Milk Hygiene

MILK-BORNE DISEASES

Introduction

Milk is, an efficient carrier for a variety of disease producing microbial agents. With mass collection and distribution of milk in industrial countries, the potential of milk for disease transmission became a widespread problem. The disease control, however, can be maintained only by constant supervision of the health of dairy animal and by adequate controls at all points from the time the milk leaves the udder until it reaches the consumer.

A second factor that is common to advanced and developing countries, is the disease causing microbes.

Such microbial agents can be conveniently classified as :

a) Communicable disease causing microbes - viruses, rickettsiae, bacteria, protozoa, and other parasites-and/ or their toxins;
b) Specific and non - specific sensitizing agents; and
c) Toxic chemicals - pesticides, preservatives, drugs, radionuclides, and other substances.

Milk as Vehicle of Microbes

Different Sources of Pathogens

A variety of pathogens may gain access to milk from a number of sources and cause different types of food borne illness. Milk and its products may carry microbes as such or their toxic metabolites called toxins to the consumers.

1-Animals

The health of dairy animals is a very important parameter because a number of diseases including brucellosis, Q-fever, salmonellosis, staphylococcal and streptococcal infections and foot and mouth disease virus may be transmitted to man through milk. The microbes causing these diseases may be transmitted to milk either directly from the udder or indirectly through the infected body discharges that may drop, splash or be blown in to milk.

2 Handlers

The diseased persons may transmit diseases like typhoid fever, scarlet fever, diphtheria, septic sore throat, infantile diarrhea by contaminated hands or by coughing, sneezing and talking during milking or subsequent handling of milk at farm level.

3 Environment

Dairy farm environment may also introduce pathogens in to milk products at different stages of production and processing. Some common air borne pathogens are like Group A Streptococci, *Corynebacterium diptheriae, Mycobacterium tuberculosis*, *Coxiella burnetii* and some viruses of respiratory origin. Contaminated water, fodder and unclean vessels and containers used for handling milk and other unhygienic conditions at farm and plant may significantly contribute to pathogens and spoilage causing micro-organisms in milk

Diseases from Animal Milk to Man

1-Tuberculosis

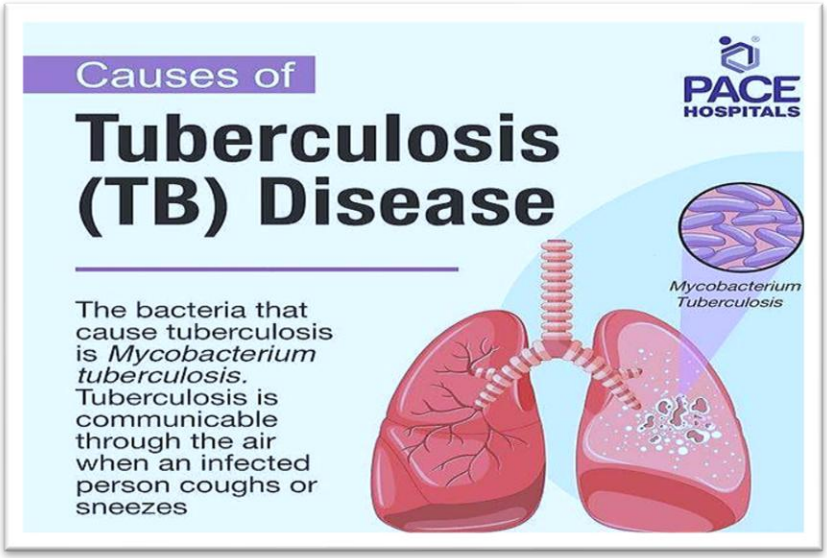
-The causative microorganism is *Mycobacterium tuberculosis*. *Mycobacterium tuberculosis* from contaminated raw milk, and its role in infant mortality.

