



FOOD CHEMISTRY

FE 271



Lecturers

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CONTENTS

- Introduction
- Water
- Lipids
- Carbohydrates
- Proteins
- Vitamins
- Mineral elements
- Food colors

References

O.R.Fennema Principles of Food Science, Part I Food Chemistry

John M. deMan, Principles of Food Chemistry

Brian A.Fox, Allan G. Cameron, Food, Science, Nutrition and Health

Text book

Food Chemistry, Kendall Hunt Publishing

Research Assistants

Aysel Elik

Exam/Lab	Weight
1.Midterm	20%
2.Midterm	20%
Laboratory	20%
Final	40%



INTRODUCTION

"Yes, it's full of chemicals."

The basic function of food is to keep us alive and healthy

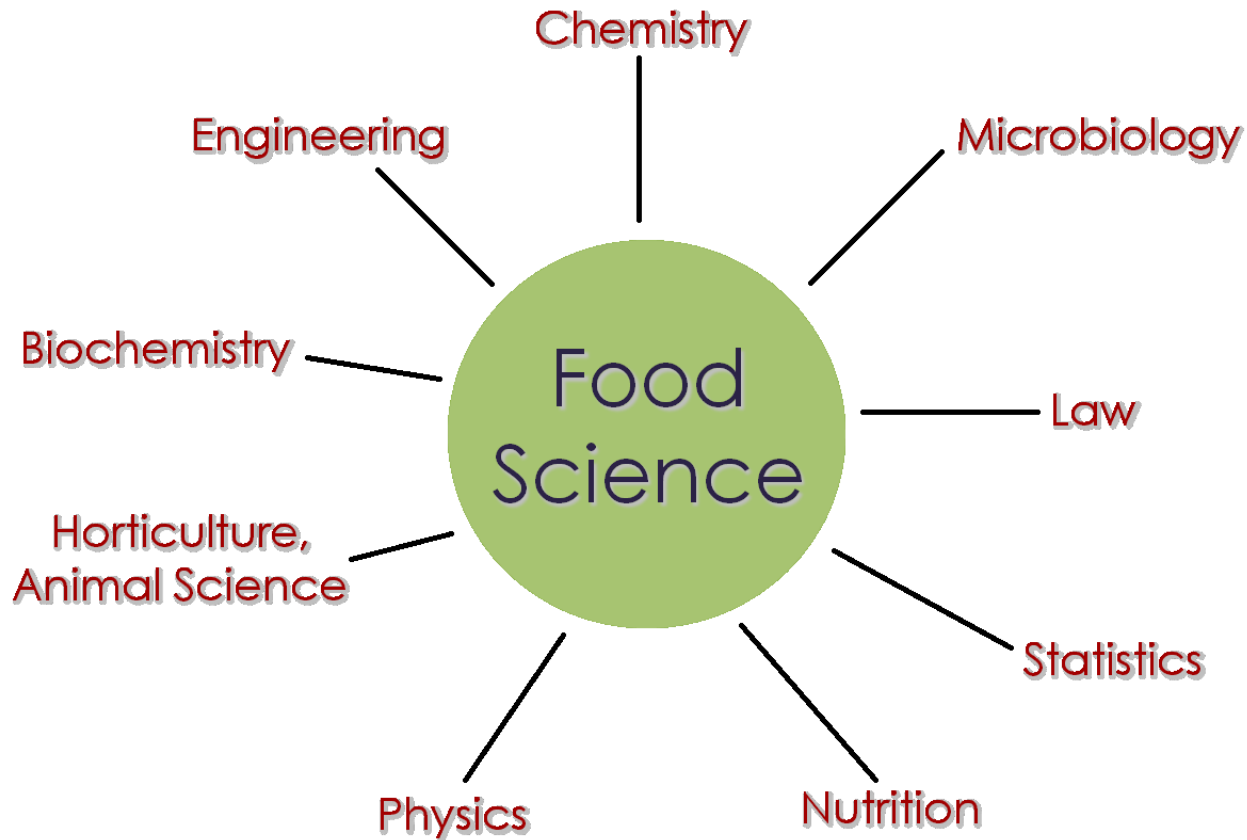
WHAT IS FOOD?

WHAT HAPPENS TO FOOD WHEN IT IS STORED,
PROCESSED, PRESERVED, COOKED, EATEN AND
DIGESTED?

