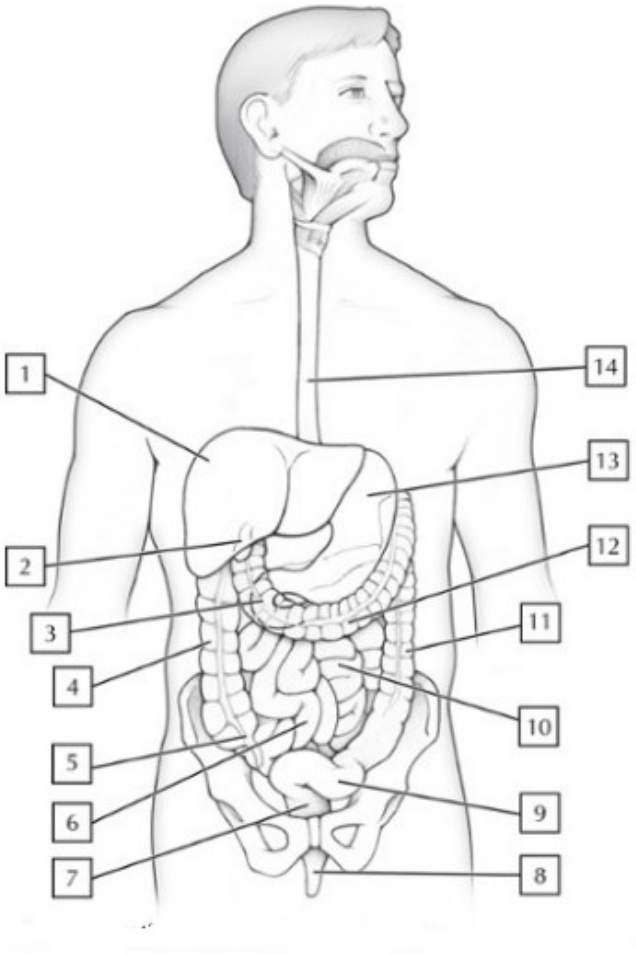
**WORKSHEET - DIGESTIVE SYSTEM**

**Task 1: Organization of gastrointestinal system – exercising the main parts**

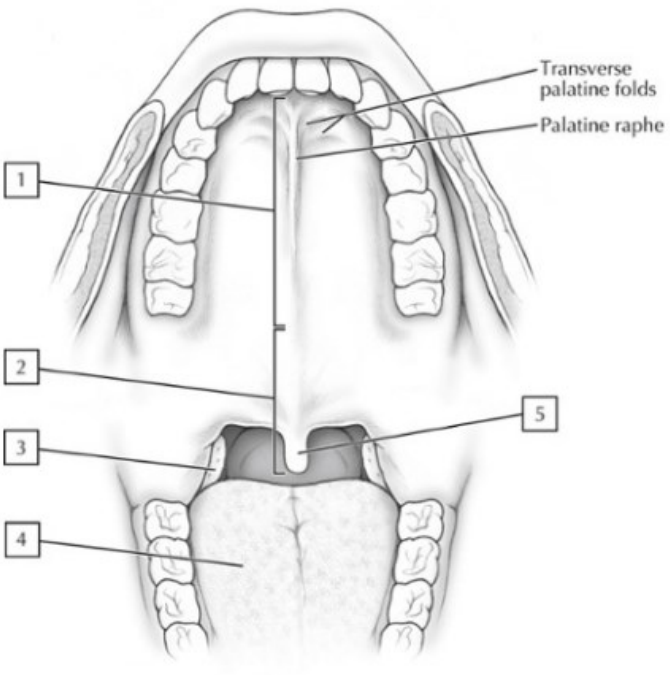
Assign the correct names to the numbers in the picture 1.

