

AL-Mustaqbal University Collage.
Department of Pathological Analysis Technique.
Subject: - Advanced laboratory techniques.
Lecture-No-6.
General stool Examination.



Stool Analysis

Digestive System

The digestive system is an entire organ that work together in a process known as digestion. It consists of two parts: The Alimentary tract (Gastro Intestinal Tract) (GIT) and the accessory glands. Fig (1)

Functions: process food that is placed in the mouth and that passes through the digestive tract where it is broken down, processed, absorbed and utilized as energy that fuels the body's daily functions. The excess of dietary mass and any toxins or waste products that are produced through metabolic processes are excreted through the anus. Organs that are indirectly involved are known as the accessory digestive organs.

Figure

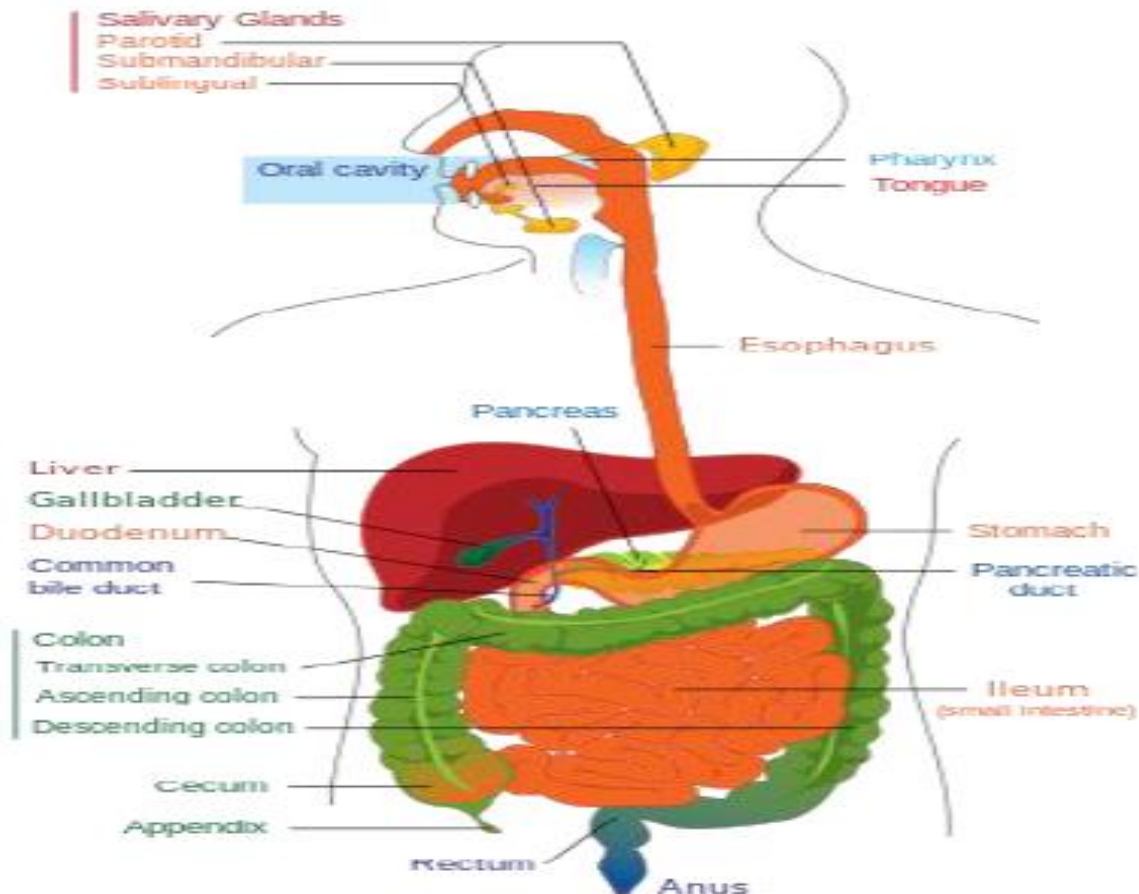


Figure (1) .The human digestive system.

Anatomy of the Digestive System

The digestive system consists of two main parts:

1-The gastrointestinal tract (GIT)

This tract is divided into the upper and lower gastrointestinal tracts:

Upper Gastrointestinal Tract

The upper gastrointestinal tract includes:

A- Oral cavity(Mouth)

B- Pharynx

C- Esophagus: the fibro muscular tube through which food passes, aided by peristaltic contractions, from the pharynx to the stomach.

D- Stomach: secretes protein-digesting enzymes called proteases and strong acids to aid in food digestion, before sending partially digested food to the small intestines.

