# Report 1: NSAIDs and Aspirin

## Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)

NSAIDs are a widely used class of drugs that possess analgesic (pain-relieving), antipyretic (fever-reducing), and anti-inflammatory properties. Unlike corticosteroids, they do not contain steroidal structures. NSAIDs primarily exert their effects by inhibiting cyclooxygenase (COX) enzymes—COX-1 and COX-2—which are responsible for the synthesis of prostaglandins, compounds involved in inflammation, pain, and fever.

## Pharmacological Effects of Aspirin

Aspirin (acetylsalicylic acid) is one of the most well-known NSAIDs. It works by irreversibly inhibiting the COX enzymes, particularly COX-1, which distinguishes it from other NSAIDs. Aspirin has three main pharmacological functions:

### 1. Analgesic Effect

Aspirin relieves mild to moderate pain by reducing the production of prostaglandins that sensitize nerve endings to pain stimuli. It is effective against headaches, muscle aches, toothaches, and other common pains.

### 2. Anti-inflammatory Effect

By blocking prostaglandin synthesis, aspirin reduces the classic signs of inflammation such as redness, swelling, and pain. It is used to treat inflammatory conditions such as rheumatoid arthritis and osteoarthritis.

### 3. Antipyretic Effect

Aspirin reduces fever by acting on the hypothalamic heat-regulating center. It decreases the elevated body temperature associated with fever by promoting vasodilation and sweating, which helps dissipate heat.

## Salicylate (Salicylic Acid)

Salicylic acid is the parent compound of aspirin. It has anti-inflammatory properties and is often used topically in dermatological treatments for acne, psoriasis, and warts. Unlike aspirin, it does not contain the acetyl group and therefore does not irreversibly inhibit COX enzymes. It is less effective as a systemic analgesic or antipyretic but is a potent keratolytic agent.

# Report 2: Epinephrine and Blood Glucose Regulation

## Introduction

Epinephrine, also known as adrenaline, is a hormone and neurotransmitter produced by the adrenal medulla. It plays a key role in the 'fight or flight' response by preparing the body for sudden physical activity. One of its effects is increasing plasma glucose levels to provide immediate energy to muscles and vital organs.

## Beta-2 Adrenergic Receptors

Beta-2 adrenergic receptors are G protein-coupled receptors activated by epinephrine. They are primarily located in liver, skeletal muscle, bronchial smooth muscle, and the vascular system. Upon activation, these receptors stimulate intracellular signaling pathways that lead to metabolic and physiological changes, including increased glucose availability.

## Role of Beta-2 Receptors in Glucose Regulation

Activation of beta-2 receptors leads to the stimulation of glycogenolysis and gluconeogenesis in the liver, increasing glucose output. In skeletal muscle, glycogenolysis provides glucose for local use. These actions collectively raise blood glucose levels during stress or physical exertion.

### Q: What are the side effects of increased plasma glucose concentration?

- Hyperglycemia, especially in diabetic individuals  
- Increased risk of oxidative stress  
- Potential for insulin resistance with prolonged elevation

### Q: Why does blood glucose increase due to epinephrine?

Epinephrine stimulates liver enzymes involved in glycogen breakdown and gluconeogenesis. It also inhibits insulin secretion and promotes glucagon release, both of which contribute to elevated blood glucose.

### Q: Is epinephrine an antagonist to glucose?

No, epinephrine is not an antagonist to glucose. It functions as a metabolic stimulant, increasing blood glucose levels by enhancing its production and release during stress conditions.

# Report 3: Receptor Pharmacology Highlights

## 8-OH-DPAT and 5-HT7A Receptors

8-OH-DPAT is a synthetic compound used in research as a selective agonist at 5-HT1A receptors. It has also been explored as a selective antagonist for 5-HT7A receptors. These serotonin receptors are implicated in mood regulation, thermoregulation, and circadian rhythms. Research involving 8-OH-DPAT helps in understanding the pharmacological effects of serotonergic signaling.

## Propranolol and Beta-Adrenergic Receptors

Propranolol is a non-selective beta-adrenergic receptor antagonist (beta-blocker) that blocks both beta-1 and beta-2 receptors. It is widely used in the treatment of hypertension, anxiety, and certain types of arrhythmias. Because it blocks beta-2 receptors, it can reduce glucose release from the liver, posing a risk of hypoglycemia in diabetic patients.

## Non-Selective Beta Receptor Antagonists

Non-selective beta-blockers affect both beta-1 and beta-2 receptors. Their clinical effects include:  
- Reduced heart rate and cardiac output (beta-1)  
- Bronchoconstriction (beta-2), which is a concern in asthma patients  
- Inhibition of hepatic glucose production (beta-2), which may interfere with glucose homeostasis