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Diploma in human nutrition

Module two

Assignment two

1. Describe the major function of each region of the gastrointestinal tract

* In general , the organs of the GI tract consist of the 4 layers :

A mucosa

B sub mucosa

C muscular is

D serosa

1 mucosa

* Inter layer of the GI tract
* Subdivided in to the following

A epithelium

-located closest to the lumen of GI

B lamina propria

-consist of connective tissue containing collagen fibers, elastic fibers, blood vessel and lymphatic vessel.

C muscular is mucosa

* Consists of a thin layers of smooth muscle
* Peristaltic contraction occur through the GI tract, but the intensity of these contraction varies depending on the location.
* Peristaltic contractions are strong in the esophagus, moderate in the stomach, and weak in the intestines.

4 serosa

-also called the peritoneum

-the outer layer of the GI tract

-consist of epithelial tissue and connective tissue

1 Enteric nervous system

* The enteric nervous system (ENS) consist of about 100 million neurons found within the wall of the GI tract.
* Arranged into two plexuses (group) of neurons (figures) 24.2 and 24.3)

1. sub mucosal plexus

* also known as the plexus of messier
* located in the sub mucosa
* regulates GJ secretion

1. my enteric plexus

* also known as the plexus of Auer Bach

1 mouth

* contains the oral cavity
* surrounded by the following (figure 24.5,tortoria )

A lips

B cheeks

C hard palate

* forms the anterior region of the roof of the mouth
* consists of skeletal muscle that covered by a mucosa
* The uvula is an extension of the soft palate.
* During deglutition (swallowing ) the soft palate closes off the entrance to the nasal cavity ,thereby preventing reflux of food into the nose

Consist of

1. epithelium

2 connective tissue b. smooth muscle

- Middle layer c serosa

- The small intestine has the following dimension: diameter 1 inch

Length: 20 feet

The small intestine is the longest part of the digestive tract.

-structure

- Anatomy

- The small intestine consist of 3 major external region (figure 24.18, tutorial)

A duodenum

* the initial portion of the small intestine

The duodenum is separated from pyloric canal of the stomach via the pyloric sphincter

B jejunum

* The middle portion of the small intestine

C ileum

* The terminal and longest portion of the small intestine
* Ileum is separated from the cecum of the large intestine by the ileocecal sphincter

-small intestine (duodenum, jejunum and ileum)

-starch hydrolysis catalyzed by amylase secreted by the pancreas.

-hydrolysis of disaccharides within the brush border of the intestinal mucosa:

- Fat hydrolysis catalyzed by lipase secreted by the pancreas:

- Protein hydrolysis catalyzed by a variety of exo. And end peptidase secreted by the pancreas and small intestine mucosa

-hydrolysis of di and tripe tides within the brush border of the intestinal mucosa:

- Absorption of the products of digestion :

-absorption of water (failures of water absorption, as in diarrhea, can lead to serious dehydration.

1. Explain the digestion and absorption of fluid lipids ,the role of bile salt and the formation of

Chylomicrons

The digestion and absorption of fats

The major fats in the diet are triacylglycerol and to a lesser ,phospholipids .these are hydrophobic molecule and have to be emulsified to very small droplets (micelles before they can be absorbed .this emulsification is achieve by hydrolysis to monodactyl –and diacylglycerols and free fatty ,and also by the action of the bile salts .

The classification of dietary lipids

Fatty acids

There are a number of different fatty acids, differing in both the length of the carbon chain and whether or not they have one or more double bond (- CH-CH-) in the chain, those with no double bonds are saturated fatty acids –the carbon chain is completely saturated with hydrogen.

Those with double bonds are unsaturated fatty acids –the carbon chain is not completely all have systematic chemical name, based on the number of carbon atoms in the chain and the number and position of double bonds (if any)

A shorthand notation shows the number of carbon atoms in the molecule, followed by colon and the number of double bonds. The position of the first double bonds from the methyl group of an intake of polyunsaturated fatty acids greater than need to meet physiological requirements may confer benefits in terms of lowering the plasma concentration of cholesterol and reducing the risk of atherosclerosis and ischemic heart disease. The requirement is less than 1% of energy intake, but it is recommended that 6% of energy intake should come from polyunsaturated fatty acids.