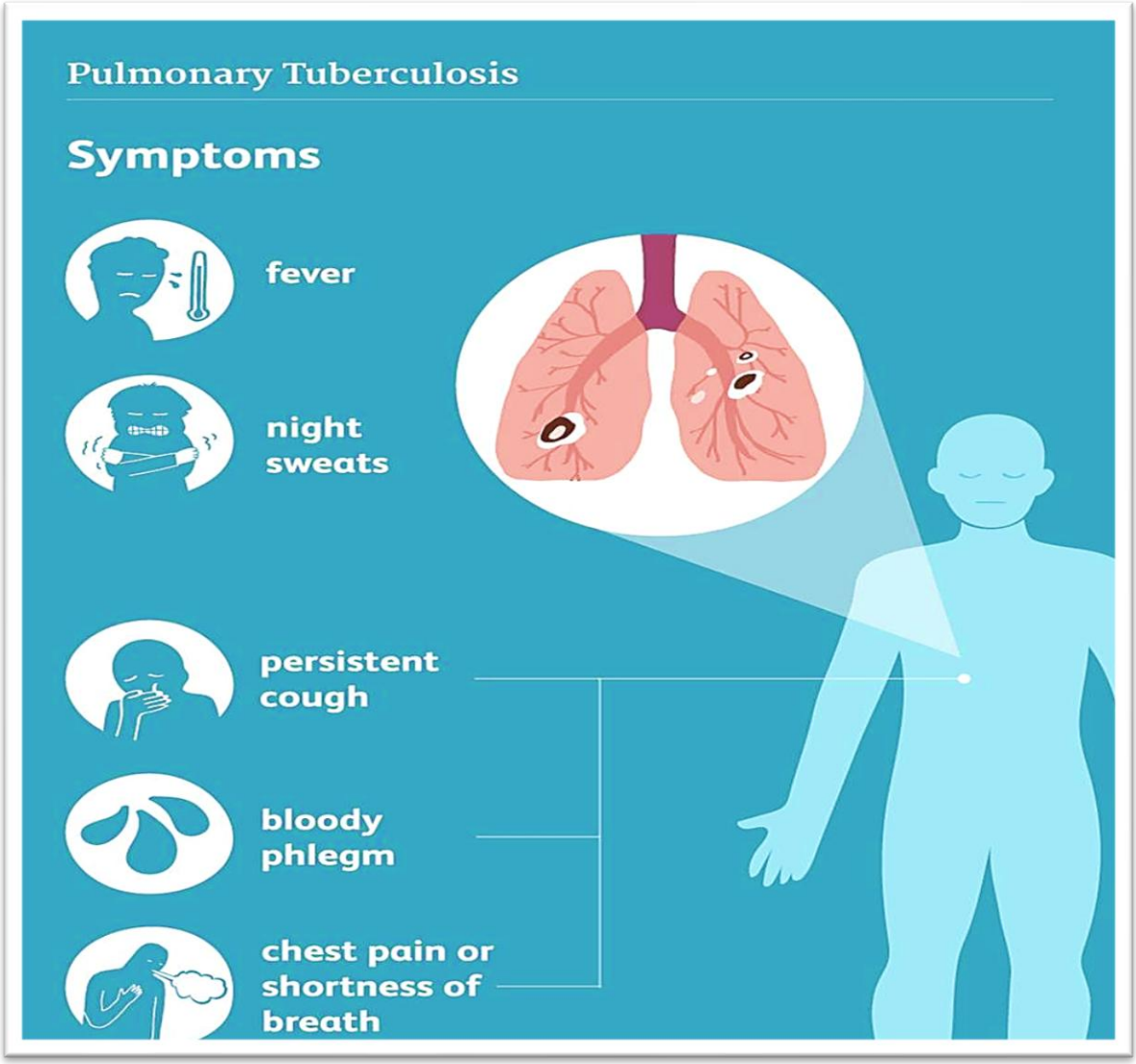
-also reported that another strain, *M. bovis*, was responsible for tuberculosis in cows, and that it was species-specific and believed that cow strain would not infect humans.

-Milk-borne tuberculosis is directly or indirectly related to consumption of raw milk from infected dairy herds. The tuberculosis observable in raw milk was the result of external contamination or lesions in the udders of cows racked with bovine tuberculosis. The milk buckets, too, were easily contaminated by workers.

Symptoms

Tuberculosis is characterized by the onset of parenchymal pulmonary infiltration, which is recognizable by X-ray examination. It is followed by an advanced stage accompanied by cough, fever, and weight loss. The incubation period is 4 to 6 weeks from infection to demonstrable primary lesion.



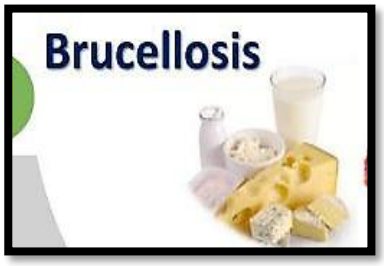


- Tuberculosis of cattle is produced by *Mycobacterium bovis*.

Prevention and control Animals should be subjected to tuberculin test.

- Animal suffering with tuberculosis should be isolated.
- Proper heat treatment of milk. The traditional of boiling every lot of milk before consumption is good
- Tuberculosis patients should be isolated from handling cattle as well as milk.
- Proper disinfection should be followed.

