

## 2.3 The Heart at Work Study Guide by Hisrich

### 2.3.a. In what ways can technology be used to collect and analyze cardiovascular data?

Thing measured	Tool used	Used how
Blood pressure	<b>Sphygmomanometer</b> "pulse measurer"	Determines systolic and diastolic arterial pressure
Heart rate	Timer	Used to find beats during 10 seconds (then multiply by 6 for bpm)
Electricity within heart	<b>EKG</b>	Electrodes on skin pick up current and show graphically

### 2.3.e. What is an EKG? 2.3.f. How can an EKG be used in the diagnosis and treatment of heart disease?

**EKGs, or electrocardiographs** ("electricity heart pictures") measure the heart's electrical activity and display it in the form of a picture:

- **P wave** → signal passes from **SA node** (sinoatrial node) to AV node (atrioventricular node), moving across atria
- **QRS interval** → signal passes from AV node through Purkinje fibers & the ventricles contract
- **T wave** → the ventricles repolarize & the heart is relaxed

EKGs are examined for missing, extra or malformed waves.

**EKGs** are taken when heart problems are suspected and can be used in **cardiology** ("the study of the heart") to diagnose heart attacks, lack of blood flow to the heart, arrhythmia ("no rhythm"), lack of forcefulness of heart muscle, muscle parts that are too thick or heart parts that are too big, birth defects of the heart, heart valve diseases.

### 2.3.b. What factors can influence heart rate?

Lower heart rate	Raise heart rate
<b>Short-term method</b> <ul style="list-style-type: none"> <li>• Sleeping or relaxing</li> <li>• Hydrating yourself</li> </ul> <b>Long term method</b> <ul style="list-style-type: none"> <li>• Exercise</li> <li>• Reducing stress</li> <li>• Eating fruits, vegetables, nuts, beans &amp; fish</li> </ul>	<b>Short-term method</b> <ul style="list-style-type: none"> <li>• Exercising or other rapid movements</li> <li>• Being scared or very stressed briefly</li> <li>• Drinking caffeine or alcohol</li> </ul> <b>Long term method</b> <ul style="list-style-type: none"> <li>• Being out of shape</li> <li>• Increasing stress</li> </ul>

\*\*\*Factors that influence heart rate can be determined by creating a **hypothesis** (testable prediction) and then testing it out, like we did in class.

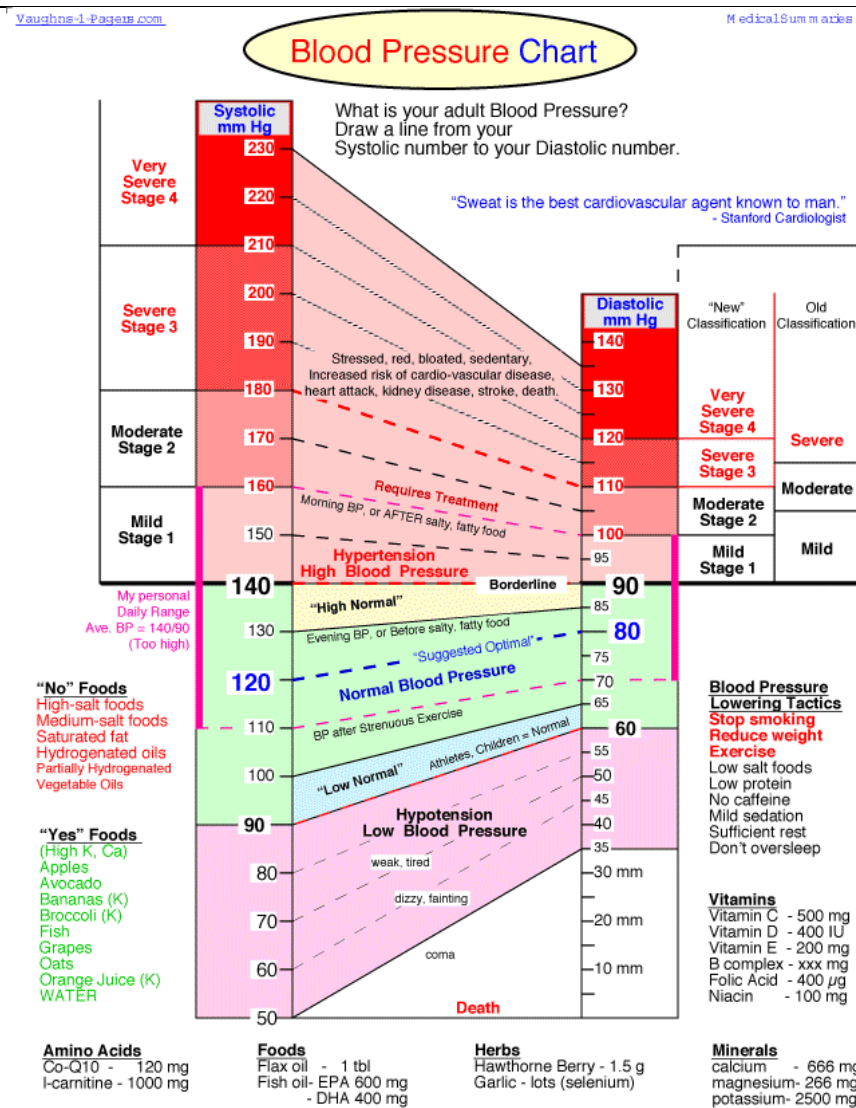
2.3.c. What is the relationship between **blood pressure** and cardiovascular function?

A normal **blood pressure** reading usually indicates a healthy heart, with higher readings indicating that the heart is stressed. It measures the **pressure** on vessel walls from the movement of blood particles.

- Top number → **Systolic** → pressure in arteries as the ventricles contract & the chambers emptying (always higher)
- Bottom number → **Diastolic** → pressure in arteries when ventricles are relaxed & the chambers are filling with blood (always lower)

Blood Pressure Category	Systolic mm Hg (upper #)	Diastolic mm Hg (lower #)
<b>Normal</b>	less than 120	and less than 80
<b>Prehypertension</b>	120 – 139	or 80 – 89
<b>High Blood Pressure (Hypertension) Stage 1</b>	140 – 159	or 90 – 99
<b>High Blood Pressure (Hypertension) Stage 2</b>	160 or higher	or 100 or higher
<b>Hypertensive Crisis (Emergency care needed)</b>	Higher than 180	or Higher than 110

2.3.d. What factors can influence blood pressure?



According to the Mayo Clinic, the top 10 ways to reduce your blood pressure or prevent hypertension ("extra tension") are to:

1. Lose extra pounds and watch your waistline
2. Exercise regularly
3. Eat a healthy diet
4. Reduce sodium in your diet
5. Limit the amount of alcohol you drink
6. Avoid tobacco products and secondhand smoke
7. Cut back on caffeine
8. Reduce your stress
9. Monitor your blood pressure at home and make regular doctor's appointments
10. Get support from family and friends

<http://www.mayoclinic.com/health/high-blood-pressure/HI00027>

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