E- Duodenum: the first section of the small intestine and may be the principal site for iron absorption

Lower Gastrointestinal Tract :-

The lower gastrointestinal tract includes most of the small intestine and all of the large intestine. According to some sources, it also includes the anus.

a-The small intestine has three parts:

□ Duodenum: Here the digestive juices from the pancreas (digestive enzymes) and the gallbladder (bile) mix together. The digestive enzymes break down proteins and bile emulsify fats into micelles. The duodenum contains Brunner's glands which produce bicarbonate, and pancreatic juice contains bicarbonate to neutralize hydrochloric acid of the stomach.

□ Jejunum:الصائم This is the midsection of the intestine, connecting the duodenum to the ileum. It contains the plaice circulars and villi to increase the surface area of that part of the GI Tract.

□ Ileum: الامعاء الغليضة Has villi, where all soluble molecules are absorbed into the blood (capillaries and lacteals).

b-The large intestine has four parts:

□ Cecum: The vermiform appendix is attached to the cecum.

□ Colon: Includes the ascending colon, transverse colon, descending colon, and sigmoid flexure. The main function of the colon is to absorb water, but it also contains bacteria that produce beneficial vitamins like vitamin K.

□ Rectum

□ Anus

2-Accessory glands

The accessory glands consist of the salivary gland, liver, pancreas and gall bladder.

Function of digestive system

□ The digestive system responsible for consuming and digesting foodstuffs, absorbing nutrients, and expelling waste, and this the main function of digestive system.

The time taken for food or other ingested objects to transit through the gastrointestinal tract varies depending on many factors, but roughly, it takes less than an hour after a meal for 50% of stomach contents to empty into the intestines and total emptying of the stomach takes around 2 hours.

Subsequently, 50% emptying of the small intestine takes 1 to 2 hours.

Finally, transit through the colon takes 12 to 50 hours with wide variation between individuals.

□ Immune barrier

The gastrointestinal tract is also a prominent part of the immune system. The surface area of the digestive tract is estimated to be the surface area of a football field. With such a large exposure, the immune system must work hard to prevent pathogens from entering into blood and lymph.

The low pH (ranging from 1 to 4) of the stomach is fatal for many microorganisms that enter it. Similarly, mucus (containing IgA antibodies) neutralizes many of these microorganisms. Other factors in the GI tract help with immune function as well, including enzymes in saliva and bile

Health-enhancing intestinal bacteria of the gut flora serve to prevent the overgrowth of potentially harmful bacteria in the gut. These two types of bacteria compete for space and "food," as there is limited resources within the intestinal tract. A ratio of 80-85% beneficial to 15-20% potentially harmful bacteria generally is considered normal within the intestines.

Microorganisms also are kept at bay by an extensive immune system comprising the gut-associated lymphoid tissue (GALT).

□ Normal Gastrointestinal Microbes (normal flora) Bacteria make up most of the flora in the colon and up to 60% of the dry mass of feces. Somewhere between 300 and 1000 different species live in the gut. Fungi and protozoa also make up a part of the gut flora, but little is known about their activities.

The microorganisms perform a host of useful functions, such as:

1-Fermenting unused energy substrates 2-Training the immune system, 3-Preventing growth of harmful, pathogenic bacteria,4- Regulating the development of the gut, 5-Producing vitamins for the host (such as biotin and vitamin K), and 6-Producing hormones to direct the host to store fats.

Stool or Feces:-

Define as: A wastes of food digestion which did not absorbed.

Normal stool characteristics:

Brown in color, soft, homogenized, do not contain blood, mucus, pus, .bacteria, fungi, parasites or viruses, looks like cylinder , PH=6, contain less than 2-5mg/g stool reducing factors and its quantity around 200g/day.

Diseases of digestive system

There are a number of diseases and conditions affecting the gastrointestinal system, including:

Infection: Gastroenteritis is an inflammation of the intestines. It occurs more frequently than any other disease of the intestines.

-Classification of infection in the digestive system

Infections in the digestive system are classified in two groups:

Exogenous infections –pathogens that come into the body
–organisms that are part of the normal microbial flora

Exogenous infections:-

**C. difficile* and other exogenous infections are frequently acquired in hospital environments.

**Helicobacter pylori* spreads through oral-oral or fecal-oral contact.

*Exogenous infection can cause nausea and vomiting within 6 hours.

Endogenous infections:-

*Endogenous infection are caused by organisms that are part of normal flora.

**Streptococcus* and *Enterococcus* are example.

In the right circumstances the can cause: -

-Dental disease.

-Infection of bowel, appendix and liver.

-Diverticular abscesses.