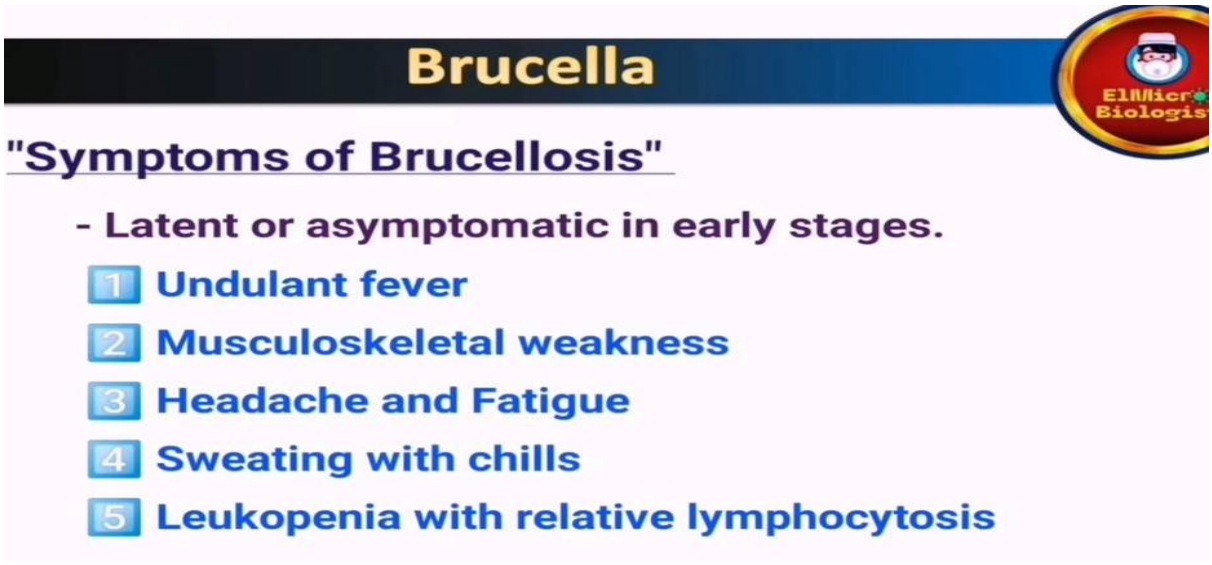
2- Brucellosis



It is one of the most common milk-borne diseases.

Brucellosis, also called

Malta fever, **Maltese fever**, **rock fever**, or **undulant fever**, is a highly contagious zoonosis caused by the ingestion of unsterilized milk or meat from infected animals or close contact with their secretions.



B. abortus can settle in udder and be excreted in milk, but it causes no visible lesions in mammary tissue.

In pregnant uterus, which is predilection site, cotyledons are necrotic, soft, yellow grey in colour and covered by a brown exudate.

Uterus / B. abortus / cow / abortion / Several necrotic and haemorrhagic placentomes / fibrinous-necrotising and haemorrhagic acute placentitis

Foetus may be oedematous with blood- tinged subcutaneous fluid.

The main symptoms are like muscular pain and sweating and the duration of disease can vary from a few weeks to months or years. In the first stage of disease, septicemia occurs and leads to undulant fevers, sweating and migratory arthralgia.

Diagnosis of brucellosis

- Blood cultures in broth, bone marrow cultures. The growth of brucellae is extremely slow and the culture poses a risk to lab personnel due to high infectivity of brucellae.
- Demonstration of antibodies against the agent either with, ELISA or IgM antibodies associated with chronic disease
- Histologic evidence of granulomatous hepatitis

Prevention and control

❖ Segregation of infected herd to avoid cross infection and if possible, the infected animals should be slaughtered.

