

## Question I. *Omega 3 Fatty Acids* (5pts)

**Essential Fatty Acids (EFAs)** are fats that are essential for our body but the body cannot synthesize them. These fats are classified as essential because they manufacture and repair cell membranes and expel harmful waste products. They produce prostaglandins, which regulate several physiological functions including blood pressure, heart rate, blood clotting and immune function. If we do not get these essential fats, then we may get many health problems.

Essential Fatty Acids are polyunsaturated fatty acids. There are two families of **EFAs**: omega 3 fatty acid and omega 6 fatty acid. There is a third one, omega 9 fatty acid, but as our body can manufacture it in adequate amount, it is not in **EFA** category.

The symptoms of omega 3 fatty acid deficiency are dry and itchy skin, brittle nails and hair, constipation, frequent colds, depression, cardiovascular disease, type 2 diabetes, accelerated aging, fatigue inability to concentrate and joint pain. However, these symptoms may be due to some other health conditions or nutrient deficiencies. Hence it is difficult to know whether a person is having an omega 3 deficiency.

Omega 3 fatty acids are polyunsaturated. All polyunsaturated oils are highly susceptible to damage from heat, light and oxygen. When exposed to these elements for too long, the fatty acids are oxidized producing free radicals, which are believed to promote cancer and other degenerative diseases. The omega 3 oils should be used for dressings and not for deep frying.

### 1). Pick up from the text

- a. *Why essential fatty acids are considered as essential fats?*
- b. *Why omega 9 fatty acid is not considered as (EFA)?*

### 2) By referring to the text

- a. *can we consider a fried food with omega 3 oil as a good source for omega 3 fatty acids? Justify your answer.*
- b. *Can we know that we have omega 3 deficiency symptoms? Justify.*
- c. *what are the symptoms of omega 3 deficiency ?*

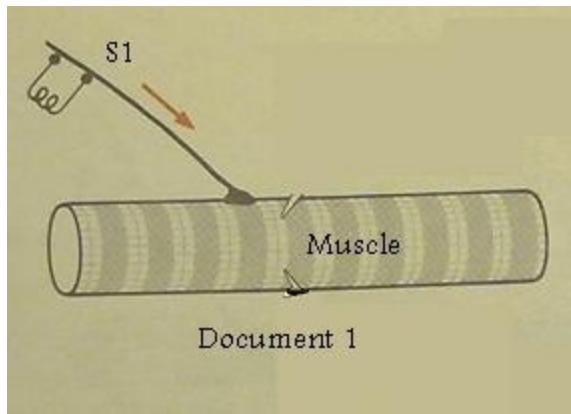
## Question II : *Botulinum Toxin*(5pts)

**Botox** is a trade name for a **Botulinum toxin** which is a protein produced by a bacterium clostridium and it is extremely neuro toxic .**Botox** is a lethal naturally occurring substance transmitted from food which is not heated correctly or caned In correctly .Honey can contain this toxin for that reason it should not be given for children under the age of one year **Botox** can be used as effective medication. **Botox** injections consist of small doses of **Botulinum toxin** that can be injected in the face to prevent wrinkles by paralyzing the facial muscles .It lasts for approximately 4 months.

### A -1) Pick up from the text

- a. *What is Botox?*
- b. *how is Botox used as effective medication?*

B- *A number of experiments are done at the level of a motor neuron and muscle as seen in the next setup (document 1) in order to understand the effect of drugs on the contraction of the muscle.*



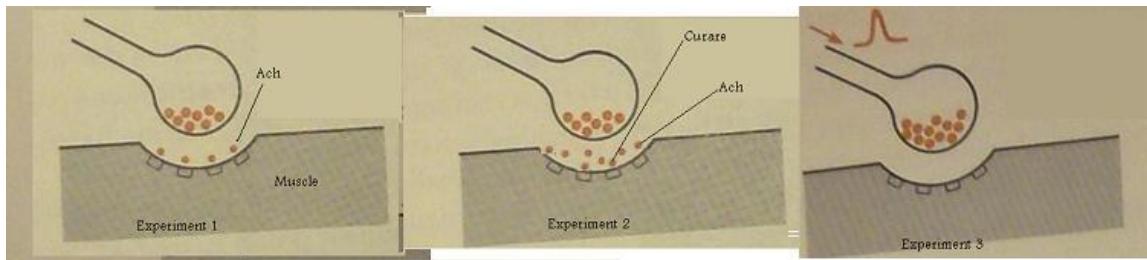
The results of these experiments are summarized in this table of document 2:

**Document 2: experiments showing the effect of curare and botulinum**

| No of experiments | Stimulation  | Ach released at synaptic cleft | Response of muscle |
|-------------------|--|--------------------------------|--------------------|
| Experiment 1      | Stimulation at S1  | Ach released                   | Contraction        |
| Experiment 2      | Stimulation at S1 after adding curare at the Synaptic cleft    | Ach is released                | No contraction     |
| Experiment 3      | Stimulation at S1 after adding Botulinum at the Synaptic cleft | Ach is not released            | No Contraction     |

1. Interpret the 3 experiments.
2. To understand the mode of action of curare and Butulinum toxins, the document 3 shows the synapse at the level of each experiment.

