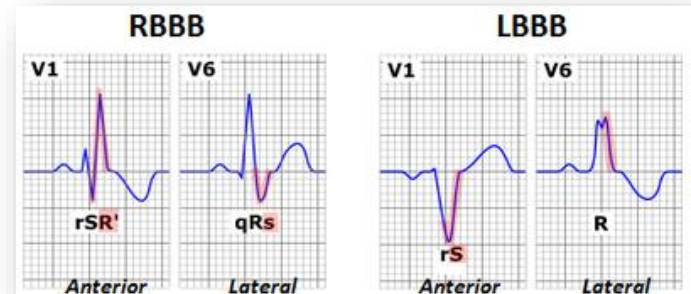
Left Bundle Branch Block (LBBB)

- Common with >200,000 US cases yearly
- Makes it harder for the heart to pump blood efficiently through the circulatory system
- Can be caused by aortic stenosis, ischemic heart disease, HTN, anterior MI
- Unusual to exist in absence of organic disease

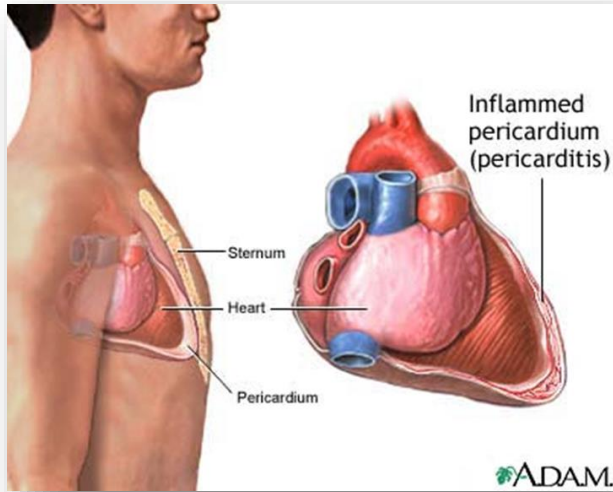
Donor Risk: RBBB no significant risk; LBBB can cause uncoordinated ventricular contractions (if asymptomatic requires cardiac consult for clearance)

Right Bundle Branch Block (RBBB)

- Usually no symptoms unless there are additional heart conditions
- Typically does not need treatment



Pericarditis

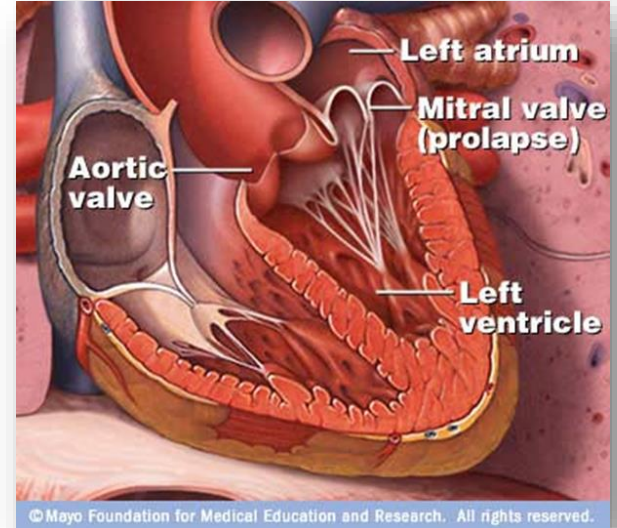


- Swelling and irritation of the thin saclike membrane surrounding the heart (pericardium)
- Rare with fewer than 200,000 US cases yearly
- Usually a complication of viral infections caused by adenovirus and coxsackie virus
- Can be associated with systemic diseases such as autoimmune disorders or rheumatic fever
- Can range from mild cases resolving on own or life-threatening
- Filgrastim can cause pericarditis

Donor Risk: Atrial fibrillation can be seen with pericarditis.
Acute infection can develop into chronic restrictive or effusive pericarditis.

Mitral Valve Prolapse

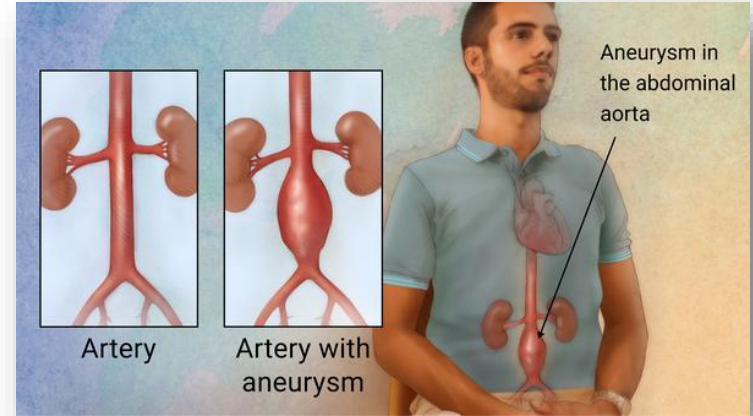
- Improper closure of the valve between the heart's upper and lower left chambers
- Very common with >3 million US cases yearly
- Can develop at any age
- Usually a lifelong disorder
- May run in families
- Symptoms include irregular heart beat, SOB, and palpitations
- Most don't require treatment



