

The background features a series of concentric circles in shades of blue and black, creating a ripple effect. A small, light-colored star icon is positioned to the left of the main title.

# \*Water borne diseases

Dr. Hira Mushtaq

- \* The presence of organic matter is favourable to bacterial growth
- \* some inorganic metals like silver, copper, aluminium have an inhibitory effect.
- \* Iron and manganese inhibit the growth of some but encourage that of other bacteria.
- \* Coliform organisms (E. coli, Citrobacter, Enterobacter and Klebsiella species) are recognised as suitable microbial indicator of drinking water quality. They are derived from faeces of warm blooded animals, vegetation and soil, and, therefore, they may contaminate water by entering through non metallic construction material.<sup>6</sup>

\*Water quality

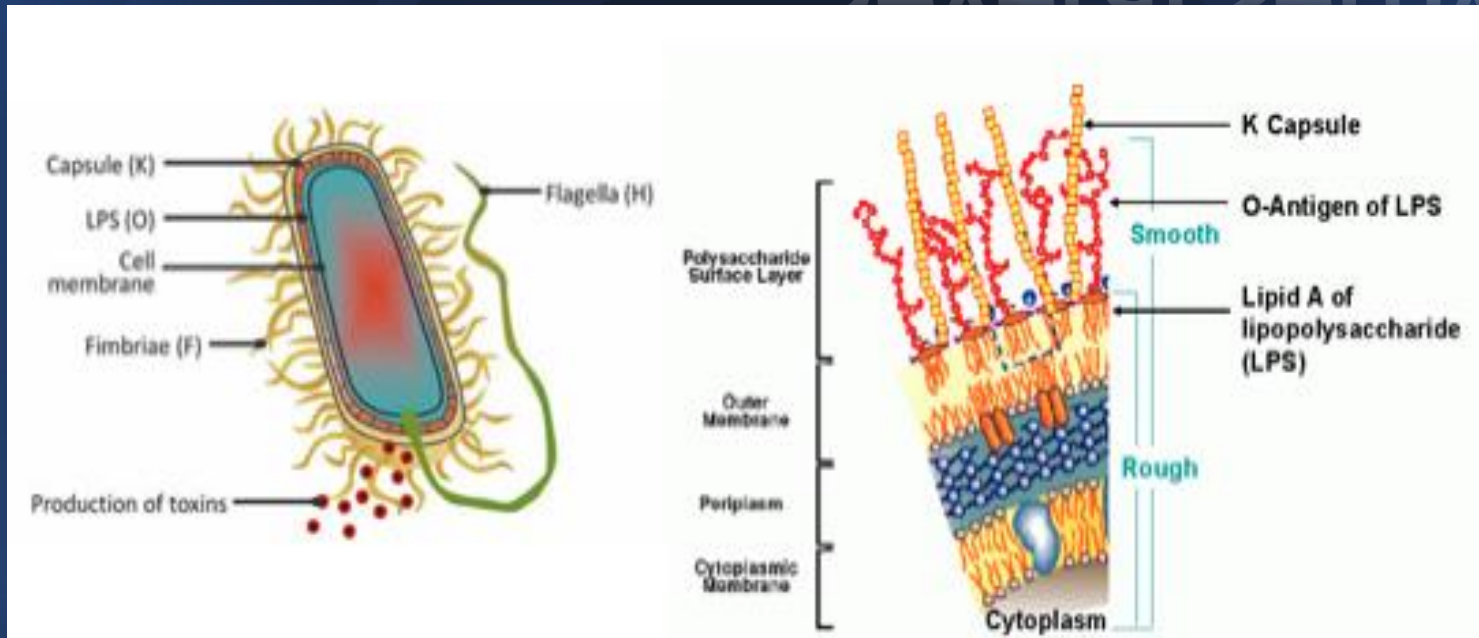
- \* Presence of faecal streptococci = faecal pollution, rarely multiply in polluted water and are more resistant to disinfection than coliforms.
- \* *Cl. Perfringens* = in faeces in smaller numbers than *E. coli*. They can survive in water for a longer time and are more resistant to disinfection than the coliform group.
- \* *Pseudomonas aeruginosa* = assess the hygienic quality of drinking water. Presence of these organisms indicates the general cleanliness of the distribution system and the quality of bottled water.
- \* *Campylobacter jejuni* and Norwalk like virus are also documented as cause of waterborne outbreaks.
- \* Waterborne giardiasis occurs due to untreated surface and ground water. Giardiasis is directly related to the dose of infecting agent and the amount of water consumed per day.
- \* Amoebiasis occurs due to water supply being contaminated with sewage
- \* Ascariasis can also occur due to contaminated water as the eggs resist most chlorination procedures and can remain viable in water for a long time

