

# Pharmacodynamics – Lecture 3 Summary

## COX Enzymes (Cyclooxygenases)

**COX-1:** Constitutive enzyme, maintains gastric mucosa, platelet aggregation, renal blood flow.

**COX-2:** Inducible during inflammation, produces prostaglandins → pain, fever, swelling.

**Inhibitors:** Ibuprofen, Paracetamol, Celecoxib.

**Diseases:** Inflammation, Arthritis, Fever, Pain.

## Alpha ( $\alpha$ ) Receptors

$\alpha$ 1: Blood vessels → vasoconstriction → ↑ BP.

$\alpha$ 2: Presynaptic neurons → ↓ norepinephrine release → ↓ sympathetic tone.

**Drugs:** Prazosin ( $\alpha$ 1 blocker), Clonidine ( $\alpha$ 2 agonist).

**Diseases:** Hypertension, Peripheral vascular disorders.

## Beta ( $\beta$ ) Receptors

$\beta$ 1: Heart → ↑ rate & contractility.

$\beta$ 2: Lungs → bronchodilation, smooth muscle relaxation.

**Non-selective Blocker:** Propranolol → blocks  $\beta$ 1 &  $\beta$ 2 → worsens asthma.

**Selective  $\beta$ 2 Agonist:** Salbutamol → for asthma/COPD.

**Diseases:** Hypertension, Arrhythmia, Asthma, COPD.

| Category   | Location                    | Function                  | Drugs                   | Diseases                 |
|------------|-----------------------------|---------------------------|-------------------------|--------------------------|
| COX-1      | Stomach, Platelets, Kidneys | Protects mucosa, clotting | Ibuprofen, Aspirin      | Ulcers, Bleeding risk    |
| COX-2      | Inflammatory sites          | Pain, fever mediator      | Celecoxib, Paracetamol  | Arthritis, Fever         |
| $\alpha$ 1 | Blood vessels               | Vasoconstriction          | Prazosin                | Hypertension             |
| $\alpha$ 2 | Presynaptic neurons         | ↓ NE release              | Clonidine               | Hypertension             |
| $\beta$ 1  | Heart                       | ↑ HR & contractility      | Propranolol, Metoprolol | Arrhythmia, Hypertension |
| $\beta$ 2  | Lungs                       | Bronchodilation           | Salbutamol              | Asthma, COPD             |