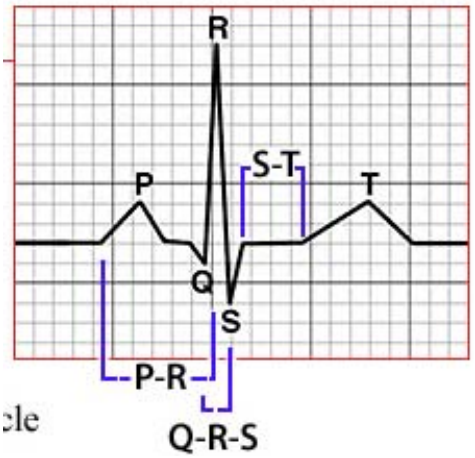
ELECTRICAL ACTIVITY OF THE HEART

revised 3 March 2016
Martini's 5th: 8th: 695-717, 9th: 10th: 697-719 See also handouts of EKGs, both normal and abnormal.

CONDUCTION SYSTEM IN THE HEART: p 701
Sinoatrial node (modified cardiac muscle) initiates impulse, transmitted via atria (in 50 msec) to
atrioventricular node sends to ventricles AV bundle via **bundle of His**, then **bundle branches** to Purkinje fibers
YouTube: http://www.youtube.com/watch?v=v3b-YhZmQu8

P 703

P wave	depolarization of atria	P-R:	0.16-0.18
QRS complex	depolarization of ventricles	QRS:	0.06-0.10
T wave	ventricles repolarize	Q-T:	0.31-0.41



Abnormal heart rates **bradycardia:** heart rate below 60 bpm
tachycardia: above l00 bpm

sustained even tachycardia flutter 200-300 bpm
uncoordinated tachycardia fibrillation circus movement, ectopic focus

Heart Block: failure of proper transmission fr SA to AV , part or complete
1° long P-R interval (>0.21 sec)
2° occasional P without a QRS
3° uncoordinated, P has no relation to QRS

Myocardial infarction (infarct: stuffed) Heart attack, death of myocardium.
Cardiac enzymes appear in blood as result of cell death:
LDH, SGOT, CPK, CK-MB

CARDIAC CYCLE: (p 707) **systole** highest pressure (LUBB), and **diastole**, relaxation, lowest pressure (DUBB)
Cardiac Output: stroke vol (75 mL) x rate (72 bpm) : 5.4 L/min pumped
Stroke volume l) length of ventricular diastole (tachycardia decreases filling)
2) venous pressure
Starling's law of the heart: strength of contraction increases with increased stretching up to a point
Up to 30 L/min in trained athlete, difference = cardiac reserve (both rate & stroke volume can be altered)

REGULATION: These increase heart rate: adrenaline, heat, being female, Ca, low K or Na
p 711, 717: **autonomic** enervation of SA node: **acetylcholine** slows (vagus)
norepinephrine increases rate and force (from brain stem)
Baroreceptors: stretch receptors in **aortic arch** and **carotid sinus** detect BP, excite cardioinhibitory centers.
If vagal impulses are inhibited, rate increases (obliterate parasympathetic enervation: 100 bpm)

Heart diseases:

Heart attack:	blood supply cut off to heart muscle, can lead to **Myocardial infarction**			
Arteriosclerosis	**angina pectoris**, avoid: proper exercise, stop smoking, reduce fat intake			
	British RR study:	clerks	10.4 (% with arteriosclerosis?)	
		Switchers	6.7	
		Section hands	4.2	collateral circulation can develop
Rheumatic Fever	most impt cause of death of child 5 to 19, associated with streptococcal infections			
Heart Murmur	either valvular insufficiency or stenosis (narrow) causes turbulence. Functional murmurs frequent in children following exercise, non-pathological.			
aneurysm	[upward, stretch] dilation of vessel, can lead to rupture can cause death.			
Obesity	increased load, fat deposits among heart muscles, mechanical interference with beating			
Hypertension	leads to heart failure, vascular accident in brain, kidney failure			
Syphilis	affects arteries to heart, may cause aneurysm.			