ANSWER-

BY EXPERIMENTS

DIFFERENT SCIENCES PLAY A PART IN HELPING TO PROVIDE ANSWERS

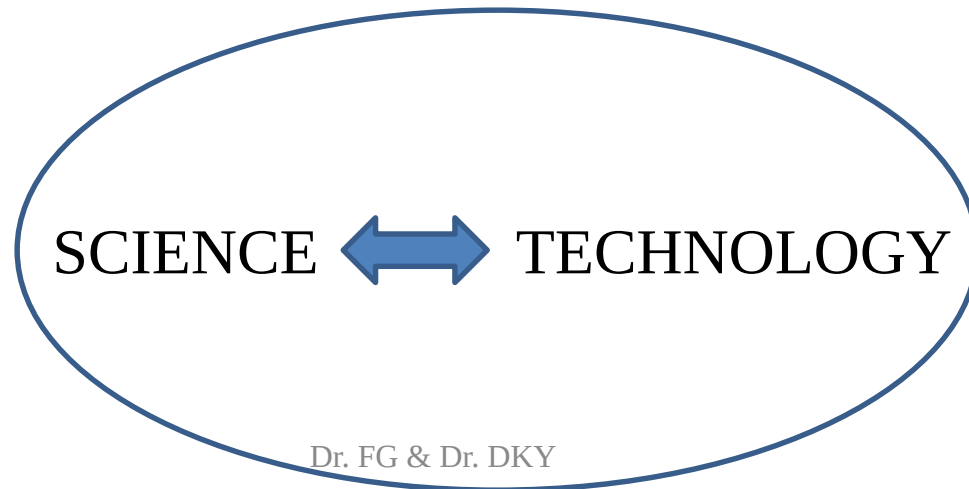


FOOD SCIENCE, in a sense, a 'pure applied science' in that it exists not only to pursue academic knowledge, but also to promote the fulfilment of a basic human need-

the need for a diet that will sustain life and health.

To be effective, FOOD SCIENCE must be applied and this is the province of FOOD TECHNOLOGY

The dividing line between the SCIENCE and TECHNOLOGY is often blurred because TECHNOLOGY uses and exploits the knowledge of SCIENCE



What is Food?



FOODS ARE SUBSTANCES WHICH, WHEN EATEN AND ABSORBED BY THE BODY, PRODUCE ENERGY, PROMOTE THE GROWTH AND REPAIR OF TISSUES OR REGULATE THESE PROCESSES



TEA EXTRACT WITH NO SUGAR?

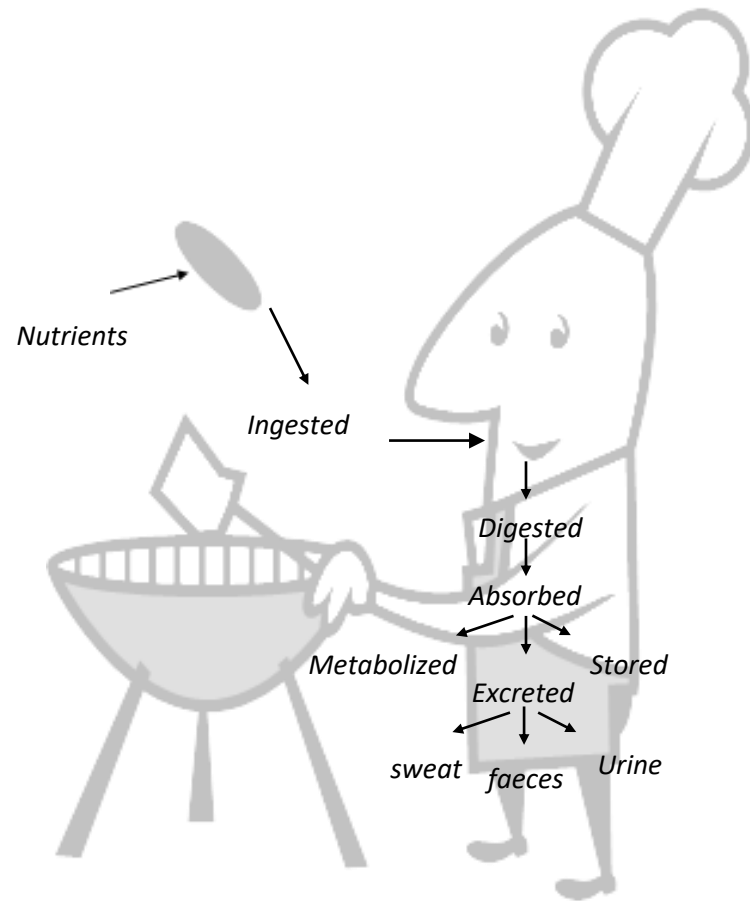
MILK ?