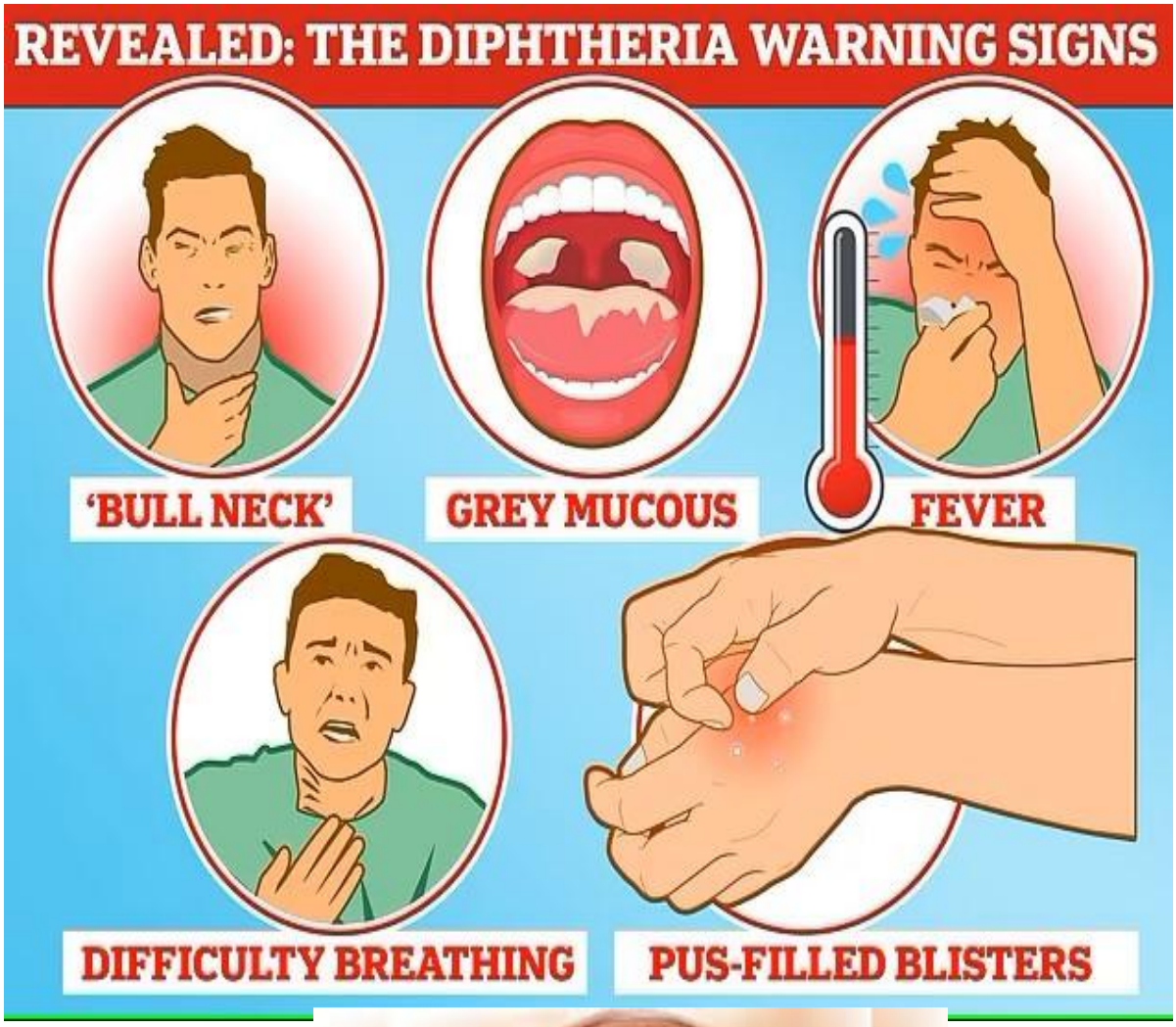
❖ Herds should be properly vaccinated.

❖ Adequate heat treatment should be given to milk for the destruction of causative microbial agents.

3- Diphtheria

Only toxigenic strains of Corynebacterium diphtheriae cause diphtheria.

C. diphtheriae has three biotypes: gravis, mitis. The gravis biotype is associated with the most severe disease, but any strain may be toxigenic.



Illness

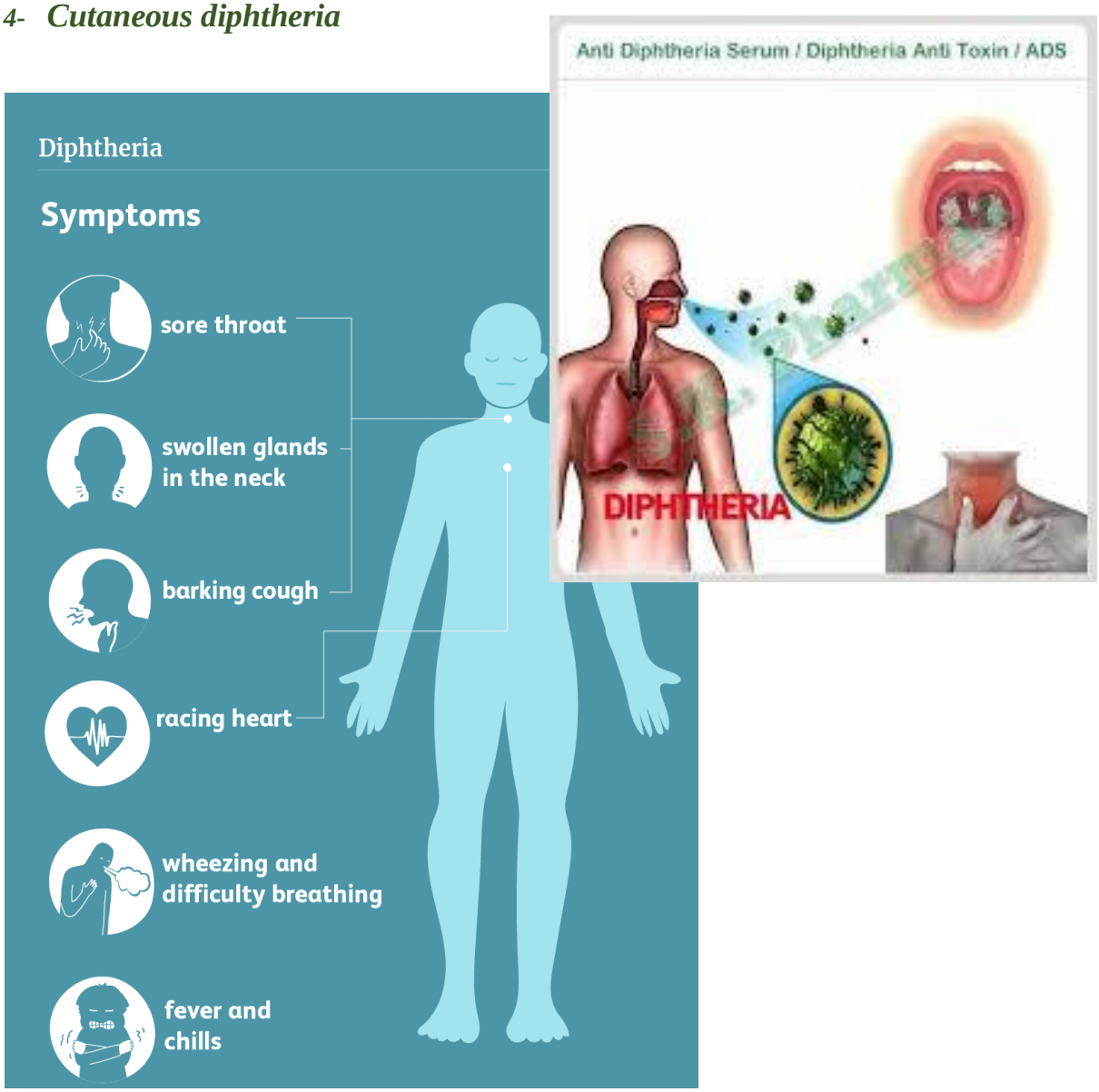
Classic diphtheria is an upper respiratory tract infection characterized by sore throat, low-grade fever, and an adherent pseudomembrane of the tonsil(s), pharynx, and/or nose. The disease can involve almost any mucous membrane. For clinical purposes, diphtheria can be classified according to the site of the infection:

