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## Chemistry students' knowledge and awareness about basic food constituents, their features and role

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We present third-year chemistry students' knowledge and awareness of the main food constituents. The study was conducted for two consecutive academic years (2014-15 and 2015-16), in the Department of Chemistry of the University of Ioannina, within the context of a laboratory course on "Food Analysis and Technology". This course was taught in the 6<sup>th</sup> semester (3<sup>rd</sup> year) of the chemistry major program. A sample of 110 students answered a questionnaire on carbohydrates, while another sample of 113 students answered a questionnaire on proteins and fats. Table 1 gives descriptive statistics for the samples. The results show that the students generally had satisfactory to excellent knowledge and awareness of the topics under consideration.

TABLE 1. Data for the samples

	Min	Max	Mean	SD	N	%
Age	19.0	23.0	20.9	0.9		
Gender						
Female					140	62.8
Male					83	37.2
TOTAL					223	100

### FINDINGS CONCERNING CARBOHYDRATES

Questions dealt with their features, the reasons why we consume them, and the consequences for the human health of eating foods rich in carbohydrate. The role of fiber in nutrition has also been analyzed.

The vast majority of students (average 92%) answered correctly to the questions concerning features of carbohydrates (Table 2).

TABLE 2. Questions about features of carbohydrates	% correct answers
•Which of the following foods (cereal, meat, fish, nuts) are a source for carbohydrates?	94
•Do carbohydrates constitute the main source of energy for the human body?	91
•Are aldoses and ketoses carbohydrates?	87
•Dextrose is di-, mono-, or polysaccharide?	94
•Which of the following substances (glycine, glutamine, lactose, thiamine) are sugars?	84
•Is C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> the chemical formula for dextrose?	88
•Dextrose is added to foods as an antioxidant, a thickening agent, a sweetener or a preservative?	90
•Is starch a carbohydrate, a protein, a vitamin or a fatty substance?	99
•Which of the following foods (corn, milk, eggs, meat, fish) are a source of starch?	100

### Reasons to consume foods rich in carbohydrates:

- Emotional reasons: e.g. they are tasty / they have a pleasant sweet taste
- Health reasons: e.g. for metabolism / for proper bowel function / for nutrients / for good nutrition / help control body weight
- As energy source
- Misconceptions: e.g. they do good in the heart

### Adverse effects of added sugars :

- Weight gain/ linking with obesity
- Specific diseases: e.g. diabetes / tooth decay / artery blockage
- Wrong answers: e.g. increased glucose in the body / increased blood pressure / Alzheimer's disease

### FINDINGS CONCERNING PROTEINS

Questions deal the features of proteins and the reasons we consume them. Questions about soybeans were also included.

Table 3 gives the relevant questions. The majority of students (average 87%/ 96% excepting question 3) answered correctly, with the lowest performance (48%) presented in question 3, for proteins of high biological value.

TABLE 3. Questions about features of proteins	% correct answers
•Are proteins compounds consisting only of C, H and N?	98
•Indicate the basic building blocks of proteins	96
•When do we say that a protein is of high biological value?	48
•Are plant proteins of higher biological value than animal ones?	95
•Which of the following (cereal, beans and legumes, eggs, potatoes) are foods high in protein?	96

### Reasons for the utility of proteins:

- General reasons: e.g. body defense / participating in metabolic pathways / catalyzing reactions
- Energy-storage role
- For the muscle system: e.g. for muscle strengthening
- For cell function: e.g. for cell growth and differentiation
- For intake of essential substances that the body cannot synthesize
- For synthesizing substances useful to the body
- Wrong answers: e.g. supplying iron / helping to rebuild muscle that degrades after exercise

### FINDINGS CONCERNING FATS

Table 4 gives the relevant questions and the percentage of correct answers. With the exception of question 1, correct answers vary between 82 and 100% [average 87% / 91% excepting question 1 about lipids (54%)].

TABLE 4. Questions about fats	% correct answers
•What lipids are?	54
•From the chemical point of view, in which form do lipids occur in the human body?	85
•Give definitions for saturated, monounsaturated and polyunsaturated fats	96, 95, 95
•Match the fatty acids class (saturated, unsaturated, trans-fatty acids) with the type of food (of animal origin / of vegetable origin./ manufactured foods.)	82, 95, 82
•To which class (saturated fatty acids, unsaturated fatty acids, polyunsaturated fatty acids) do the following fatty acids (palmitic, stearic, oleic, linoleic, $\alpha$ -linolenic) belong?	95, 89, 90, 89, 89
•Does the quality of fats and oils depend to a large extent on the type of fatty acids they contain?	100
•Which of the following fatty acids the consumption is beneficial to health? (Expected answer: unsaturated fatty acids)	92
•What category of fatty acids (saturated, unsaturated) is hiding behind the term "processed vegetable oils" on food labels?	89

### CONCLUSION

The results show that the students generally had satisfactory to excellent knowledge and awareness of the topics under consideration.

### RELEVANT LITERATURE

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