GLUCOSE ?

The chemical components of food which perform these functions are called nutrients and so no substance can be called a FOOD unless it contains at least one nutrient

WHAT IS FOOD?	
<u>Not Food</u>	<u>Food</u>
TEA	MILK GLUCOSE

WHAT HAPPENS TO THE NUTRIENTS WE EAT?



TYPES OF NUTRIENTS

Nutrients are of six types:



They are present in the diet of healthy people



Fats



Carbohydrates



Proteins



Vitamins



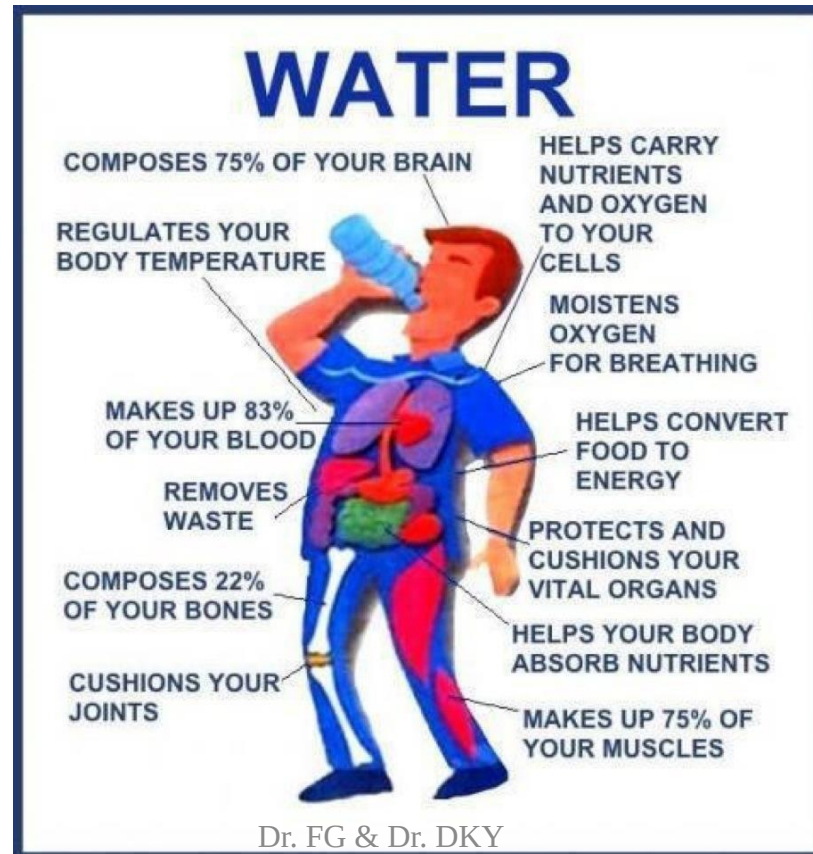
Mineral elements



Water

Water is not always included as a nutrient, but it seems advisable to accept it as a nutrient because it is essential that our diet provides us with sufficient water required for many functions in the body.