1- ***Anterior nasal diphtheria***

2- ***Pharyngeal and tonsillar diphtheria***

3- ***Laryngeal diphtheria***

4- ***Cutaneous diphtheria***



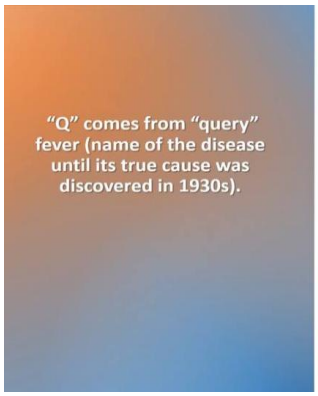
Modes of transmission

Diphtheria is transmitted from person to person through respiratory droplets or less commonly, through contact with discharge from skin lesions, raw milk and fomites

Prevention and control

- adequate heat treatment of milk.
- Infected person should not be allowed to handle milk and milk products.
- Unhygienic practices like sneezing and coughing by the dairy persons should be avoided.
- Proper vaccination of individuals against disease is an efficient prophylactic measure.

4-Q Fever



Q-fever is caused by *Coxiella burnetti*.

Raw milk is commonly implicated as a vehicle for transmission of disease.

Coxiella burnetti is more heat resistant than *Mycobacterium tuberculosis*. It can survive pasteurization, if the specified temperature is not maintained and also freezing temperatures.

Sources

Mostly human infection is by inhalation of infected dust of the fecal matter. Infected cattle continue to excrete the microorganisms in milk for a long time.

Symptoms

High fever, headache, weakness, malaise, severe sweating and virus like pneumonia.

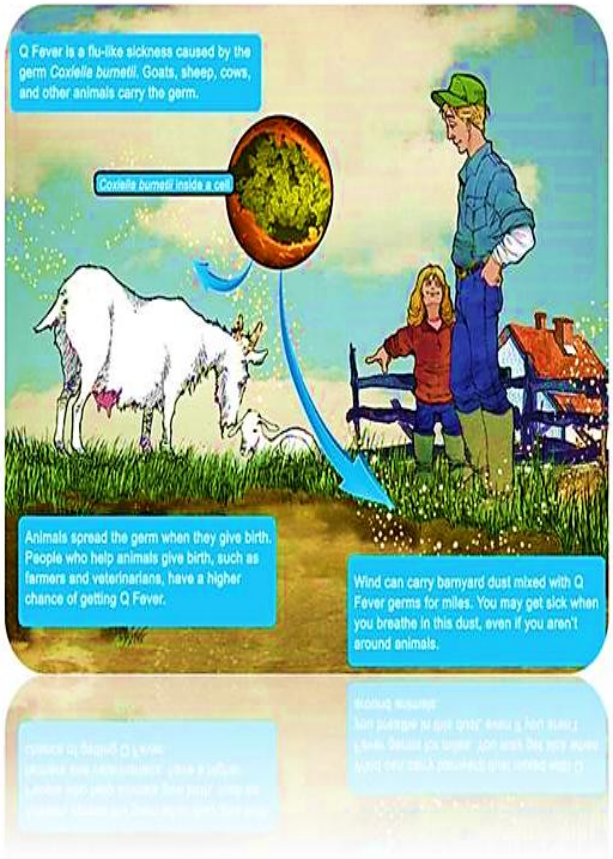
Prevention and control

- Adequate heating of milk and cream
- Animals should be properly vaccinated
- Survey for determining the prevalence of infection in an area should be carried out

Q fever is also transmitted by inhalation or dust contaminated with infected animal secreta or excreta.