- Sigmoid colon
- Ascending colon
- Esophagus
- Cecum
- Gallbladder
- Ileum
- Anal canal
- Jejunum
- Liver
- Duodenum (phantom in figure behind the transversecolon)
- Transverse colon
- Descending colon
- Rectum
- Stomach



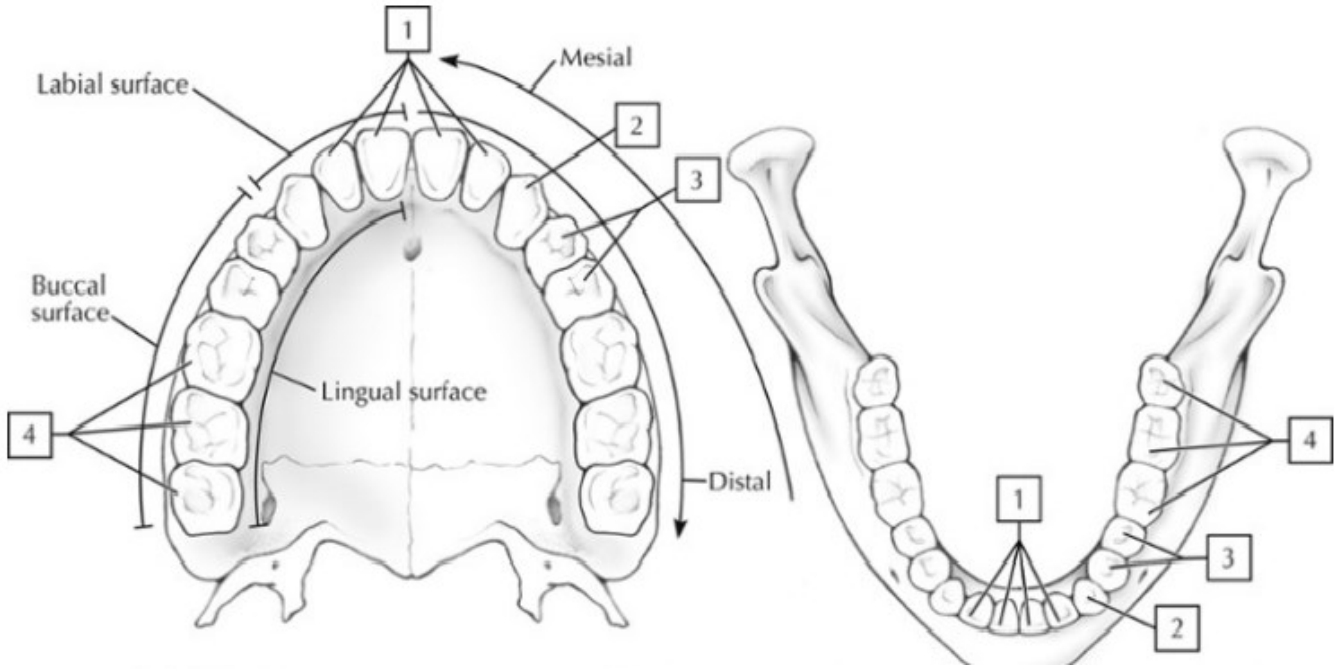

Assign the correct names to the numbers in the picture 2

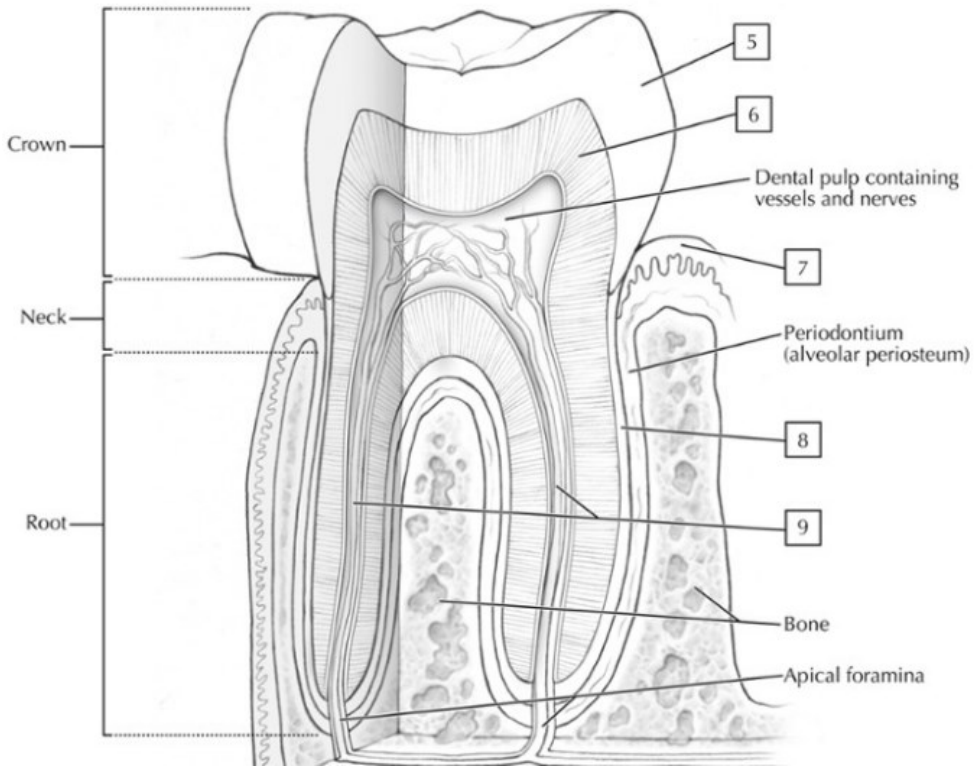
