

Sawsan Karadsheh
The Ahliyyah School for Girls
Antioxidant Enzymes:

“Three or four raw veggies a day keep the aging away”

Segment: 1

Hello everybody. My name is Sawsan Karadsheh , I am a biology teacher in The Ahliyyah School for Girls, I hope you are feeling well today and ready to make use of our lesson.

Look at this picture, what do you think of them don't they look great? Would you like to look like that when you grow old? Personally I would.

*(I bring a big bowl of colorful fruits and vegetable and exhibit it in front of the students)*Look how good this collection of food looks to your eyes, is it also good to your health???

As they say **“An apple a day keeps the doctor away”** so could we say **“Three or four raw veggies a day keep the aging away”** Well... this is what we want to know and discuss today

The importance of eating raw colorful fruits and vegetable, and in specific we will discuss their content of enzymes and their effect on our health.

As you know enzymes are all proteins and considered organic catalysts that increase the rate at which foods are broken down and absorbed by the body cells and help various metabolic functions in the body ... In fact every metabolic function of the body is helped or supervised by metabolic enzymes. And always keep in your mind that enzymes are vulnerable to high temperature they get denatured when subjected to high temperature when i say high temperature i mean the temperature of cooking.

I am sure at this stage you are all familiar with enzyme and you have quite well previous knowledge.

Now please take 4 minutes to discuss the enzyme structure, function and the factors that affect the rate of their reaction using your previous knowledge

Segment: 2

Hi, welcome back ...as you know there are many enzymes, but there are two major types: metabolic enzymes, and food enzymes. The metabolic enzymes that run the body are synthesized from raw food. This includes raw fruit, vegetables, nuts, grain, and even raw meat.

As you know by now without enzymes there is no life. Age is not so much a matter of how long one has been alive, but is rather a matter of the integrity of the tissues of the body. These tissues depend on the amount of enzymes present to carry on the metabolism of every cell.

What we are going to discuss today is the type of enzymes that are also synthesized in our body from raw food; and these are ;Antioxidants enzymes, these enzymes are considered the body's arsenal weaponry: therefore they protect the body cells against damaging from certain cell wastes such as free radicals; in another word the Antioxidants enzymes can cancel out or neutralise the cell-damaging effects of free radicals.

Please take 3 minutes to think of possible cell wastes that are considered free radicals .

Segment: 3

Hi again, hope you were able to track some substances that might damage the cells, the free radicals.

Free radical in chemistry, are atoms or groups of atoms with an odd (unpaired) number of electrons and can be formed when oxygen interacts with certain molecules. Once formed these highly reactive radicals can start a chain reaction, like dominoes.

These free radicals wastes produced by cells, their chief danger comes from the damage they can do when they react with important cellular components, eventually cells may function poorly or die if this occurs. because if they stay in between cells they can injure biological molecules such as, proteins and lipids of the cell membrane, or they go further and react with other cell components and might reach the nucleus and DNA , causing cell and tissue damage leading to aging and disease.

Research implicates free radicals in development of a number of degenerative diseases, such as cancer, cardiovascular disease, cataracts, macular degeneration and several other diseases. It is suggested that certain conditions, such as chronic diseases and aging, can tip the balance in favour of free radicals that cause ill effects. That is why the body has establish a defence against free radicals that cause the damage to body cells made of ANTIOXIDANTS.

The human body produces several types of antioxidant enzymes. The antioxidant enzymes include:

Superoxide dismutase (SOD),
Catalase

These antioxidant enzymes neutralize many types of disease-causing free radicals.

Now we are going to study the effect of one of the previous antioxidant on a well known cell waste. This well known metabolic waste is Hydrogen peroxide which is considered a harmful by-product of many normal metabolic processes such aerobic respiration: To prevent damage, it must be quickly converted into other, less dangerous substances. To this end, catalase rapidly catalyzes the decomposition of hydrogen peroxide into less reactive gaseous oxygen and water molecules, as indicated by this following equation.

$2\text{H}_2\text{O}_2 \xrightarrow{\text{catalase}} 2\text{H}_2\text{O} + \text{O}_2$
(I write this equation on a screen)

And the rate of oxygen production indicates the rate of calalase reaction

Activity: 1

I am going to demonstrate this experiment to prove the existence of catalase in living cells of mammals

As you can see there are two test tubes

Tube # 1 contains 5 grams of sheep liver

Tube # 2 contains 5 grams of sheep brain

Now 5ml of 4% hydrogen peroxide is added to each tube.

I need you to watch carefully what will happen....

Can you see this big amount of bubbles that is forming? This is oxygen gas...

Please take 3 minutes to establish a suitable conclusion for what you have observed.

Segment: 4

Welcome back I hope I made it clear for you how catalase along with other antioxidant enzymes that are found naturally in liver, brain cells and of course other body cells of some mammals decomposes the 4% hydrogen peroxide and that is possible to detect by the amount of oxygen gas produced.

Now the question is WHAT IS THE ROLE OF FRESH COLORED FRUITS AND VEGETABLES IN KEEPING OUR CELLS HEALTHY AND PREVENT THEM FROM GETTING DAMAGED???

As I mentioned at the beginning .

Please take 3 minutes to think and to answer this question

Segment: 5

Back again....I think your answer would be; these fruits and vegetables must have too antioxidant enzymes. Let me prove this for you by demonstrating some experiments similar to the previous ones but with different samples.

Tube #1 contains 10 grams of crushed red bell pepper

Tube #2 contains 10 grams of crushed yellow bell pepper

Tube #3 contains 10 grams of crushed red cabbage

Tube #4 contains 10 grams of crushed green broccoli

Tube #5 contains 10 grams of black grape

Now 5ml of 4% hydrogen peroxide is added to each tube.

I need you to watch carefully what will happen

Can you see this amount of bubbles that is forming in each tube? This is oxygen gas...

Please take 3 minutes to establish a suitable conclusion for what you have observed.

Segment: 6

Welcome back, I am sure by now you know that fresh fruits and vegetables have also antioxidant enzymes. But what is the effect they do have on our body cells and accordingly our health.

When we eat cooked, live enzyme deficient food, the body is forced to produce enzymes needed for digestion. This would lead to stealing of enzymes from other parts of the body and eventually sets up a competition for enzymes among various organ systems and tissues of the body . The resulting is metabolic disruption and that may on the long run be the direct cause of many chronic incurable diseases such as obesity, heart disease, Cancer, and other degenerative problems .

You should be aware of the fact that the length of your life is inversely proportional to the rate of exhaustion of your enzyme potential, and the increased use of food enzymes promotes a decreased rate of exhaustion of your enzyme potential." IN OTHER WORDS: Raw fruits and vegetables will help you live longer & better. Fruits and vegetables have Food Enzymes which keep them alive in much the same way that Metabolic Enzymes keep us alive. When we eat raw fruits and vegetables, we ingest these food enzymes and utilize them in our own digestive processes.

Despite those who still believe that all enzymes are destroyed in the stomach, it has been proven that live enzymes do survive the journey through the stomach and start working in the small intestine. But, when we cook these "real" foods, we kill all their natural enzymes and our pancreas is forced to produce enzymes so that the cooked material can be digested. In time our pancreas becomes exhausted which in turn causes our immune system to grow weaker and leaves us more and more susceptible to chronic disease and the degeneration of old age.

Extension:

Now read the following statement, think of it and try to explain what it means as home work