Greatest risk of transmission occurs around parturition, through inhalation, ingestion, or direct contact with birth fluids or placenta.

Healthy animals may serve as carriers (harbour infection with no clinical signs) and shed organisms in milk, urine, faeces, placenta and foetal fluids.



5- Viral infections

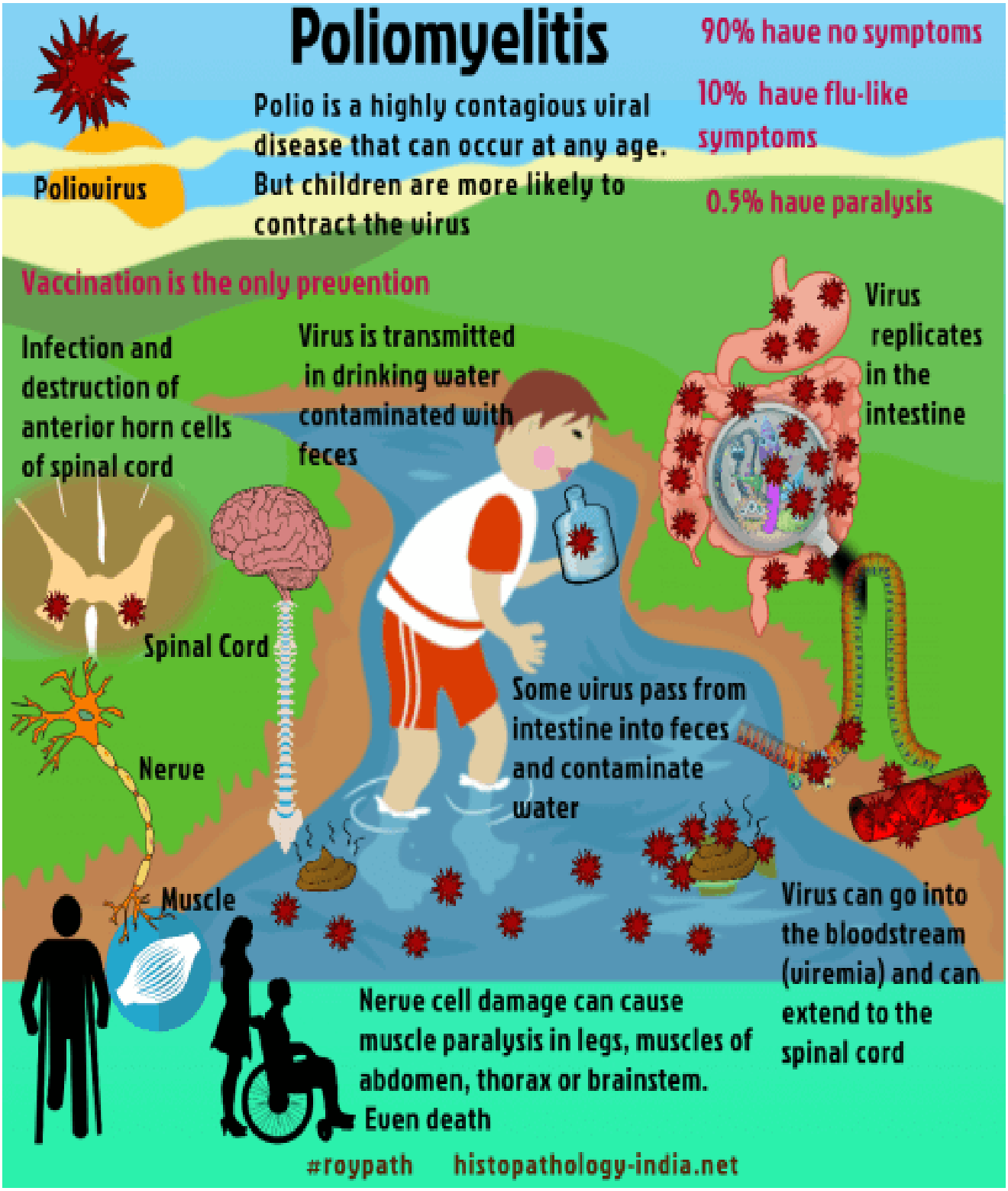
The rapid growth of the frozen and convenience foods has given rise to increased concern about the possible role of such foods in the dissemination of viral infections. Although, food is rarely reported a vehicle for viral distribution. A few breakouts of poliomyelitis have been traced to raw milk. Personal contact and mechanical distribution by flies are believed to be the usual routes of infection with enteric viruses.