- Tongue
- Soft palate
- Uvula
- Hard palate
- Palatine tonsil



Assign the correct names to the numbers in the pictures 3 and 4

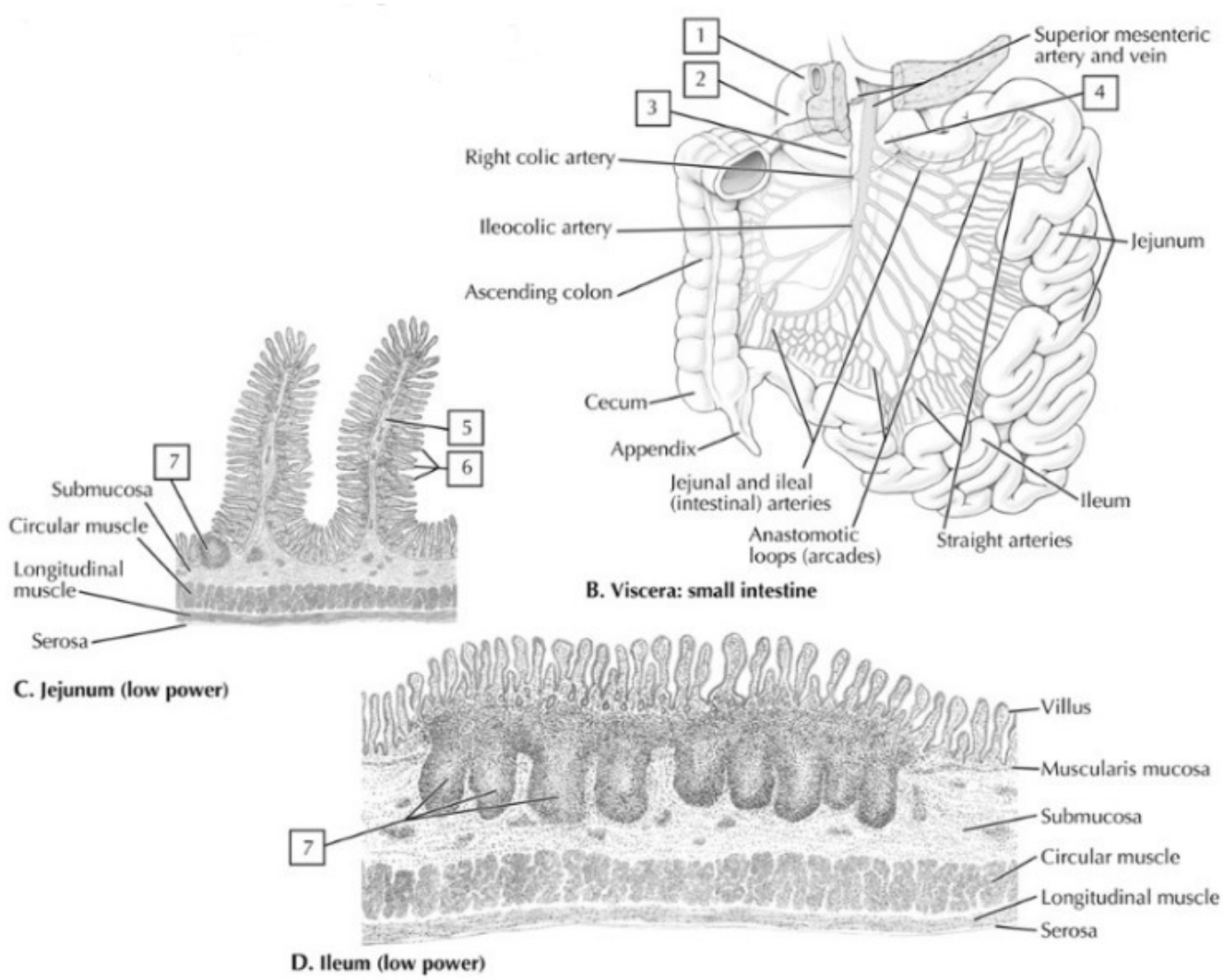
- Gingival (gum) epithelium (stratified squamous)
- Incisors
- Molars
- Enamel
- Premolars
- Dentin
- Canine
- Root canals (containing vessels and nerves)
- Cement



