Physiology Lessons
for use with the
Biopac Student Lab

PC under Windows®98SE, Me, 2000 Pr
or Macintosh® OS 8.6-9.1

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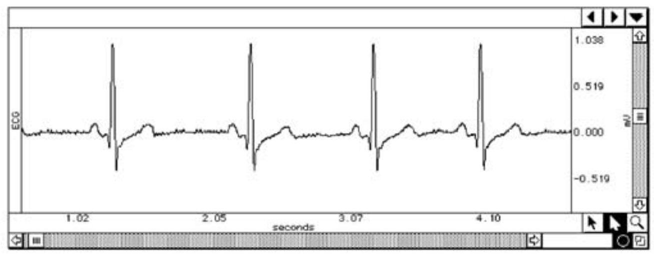
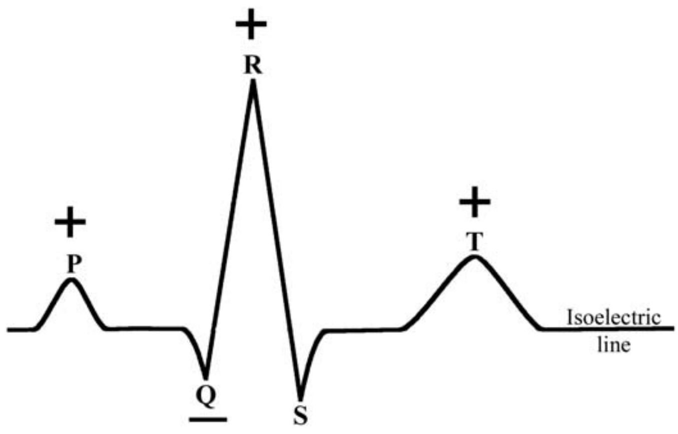
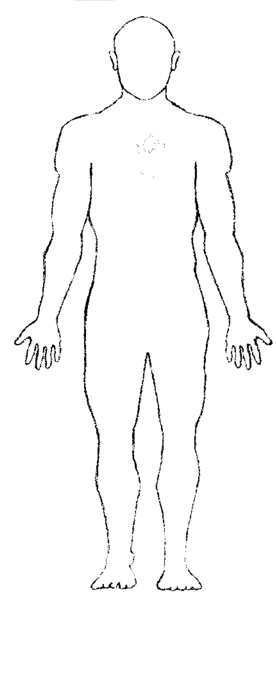
Lesson 5 Data Report

ELECTROCARDIOGRAPHY I

Components of the ECG







Lesson 5

ELECTROCARDIOGRAPHY I

ECG I

DATA REPORT

Student's Name: 解正平、劉維凱、張景程

Lab Section: MD303 Group 3

Date: 2018/3/23

I. Data and Calculations

Subject Profile

Name 張景程 Height 178cm

Age 21 Weight 67kg

Gender: Male / Female

A. Supine, Resting, Regular Breathing (using *Segment 1* data)

Complete the following tables with the lesson data indicated, and calculate the Mean and Range as appropriate.

Table 5.3

Measurement	From Channel	Cardiac Cycle 1	2	3	Mean	Range
ΔT	CH 2	0.668s	0.728s	0.745s	0.714s	0.077s
BPM	CH 2	89.82036BPM	82.41758BPM	80.53691BPM	84.25828BPM	9.28345BPM

Table 5.4

ECG Component	Duration Δ T [CH 2] Cycle 1	Cycle 2	Cycle 3	Mean	Amplitude (mV) Δ [CH 2] Cycle 1	Cycle 2	Cycle 3	Mean
P wave	0.064	0.078	0.093	0.078	0.05280	0.0732	0.0061	0.044
PR interval	0.12300	0.14100	0.143	0.135	0.07263	0.08026	0.03723	0.06337
PR segment	0.054	0.048	0.039	0.047	0.03375	0.01129	0.02136	0.02213
QRS complex	0.1	0.101	0.098	0.1	0.00641	0.05127	0.01190	0.02319
QT interval	0.349	0.326	0.334	0.336	0.00916	0.05585	0.01404	0.02635
ST segment	0.121	0.122	0.116	0.120	0.01129	0.00855	0.01221	0.01068
T wave	0.194	0.204	0.228	0.209	0.04303	0.00122	0.06195	0.0354

Table 5.5

Ventricular Readings	CH 2 Δ T			
	Cycle 1	Cycle 2	Cycle 3	Mean
QT Interval (*corresponds to Ventricular Systole*)	0.349	0.326	0.334	0.336
End of T wave to subsequent R wave (*corresponds to Ventricular Diastole*)	0.446	0.453	0.526	0.475