Donor Risk: can develop mitral valve regurgitation or heart valve infection (endocarditis)

Aneurysm

- Bulge or weakness in the wall of an artery or vein
- Common with >200,000 US cases yearly
- Usually enlarge over time with potential to rupture and cause life-threatening bleeding
- Most common sites include abdominal aorta and arteries of base of the brain
- Can occur at any age



Donor Risk: ruptured aneurysm can result in internal bleeding, stroke, and can sometimes be fatal (Defer if aneurysm)

Cardiac Assessment Recommendations

DIAGNOSIS? Is there an actual diagnosis?

SYMPTOMS? What were/are the symptoms?
How long did they last? What makes them better or worse? Impact on activities?

EVALAUTION? What kind of testing was performed? By whom? Any follow-up?

MEDICATIONS? On any medications? How long? Effective? Any they are supposed to be on but are not taking?

Location?

Intensity?

Frequency?

Triggers?

Onset?

Duration?

Treatment?

Limitations?

CASE STUDIES



1

40 yo M
5'7" 188 lbs
Recruitment

- "Clogged" artery 5 yrs ago found with testing after chest pain
- No surgery
- On several cardiac medications

DEFER

2

31 yo M
5'11" 198 lbs
Stage: CT

- Wolff-Parkinson White
- Mild; being monitored
- Not on any medications

DEFER

3

50 yo M
5'8" 190 lbs
Stage: HR

- MVP diagnosed age 18
- PVCs at age 26
- Cardiology consult WNL
- Runner with HR ~50s
- Mild sleep apnea

PBSC-only

CASE STUDIES



4

45 yo M
5' 10" 216 lbs
Stage: CT

- Right Bundle Branch Block
- No symptoms or other health issues
- Found on annual work physical

ACCEPT

5

50 yo M
5'8" 155 lbs
Stage: Prelim

- Recent diagnosis of "mild sinus arrhythmia"
- Lipitor for high cholesterol
- No other meds

ACCEPT

6

19 yo FM
5'1" 105 lb
Stage: WU

- Syncope and palpitations for several yrs
- May be getting worse
- Experiences light-headedness 5x / wk
- No real evaluation yet

DEFER

CASE STUDIES



7

40 yo FM
5'5" 140 lbs
Stage: CT

- At 21 had racing heart a few times each week
- Diagnosed with SVT
- Ablation 2013
- No symptoms since ablation

ACCEPT

8

29 yo M
5'9" 160 lbs
Stage: WU

- Hospitalized with pericarditis in 2015
- No further issues
- No medications

ACCEPT

9

55 yo FM
5'7" 235 lbs
Stage: CT

- Seen in ER for SOB 2015
- Diagnosed with pulmonary edema & mitral valve regurgitation
- Stable; on 3 HTN meds
- Cardiologist ok'd her to proceed as stem cell donor

DEFER

CASE STUDIES



10

55 yo FM
5'2" 163 lbs
Stage: CT

- 2010 heart surgery for MVP repair; fully recovered
- On Metformin for triglycerides
- Injured foot in MVA 2016; still 3/10 pain

DEFER

39 yo M
6' 250
Stage: CT

11

- Discharged from military d/t vasovagal syncope episodes
- As teen, electrocuted when hair dryer fell into tub; required resuscitation
- Developed seizures following incident; stopped after a few years
- Meloxicam for daily knee pain
- Backs aches if stands all day

DEFER

12

45 yo M
5'9" 193 lbs
Stage: CT

- H/o chest pain for past 8 yrs; happens a few x / yr; lasts a few mins, then better; pain 1-2/10
- No treatment or meds
- All cardiac eval WNL
- Annual cardiology eval normal

ACCEPT

CASE STUDIES



23 yo FM PBSC
5'0" 128lbs
Stage: WU



PE:

- Previously deferred from blood donation d/t low iron
- Cardiac exam marked as abnormal "Murmur 3/6 R>L sternal border"
- Donor unaware of any history of previous murmur

EKG:

Normal

**Cardiology
Consult**

CONSULT: Normal cardiac exam; no murmur heard; "Mild tricuspid regurgitation on ECHO, trace mitral regurgitation; no reason to disqualify"

Labs:

K+ 3.2 (3.5); RDW 14.8 (14.5); Mono A 0.21 (0.30); Neut % 64.3 Neut A WNL;
Lymph% 29.9 Lymph A WNL; EOS% 1.2; EOS A WNL; Baso% 0.9 Baso A WNL

UA: mucus, squamous cells rare

ACCEPT - Collection cancelled

Now to
our Jack of Backs...