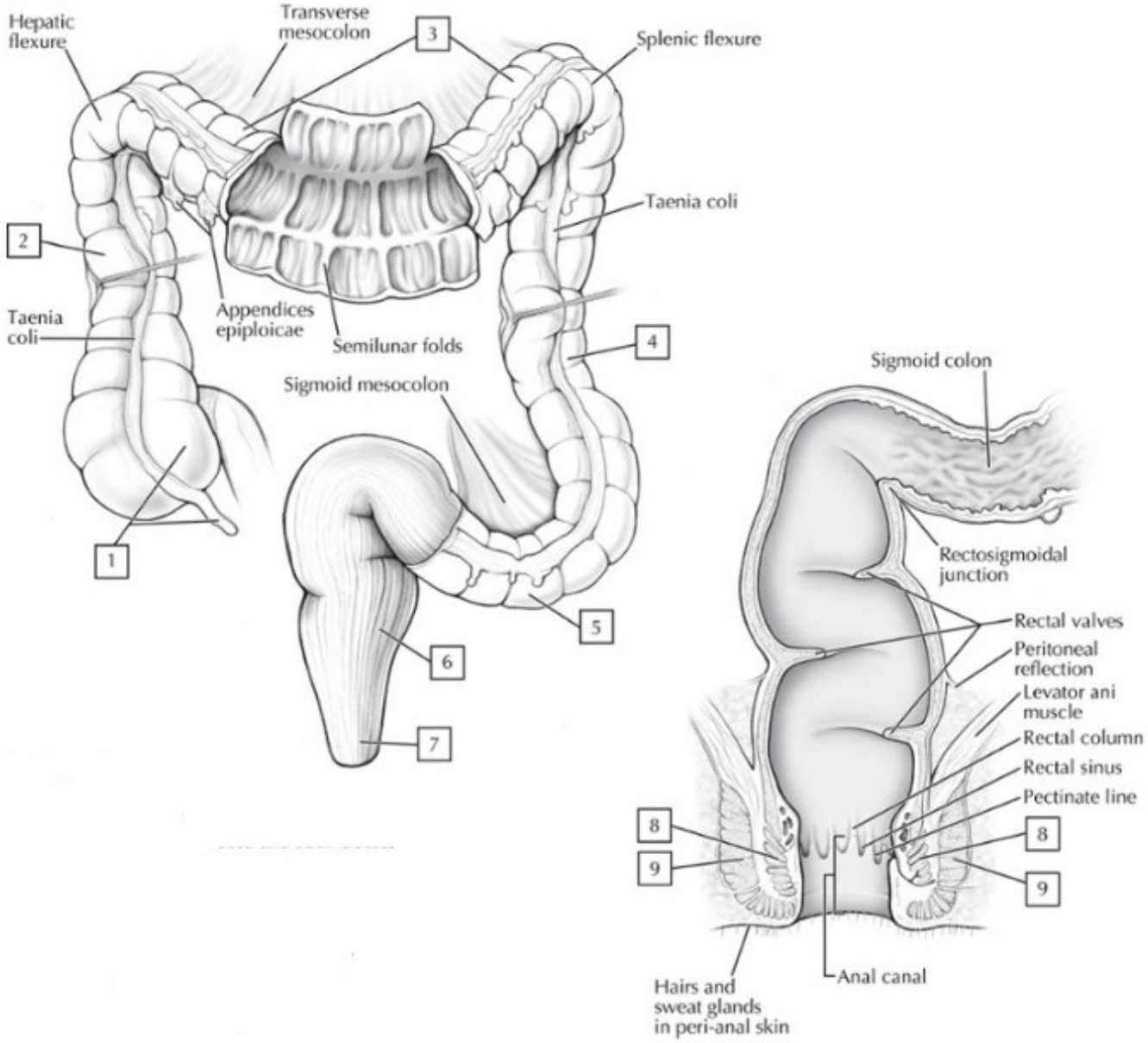
Assign the correct names to the numbers in the picture 5

