

2024 NJABR High School Essay Contest
1st Place

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“ACHOOOO!”

Allergies - not quite the most comfortable thing in the world. This reaction, triggered by a variety of substances from nuts and meats to airborne particles like dust and pollen, afflicts a significant portion of the population. In 2021, approximately 81 million people, or 26% of adults and 19% of children, in the U.S. were diagnosed with an allergy to pollen from trees, grasses, and weeds. Among them, I count myself, as I have sensitivities to dust, animal fur, and pollen. Like many students, I needed to stay indoors during springtime recess because the tiny particles of pollen were being carried by butterflies and bumblebees from flower to flower, grass to grass, and tree to tree. If only my immune system didn't treat these technically harmless things as viruses; if only my immune system could stop emitting symptoms like sneezing, coughing, and watery eyes.

Enter Zyrtec, a beacon of relief in the form of a small white pill. I started taking it when I was nine, and since then, I have been able to play softball and baseball without itching my red eyes and sneezing every other pitch. Similar to 25% of spring allergy sufferers, I have grown reliant on this over-the-counter medication that can be easily found at most pharmacies.

Zyrtec, scientifically known as cetirizine, is a second-generation antihistamine discovered by Nobel Prize winner Daniel Bovet in 1937. Antihistamines are drugs or other compounds that inhibit the physiological effects of histamine, specifically H1 receptors, used commonly in the treatment of allergies. Activation of H1 receptors mediates the classic symptoms of allergic reactions, such as itching, sneezing, nasal congestion, and inflammation. Thus, blocking these receptors decreases the severity of the symptoms. First-generation antihistamines are effective at blocking histamine receptors, but they have the ability to cross the blood-brain barrier and bind to histamine receptors in the brain, leading to a central nervous system depressant effect. However, the cell structure of second-generation antihistamines, like cetirizine (as well as loratadine-Claritin, fexofenadine-Allegria, etc.) prevents them from crossing the barrier. Therefore, cetirizine relieves people of their allergic reactions but simultaneously resolves the sedative side effects of its first-generation counterpart, hydroxyzine, for the most part.

Through biomedical research, we have proven that Zyrtec is safe for human consumption. Biomedical research includes preclinical trials, which involve non-human animals as test subjects, to gauge the safety of a certain drug; cetirizine follows this trend, as it was tested in various animal species, including mice, rats, beagles (a breed of dog), and cynomolgus monkeys (a type of monkey). These studies were conducted for varying durations, ranging from

short-term studies lasting a few weeks to long-term studies lasting up to one year. The studies conducted for up to one year revealed that no specific organs were identified as targets for toxicity in dogs or cynomolgus monkeys. Furthermore, cetirizine was tested for its potential to cause genetic damage (genotoxicity); luckily, the results indicated that cetirizine did not show genotoxic potential. Cetirizine was also evaluated for its effects on reproduction in animals. These studies included different segments (I, II, and III) and were conducted in mice, rats, and rabbits. Overall, cetirizine did not show significant adverse effects on reproduction. Moreover, long-term studies in mice and rats were conducted to assess the potential of cetirizine to cause cancer. The results showed that cetirizine generally does not induce tumors in rats or mice, as long as relevant dosages are used. Thus, the animal studies provided valuable information about the safety profile of cetirizine, which helped inform the regulatory FDA approval of cetirizine for human use.

While biomedical research is often celebrated for its triumphs against formidable foes like cancer and debilitating conditions, its impact on simple everyday experiences should not be overlooked. It is this dual nature – addressing both grand challenges and common inconveniences – that evokes the profound significance it has in shaping humans’ well-being. As we peer into the future, one can only anticipate further strides in allergy medication, perhaps a third-generation of antihistamines completely devoid of sedative side effects will come to fruition. The efforts in biomedical research also point toward new solutions to humanity's myriad health concerns.

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