

L16 - Blood Pressure (4.1.2 Jan 11 2017)  
File name: DaveL16-L16  
05/03/2019  
12:45

First recording (starts at event labeled 'Left arm, seated 1'): Cuff on left arm, seated and relaxed.

Second recording (starts at event labeled 'Left arm, seated 2'): Cuff on left arm, seated and relaxed.

Third recording (starts at event labeled 'Right arm, seated 1'): Cuff on right arm, seated and relaxed.

Fourth recording (starts at event labeled 'Right arm, seated 2'): Cuff on right arm, seated and relaxed.

Fifth recording (starts at event labeled 'Right arm, supine 1'): Cuff on right arm, supine and relaxed.

Sixth recording (starts at event labeled 'Right arm, supine 2'): Cuff on right arm, supine and relaxed.

Seventh recording (starts at event labeled 'Right arm, after exercise'): Cuff on right arm, recovering from mild exercise.

---

---

### L16 DATA REPORT

Student's Name:

Lab Section:

Date:

## I. Data and Calculations

### Subject Profile

Name:	Height:	Age:
Time:	Gender:	Weight:

**Note:** This Data Report assumes that all lesson recordings were

performed, which may not be the case for your lab. Please disregard any references to excluded recordings.

#### 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 ( $\Delta$ ) 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) A	Microphone Detected Pressure (In data, unmarked)	Average Pressure (Calculate) B	$\Delta$ Average Pressure B Minus Average Pressure A
Left arm, seated	1	68.67960	87.044	61.30112	81.086	-5.9580
	2	105.40826		100.87136		
	$\Delta$	36.729		39.570		
Right arm, seated	1	114.79030	113.17	109.31905	108.15	-5.0200
	2	111.55378		106.97835		
	$\Delta$	-3.2365		-2.3407		
Right arm, lying down	1	35.94842	56.138	33.85817	49.766	-6.3720
	2	76.32779		65.67426		
	$\Delta$	40.379		31.816		
Right arm, after exercise*	1	150.77725		147.32882		-3.4484
*For 'Right arm, after exercise' recording, calculate the Delta difference between 'Audibly Detected Pressure' and '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 Korotkoff sound disappeared from the stethoscope microphone. Calculate the Delta difference ( $\Delta$ ) 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						
Condition	Trial	Audibly Detected Pressure (Event marker)	Average Pressure (Calculate) A	Microphone Detected Pressure (In data, unmarked)	Average Pressure (Calculate) B	$\Delta$ Average Pressure B Minus Average Pressure A
Left arm, seated	1	9.68064	39.585	9.24681	34.744	-4.8405
	2	69.48873		60.24154		
	$\Delta$	59.808		50.995		
Right arm, seated	1	NA	62.68229	NA	57.08209	-5.6062
	2	62.68829		57.08209		
	$\Delta$	62.68829		57.08209		
Right arm, lying down	1	20.71947	15.147	15.52756	11.439	-3.7085
	2	9.57468		7.34958		
	$\Delta$	-11.145		-8.1780		
Right arm, after exercise*	1	53.14240		36.33372		-16.809
*For 'Right arm, after exercise' recording, calculate the Delta difference between 'Audibly Detected Pressure' and '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 of the seven data recordings and calculate the mean BPM for each recording.

\* **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	68.986551	65.93406	64.93506	66.619	66.211
	2	64.51612	66.66666	66.22516	65.803	
Right arm, seated	1	72.63922	70.58823	69.93006	71.053	69.016
	2	68.48315	66.66666	65.78948	66.980	
Right arm, lying down	1	64.51612	62.11180	58.02707	61.552	62.707
	2	66.66666	63.69426	61.22448	63.862	
Right arm, after exercise	1	57.36137	59.17159	59.05511	58.529	

#### 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). Note the pressure measurements at the event marker insertion points (where Director audibly detected and marked systolic and diastolic).

Pulse pressure = Systolic pressure – Diastolic pressure

$$MAP = \frac{\text{pulse pressure}}{3} + \text{diastolic pressure}$$

OR

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

**Table 16.5 Average Systolic Pressure/Average Diastolic Pressure**

CONDITION	SYSTOLE	DIASTOLE	BPM	Calculations:	
	Table 16.2 Sound Average	Table 16.3 Sound Average	Table 16.4	Pulse pressure	MAP
Left arm, sitting up	81.086	34.744	66.211	46.342	50.191
Right arm, sitting up	108.15	57.08209	69.016	51.068	74.105
Right arm, lying down	49.766	11.439	62.707	38.327	24.215
Right arm, after exercise	147.32882	36.33372	58.529	111.000	73.332

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**

	Timing of Sounds		
Condition	Trial 1	Trial 2	Mean (calculation)
Left arm, sitting up	0.53200	0.21600	0.37400
Right arm, sitting up	0.22200	0.22600	0.22400
Right arm, lying down	0.79000	0.61600	0.70300
Right arm, after exercise	0.31600	NA	0.31600

#### F. Calculation of Pulse Speed

Complete the calculation in Table 16.7 using "Right arm, seated" data.

**Table 16.7**

		Result	
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 the sound actually began, was detected by the stethoscope transducer, and 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 their 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 (systolic pressure - 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***

**End of Lesson 16 Data Report**

**BSL 4.1 DRL16-04092015**