- Third (horizontal) part of the duodenum
- First (superior) part of the duodenum (tethered by the hepatoduodenal ligament containing the common bile duct, hepatic artery proper, and portal vein)
- Lymph nodule
- Second (descending) part of the duodenum
- Villi
- Fourth (ascending) part of the duodenum
- Circular fold



Assign the correct names to the numbers in the picture 6

- Anal canal
- Ascending colon
- Transverse colon
- Sigmoid colon
- Descending colon
- External anal sphincter (voluntary, skeletal muscle; somatic innervation)
- Cecum and appendix
- lnternal anal sphincter (involuntary, smooth muscle; parasympathetic innervation)
- Rectum



**Task 2: The functions of the digestive system** - Link correctly the parts of the sentences from the left and right columns:

1. The function of the digestive system is to break down food (complex carbohydrates, proteins, and fats)…
2. This process …
3. Digestion allows the body's cells to convert food energy into …
4. The major organs and accessory structures that perform this function …
5. The digestive system prepares food for use…
6. a) Ingestion or …

   b) Peristalsis or …

   c) Digestion or …

   d) Absorption or …

e) Defecation or …

1. … is called digestion
2. …the elimination from the body of those substances that are indigestible and cannot be absorbed.
3. …are collectively referred to as the digestive system.
4. … by cells through five basic activities:
5. … the breakdown of food by both mechanical and chemical mechanisms
6. … the physical movement or pushing of food along the digestive tract
7. … the passage of digested food from the digestive tract into the cardiovascular and lymphatic systems for distribution to the body's cells
8. …the high-energy adenosine triphosphate (ATP) molecules that run the cell's machinery.
9. …via hydrolysis into simpler substances or molecules that can be used by the body's cells.
10. … the taking of food into the body

