**COURSE TITLE: PHARMACOLOGY**

**COURSE CODE: PHA 302**

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**ASSIGNMENT TITLE: BACTERIAL PROTEIN SYNTHESIS INHIBITOR**

**Q1.***WRITE ON A NAMED BACTERIAL PROTEIN SYNTHESIS INHIBITOR, STATING ITS MECHANISM OF ACTION, INDICATION FOR USE, TOXICITY AND ADVERSE EFFECTS*

**Erythromycin**
 Erythromycin is a broad-spectrum bacteriostatic antibiotic drug produced by a strain of *Saccharopolyspora erythraea* and belongs to the macrolide group of antibiotics which consists of Azithromycin, Clarithromycin and others. It was originally discovered in 1952. Erythromycin is widely used for treating a variety of infections, including those caused by gram-positive and gram-negative bacteria. It is available for administration in various forms, including intravenous, topical, and eye drop preparations. Enteric bacteria and other eubacteria, *Streptococcus pyogenes, Haemophilus influenza, Staphylococcus aureus* are susceptible to erythromycin.

**Mechanism of action**

 In order to replicate, bacteria require a specific process of protein synthesis, enabled by ribosomal proteins. Erythromycin acts by inhibition of protein synthesis by binding to the 23S ribosomal RNA molecule in the 50S subunit of ribosome in susceptible bacterial organisms. It stops bacterial protein synthesis by inhibiting the transpeptidation/translocation step of protein synthesis and by inhibiting the assembly of the 50S ribosomal subunit which results in the control of various bacterial infections.

The strong affinity of macrolides, including erythromycin, for bacterial ribosome, supports their broad‐spectrum antibacterial activities.

**Toxicity**

LD50; the oral LD50 of erythromycin in rats is 9272 mg/kg. Overdose information**;** Symptoms of overdose may include diarrhea, nausea, stomach cramps, and vomiting. Erythromycin should immediately be discontinued in cases of overdose. Rapid elimination of unabsorbed drug should be attempted. Supportive measures should be initiated. Erythromycin is not adequately removed by peritoneal dialysis or hemodialysis.

**Indication for use**

Erythromycin is indicated in the treatment of infections caused by susceptible strains of various bacteria. The indications for erythromycin have been summarized by body system below:

* **Respiratory infections**

Mild to moderate upper respiratory tract infections caused by Streptococcus pyogenes, Streptococcus pneumoniae, or Haemophilus influenzae (when used concomitantly with appropriate doses of sulfonamides) can be treated with erythromycin. Mild to moderate lower-respiratory tract infections due to susceptible strains of *Streptococcus pneumoniae* or *Streptococcus pyogenes* may also be treated. Erythromycin treats listeriosis caused by Listeria monocytogenes may also be treated with erythromycin. Erythromycin is indicated to treat pertussis (whooping cough) caused by *Bordetella pertussis*. It is effective in eliminating the causative organism from the nasopharynx of infected individuals, rendering them noninfectious. Clinical studies suggest that erythromycin may aid in the prevention of pertussis infection for individuals who have been exposed to the bacteria. Respiratory tract infections due to *Mycoplasma pneumoniae* may also be treated with erythromycin. Despite the fact that no controlled clinical efficacy studies have been conducted to this date, in vitro and certain preliminary clinical study results indicate that erythromycin may be an effective treatment in Legionnaires ’ disease. Finally, erythromycin is indicated to treat diphtheria and other infections due to *Corynebacterium diphtheriae*, as an adjunct to antitoxin, to prevent carrier status and to eradicate the organism in existing carriers. In addition to the prevention of diphtheria, erythromycin can be used to prevent rheumatic fever in penicillin intolerant patients.

* **Skin infections**

Mild to moderate skin or skin structure infections caused by *Streptococcus pyogenes* or *Staphylococcus aureus* may be treated with erythromycin, however, resistant staphylococcal organisms may emerge. Erythromycin can also be used to treat erythrasma, an infectious condition caused by *Corynebacterium minutissimum*.

* **Gastrointestinal infections**

Intestinal amebiasis caused by *Entamoeba histolytica* can be treated with oral erythromycin. Extra enteric amebiasis warrants treatment with other antimicrobial drugs.

* **Genital infections/STIs**

Erythromycin can be used as an alternative drug in treating acute pelvic inflammatory disease caused by N. gonorrhea in female patients who have demonstrated hypersensitivity or intolerance to penicillin. Syphilis, caused by *Treponema pallidum*, can be treated with erythromycin. It serves as an alternative treatment for primary syphilis in patients who have demonstrated penicillin hypersensitivity. Erythromycin can also be used in the primary stage of primary syphilis. Another approved indication of erythromycin is to treat Chlamydia infections that cause conjunctivitis of the newborn, pneumonia of infancy, and urogenital infections occurring in pregnancy. It is indicated as an alternative option to tetracycline for the treatment of uncomplicated rectal, urethral and endocervical infections in adults caused by *Chlamydia trachomatis*. Erythromycin can be used in nongonococcal urethritis when tetracycline cannot be administered. Finally, erythromycin is indicated to treat nongonococcal urethritis due to Urea plasma urealyticum.

* **Side Effects**

Mild side effects include; Nausea, [vomiting](https://www.webmd.com/digestive-disorders/digestive-diseases-nausea-vomiting), [diarrhea](https://www.webmd.com/digestive-disorders/digestive-diseases-diarrhea), [stomach pain](https://www.webmd.com/pain-management/guide/abdominal-pain-causes-treatments)/cramping, and loss of appetite may occur. Other serious side effects include; rash, itching, hives, difficulty breathing or swallowing, wheezing, yellowing of the skin or eyes, dark urine, pale stools, unusual tiredness, pain in the upper right part of the stomach, seizures, fast pounding, or irregular heartbeat, severe diarrhea (watery or bloody stools) that may occur with or without fever and stomach cramps (may occur up to 2 months or more after your treatment)