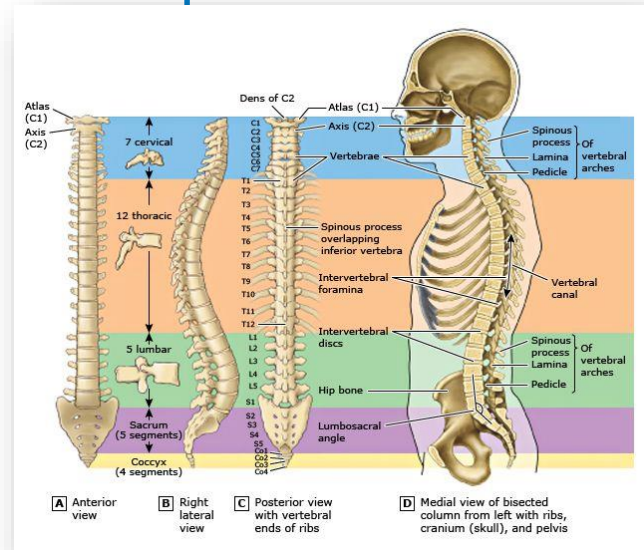
Spinal Anatomy

Remarkable combination of

- strong bones (vertebrae, ribs, sternum, pelvis)
- flexible ligaments
- tendons
- large muscles (spinal and abdominal)
- highly sensitive nerves

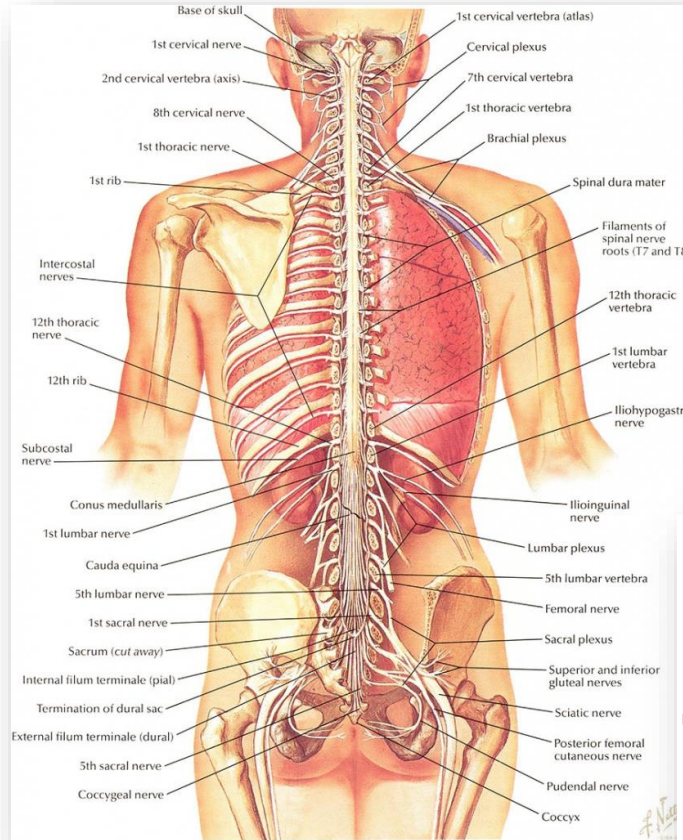
Designed to be

- incredibly strong
- protect highly sensitive nerve roots
- highly flexible
- provide mobility on many different planes

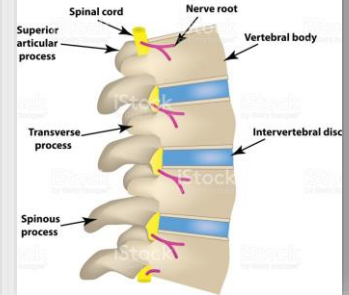


Spinal Anatomy

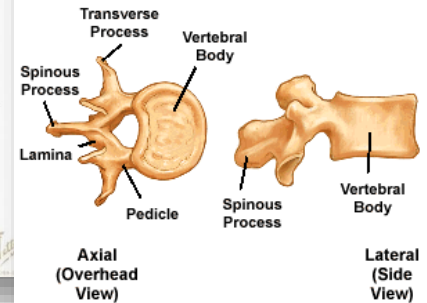
- Backbone is a stack of more than 30 vertebrae
- Vertebrae are held together by muscles, tendons and ligaments
- Discs between vertebrae are shock absorbers
- Together they form a canal for the spinal cord



THE STRUCTURE OF THE VERTEBRAE
(Side view)



Lumbar Vertebrae



Spinal Anatomy

Cervical

- Supports weight of head (~10 lbs)
- Protects spinal cord from brain

Thoracic

- Have very little motion
- Are attached to ribs

Lumbar

- Carry body's weight
- Lacks skeletal support
- Torsion / twisting risk injuries (L3/L4)
- Most strain and most likely to herniate (L4/L5)