B. Seated, deep breathing

Table 5.6

Rhythm	CH. #	Cycle 1	Cycle 2	Cycle 3	Mean
Inspiration					
Δ T	CH 2	0.58	0.651	0.753	0.6613
BPM	CH 2	103.44828	92.1659	79.68128	91.76515
Expiration					
Δ T	CH 2	0.664	0.808	0.821	0.764
BPM	CH 2	90.3614	74.25743	73.08161	79.23348

C. Sitting

Table 5.7

Heart Rate	CH. #	Cycle 1	Cycle 2	Cycle 3	Mean
Δ T	CH 2	0.893	0.867	0.841	0.867
BPM	CH 2	67.18925	69.29415	71.34364	69.27568

D. After Exercise

Table 5.8

Ventricular Readings	CH 2 Δ T			
	Cycle 1	Cycle 2	Cycle 3	Mean
QT Interval (*corresponds to Ventricular Systole*)	0.359	0.242	0.305	0.302
End of T wave to subsequent R wave (*corresponds to Ventricular Diastole*)	0.073	0.172	0.189	0.145

II. Data Summary and Questions

160.85791、164.83516、167.13092
100.00000、101.18044、110.90573

E. Heart Rate (BPM)

Condition	Mean	Range
Supine, regular breathing	84.25828	9.28345
Seated, deep breathing, inhalation	91.76515	23.767
Seated, deep breathing, exhalation	79.23348	17.27979
Sitting, regular breathing	69.27568	4.15439
After exercise – start of recording	164.27491	6.27301
After exercise – end of recording	104.02872	10.90573

Explain the changes in heart rate between conditions. Describe the physiological mechanisms causing these changes.

First, we define the seated action for a sudden movement while the sitting is a relaxed state. Morever, the suspine is that the subject lay on the chairs and exercise is that the subject went upstairs and downstairs. Analyzing the data, we find after a sudden sitting and exercising, the heart rate is higher than any other conditions due to the use of energy for muscle and the more consumption of oxygen for cells. It is obvious that the BPM declined seriously after a while time of rest, condition 4 and 6, which means the less need for the oxygen and the reducing in metabolism. Next we focus on the condition 1 and 4 for the difference between supine and sitting. The former has a higher heart rate than the latter perhaps attributes to the uncomfortable environment for supine movement. Most importantly, it is essential to explaining the reason for the lower BPM in exhalation than inhalation. We think the higher pressure in chest cavity when inhalation causing the heart beating faster to transmit oxygen. On the other hand, when exhalation the lower pressure makes our heart relaxed.

As a result, we conclude the pressure in chest cavity and the movement with oxygen in need are the mainly factors affect the BPM.

F. Duration (Δ T)

Rhythm

Measurement	Mean	Range
Supine, regular breathing		
Inhalation	2.102	0.410
Exhalation	2.325	0.402
Supine, deep breathing		
Inhalation	3.145	0.320
Exhalation	3.275	0.304

Are there differences in the cardiac cycle with the respiratory cycle?

When observing the difference in deep breathing and regular breathing, we can find that the duration of deep breathing is longer than the regular breathing. Maybe it is resulting from the more oxygen the more time we need to exchange with the respiratory circle. According to the inhalation and exhalation, the former takes less time no matter it is regular or deep breathing since the pressure change in our chest cavity will decrease the venous return, increasing the heart rate.

Measurement	**Mean**	**Range**
Supine, regular breathing		
Ventricular systole	0.336	0.023
Ventricular diastole	0.475	0.08
After Exercise		
Ventricular systole	0.302	0.117
Ventricular diastole	0.145	0.116

What changes occurred in the duration of systole and diastole between resting and post-exercise?

The systole duration doesn't change a lot between resting and post-exercise; however, it is even decrease. On the contrary, the diastole duration decreases sharply which resulting that the BPM is more higher after exercising.When it comes to the phenomena, we think that the duration of systole is the process transmitting blood to the whole body with a higher pressure while the processing duration can't change obviously in high pressure.

G. Review your Data

1. Is there always one P wave for every QRS complex? Yes No
2. Describe the P and T wave shapes: like a half-sine wave which the right side has a higher slope and T wave usually bigger than T wave.
3. Do the wave durations and amplitudes for all subjects fall within the normal ranges listed in Table 5.2? Yes No a little date has a deviation
4. Do the ST-segments mainly measure between –0.1 mV and 0.1 mV? Yes No
5. Is there baseline “drift” in the recording? Yes No
6. Is there baseline “noise” in the recording? Yes No

End of Lesson 5 Data Report