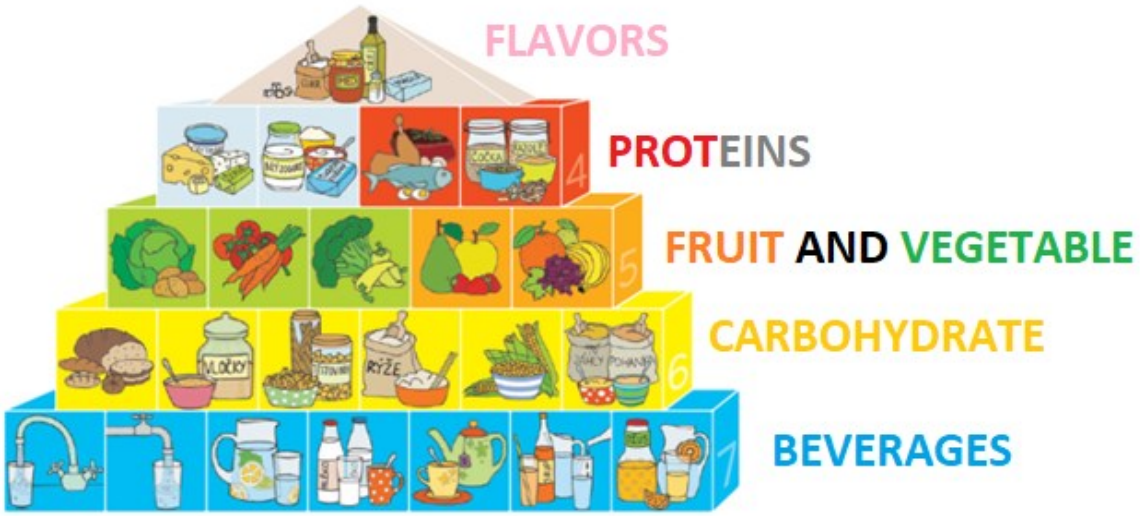
**Task 3: ESSENTIAL NUTRIENTS –** find in the text as many errors as possible, highlight them correct them.

*There are six classes of nutrients: carbohydrates, lipids (fats), proteins, vitamins, calcium, and water. These nutrients in combination contain the nonessential elements carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur (CHNOPS). These are essential nutrients that a person must obtain from blood because the body can manufacture them in sufficient amounts to meet its physiological needs.*
*It is essential that we choose good dietary guidelines to maintain a healthy body. These guidelines have been established by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services:*
*• Eat the same foods.*
*• Balance the food you eat with physical activity and maintain or improve your weight.*
*• Pick a diet with lots of fresh fruit and vegetables and white bread.*
*• Choose a diet low in compound carbohydrates, saturated fat, and cholesterol.*
*• Pick a diet that has moderate salt, sodium, and minerals.*
*• If you drink alcoholic beverages, do it in great moderation.*
*To assist you in choosing a healthy diet, read food labels. Food labels help consumers select foods with less fat, saturated fats, cholesterol, and sodium, and foods with more dietary fiber and complex carbohydrates. Nutrition fact labels can include information per serving size and number of servings per container; kilocalorie (kcal) information and quantities of nutrients per serving, in actual amounts; quantities of nutrients as "% Daily Values" based on a 2000 kcal energy intake; the daily values for selected nutrients for a 2000 and a 2500 kcal diet; kilocalorie per gram reminder; and the ingredients in descending order of predominance by weight. Packages with less than 25 square inches of surface area do not have to carry any nutrient information but will have a telephone number or address to contact to obtain that information.*
*All the food groups provide valuable nutrients. MyPyramid, developed by the Department of Agriculture, provides personalized eating plans and tools to help you make food choices that are right for you. Visit www.mypyramid.gov to learn more about the various pyramids based on different lifestyles and nutritional needs, and to take advantage of the many tools offered on the website.*

**Task 4: Nutrition**
If we want to eat healthy, we should stick to the following principles of healthy nutrition:

- **Variety** – change food - types, colours, try new meals
- **Proportionality** – enough portions during the day - (clenched fist, open palm = 1 portion - in the pyramid, one cube shows one portion)
- **Regularity** – we eat at regular intervals best every 2-3 hours
- **Preparation** – we pay attention to food preparation and food processing
- **Truthfulness** – we are aware of the composition of the food, due to the needs of our body (we read the packaging, we take care of sufficient supply of carbohydrates, proteins, fats, vitamins and minerals)

In order to verify whether we consume sufficient amount of food during the day, the food pyramid will help us:




*Source: www.pav.rvp.cz*

The pyramid is a tool for variety and adequacy in nutrition. One pyramid cube = 1 portion/serving = size of the clenched fist/open palm. The pyramid shows the right daily intake of suitable food.

**TASK:** *ASSEMBLE THE DAILY MENU ACCORDING TO THE RULE SO THAT EACH DISH IS COMPOSED OF ALL PYRAMID LEVELS.* (e.g. Breakfast: tea + honey (1st + 5th floor), wholemeal bread (2nd floor), a piece of pepper (3rd floor), cheese (4th floor), flavours are not necessary for all meals)

**Task 5: Determination of energy expenditure by calculation**

Clinical practice often requires actual energy expenditure (AEE). As indirect calorimetry measurement is not always available we use tables and formulas based on data obtained by measuring population samples.