# \*Microbes in water

- \* 41 genera with hundreds of species
- \* Gram-negative,
- \* usually motile (peritrichous flagellation or swarming movement)
- \* facultative rod bacteria
- \* natural habitat is the intestinal tract of humans and animals
- \* Responsible for nosocomial diseases as well

## \*Enterobacteriaceae.

# \*Several serovars



- \* **O antigens.** Specific polysaccharide chains in the lipopolysaccharide complex of the outer membrane.
- \* **H antigens.** Flagellar antigens consisting of protein.
- \* **K antigens.** Linear polymers of the outer membrane built up of a repeated series of carbohydrate units (sometimes proteins as well). They can cover the cell densely.
- \* **F antigens.** Antigens of protein attachment fimbriae.



- \* *Salmonella enterica* with seven subspecies including *S. enterica* subsp *typhi* .
- \* of which four are of major medical relevance for humans: **Typhi** and **Paratyphi A** cause typhoid fever while **Typhimurium** and **Enteritidis** are the dominant cause of non-typhoidal *Salmonella* infections

- \* rod-shaped,
- \* flagellate
- \* facultative aerobic,



- \* Human carriers are the only source of infection

\* *Salmonella enterica*

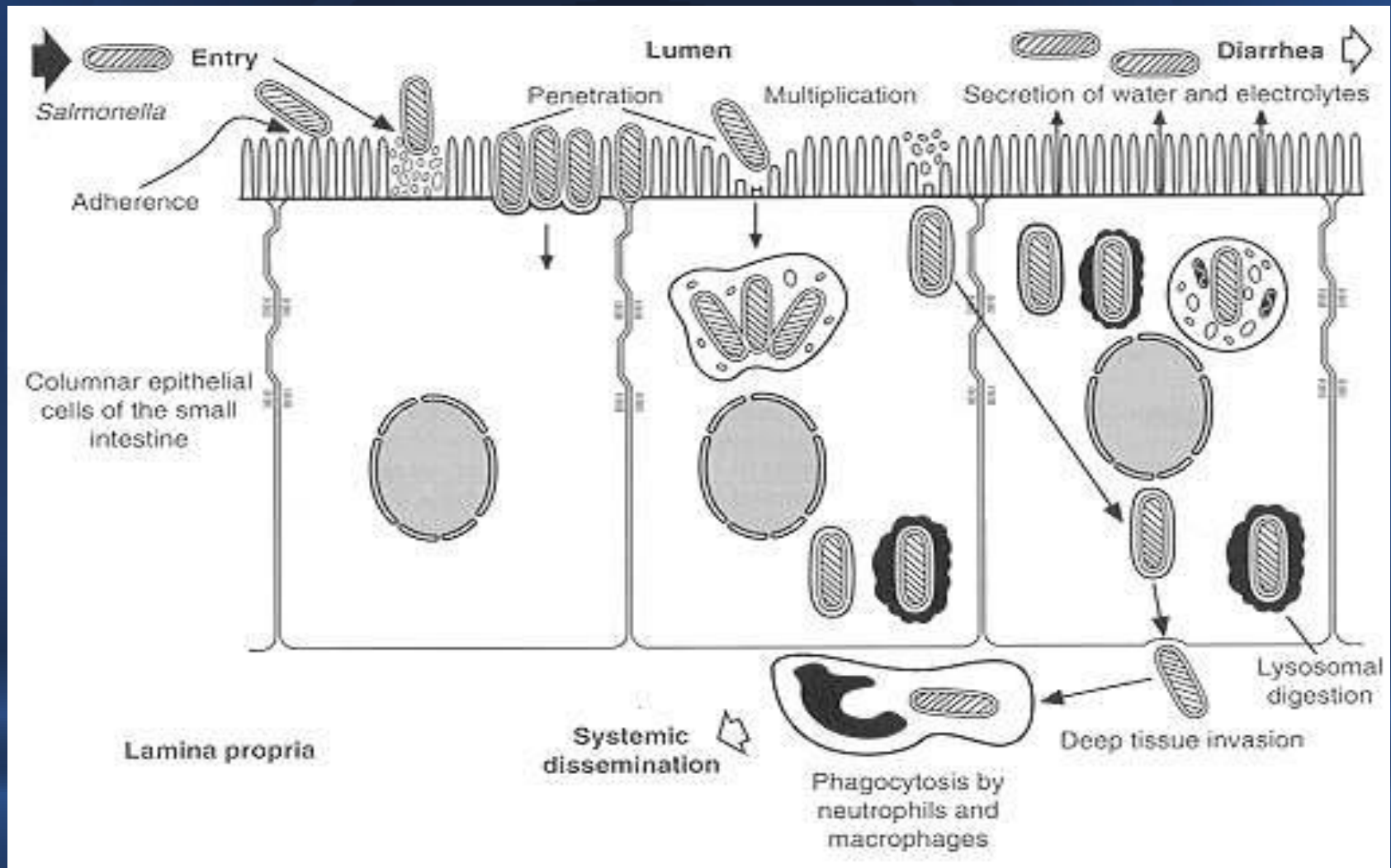
- \* **Enteric salmonellos** : develop when pathogens are taken up with food. The primary infection source is usually livestock. These relatively frequent infections remain restricted to the gastrointestinal tract.
- \* incubation period 1-2 days
- \* **Typhoid salmonellos**: typhi and paratyphi A, B, and C
- \* S. Paratyphi A, B and C bacteria cause a similar illness which is included under the typhoid heading. However, paratyphoid fever is generally milder and shorter in duration than typhoid fever.
- \* Salmonellae are taken up orally and the invasion pathway is through the intestinal tract, from where they enter lymphatic tissue, first spreading lymphogenously, then hematogenously.
- \* 1-3 weeks