High intake of the –chain 3 polyunsaturated fatty acids (as found in fish oils) may additionally provide protection against thrombosis, as they form the 3 –series eicosanoids, which inhibit platelet cohesiveness

Phospholipids

The cholesterol that is required for membrane synthesis ,and the very much smaller amount that is required for the synthesis of steroid hormones , may either be synthesized in the body or provide by the diet , average intake are of the order of 500 mg (1.3mmol ) day

An elevated plasma concentration of cholesterol (in low – density lipoprotein) is a risk factor for atherosclerosis and ischemic heart disease. the dietary intake of cholesterol is less important as a determinant of plasma cholesterol than is the intake of total and saturated fat, or the intake of compounds that i inhibit the reabsorption of cholesterol secreted in bile, or the reabsorption of bile salts themselves fatty acids by pancreatic esterase in the intestinal lumen and intracellular lipase within intestinal mucosal cells

1. Describe the absorption of mineral , especially iron

Iron absorption

Only about 10% of dietary iron is absorbed, and only as little as 1-5% of that in many plant foods. As discussed in section 11.15.2.3, iron deficiency is serious problem : some 10-15% of women of child bearing age have menstrual iron losses greater than can be met from a normal dietary intake .Harem iron in meat is absorbed better than is inorganic iron plant foods, and by a separate system .

Inorganic iron is absorbed only in the feb2+ (reduce) form .this means that a variety of reducing agents preset in the intestinal lumen together with dietary iron will enhance its absorption .the most effective such compound is vitamin c and, although intake of 40-60 mg of vitamin c per a day more than adequate to meet requirements, an intake of 25-50 mg per meal is sometimes recommended to enhance iron absorption .Alcohol and fructose also enhance iron absorption.

Like other minerals, iron enters the mucosal cells by carrier-mediated passive diffusion and is accumulated in the cells by binding to a protein, ferritin, once all the ferritin in the mucosal cell is saturated with iron , no more can be taken up from the gut lumen . iron can leave the mucosal cell only if there is free transferrin in plasma for it to bind to and, once plasma ferine is saturated with iron ,any has accumulated in the mucosal in the mucosal cells will be lost back into the intestinal lumen when the cell are shed at the tip of the villus .

The mucosal barriers to the absorption of iron has a protective function .iron overload is a serious condition , leading to absorption of inappropriately large amount of iron in tissues , and about 10% of the population are genetically susceptible to iron overload, once the normal tissues iron binding protein are saturated , free iron ions will accumulated in tissue , iron ions in solution are able to generate –tissue –damaging oxygen radicals ,and this may be a factor in the development of precursor of trypsin , is activated by the action of a specific enzyme, enter peptidase (some time known by its obsolete name of enter kinase ) , which is secreted by the duodenal epithelial cells trypsin can then activate chymotrypsin prelates to elastase ,procarboxypetidase to carboxypeptidase and proamonopeptidase to amino peptidase.

4 Describe and explain the classification of amino acids according to their chemical and nutritional properties

The amino acids can be classified according to the chemical nature of the side –chain, whether it is hydrophobic (on the left of figure 4.18) or hydrophilic (on the right of figure 4.18) and the nature of the group

* Small hydrophobic amino acids: glycine, alanine, praline.
* Branched –chain amino acids: leucine ,isoleucine, saline.
* Aromatic amino acids :phenylalanine ,tyrosine ,tryptophan .
* Sulphur –containing amino acids: cysteine ,methionine .
* Neutral hydrophilic amino acids :serine and threonine .
* Acidic amino acids:glutamic and aspartic acids (the salts of these acids are glutamate and asparate respectively
* Amindes of the acidic amino acids :glutamine and asparagine
* Basic amino acids : lysine ,arginine ,histine