



FOOD INTOXICATION

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TOXIN IN FOOD

Illness occurring as a result of ingesting food or water contaminated with:

1. Infectious agents
 - Bacteria
 - Viruses
 - Parasites

2. A toxin or chemical
 - Bacterial toxin
 - Heavy metals
 - Other chemical contaminants

Contamination by pesticides and weed killer and industrial waste

3. Food additives
4. Oncogenes



FOOD SAFETY AND MICROBIOLOGY

- Bad and Good Microorganisms
 - Pathogens
 - Spoilage
 - Probiotics
- Food Safety: Safe food storage and preservation



BAD AND GOOD OF MICROORGANISMS

Harmful effects:

- Food borne disease

Pathogens

- Food infections
- Food poisoning

- Food spoilage

Beneficial effects:

- Fermentation

- Cheese
- Yogur
- Wine
- Beer

- Probiotics



HARMFUL: FOOD INFECTION VS. FOOD POISONING

Food infection

- Live cells delivered by contaminated food; organism multiply once food is ingested

Amoebic dysentery Salmonella Tape worms Tuberculosis

Food poisoning (intoxication)

- Caused by preformed toxin in the food; organism may or may not be alive and growing
 - *Clostridium botulinum*; *Staphylococcus aureus*



SPOILAGE MICROORGANISMS: NOT HARMFUL

Food Spoilage Microorganisms

bacteria, yeasts, molds

It is important to be able to distinguish food poisoning from food spoilage

Food poisoning is when food is eaten which looks normal, smells normal and tastes normal: you eat enough to make you ill from the ingested pathogens or toxins

Spoiled food does not normally cause food poisoning because it is rejected by the consumer before ingestion



MICROBIAL FOOD SPOILAGE = CHANGES IN FOOD *QUALITY*

- Odor
 - due to production of volatile end compounds
- Color
 - pigment production or oxidation
- Texture
 - softening due to the breakdown of pectin in vegetables or the tissues by proteinases
- Accumulation of gas
 - carbon dioxide, sulfur compounds
- Slime formation
 - production of dextrans and/or amount of microorganisms



PATHOGENS IN FOOD INCLUDE:

1. Amoebic dysentery
2. Salmonella
3. Tape worms
4. Tuberculosis



AMOEBIC DYSENTERY

- Amoebic dysentery (amoebiasis) is an infection of the intestine (gut) caused by an amoeba called *Entamoeba histolytica*, which, among other things, can cause severe diarrhea
- Amoebae are found in contaminated food or drink. They enter the body through the mouth when the contaminated food or drink is swallowed. The amoebae are then able to move through the digestive system and take up residence in the intestine and cause an infection.

