Documentary Script / Project Report: The Aspirin

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Topic: Synthesis and Pharmacology of Acetylsalicylic Acid

Research Database: DrugBank Online

This report provides a summary of Aspirin (Acetylsalicylic Acid) based on the official data from DrugBank (DB00945).

1. General Information

* DrugBank Accession Number: DB00945
* Generic Name: Aspirin
* Chemical Name: Acetylsalicylic acid
* Drug Type: Small Molecule
* Groups: Approved, Investigational, Vet approved.

2. Summary & Pharmacology

Aspirin is a non-steroidal anti-inflammatory drug (NSAID) and a salicylate. It is one of the most widely used medications globally due to its versatile effects at different dosages.

* Indication: * Treatment of mild to moderate pain (headache, toothache, muscle aches).
  * Reduction of fever.
  * Treatment of inflammatory conditions (rheumatoid arthritis, osteoarthritis).
  * Cardiovascular protection: Used in low doses to prevent heart attacks, strokes, and blood clot formation in high-risk patients.
* Pharmacodynamics: * Aspirin acts as an analgesic, antipyretic, and anti-inflammatory agent.
  * Unlike other NSAIDs, it inhibits platelet aggregation irreversibly, which is why its effects on blood thinning last for the life of the platelet (7–10 days).

3. Mechanism of Action

Aspirin works by irreversibly inhibiting the Cyclooxygenase enzymes (COX-1 and COX-2):

* It transfers an acetyl group to a serine residue in the active site of the COX enzyme.
* This prevents the conversion of arachidonic acid into prostaglandins (which cause pain/inflammation) and thromboxane A2 (which causes blood clotting).

4. Chemical & Physical Properties

* Molecular Formula: C_9H_8O_4
* Molecular Weight: 180.157 g/mol
* State: Solid (White crystalline powder)
* Solubility: Slightly soluble in water; freely soluble in alcohol and ether.

5. Pharmacokinetics

* Absorption: Rapidly absorbed from the stomach and upper small intestine.
* Metabolism: Rapidly hydrolyzed in the liver and plasma to Salicylic Acid (its active metabolite).
* Half-life: * Aspirin: ~15 to 20 minutes.
  * Salicylic Acid (metabolite): 2 to 3 hours (at low doses) up to 15–30 hours (at high doses).
* Elimination: Primarily excreted through the kidneys (urine).

6. Safety & Toxicity

* Common Side Effects: Gastrointestinal upset, stomach ulcers, and increased bleeding.
* Toxicity (Salicylism): Tinnitus (ringing in the ears), dizziness, vomiting, and metabolic acidosis in severe cases.
* Contraindications: * Patients with a history of asthma or stomach ulcers.
  * Reye's Syndrome: Aspirin should not be given to children or teenagers with viral infections (like chickenpox or flu) due to the risk of this fatal condition.

Source: DrugBank Online - Aspirin (DB00945)
https://go.drugbank.com