**Document 3: the synapse in each experiment**



- a. By referring to document 3, explain the role of acetylcholine (experiment 1) and the mode of action of each of curare (experiment 2) and botilium (experiment 3).
- b. By referring to documents 2 and 3, identify the type of the synapse in experiment 1?

### Question III. Magnesium (5pts)

**Magnesium** plays important roles in the structure and the function of the human body. The adult human body contains about 25 grams of magnesium. Over 60% of all the magnesium in the body is found in the skeleton, about 27% is found in muscle, 6% to 7% is found in other cells, and less than 1% is found outside of cells (1). Magnesium is involved in more than 300 essential metabolic reactions as well as structural role in building up bones, chromosomes, and membranes.

The recommended dietary allowance of Magnesium (RDA) had recorded the following results:

| Recommended Dietary Allowance (RDA) for Magnesium |                      |                |                  |
|---|----------------------|----------------|------------------|
| Life Stage  | Age                  | Males (mg/day) | Females (mg/day) |
| Infants   | 0-6 months           | 30 (AI)        | 30 (AI)          |
| Infants   | 7-12 months          | 75 (AI)        | 75 (AI)          |
| Children  | 1-3 years            | 80             | 80               |
| Children  | 4-8 years            | 130            | 130              |
| Children  | 9-13 years           | 240            | 240              |
| Adolescents                                       | 14-18 years          | 410            | 360              |
| Adults  | 19-30 years          | 400            | 310              |
| Adults  | 31 years and older   | 420            | 320              |
| Pregnancy   | 18 years and younger | -              | 400              |
| Pregnancy   | 19-30 years          | -              | 350              |
| Pregnancy   | 31 years and older   | -              | 360              |
| Breast-feeding                                    | 18 years and younger | -              | 360              |
| Breast-feeding                                    | 19-30 years          | -              | 310              |
| Breast-feeding                                    | 31 years and older   | -              | 320              |

Also Mg decreases coronary heart diseases, hypertension and severity of migraine headaches. It is mainly found in oat, Bran cereals, and almond.

1. Draw a histogram showing the (RDA) of Mg among males according to their age.
2. What information does this table reveal concerning magnesium needs?
3. Mg decreases coronary heart diseases, mention four factors that increase heart diseases.
4. Formulate a hypothesis that explains why males need more magnesium than females in adolescence and adult age.

#### QUESTION IV      *Obesity and BMI (5pts)*

Obesity is a term used to describe body weight that is much greater than what is healthy. If you are obese, you also have a much higher amount of body fat than is healthy or desired. Obesity is measured most accurately by calculating the body mass index, or BMI. An ideal body mass index (BMI) is in the range of 20 to 24 and anything above or below that range will increase certain risks for morbidity and mortality. However, the distribution of fat has importance in determination of risk. A central distribution of fat, as is more typical of men, carries a higher risk for morbidity. A more peripheral distribution, as in hips and thighs in women, carries a lesser risk. In general, a waist (length): hip circumference ratio  $>0.9$  for men and  $>1.0$  for women carries an increased risk for morbidity. The relationship between BMI and all-cause mortality has been shown in a large study involving nearly 1.5 million. The table below gives the estimated hazard ratios for death (larger number is worse) from any cause for persons who never smoked, according to BMI category:

| Hazard Ratios, Deaths from Any Cause |          |         |
|--------------------------------------|----------|---------|
| BMI                                  | Women(%) | Men (%) |
| 15 - 18.4                            | 1.47     | 1.37    |
| 18.5 - 19.9                          | 1.14     | 1.01    |
| 20 - 22.4                            | 1.00     | 1.00    |
| 22.5 - 24.9                          | 1.00     | 1.00    |
| 25 - 27.4                            | 1.09     | 1.06    |
| 27.5 - 29.9                          | 1.19     | 1.21    |
| 30 - 34.9                            | 1.44     | 1.44    |
| 35 - 39.9                            | 1.88     | 2.06    |
| 40 - 49.9                            | 2.51     | 2.93    |

1. *Analyze the above table, what do you deduce?*
2. *Indicate how is calculated the BMI.*
3. *According to your acquired knowledge and referring to the text indicate what factors increase the body mass index.*

**Good Work**