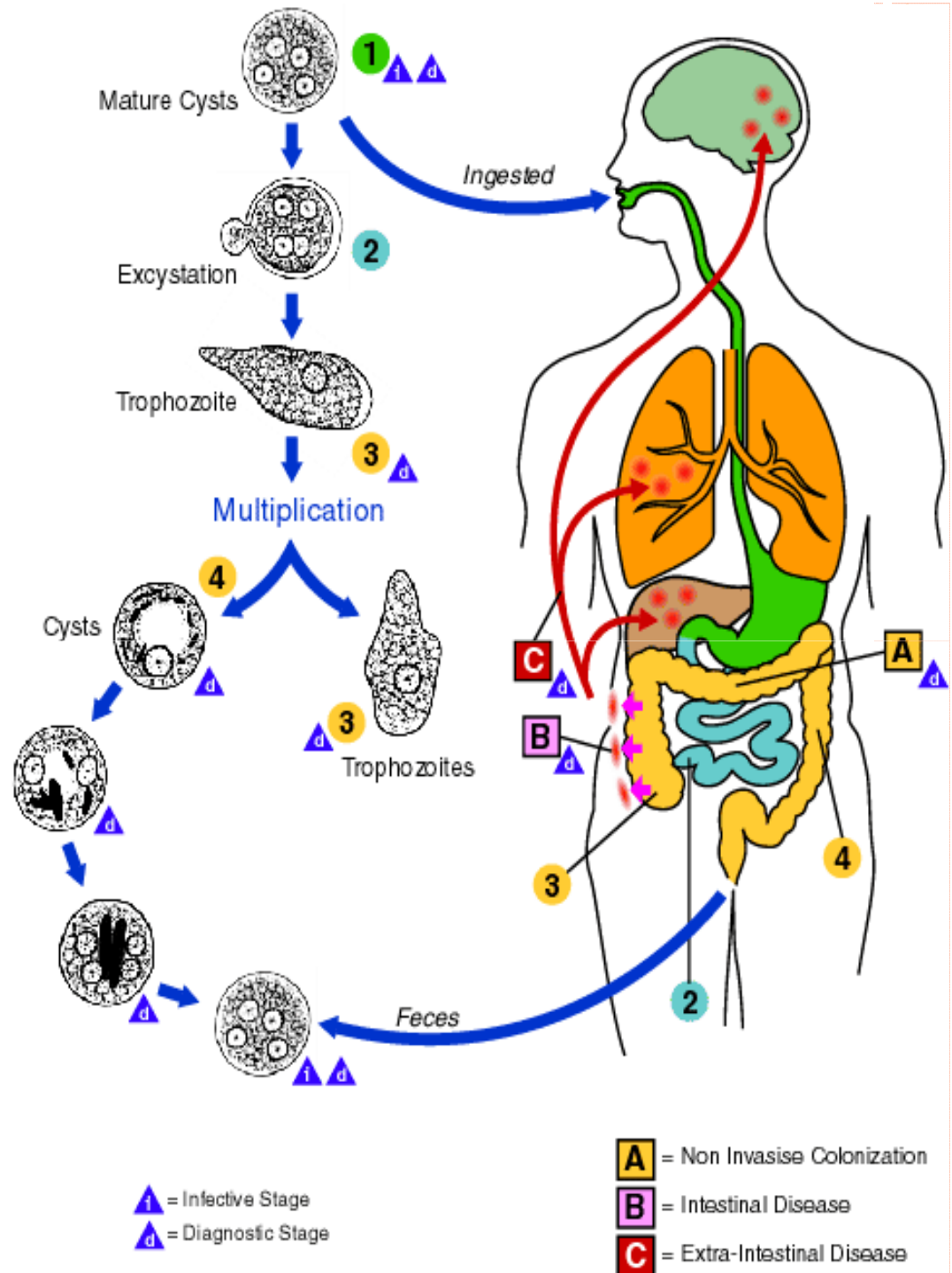


Infection occurs by ingestion of cysts on fecally contaminated food or hands.

The cyst is resistant to the gastric environment and passes into small intestine where it decysts.

The metacyst divides into four and then eight amoebae which move to the large intestine.

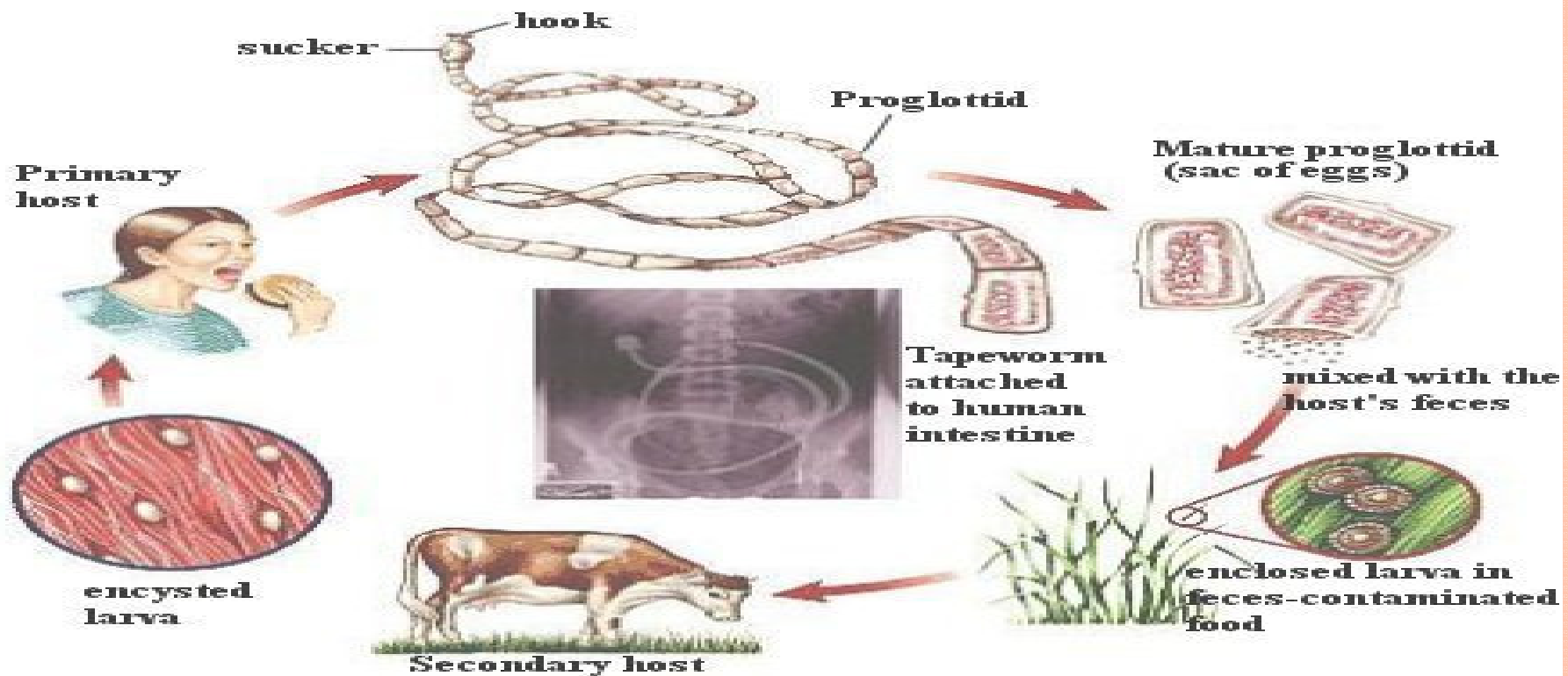
The majority of the organisms are passed out of the body with the feces





TAP WORMS

- Tape worms form cysts which are present in muscles, if these are eaten by man, the adult worm develop in the gut and these can be transmitted by eating **undercooked beef**.