Neck

Cervical Vertebrae

Back

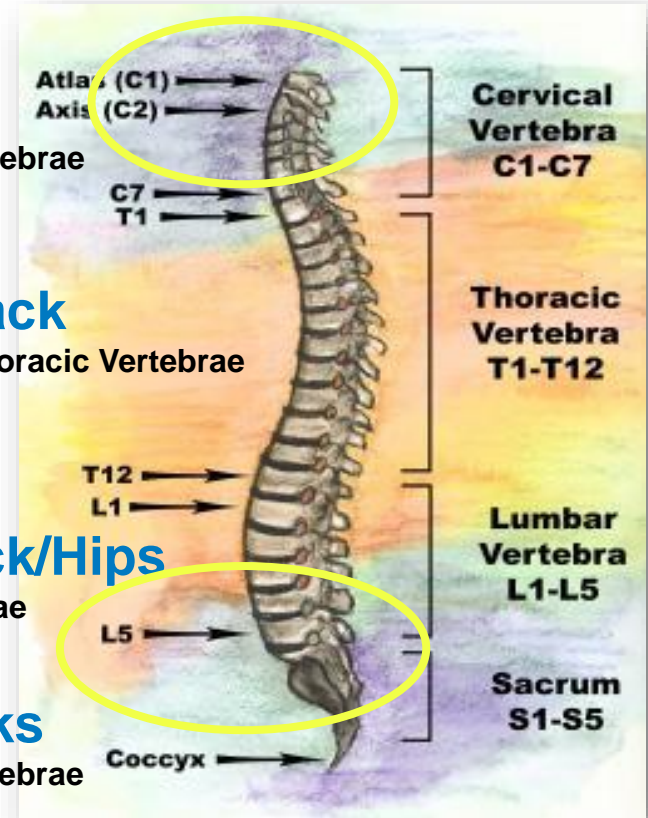
Thoracic Vertebrae

Lower Back/Hips

Lumbar Vertebrae

Buttocks

Sacral Vertebrae



Back / Neck Pain

Incidence

- Very common with >3 million US cases yearly
- Most episodes last days to several weeks
- 2nd most common cause of missed days of work in US

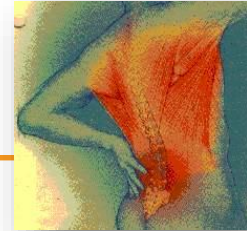
Risk Factors

- Age – more common as we age
- Lack of exercise; excess weight; disease (arthritis and cancer); improper lifting; psychological conditions; smoking



Diagnosis

- Most important is a good medical history.
- Physical exam is also useful.
- Imaging studies (MRI) are less useful:
 - Often a specific anatomic defect is not found
 - High incidence of background abnormalities with no symptoms
 - Imaging is used to rule out more serious conditions for pain including tumors, infectious or nerve injury
- Diagnostic anesthetic injections may be helpful.



Treatment

- Exercise is best therapy for persistent low back pain
- Physical Therapy including Stretching & Strengthening
- Alternative options such as acupuncture / acupressure or chiropractor
- Best treatment plans for severe pain are multifactorial and include a psychosocial component
- Pain medications and muscle relaxants may/may not help



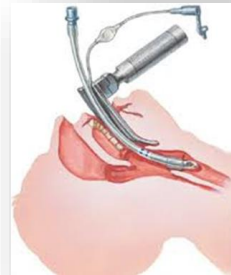
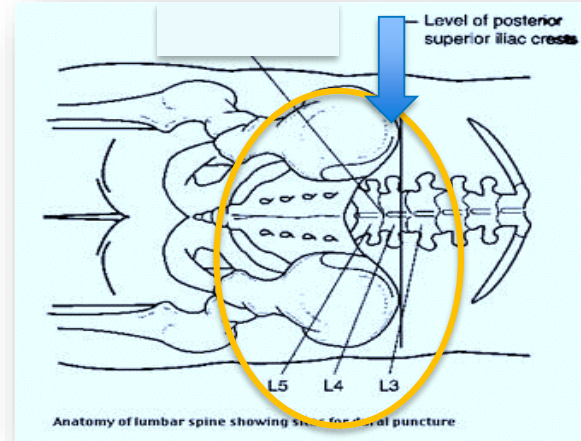
Pain Medications