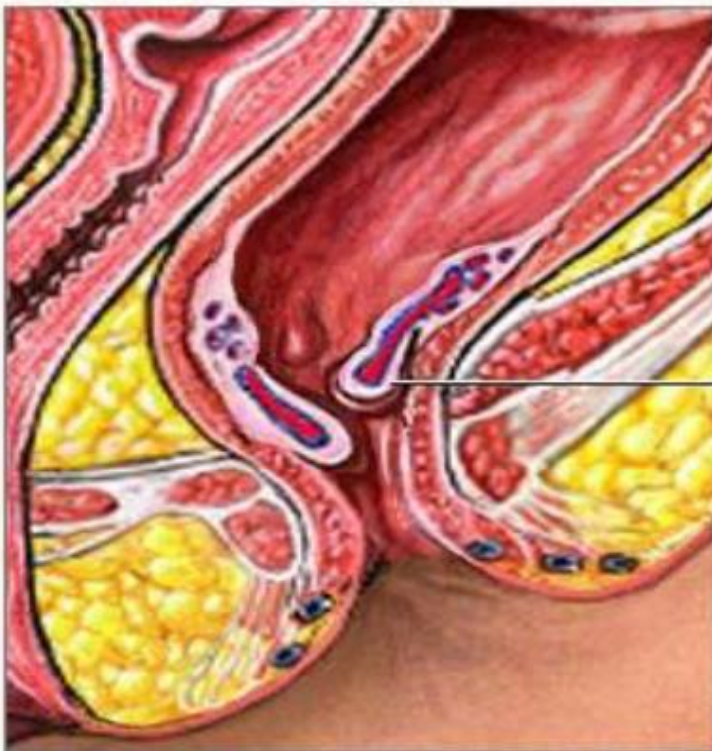
*Cancer:- may occur at any point in the gastrointestinal tract, and includes mouth cancer, tongue cancer, esophageal cancer, stomach cancer, and colorectal cancer.

Inflammatory conditions: **Ileitis** is an inflammation of the ileum; **Colitis** is an inflammation of the intestine, **Appendicitis:** Is inflammation of the vermiform appendix located at the caecum. This is a potentially fatal condition if left untreated; most cases of appendicitis require surgical intervention.

□ **Diverticular disease:** Is a condition that is very common in older people. It usually affects the large intestine and the small intestine as well.

Diverticulosis occurs when pouches form on the intestinal wall. Once the pouches become inflamed it is known as diverticulitis, (the patients stool is red and bloody).

- Cholelithiasis, gallstones in the gallbladder
- Peptic ulcer, open sore in the lining of the stomach or duodenum
- Anal fistula, abnormal tube-like passageway near the anus.
- Dysentery, painful, inflamed intestines commonly caused by bacterial infection.
- Hemorrhoids, swollen, twisted, varicose veins in the rectal region



Inflamed hemorrhoids

Hemorrhoids are enlarged veins located within tissues of the lower portion of the rectum or anus

ADAM.

Symptoms

Several symptoms are used to indicate problems with the gastrointestinal tract:-

- **Nausea**, unpleasant sensation in the stomach associated with a tendency to vomiting.

Vomiting :-which may include regurgitation of food (due to GIT inflammation, acute pain, drugs, pregnancy, emotions) or the vomiting of blood (as in upper GIT bleeding (Haematemesis)).

- **Melena**, black, tarry stools; feces containing digested blood (which is a sign of upper GIT bleeding).

□ **Diarrhea**, the passage of liquid or more frequent stools (watery), more than three times in a day and more than 200g/day, and with incontinence. There are two types of diarrhea: Acute and chronic diarrhea.

-**Acute Diarrhea** : short in time , do not need any medication unless the patient is immunocompromised. Most cases (90%) are due to ingestion of contaminated food with bacteria or its toxin ,viruses and parasites, the rest (10%) are due to medication drugs like antibiotics.

-**Chronic Diarrhea**: long in time (more than one month), need medication for dehydration because of losing K, Mg, Na salts which may cause death. The causes of chronic Diarrhea are colitis, mal-absorption, colon cancer, irritation of small intestine with some drugs.

□ **Constipation**, which refers to the passage of fewer and hardened stools (difficulty in passing stools (feces)), due to: pregnancy, GIT obstructions with tumors, diverticulum and hemorrhoids, Age.

□ **Dysphagia**, difficulty in swallowing.

□ **Eructation**, gas expelled from the stomach through the mouth

□ **Flatus**, gas expelled through the anus.

□ **Jaundice (icterus)**, yellow-orange coloration of the skin and whites of the eyes caused by high levels of bilirubin in the blood (hyperbilirubinemia)

□ **Statorrhea**, fat in the feces; frothy, foul-smelling fecal matter, due to mal-absorption which result from pancreatic diseases.