SALMONELLA

- A salmonella infection is a foodborne illness caused by the salmonella bacteria carried by some animals, which can be transmitted from kitchen surfaces and can be in water, soil, animal feces, raw meats, and eggs. Salmonella infections typically affect the intestines, causing vomiting, fever, and other symptoms that usually resolve without medical treatment

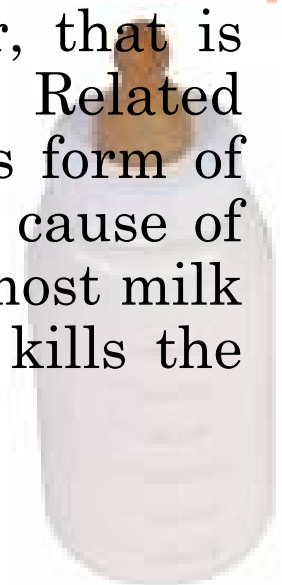




TUBERCULOSIS:



- Tuberculosis (TB) is an infectious disease caused by bacteria whose scientific name is *Mycobacterium tuberculosis*.
- TB most commonly affects the lungs but also can involve almost any organ of the body.
- The bacteria get into the air when someone who has a tuberculosis lung infection coughs, sneezes, shouts, or spits.
- There is a form of atypical tuberculosis, however, that is transmitted by drinking unpasteurized milk. Related bacteria, called *Mycobacterium bovis*, cause this form of TB. Previously, this type of bacteria was a major cause of TB in children, but it rarely causes TB now since most milk is pasteurized (undergoes a heating process that kills the bacteria).



PATHOGENS ARE DESTROYED BY HEAT

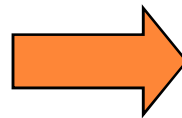
All pathogens are destroyed by heat and food which has been properly cooked and handles is safe. However, food may be contaminated after cooking. Meat, milk and eggs are excellent growth media of bacteria; foods which have been cooked but improperly stored and then wormed up are dangerous



THE GOOD MICROORGANISMS: PROBIOTICS

Human probiotics: where?

- Gastro-intestinal
- Skin
- Scalp
- Oral cavity
- Underarm and feet
- Urogenital
including vaginal



Expected Benefits with Consumption

- Increased tolerance to infections
- Control of diarrhea
- Reduction of blood pressure
- Cholesterol reduction
- Allergy control
- Immunomodulation
- Cancer reduction



FOOD ADDITIVES

Food additives

Some food additives have evidence of food poisonings, these include:

- **Monosodium glutamate**: this is a flavour enhancer widely used in Chinese food. It has been reported that some people develop numbness of the back of the neck, general weakness and palpitation.
- **Cyclamate**: is an artificial sweetener that was found to cause tumours in the urinary bladder and it is banned in both Britain and USA.



ONCOGENES



- These are genes capable of causing cancer and can be present in natural food as well as in chemical food additives. Examples of oncogenes are:
- **Aflatoxin:** a type of mold that may grow on nuts and other food when stored in damp conditions, this will cause acute poisoning with severe liver damage and it can be considered as the most hepatic carcinogen known.
- **High fat intake:** can increase cancer colon.
- **High meat intake:** may not by itself be carcinogenic but it can produce oncogenes through grilling.



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SAFE FOOD STORAGE AND PREPARATION

5 MAJOR RISK FACTORS OF FOOD SAFETY

1. Poor personal hygiene
2. Improper holding temperatures
3. Inadequate cooking:
 - i.e. undercooking raw shell eggs
4. Contaminated equipment
5. Food from unsafe sources



FOOD HYGIENE:

- Infections can be avoided by taking extra care in washing and cleaning the food and kitchen utensils very well.
1. Prevention of the presence of insects like flies and cockroaches.
 2. The presence of good way of preserving food such as refrigerators.
 3. Proper cooking of food especially meat

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PROPER FOOD STORAGE STARTS AT THE STORE

- Shop for shelf-stable items such as canned and dry goods first
- Buy refrigerated and frozen foods and hot deli items last
- Don't choose meat, fish, poultry or dairy products that feel warm to the touch or have a damaged or torn package
- Place leaking packages in plastic bags
- Choose only pasteurized dairy products
- Choose only refrigerated eggs
- Check "sell-by" and use by dates on packages
- Buy intact cans that are not bulging, leaking or dented on the seam or rim

MODES OF PRESERVING AND PROCESSING FOOD:

- **Drying** (reduces water activity sufficiently to prevent or delay bacterial growth)



- **Smoking as in meat and fish**



- **Salting**



- **Freezing**



- **Sterilization by canning or bottling**



- **Pasteurizing milk.**