Class	Functions	Example
Non-Steroidal Anti-Inflammatory (NSAIDS)	Act on substances in the body that can cause inflammation, pain, and fever	ibuprofen / Advil® Motrin® naproxen / Aleve®
Corticosteroids	Exert powerful anti-inflammatory effects	prednisone
Acetaminophen	Increase the body's pain threshold, but it has little effect on inflammation	Tylenol®
Opioids (narcotic analgesic)	Modify pain messages in the brain	hydrocodone / Vicodin® tramadol / Ultram®
Muscle relaxants	Reduce pain from tense muscle groups, most likely through sedative action in the central nervous system	cyclobenzaprine / Flexeril® baclofen / Lioresal®
Anti-anxiety drugs	Work on pain in three ways: they reduce anxiety, they relax muscles, and they help patients cope with discomfort	alprazolam / Xanax® aorazepam / Ativan® diazepam / Valium®
Antidepressants	May reduce pain transmission through the spinal cord	amitriptyline
Anticonvulsant	Relieve the pain of neuropathies, possibly by stabilizing nerve cells	gabapentin / Neurontin® pregabalin / Lyrica®



Back & Neck Problems and Marrow Collection

- Intubation requires positioning & movement of cervical area
- Puncture sites along posterior superior iliac crest aligns with L4/L5
- Heavy pressure needed to insert needle into iliac crest.
- Weakened or injured vertebra can be further injured by this pressure or problems with intubation.



Back & Neck Problems and PBSC Collection

Sitting for 4-5 hours is primary concern for donors with serious or chronic back pain – especially sciatica.

With sciatica, sitting usually causes the most pain because of the weight this position puts onto the involved discs.

Additional concern if requires daily ongoing use of narcotics to manage pain.



NMDP Experience

Post-Donation Complications Related to the Back Retrospective Study

Of all NMDP marrow collections between 1987 and 1999, a total of **116** of **9,345 (1.2%)** donors experienced serious complications related to the collection procedure.

Of these **116** cases, **69** (nearly **60%**) involved back pain caused by mechanical injury to bone, nerve or muscle.

29 of these donors experienced moderate-to-severe pain for a prolonged period of 8 months or longer.

From 2004-2009, **14 (0.5%)** donors had prolonged recovery of >3 months related to hip, back or leg pain. (Pulsipher, Blood 2014)

Back Assessment

Location?
Intensity?
Frequency?
Triggers?
Onset?
Duration?
Treatment?
Limitations?
Profession?

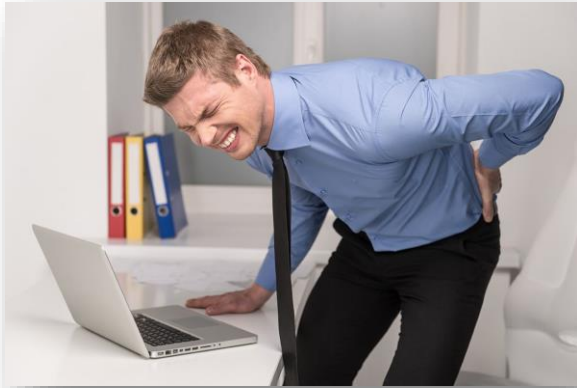
0-10 SCALE OF PAIN SEVERITY

Severity	Description of Experience
10 Unable to Move	I am in bed and can't move due to my pain. I need someone to take me to the emergency room to get help for my pain.
9 Severe	My pain is all that I can think about. I can barely talk or move because of the pain.
8 Intense	My pain is so severe that it is hard to think of anything else. Talking and listening are difficult.
7 Unmanageable	I am in pain all the time. It keeps me from doing most activities.
6 Distressing	I think about my pain all of the time. I give up many activities because of my pain.
5 Distracting	I think about my pain most of the time. I cannot do some of the activities I need to do each day because of the pain.
4 Moderate	I am constantly aware of my pain but I can continue most activities.
3 Uncomfortable	My pain bothers me but I can ignore it most of the time.
2 Mild	I have a low level of pain. I am aware of my pain only when I pay attention to it.
1 Minimal	My pain is hardly noticeable.
0 No Pain	I have no pain.

Donor Assessment

Medically suitable for both marrow and PBSC	Medically unsuitable for marrow but suitable for PBSC	Medically unsuitable for both products
<ul style="list-style-type: none"> • minimal pain (1-2/10) • infrequent pain (<1-2 / week) • rare use of pain meds • rare use of therapy such as PT or chiropractor 	<ul style="list-style-type: none"> • moderate pain (3-4 /10) • somewhat frequent pain (2-3 / week) • requires pain med (primarily OTC but some prescription) daily or consistent use of therapy such a PT or chiropractor intermittently 	<ul style="list-style-type: none"> • severe pain (>5 / 10) • consistent and/or chronic pain (has had >3 mos) • requires/relies on pain meds (either prescription or OTC) throughout the day and may still report pain • requires medical intervention such as chiropractor or PT treatments to help control symptoms