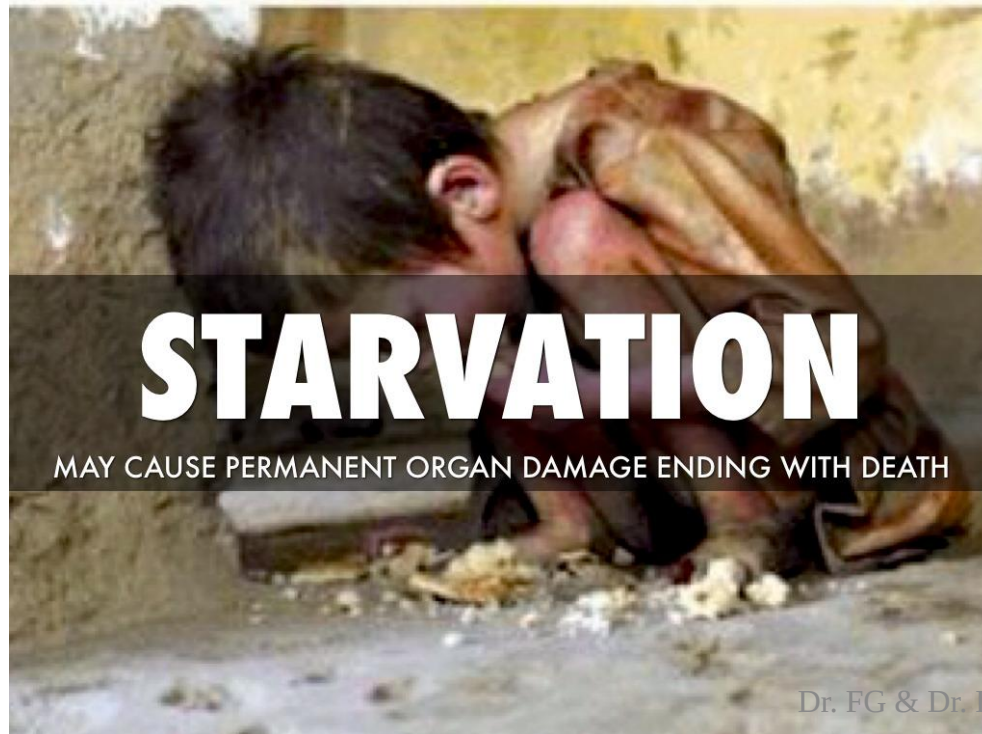
For example, it provides the medium by which the complex chemical processes which take place in the body can occur.



Malnutrition: a condition resulting when a person's diet does not provide adequate nutrients for growth and maintenance or when a person is not able to adequately utilize the food consumed due to illness.

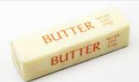


Lack of protein



Starvation: It is the most extreme form of [malnutrition](#)

The relation between NUTRIENTS and THEIR FUNCTIONS in the body and IMPORTANT FOODS that supply them

Functions	Carbohydrates	Proteins	Fats	Vitamins	Minerals	Water
Provide Energy Contribute calories to diet						
Regulate the body Blood pressure, temperature						
Build and repair muscles, bones, cells						
	    	    	  	 		 
		Dr. FG & Dr. DKY				

ENERGY BALANCE

In order to express the energy value of nutrients in terms of the energy actually made available to the body it is necessary to calculate the available energy values. Such values are always lower than heats of combustion because of losses within body. A small loss is due to incomplete absorption; such loss should be accounted for all three nutrients. There is an additional loss for protein because it is incompletely oxidised in the body. In addition a correction may need to be made for fibre. Insoluble fibre is not oxidised in the body and therefore cannot contribute to available energy.

	Heat of combustion	Available energy value
Nutrient	kcal	kcal
Carbohydrate	4.1	4
Fat	9.4	9
Protein	5.7	4
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Example: Calculate the energy of 250 ml of macaroni and cheese using the average energy values

Nutrient	Amount in g	Average Energy Values Cal/g	Calories
Protein	18	x 4	= 72
Fat	23	x 9	= 207
Carbohydrate	42	x 4	= 168

Total energy = 447 Cal

Dietary fibre-A value of 2 Cal (8kJ) per gram should be used

Inulin-A value of 2.2 Cal (9.2 kJ) per gram should be used

Recommended daily energy intake varying with weight and age (Souci et al., 2000)

Recommended Energy Intake (kilojoules)							
Body weight (kg)	Men			Body weight (kg)	Women		
	25 years	45 years	65 years		25 years	45 years	65 years
55	9800	9200	7600	40	7000	6200	5800
60	10400	9600	8000	45	7400	6600	6000
65	11000	10300	8400	50	7800	7000	6200
70	11600	10400	8800	55	8200	7400	6400
75	12200	10800	9200	60	8600	7800	6600
80	12800	11200	9600	65	9200	8200	6800
85	13400	11600	10000	70	9600	8600	7000
90	14000	12000	10400	75	10000	9000	7200
95	14600	12400	10800				

Energy used in different physical activities (Souci et al., 2000)

Physical activity	Energy expenditure (kilojoules per minute)	
	58 kg woman	70 kg man
Sleeping, resting, fasting	3-5	4-6
Sitting, reading, desk work	5-7	6-9
Sitting typing, operating controls	6-10	8-12
Light bench work, slow walking	9-15	12-18
Social sports, cycling, tennis, light factory work, light farm work	12-20	16-24
Heavy physical labour, carrying, cutting wood, jogging, competitive sports	18-30	24-36
Very hard physical labour, intense physical activity, very vigorous sporting activity	over 40	over 50