

BLOOD PRESSURE

- *Indirect measurement*
- *Ventricular Systole & Diastole*
- *Korotkoff sounds*
- *Mean Arterial pressure*

DATA REPORT

Student's Name: _____

Lab Section: _____

Date: _____

I. Data and Calculations

Subject Profile

Name: _____

Height: _____

Age: _____ Time: _____ Gender: Male / Female

Weight: _____

A. Systolic Measurements

Complete Table 16.2 with the systolic measurements for all data recordings. Note the pressure measurement at the event marker insertion point (where Director audibly detected and marked systolic) and where the first Korotkoff sound was detected with the stethoscope microphone. Calculate the Delta difference (Δ) between the trials for each condition, the trial average pressure, and the Delta difference between the event marker and stethoscope microphone average pressure measurements.

Table 16.2 Systolic Data

Systolic Pressure mmHg						
Condition	Trial	Audibly Detected Pressure (Event marker)	Average Pressure (Calculate)	Microphone Detected Pressure (In data, unmarked)	Average Pressure (Calculate)	Δ Average Pressure B minus Average Pressure A
			A		B	
Left arm, seated	1					
	2					
	Δ					
Right arm, seated	1					
	2					
	Δ					
Right arm, lying down	1					
	2					
	Δ					
Right arm, after exercise*	1					

*For 'Right arm, after exercise' recording, calculate the Delta difference between the 'Audibly Detected Pressure' and the 'Microphone Detected Pressure' values, and record the result in the right column.

B. Diastolic Measurements

Complete Table 16.3 with the diastolic measurements for all data recordings. Note the pressure measurement at the event marker insertion point (where Director audibly detected and marked diastolic) and where the sound disappeared from the stethoscope microphone. Calculate the Delta difference (Δ) between the trials for each condition, the trial average pressure, and the Delta difference between the event marker and stethoscope microphone average pressure measurements.

Table 16.3 Diastolic Data

Diastolic Pressure mmHg 1 Value						
Condition	Trial	Audibly Detected Pressure (Event marker)	Average Pressure (Calculate) A	Microphone Detected Pressure (In data, unmarked)	Average Pressure (Calculate) B	Δ Average Pressure B minus Average Pressure A
Left arm, seated	1					
	2					
	Δ					
Right arm, seated	1					
	2					
	Δ					
Right arm, lying down	1					
	2					
	Δ					
Right arm, after exercise*	1					

*For 'Right arm, after exercise' recording, calculate the Delta difference between the 'Audibly Detected Pressure' and the 'Microphone Detected Pressure' values, and record the result in the right column.

C. BPM Measurements

Complete Table 16.4 with the BPM measurements from three cycles of each data recording and calculate the mean BPM for each.

* **Cycle** measurements: If ECG was recorded, use 3 BPM; if ECG was not recorded, use 1 BPM.

Table 16.4 BPM

Condition	Trial	Cycle*			Calculate the Mean	
		1	2	3	of Cycles 1 – 3	of Trial 1 – 2 means
Left arm, seated	1					
	2					
Right arm, seated	1					
	2					
Right arm, lying down	1					
	2					
Right arm, after exercise	1					

D. Summary of Mean Blood Pressure Data

Complete Table 16.5 with the average from sound data from tables 16.2 and 16.3 and then calculate the pulse pressure and the mean Arterial Pressure (MAP).

Pulse pressure = Systolic pressure – Diastolic pressure

$$MAP = \frac{\text{pulse pressure}}{3} + \text{diastolic pressure} \quad OR \quad MAP = \frac{(\text{systolic pressure} + 2 \text{ diastolic pressure})}{3}$$

Table 16.5

CONDITION	SYSTOLE	DIASTOLE	BPM	Calculations:	
	Table 16.2 Sound Average	Table 16.3 Sound Average	Table 16.4	Pulse pressure	MAP
Left arm, seated					
Right arm, seated					
Right arm, lying down					
Right arm, after exercise					

- E. **Timing of Korotkoff Sounds** NOTE: This table requires ECG data, which is not recorded on MP45 systems. Complete Table 16.6 with the Delta T for each condition, and calculate the means.

Table 16.6

Condition	Trial	Timing of Sounds		Mean (calc)
		1	Delta T	
Left arm, seated	1			
	2			
Right arm, seated	1			
	2			
Right arm, lying down	1			
	2			
Right arm, after exercise	1			

- F. **Calculation of Pulse Speed**
Complete the calculation in Table 16.7 using “Left arm, seated” data.

Table 16.7

Distance	Distance between Subject’s sternum and right shoulder	cm
	Distance between Subject’s right shoulder and antecubital fossa	cm
	Total distance	cm
Time	Time between R-wave and first Korotkoff sound	secs
Speed	Speed = distance/time = _____ cm / _____ sec	cm/sec

II. Questions:

1. Note the difference in systolic pressure value between when (a) the sound actually began, (b) was detected by the stethoscope transducer, and (c) was recorded, and the time when the observer first heard the sound and pressed the event marker keystroke. (Example: 141 mmHg – 135 mmHg = 6 mmHg.) What factors could account for this difference? Would the observed difference be the same if measured by another observer? Explain your answer.

2. a) Does your systolic and/or diastolic arterial pressure change as your heart rate increases?

b) How does this change affect your pulse pressure?

c) How would you expect the systolic, diastolic and pulse pressures to change in a normal healthy individual as the heart rate increases?

3. Give three sources of error in the indirect method of determining systemic arterial blood pressure.

4. Use an equation that relates flow, pressure, and resistance to define mean arterial pressure:

5. Blood flow (liters per min). through the pulmonary circuit equals blood flow through the systemic circuit, but pulmonary resistance to flow is 5 times less than the systemic resistance to flow. Using the equation in Question 4, show that mean pulmonary pressure is 5 times less than mean systemic pressure.

6. Define the first and second sounds of **Korotkoff**. Which sound is used to approximate systolic pressure and which sound is used to approximate diastolic pressure?

7. Why is mean arterial pressure not equal to $(\text{systolic pressure} - \text{diastolic pressure})/2$?

8. Define **pulse pressure**. Explain, in terms of changes in systolic and diastolic pressures, why pulse pressure increases during exercise.

9. Give one reason why blood pressure in the left arm may be different than blood pressure in the right arm of a Subject at rest.

10. Name an artery other than the brachial that could be used for an indirect measurement of blood pressure and explain your choice.

III. OPTIONAL Active Learning Portion

A. *Hypothesis*

B. *Materials*

C. *Method*

D. *Set Up*

E. *Experimental Results*
