Aspirin Analogs in Medicine

Introduction

A. General History of Painkillers

B. General History of Aspirin


- Aspirin is a non-steroidal anti-inflammatory drug, NSAID
- Works by blocking synthesis of prostaglandin by cyclooxygenase (COX)
- Permanently inactivates both COX-1 and COX-2 by transfer of acetyl group to Ser530
- Anti-inflammatory, and anti-aggregatory properties
- “Gastrotoxic,” meaning it can cause damage (ie ulcers) in the stomach.


- Acetylsalicylic acid named aspirin in 1899, first synthesized by Bayer in 1897
- Medicinal uses of salicin (in willow bark) known as early as the 1700’s
- Prostaglandins are involved in pain signaling
- COX-2 prostaglandins occur in inflammatory cells
- Acetylsalicylic acid is a “pro-drug” for salicylic acid
- Several conformational isomers of aspirin exist, two of which are the most stable forms


- A three step synthesis converts oil of wintergreen into acetylsalicylic acid
- Intermediate product salicylic acid is made into aspirin by acetylation
- This synthesis undergoes a hydrolysis and condensation reaction
- Successful synthesis of aspirin product can be confirmed with IR spectra

http://inventors.about.com/library/inventors/blaspirin.htm

- Hippocrates left historical records about the leaves of the willow tree to help heal headaches, pains and fevers. He lived from 460-370 B.C.
- By 1829, scientists discovered that it was the compound called salicin in willow plants which gave the pain relief.
- Henri Leroux had extracted salicin, in crystalline form for the first time, and Raffaele Piria succeeded in obtaining the salicylic acid in its pure state.
• Salicylic acid was tough on the stomach. In 1853, Gerhardt neutralized salicylic acid by buffering it with sodium (sodium salicylate) and acetyl chloride, creating acetylsalicylic acid.
• In 1899, a German chemist named Felix Hoffmann, who worked for a German company called Bayer, rediscovered Gerhardt's formula.
• Aspirin was patented on February 27, 1900.

C. General History of Aspirin Analogs
Materials and Methods
Results
Discussion
Conclusion
References
General History of Aspirin

The earliest recorded pain relief techniques were those penned by Hippocrates, circa 4\textsuperscript{th} century B.C., in which he described the use of willow leaves to relieve headaches, pains, and fevers.\textsuperscript{1} However, it was not until the 1700’s that the actual chemical responsible for the relief was discovered—salicilin.\textsuperscript{2} The first person to isolate salicilin was Henri Leroux, but the first person to purify it into salicylic acid was Raffaele Piria.\textsuperscript{1} Salicylic acid was found to be too harsh on the human stomach, so it was converted into acetylsalicylic acid by Charles Gerhardt and later patented as “Aspirin” for Bayer by Felix Hoffmann in 1900.\textsuperscript{1} Aspirin is produced through a series of three steps; the starting material is oil of wintergreen, and the final product is acetylsalicylic acid.\textsuperscript{3} Aspirin is a non-steroidal anti-inflammatory drug (NSAID) that blocks the production of prostaglandin by cyclooxygenase (COX).\textsuperscript{4} Prostaglandin is a chemical that increases the sensitivity of nerves.\textsuperscript{1} Thus, when blocked, it decreases a person’s perceived sense of pain.