

NAME _____ LAB TIME/DATE _____

REVIEW SHEET
exercise

31

Conduction System of the Heart and Electrocardiography

The Intrinsic Conduction System

1. List the elements of the intrinsic conduction system in order starting from the SA node.

SA node → AV node → AV bundle (bundle of His) →
left and right bundle branches → Purkinje fibers

Which of those structures is replaced when an artificial pacemaker is installed? SA node

At what structure in the transmission sequence is the impulse temporarily delayed? AV node

Why? Allows completion of atrial contraction before initiation of ventricular systole.

2. Even though cardiac muscle has an inherent ability to beat, the nodal system plays a critical role in heart physiology. What

is that role? Ensures that depolarization proceeds in an orderly manner from atria to ventricles; accelerates and coordinates heart activity.

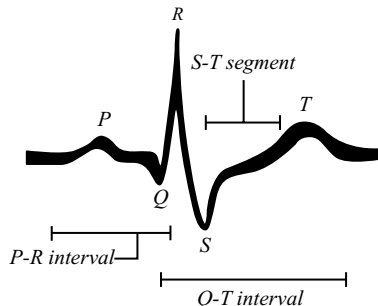
3. How does the “all-or-none” law apply to normal heart operation? The myocardium (heart as a whole) beats as a unit as long

as the intrinsic conduction system is operative and the heart muscle is healthy.

Electrocardiography

4. Define ECG: Recording of electrical changes occurring during heart activity.

5. Draw an ECG wave form representing one heartbeat. Label the P, QRS, and T waves; the P-R interval; the S-T segment, and the Q-T interval.



6. What is the normal length of the P-R interval? *(student data)* _____ QRS interval? *(student data)* _____

When the heart rate increases, which interval becomes shorter? *(student data)* _____

7. What changes from *baseline* were noted in the ECG recorded during running? *None. The rate and strength of heart contractions is increased but the electrical current pattern height remains unchanged. ↑ rate; ↓ Q-T interval.* _____

Explain why these changes occurred. *Both increased body heat and muscular activity enforce a faster heart rate. During exercise, cardiac output increases in almost linear proportion to the increased oxygen needs. This is mediated through sympathetic nerves.* _____

What changes in baseline were noted during breath holding? *See ↑ rate of heartbeat as above, but mechanism differs.* _____

Explain these changes. *Even though O₂ exchange is still occurring, CO₂ accumulation ↓ blood pH, causing cerebral vessel vasodilation and exciting sympathetic centers, which in turn cause a reflex increase in heart rate and ↑ the respiratory drive.* _____

8. Describe what happens in the cardiac cycle in the following situations:

1. during the P wave *depolarization of the atria* _____
2. immediately before the P wave *the heart is in relaxation (diastole)* _____
3. immediately after the P wave *contraction of the atria* _____
4. during the QRS wave *depolarization of the ventricles* _____
5. immediately after the QRS wave (S-T interval) *contraction of the ventricles* _____
6. during the T wave *repolarization of the ventricles* _____

9. Define the following terms:

1. *tachycardia* *Heart rate over 100 beats/min.* _____
2. *bradycardia* *Heart rate below 60 beats/min.* _____
3. *flutter* *Extremely rapid but coordinated heart activity, e.g. atrial flutter = 300 beats/min.* _____
4. *fibrillation* *Very rapid uncoordinated myocardial activity.* _____
5. *myocardial infarction* *Region of dead myocardium that does not depolarize.* _____

10. Which would be more serious, atrial or ventricular fibrillation? *Ventricular fibrillation*

Why? *The ventricles bear major responsibility for ejecting blood from the heart.*

11. Abnormalities of heart valves can be detected more accurately by auscultation than by electrocardiography. Why is this so?

Most often serious valve problems can be detected (heard) with a stethoscope. However, since valves are not part of the depolarization pathway of the heart, their inefficiency would not be recorded on an ECG.