***Procedure:***

1) **Calculation of BASAL ENERGY EXPENDITURE (BEE):**
   The most widespread estimate of BEE is based on formulas of Harris-Benedict (1919).

   For men: **BEE = 66 + (13,7 x m + 5 x h) – (6,8 x r)**
   For women: **BEE = 655 + (9,6 x m) + (1,7 x h) – (4,7 x r)**
   m….body weight in kg
   h.….body height in cm
   r……age in years

TRANSFER THE RESULT IN KCAL/DAY TO KJ/DAY (1 KCAL=4,18 KJ, 1 J=0,2388CAL):
BEE……

2) **Calculation of ACTUALENERGY EXPENDITURE (AEE)** is based on the following formula:

**AEE = BEE x AF x TF x IF**

*While we consider these factors:*

| | | | | | |
|---|---|---|---|---|---|
| ***Activities- AF:-****lying patient* | *1,1* | | | | |
| ***-****lying but mobile patient* | *1,2* | ***demage- IF*** | *uncomplicated patient* | *1,0* |
| *-mobile patient* | *1,3* | | *postoperative condition* | *1,1* |
| *-healthy, light workin* | *1,55♀1,60♂* | | *fractures* | *1,2* |
| *-healthy, moderate working* | *1,6 ♀1,78♂* | | *sepsis* | *1,3* |
| *-healthy, hard working* | *1,82 ♀2,10 ♂* | | *peritonitis* | *1,4* |
| ***body temperature - TF*** | | | *multiple wounds* | *1,5* |
| *37°C* | *1,0* | | *multiple wounds + sepsis* | *1,6* |
| *38°C* | *1,1* | | *burns 30-50%* | *1,7* |
| *39°C* | *1,2* | | *burns 50-70%* | *1,8* |
| *40°C* | *1,3* | | *burns 70-90%* | *2,0* |
| *41°C* | *1,4* | | | |

Note: For the AEE calculation in our exercise, use only the activity factor: **healthy, light working**

**Conclusion:** CALCULATE YOUR AEE VALUES (EXPRESS IN KJ/DAY):

AEE…….

**Task 6: Assessment of nutritional status**

*Objective of the course:*

Learn how to evaluate the **state of human nutrition** using methods and procedures used in clinical practice.

*Introduction:*

It is surprising that even advanced societies encounter a high percentage of nutritional disorders in both directions - malnutrition and also significantly increased weight. Both extremes have a variety of clinical outcomes. Disorders of digestion and metabolism, where in an aggravated form, the inability to eat (anorexia mentalis) can occur. Secondly, occurrence of the increased (and increasing) percentage of people with an increased body weight accompanying manifestations not only metabolic, endocrine, cardiovascular, but also with diseases of the locomotive system. Definitely important are the currently present disorders of self-perception, feelings of inferiority and depression.

The body weight is most often used to assess nutritional status. However, this value is highly variable because it is not precisely defined in relation to the food received, the age and the sex of the person being measured. Additional auxiliary measured variables such as measured body height, waist circumference, hips, and various indexes attempt to replace these flaws.

Several values that describe the current nutritional status can more accurately distinguish some physiological deviations, for example, in the body composition in man and woman, and more accurately draw attention to the incipient changes.

For clinical practice, it is of great importance to determine other parameters of the nutrition assessment, from which we should first name the active muscle mass and the thickness of the skin layer. These values can be determined depending on workplace equipment in a variety of ways (dilution methods, spectrometry or computed tomography). These equipment demanding methods can be replaced with simpler methods, which are sufficient for normal clinical practice (caliper-measured skin layer, tailor's metre for limb girth, bioimpedance of the upper and lower half of the body).