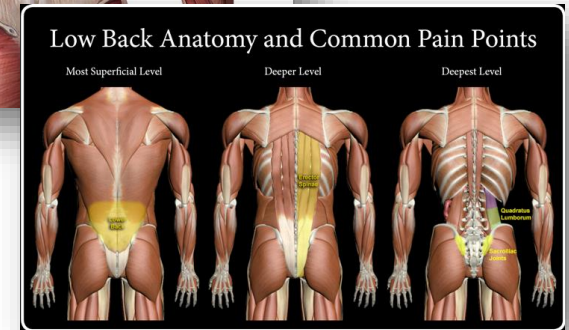
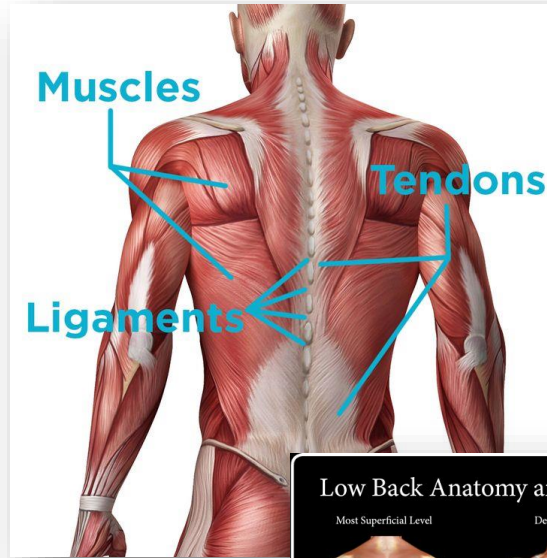
Highlights of Common Back / Neck Injuries



- Sprains/Strains
- Osteoarthritis
- Stenosis
- Spondylolisthesis
- Herniated discs
- Sciatica

Sprains & Strains

Most common
cause of back pain
is a small injury
muscle → strain
ligament → sprain

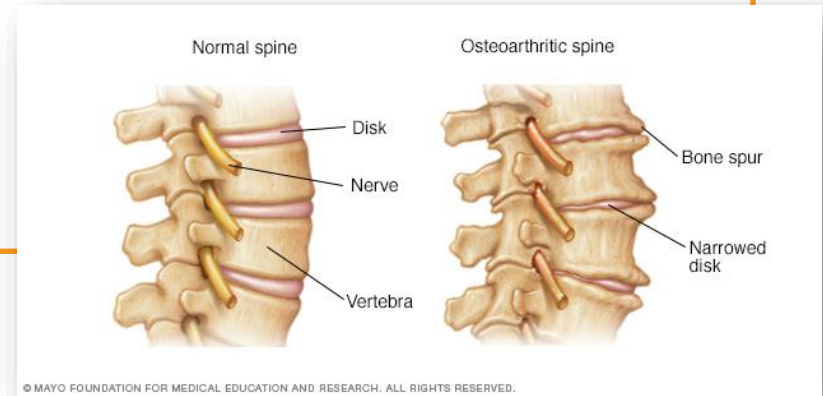


Symptoms

- Pain around low back and upper buttocks
- Low back muscle spasm
- Pain associated with activities and generally relieved with rest

Osteoarthritis (OA)

- Very common with > 3 million US cases yearly
- Degenerative “wear & tear” joint condition
- Causes slow deterioration of cartilage
- Narrows cartilage discs between the bones
- Symptoms include inflammation, pain, swelling & stiffness
- Risk factors overloading, injury, and obesity
- Treatment includes exercise, medicines, sometimes surgery



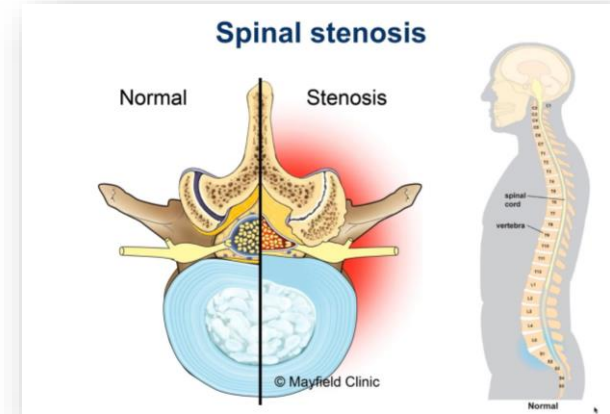
Stenosis and Spondylolisthesis

Stenosis

- Common with 200,000 US cases yearly
- Narrowing of the bony canals in the spine can compress the spinal cord and nerves.

Spondylolisthesis

- Very common with >3 million US cases yearly
- A weakness or stress fracture in the facet joints can allow a vertebra to slip out of position and pinch the nerves.

