**Name: Olushola Precious Oluwapelumi**

**Matric Number: 17/mhs07/024**

**Title: Bacterial Protein Synthesis Inhibitors**

**Course title: Introductory Pharmacology and Toxicology II**

**Corse code: PHA 302**

Write on a named bacterial protein synthesis inhibitor, stating its mechanism of action, induction for use, toxicity and adverse effects.

**Answer:**

**Bacterial protein synthesis inhibitor:** Chloramphenicol

It is a bacteriostatic broad spectrum antibiotic that is active against both aerobic and anaerobic gram positive and gram negative organism.

**Mechanism of action**

* Chloramphenicol blocks proper binding of 50s site which stops protein synthesis
* It does inhibit mitochondrial ribosomal protein synthesis because these ribosomes are 70s, the same as those in bacteria
* It hinders the transfer of the elongating peptide chain to the newly attached amino acyl tRNA at the ribosome messenger RNA complex.
* It specifically attaches to the 50S ribosomes and therefore hinder the access of aminoacyl-tRNA to the acceptor for amino acid incorporation
* It prevents formation of peptide bond
* This may be responsible for the dose related anemia caused by chloramphenicol.

Resistance to chloramphenicol is mainly due to the production of a specific inactivating chloramphenicol acetyltransferase (CAT). The CAT gene is widely disseminated on plasmids that also confer resistance to other antibiotic classes.

**Induction for use/ clinical uses**

Because it is potentially toxic, bacterial resistance, and the availability of other effective drugs, chloramphenicol may be considered mainly for the treatment of serious rickettsia infection, bacterial meningitis caused by a markedly penicillin resistant strain of pneumococcus or meningococcal, and typhoid fever.

**Adverse effect**

* **Leukemia:** leukemia, a cancer of the blood or bone marrow, is characterized by an abnormal increase of immature white blood cells. The risk of childhood leukemia is increased and the risk increases with length of treatment
* **Hypersensitivity reactions:** fever, macular and vesicular rashes, angioedema, urticarial and anaphylaxis may occur
* **Neurotoxic reaction:** headache, mild depression, mental confusion, and delirium have been described in patients receiving chloramphenicol.
* **Bone marrow suppression:** chloramphenicol may cause bone marrow suppression during treatment, this is a direct toxic effect of the drug on human mitochondria.
* **Gray baby syndrome:** it can occur in newborn infants because they do not yet have fully functional liver enzyme so chloramphenicol remains un metabolized in the body. This causes several adverse effects, including hypotension and cyanosis.

**Toxicity**

in young children a condition known as a grey baby syndrome may occur which results in swollen stomach and low blood pressure. Side effects include bone marrow suppression, nausea and diarrhea.

In newborn infants they lack an effective glucoronic acid conjugation. Consequently, when infants are given dosage above 50mg/kg/d, the drug may accumulate resulting in the gray baby syndrome, with vomiting, flaccidity, hypothermia, gray color, shock and collapse.