6-Enteroviruses

These are a group of viruses that can cause severe epidemics of diarrhea in infants and children on ingestion of contaminated milk. Among these most common human pathogens are polio and coxsackie viruses. Milk and its products are commonly contaminated with enteroviruses mainly through fecal contamination. Unheated milk contaminated after pasteurization play a significant role in the transmission of disease, especially in developing countries. However, polio virus can be inactivated in milk by pasteurization. Compared to polio virus, coxsackie viruses are more resistant to heat treatment

7- Poliomyelitis

Like many other diarrheal diseases, poliomyelitis occurs commonly.



Sources

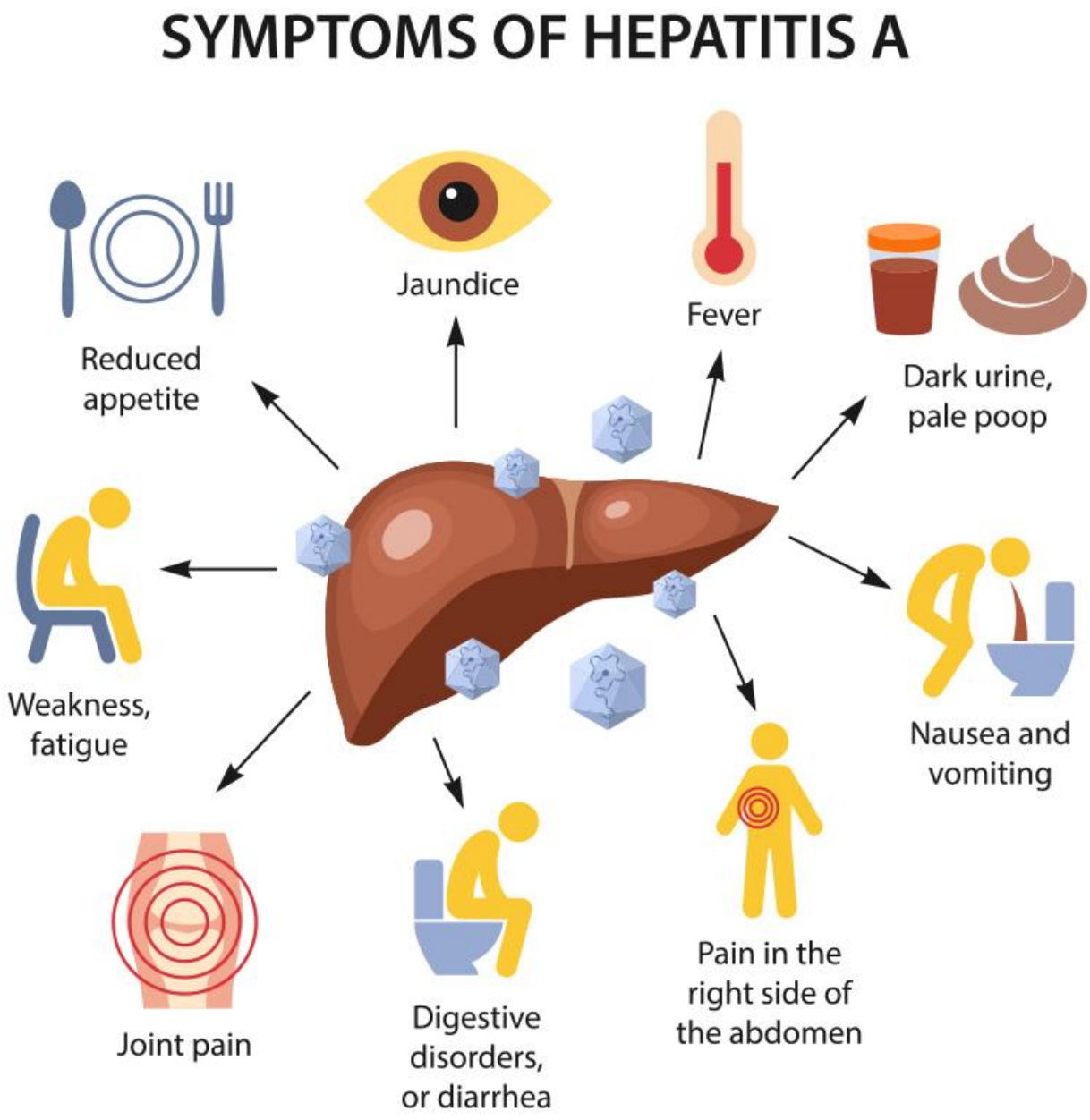
- Person to person contact is the main mode of spread of viruses
- Flies may also serve as a vector for the spread of the disease
- Fecal contamination of water and milk

