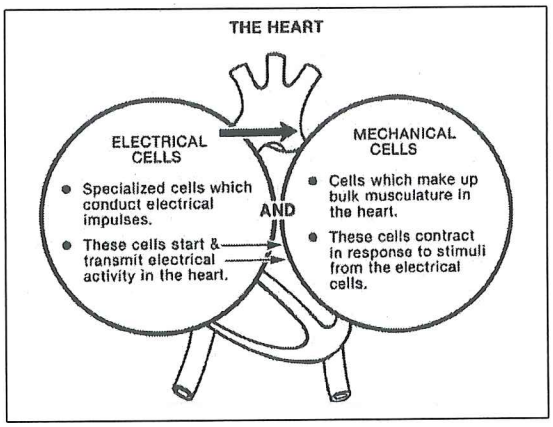
Study Sheet pt 1: Interpreting a Heart Beat Key

The information in this study sheet will help you with Quiz #2 and with your test. You will be turning it in with your test review as part of your test EC.



Procedure Clarification:

An **echo**cardiogram is an ultrasound of the heart to visualize if the valves & muscles (structures) are working correctly while an **electro**cardiogram indicates if the cardiac conduction system is sending the electrical signal correctly.

Heart Beat Interpretation: How the Electrical Events & the Muscular Events work together.

1) During ventricular filling phase, the pressure in the heart is low. The AV valves are open while the SL valves are closed, so most of the blood flows passively from the atria into the ventricles which fills about 70 % of the ventricles.
2) The SA node (the pacemaker) then sends an electrical signal to both atria that is recorded on the ECG as a P wave. This atrial depolarization (electrical word) initiates atrial systole (muscular word) which forces the remaining 30 % of blood from the atria into the ventricles. The AV node holds the electrical signal while the atria finish contracting – this is indicated by the PR segment on the ECG.
3) As this muscular pressure causes the blood pressure to rise sharply in the ventricles, the AV valves close to prevent a backflow of blood into the atria. These chambers will immediately begin filling again to begin the next cycle. This time of atrial systole lasts approximately 0.1 seconds in a resting heart.
4) The ventricles will then receive a synchronized electrical signal from the AV bundle, bundle branches, & Purkinje fibers which will be recorded as the QRS complex on the ECG. This ventricular depolarization (electrical word) causes ventricular systole (muscular word) which lasts approximately 0.3 seconds in a resting heart.
5) At this time, the AV valves AND the SL valves are closed for a very short time period to build up the blood pressure. This is known as the isovolumetric contraction phase. When the blood pressure in each of the ventricles becomes greater than the blood pressure in the aorta & pulmonary trunk, only the

SL valves are forced open and blood is expelled only into the aorta & pulmonary trunk. This is known as the ventricular ejection phase.

6) The AV valves stay shut due to their structure and the anchoring by the chordae tendinae and papillary muscles to keep the blood from back flowing into the atria. While the ventricles are depolarizing and then contracting, atrial repolarization (electrical word) occurs so atrial systole (muscular word) can resume. This electrical signal is hidden by the QRS complex.

7) All signaling from the cardiac conduction system now stops. Ventricular repolarization (electrical word) will occur as indicated by the T wave so they can resume ventricular diastole (muscular word) in order for the heart to begin the isovolumetric relaxation phase. The blood pressure drops and gravity will cause the blood in the aorta & pulmonary trunk to close the SL valves to prevent backflow into the right & left ventricles. Meanwhile the blood that has been passively flowing into the atria will cause pressure to force open the AV valves to begin the cycle again.

8) This period of total heart relaxation is called the quiescent period and lasts ~ 0.4 seconds. This is indicated by the flat (isoelectric) line on the ECG. Then the cycle continues.

Terms for the FIB: Some terms will be used more than once.

- **0.1**
- **0.3**
- **0.4**
- **30**
- **70**
- **Aorta**
- **Atria**
- **AV (atrioventricular)**
- **AV bundle**
- **Blood pressure**
- **Bundle branches**
- **Chordae**
- **Conduction**
- **Depolarization**
- **Diastole**
- **Ejection**
- **Electrical**
- **Isovolumetric contraction**
- **Isovolumetric relaxation**
- **Low**
- **Muscles**
- **P**
- **Papillary**
- **Pulmonary trunk**
- **Purkinje fibers**
- **QRS**
- **Quiescent**
- **Repolarization**
- **SA(sinoatrial)**
- **SL (semilunar)**
- **Systole**
- **T**
- **Valves**
- **Ventricles**