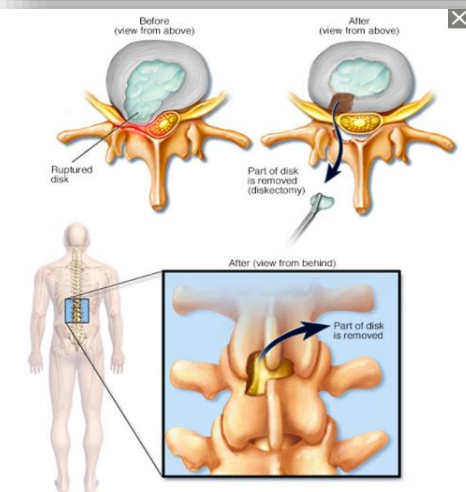
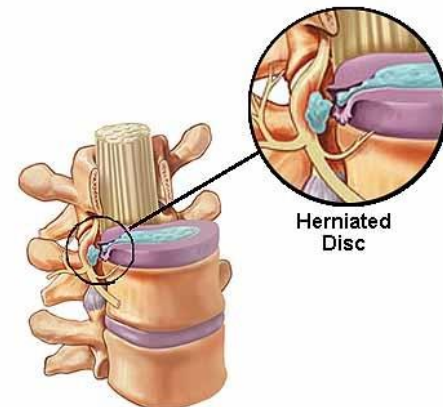


Herniated Disc

Normal wear & tear or exceptional strain can cause a disc to rupture which pinches one of 50 nerve roots

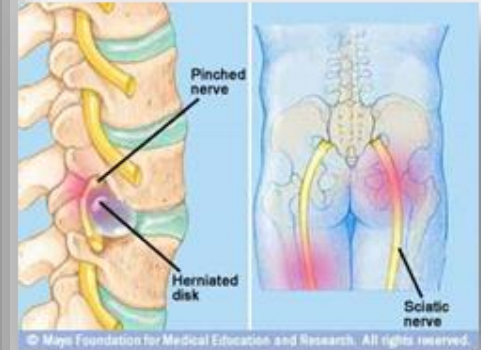
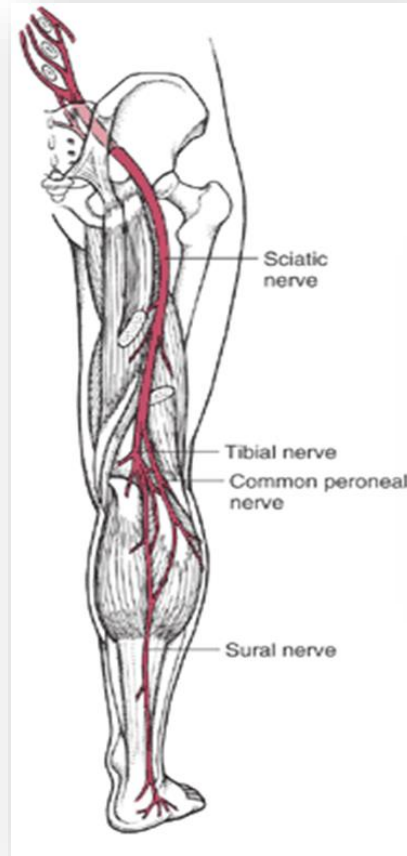
Herniated = Slipped = Bulging

- Very common with >3 million US cases yearly
- Most common symptoms arm/leg pain, numbness or tingling, weakness
- Risk factors include weight, occupation, genetics
- Medical treatment includes rest, PT and OTC meds (NSAIDs), narcotics, anticonvulsants, muscle relaxers, or cortisone injections
- May need surgery to remove protruding portion of the disc or, if needed, the entire disc then fused together with metal hardware.



Sciatica

- Very common with >3 million US cases yearly
- Herniated disc may put pressure on a nerve root in lower back, causing pain that radiates down the back of the leg
Usually affects only one side
- May cause a pins-and-needles sensation, a nagging ache, or a shooting pain. Numbness may be felt in the leg or foot.



CASE STUDIES



1

21 yo FM
5'7" 108 lbs
Stage: HR

- Car accident in 2003
- "Broke back" (L2 / L3)
- Wore brace for 5 mos
- Fully recovered
- No pain / limitations

ACCEPT

31 yo M
5'11" 198 lbs
Stage: WU

2

- Herniated disc at L4 / L5 2 yrs ago lifting box at work
- Prednisone daily x7 days at the time
- Takes OTC med and muscle relaxant for daily 3-4/10 pain
- Still has physically demanding warehouse job

PBSC-only

3

49 yo M
5'7" 187 lbs
Stage: CT

- Degenerative Joint Disease affects "whole body"
- Been taking muscle relaxants for several years
- Able to work but some limits to daily activities and sports
- Daily pain level ranges from 4-7/10

DEFER

CASE STUDIES



4

58 yo M
5'10" 220 lbs
Stage: HR

- C5 disc replaced 2007
- Fully recovered with good ROM
- Spine "fusing" over 10 yrs
- Steroid injection planned
- Daily pain 2-3 / 10
- No limits to activities

**TU 3 mos
then PBSC-only**

58 yo M
5'11" 198 lbs
Stage: HR

5

- Osteoarthritis in hip & back
- Diagnosed 2 yrs ago
- Not able to stand or sit for long periods of time
- 5/10 pain most days
- Taking Arthrotec & gabapentin twice daily