**Read the text above and answer the questions:**

1. **What are the accompanying manifestations of increased body weight?**

2. **What auxiliary measured variables do we use to assess nutritional status?**

3. **What other nutrition assessment parameters are important for clinical practice?**

*Tools:* scale, height metre, tailor's metre, (optional – scale for bioimpedance measurement)

*Procedure:*

**a) Indices based on anthropometric indicators:**

The easiest way to find the recommended (so called ideal) weight is based on **Broc's index**:

**The ideal weigh**t is determined:

for men: **body height in cm - 100 or (body height in m)$^2$ x 23**

for women: **(height in cm - 100) - 10% or (height in m)$^2$ x 21,5**

Other calculations:

**% ideal weight:** **(current weight / ideal weight) x 100**

When calculating how many percent of your ideal weight a person achieves, 4 degrees of obesity can be classified:

| Obesity degree | % ideal weight |
|---|---|
| Mild | 115-129 |
| Medium | 130-149 |
| Heavy | 150-199 |
| Morbid | > 200 |

**The Quetelet's index** = body mass index, better known under the English name body mass index (**BMI**), is now used:

$$\boldsymbol{BMI = \frac{weight\ (kg)}{height\ (m)2}}$$

Based on the obtained index, determine the individual weight categories:

| Body mass index - BMI ($kg.m^{-2}$) | | |
|---|---|---|
| Category - | Men | Women |
| Underweight | < 20 | < 19 |
| Normal | 20-24,9 | 19-23,9 |
| Overweight | 25-29.9 | 24-28,9 |
| Obesity | 30-39,9 | 29-38,9 |
| Severe obesity | > 40 | > 39 |

These indices do not aptly the fact of physiologically different fat distribution among the sexes. For this reason, two other parameters are important:

**Determination of waistline** (circumference), is very simple and also apposite.

| Waistline (cm) | | |
|---|---|---|
| Category | Men | Women |
| Recommended range | < 94 | < 80 |
| Need to reduce weight | 95-102 | 81-90 |
| Losing weight requires medical | > 102 | > 90 |

**Determination of Waist/Hip Ratio (WHR) index** in a dimensionless number.

This ratio is recommended: for women< 0,80 for men < 1,00

**Task 7: Body fat**

**7.1 Try to find (internet, books) at least 3 ways how body fat can be measured and sump them up in your own words.**

**7.1.1**

**7.1.2**

**7.1.3**

**7.2 Calculation of your body fat.**

**7.2.1 Please use this calculator to predict your body fat.**

**Your result:**

**7.2.2 See the reference tables and read the paragraph about body fat on the calculator website. Based on the information you can get from the tables and text, comment on your body fat percentage.**

**Your comment:**

**7.3 (optional) With a scale for bioimpedance, try to measure your body fat percentage and compare your result with the result from the calculator.**

**Task 8 - Virtuali Tee - Digestive system**

**8.1 Download the Curioscope Virtuali Tee from google play.**

**8.2 Open the app and scan this picture.**

**8.3 Choose between the systems – digestive system - run the "doctor gloves" tool and find the correct answers to the following questions:**

1. Which organs belong to the digestive system? - You can use the "i" tool.
2. What does our body need to get energy?
3. What is the function of HCl in the stomach?
4. Which body organ filters the toxic substances we have received?
5. What is the function of large intestine?

**Task 9: Amount of sugar and salt in foods:**

**9.1.1** **Sugar:** Keep track of the foods that you eat during the whole day and then calculate your sugar intake by adding up all the numbers.

**9.1.2** To display the sugars in certain foods please use the sugar cubes and build the sugar pyramids next to at least 5 kinds of food.

**9.1.3** Again with sugar cubes display your entire daily sugar intake. WHO recommends that if you want to stay the way you are, you shouldn't get more than 50 g of added sugars per day and if you want to improve your health you should keep your added sugar under 25g a day. Comment on your sugar intake:

**9.2.1** **Salt:** Keep track of the foods that you eat during the whole day and then calculate your salt intake by adding up all the numbers.

**9.2.2** Use the kitchen scale to weight the same amount of salt you ate on one day. WHO recommends that average adult shouldn't exceed 5 g of salt per day. Comment on your daily salt intake.