BLOOD PRESSURE

Do you know, what it is?

„150/95, please, make note into patient folder“, asked Doctor Smith his nurse. He turned to the patient and says: “So, Mr. Martin, your blood pressure is too high. And, last time, it was high as well. From now, no smoking, no alcohol drinking and tell your wife not to use salt very much.” Mr. Martin was surprised and tried to compel Doctor to allow something: “But, Doctor, just one cigarette a day.“ However, Doctor Smith was unyielding: „No, no, nothing is possible. Do you want to have a stroke? Or a heart attack? Or, you want to destroy your kidney? All of them, it is not pleasant.” “Doctor! As follows, no pleasure remains to me in this World.” Mr. Martin tried again to compel the Doctor, but the Doctor remained still unyielding. At the end, Mr. Martin started to be interested in the blood pressure: “And Doctor, what have you just actually measured? What is, in fact, the blood pressure? And, why there are two numbers? It is strange, is not it? What does the first number mean and what is the second, lower, number? And, what is the number, which is responsible for forbidden drinking and smoking? And, which number is more important? Could you, doctor, explain it to me?” “Mr. Martin” Doctor said “I would be happy to explain you the blood pressure problem. Unfortunately, waiting room of my doctor's office is crowded and there are a many patients. Happily, I have a contact to …… (Fill in your name), write down his/her mobile number …… (Fill in your phone number), he/she is smart guy/girl, he/she (cross out the non-matching), he/she will explain everything to you. Good bye.” Mr. Martin returned to home and started to peace with loose of his bad habits. However, when he came home, he took the mobile phone and called to the number from doctor. …….. (Your name) picked the mobile and Mr. Martin asked for help, because he was really interested in blood pressure problem: “Hi, I am Mr. Martin a need to explain something. Would it be possible …..” “Yes, of course”, told …….. (your name) and begun speaking ….


tonometer (left)


cuff with bulb

Cite this work as:
Šmejkal, Petr (2014). Blood pressure. pp. 1-6. Available at http://comblab.uab.cat

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein Project N. 517587-LLP-2011-ES-COMENIUS-CMP

Can you kindly explain to Mr. Martin, what the blood pressure is, why they are two numbers and what the numbers mean? And, why too high or too low blood pressure is problem? What can happen if the blood pressure of Mr. Martin will be outside some reasonable limits?

Before you go to laboratory

Try to remember, what the term pressure actually is. What is the reason of the pressure in general? From this, you can derive what is the blood pressure. So, please, write down, what the blood pressure is:

_____

_____

_____

The blood pressure is often measured by following procedure (maybe, you already followed the procedure when a doctor measured your blood pressure). Doctor wrap a cuff firmly around your arm and fill in the cuff with air. The pressure in the cuff is often high, sometimes, it is not pleasant. Arm cannot be throttled too long. Then, the doctor put a stethoscope on your elbow hole and start to release the air in the cuff. He still hear the stethoscope. In a certain time, he note a number from a bar with a scale (called tonometer) and later, he note the second number.

Try to remember the procedure; it can help you to answer Mr. Martins´ questions.

Blood pressure measurement

When performing blood pressure measurements, it is best to work with a partner. You can be a doctor, the partner is patient. Later, you can change the roles.

Follow these general procedures to use the Blood Pressure Sensor with a computer:

1. Connect the Blood Pressure Sensor to computer (mostly through some interface) or data logger.
2. Start the appropriate data-collection software on the computer (in the case you use computer). You are now ready to collect data. Settings of the measurement and axes should be set-up automatically. In the case of problem, ask your teacher for help.
3. Wrap the cuff firmly around your partner's arm, approximately 2 cm above the elbow. The two rubber hoses from the cuff should be positioned over the bicep muscle (brachial artery) and not under the arm. Important: The person having his or her blood pressure measured must remain still during data collection—no movement of the arm or hand during measurements.
4. Start the measurement to begin collecting data.

5. Quickly and repeatedly squeeze the bulb to inflate the cuff on your partner's arm. Continue inflating the cuff to a pressure between 150 and 170 mm Hg (no more!!!). A meter in the data-collection software will display the live pressure readings from the sensor. When the maximum pressure is reached, set the bulb pump down onto the table. The built-in pressure release valve will slowly deflate the cuff.
6. After the pressure drops to 40 mm Hg, stop the measurement in the data-collection software and press down on the pressure release valve to release any air left in the cuff.
7. Open graph and study carefully the curve measured.

Helpful Tips

- Blood pressure readings will differ from person to person and even between measurements on the same individual. Do not expect to receive the same measurements each trial since there are many factors that cause a person's blood pressure to increase or decrease. Use the following tips to take accurate measurements.
    a. The subject's arm and hand must remain still during measurements.
    b. Proper placement of the pressure cuff will increase the accuracy of your blood pressure measurements. The rubber hoses from the cuff should exit over the brachial artery and 2 cm above the crease in the elbow.
    c. Remove any clothing that may cover or constrict the portion of the arm being measured.
- For most individuals it is not necessary to inflate the pressure cuff higher than 170 mm Hg. Over inflation of the cuff may cause pain and/or injury.
- If the pressure release valve is exhausting slower or faster than 2.0–4.0 mmHg /s, then adjust the exhaust rate of the pressure valve. With the bulb in hand and the hose leading away from you, place a screwdriver into the metal slot on the top of the release valve. To increase the rate of exhaust, turn the screwdriver clockwise. To decrease the rate of exhaust, turn the screwdriver counter-clockwise. The larger a subject's arm the slower the release valve will exhaust.

Evaluate the measured data

Draw the measured chart below. Try to find interesting locations, spots or areas and interpret them (pressure changes, waves in chart, effects etc.).

Try to find, which value in chart corresponds to higher value of blood pressure (and why) and which value corresponds to lower value of blood pressure (and why). Try to derive, which processes in bloodstream corresponds to values of blood pressure. What is your blood pressure?

My blood pressure: ……

Higher value:

_____

_____

Lower value:

_____

_____

Conclusion:

_____

_____

_____

Communicate you results

Describe below a way, how to explain to Mr. Martin the blood pressure phenomena in your call with him. Answer his questions.

_____

_____

_____

_____

_____

Try to find (e.g. with internet) further information related to blood pressure.

1. Higher and lower values of blood pressure have a special technical term. How and why is it called that way?

   Higher value:_____

   Lower value: _____

2. Probably, you already heard, that somebody has a low or high blood pressure. What does it mean? What are the limits for high and low pressure (hypertension and hypotension)? What are the symptoms of hypertension and hypotension? What to do, if you suffer with hypertension or hypotension?

   a) What is high/low blood pressure?

   _____

   _____

   b) What are the limits for hypertension and hypotension (and normal blood pressure)?

   Hypertension_____Hypotension_____

   c) What are the symptoms of hypertension/hypotension?

   Hypertension: _____

   _____

   Hypotension: _____

   _____

d) What to do in the case of hypertension/hypotension?

Hypertension: _____

_____

_____

Hypotension: _____

_____

_____

During the previous experiments, you gathered enough the information and experience to answer the following questions:

1. Could you read from your graph another information than about the blood pressure (e.g. pulse frequency?)? Describe the procedure how to harvest the data?

_____

_____

2. The blood pressure is measured in mm Hg (bar) units? What does it mean? Would it be possible to measure the blood pressure in different units? If yes, please, convert the values in mm Hg into the different units.

_____

_____

3. Please, estimate (or investigate experimentally), which actions influence the blood pressure. Which actions lead to higher values and which to lower values of blood pressure?

_____

_____