DEFER

6

52 yo M
5'8" 175 lbs
Stage: CT

- Fell on "black ice" in Jan 2014
- Experienced low - mid grade back pain for over 1 year but better now (daily 1-2/10)
- X-rays were negative
- Was unable to work for a year
- Takes rx pain meds every few days if too active
- Will be able to sit long time

PBSC-only

CASE STUDIES



7

30 yo FM
5'3" 110 lbs
Stage: CT

- Fell down flight of cement stairs 2 weeks ago
- MRI and x-rays showed no injury but feels daily pain 3-6 / 10
- Was told her spine is "worn" down
- Has not been back for follow-up
- Wakes up at 2-3 AM to walk off pain
- Taking Ibuprofen daily

TU 3 mos
PBSC-only for period of time

8

38 yo M
5'10" 190 lbs
Stage: CT

- C5-7 fusion 2008
- Current pain 2-3 / 10 daily
- No limit to activities or ROM
- Takes Norco 10-325 & gabapentin qd
- Willing to discontinue pain meds to serve as donor
- Feels he could sit for PBSC apheresis
- Started anti-depressant & therapy 3 mos ago for chronic depression

DEFER

CASE STUDIES



9

43 yo M
5'7" 163 lbs
Stage: HR

- Pinched a nerve in lower back shoveling snow in 2006
- Reports inconsistent pain
- Back hurts in morning or after being stationary for a period of time
- Reports morning pain at 6/10 but improves after about 5 mins
- Doing PT for x1/week
- Needs gabapentin every 3 days
- Had 2 injections for muscle spasms 2 and 5 weeks ago
- Mild improvement to pain

- Currently on 3 mos course of amitriptyline; about to finish
- Started on med due to elevated heart rate (100 bpm)
- Full cardiac consult at the time
- Wore Holter monitor for 10 days with nothing identified
- Denies atrial fibrillation

DEFER

CASE STUDIES



Requested for T-cells donation
Original PBSC 12/2016

30 yo M
5'8" 210 lbs
Stage: WU

10

Previous PE:

- 5/2016 evaluated in ER for chest pain
- h/o HTN/pre-diabetes; stable on meds
- Abn EKG at PE; cardiology consult performed
- Cleared for both products with successful collection

New T-cells HHSQ:

- Herniated disc 2 weeks ago; confirmed by MRI
- Was in constant pain 8/10; lidocaine injection 1 week ago
- Pain has improved 3/10 and follow-up next week
- Continues to work as truck driver

ACCEPT for T-cells
No marrow if requested,
PBSC able to be
considered, if needed

Donor Assessment

Unrelated
Volunteer Donor

Asked to undergo
medical
procedures with
known risks

With no medical
benefit to
themselves

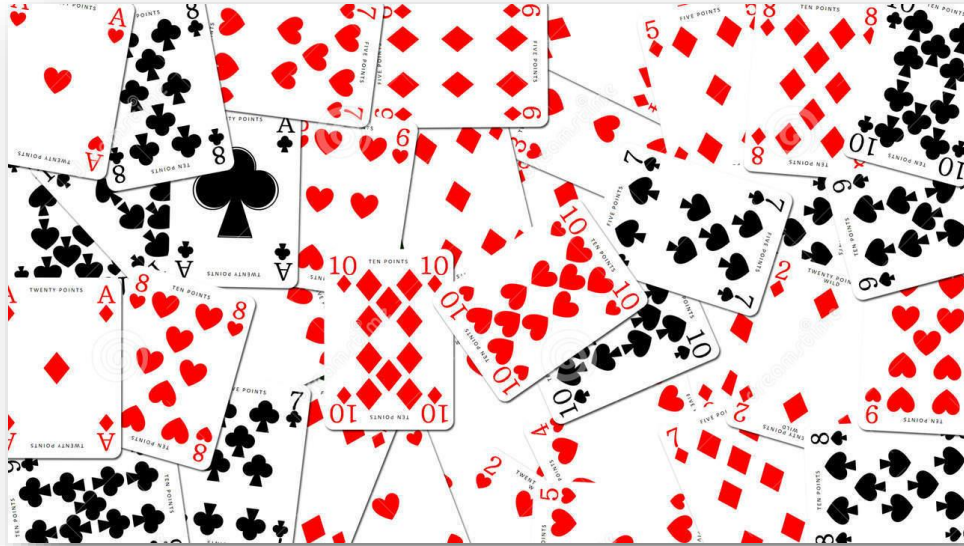
SUMMARY

Careful evaluation of both cardiac and back/spine problems is complex but important for donor safety.

GOAL

Ensure donor's safety

THANK YOU!



Evaluation Reminder

Please complete the Council Meeting 2017 evaluation in order to receive continuing education credits and to provide suggestions for future topics.

We appreciate your feedback!