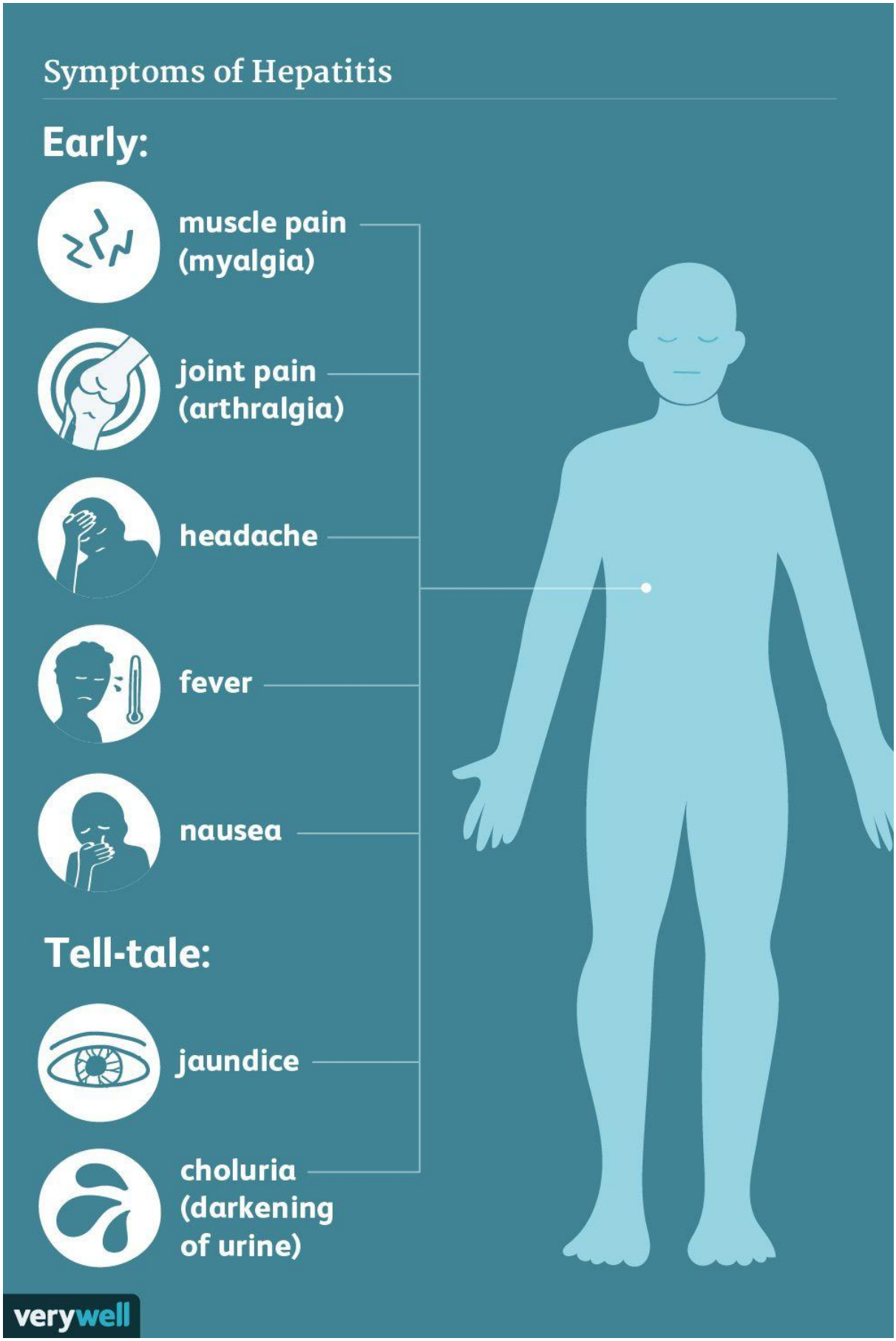
Prevention and control

- Proper pasteurization of milk
- Hygienic measures should be strictly followed to avoid fecal contamination
- Infected persons should not be allowed to handle milk.
- Proper vaccination of the children confers protection against disease.

8- Infectious hepatitis

Among various viral diseases, infectious hepatitis is considered as one of the most serious viral diseases for which milk may be important for transmission. The illness is also known as hepatitis A and is caused by Hepatitis A virus, whereas hepatitis B is not transmitted through milk.




Symptoms of Hepatitis
Early:
muscle pain (myalgia)
joint pain (arthralgia)
headache
fever
nausea
Tell-tale:
jaundice
choluria (darkening of urine)
verywell

Sources

- Since the disease spreads through person-to-person contact, hence handlers can be an important source
- Defective water supply in a milk plant may also introduce the virus to milk
- Polluted environment in milk plant may also contaminate milk

Symptoms

Nausea, vomiting, lethargy, abdominal pain, diarrhea, fever, chills, anorexia, lassitude, sore throat, bile in urine and jaundice.

Prevention and control

- Proper sanitary conditions should be maintained during production and processing of milk
- Infected persons should not be allowed to handle milk
- Fecal contamination of water should be avoided
- Adequate heat treatment of milk is likely to inactivate the virus