\* **Disease types**

- \* Typhoid fever is more common in children and young adults a
- \* S. Typhi may cause:
  - \* Constipation, more common than diarrhea
  - \* High fever
  - \* Headache
  - \* Fatigue
  - \* Loss of appetite
  - \* Dizziness
  - \* Cough
  - \* A rash on the trunk

\*Symptoms





\*Pathogenesis

- \*Diagnosis by
  - stool culture
  - metabolic properties
- \*treated with anti-infective agents (antibiotics) e.g. aminopenicillins, 4-quinolones
- \*slowing down intestinal activity (e.g., with loperamide) and replacing fluid and electrolyte losses orally as required

## \*Diagnosis & Therapy.

- \* providing training in hygienic practices for all food-handling personnel in slaughterhouses,
- \* food processing plants, and restaurants;
- \* cooking and refrigerating foods adequately in food processing plants, restaurants, and homes;
- \* and expanding of governmental enteric disease surveillance programs.

\*Control

- \* formerly classified as part of the group D *Streptococcus* system
- \* Gram-positive, cocci, non-motile, facultative anaerobe
- \* Enterococci survive very harsh environments, including extremely alkaline pH (9.6) and salt concentrations.
- \* resist bile salts, detergents, heavy metals, ethanol, azide, and desiccation.
- \* grow at 10 -45 °C and survive at temperatures of 60 °C for 30 min



# \* Enterococcus faecalis

- \* commensal bacterium inhabiting the gastrointestinal tracts of humans and other mammals.
- \* found in healthy humans, but can cause life-threatening infections through fecal oral route, especially in the nosocomial (hospital) environment.

\*Source and  
transmission



\* Enterococci can produce infections at multiple anatomic sites. These include:

- \* Bacteremia and vascular catheter-related bloodstream infections (BSIs)
- \* Endocarditis
- \* Urinary tract infections (UTIs)
- \* Abdominal and pelvic infections
- \* Skin and soft tissue infections
- \* Joint and bone infections
- \* CNS infections
- \* Pulmonary infections

\* Diseases



- \* *E. faecalis* tend to be considerably more susceptible to beta-lactam e.g. ampicillin
- \* Enterococci may contain (intrinsic) or develop (acquired) resistance to multiple antibiotics, with the most important resistance profiles being to betalactams, aminoglycosides and glycopeptides
- \* Vancomycin resistant species have been isolated

## \*Treatment