

# Overview of epinephrine: discovery, usage and environmental harm

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Epinephrine auto-injection, also known as adrenaline, or the company that most people are familiar with is the EpiPen. This molecular compound is making a great impact on the lives of those who have very intense allergies, the most common allergens are peanuts, bees and shellfish. When an intense allergic reaction occurs, the body reacts with the allergen causing their airways to swell up and their lungs with fluid in which causing them to lack of oxygen causing lethal damages such as death. Epinephrine is made up of hormone molecules that consists of Nitrogen, Hydrogen and Carbon, this functional group is called an amino group. This hormone is naturally produced from adrenal glands.

This helps the body reverse the symptoms of anaphylactic shock such as filling the body with immune mediators which are inflammatory molecules, causing hives, swelling up your tongue and throat which constricts the flow of oxygen, blood vessels expansion which causes blood pressure to drop, it also disrupts blood flow which can lead to cardiac arrest, or worse death. Before adrenaline came to be it had to go through several processes before they could completely have a purified version of adrenaline through synthesis. It first began during the 1890's by a scientist named George Oliver. He started with extracting glands from different animals, in this experiment he discovered that the inner part of the adrenal gland helped increase a dog's blood pressure. This became an enormous opportunity for many physicians and businesses as they want to find different uses for this substance.

Eventually a pharmaceutical entrepreneur named Solomon Solis-Cohen who tried a substance called “ superarenalin” prepared through sheep adrenals, he discovered that this substance was to help with relaxing the muscle lining of the airways. Before it was used to treat those who are anaphylactic it was used to treat those who had asthma before steroids were discovered.

Although it treated patients with asthma, it caused a side affect in which causes diarrhea due to the excess animal substances. Eventually by 1897, they found a way obtain epinephrine from sheep adrenal glands through synthesis creating a more purified version of adrenaline, therefore treating those who have mild asthma and suffer from severe allergies. Epinephrine auto-injector was first discovered by Sheldon Kaplan during the 1970’s, mainly for the use of the U. S. military. It is filled with nerve gas antidote in which he calls it a ComboPen, in which helped U. S soldiers during the cold war for a fast treatment. He also realized that regular civilians were suffering from anaphylaxis, in which around the same time he invented the ComboPen, he also created a similar device to treat people with allergies. Kaplan’s design was to be able to treat people as fast as possible by having a spring loaded syringe with adrenaline that can pierce through the person’s clothing, therefore not needing any professional help nor waiting for a treatment as it happens very quickly. Even though he patent his invention he never receive any royalties as the company that he worked for took over in which causing the company called Mylan to take over, in which today owns EpiPens.

Even though this technology is quite simple it is quite expensive, it used to cost a dollar for each production, but Mylan is now selling it for a large price, forcing some people to result to small kits with a syringe and a vial of epinephrine, just like how it was before WWII where people had to draw up and measure the adrenaline before injecting it. This takes away the purpose of its technology and how it helps millions across the world. As Mylan has taken advantage of Kaplan's creation. A person with a severe allergy can be life threatening in their everyday life, especially to those who are allergic to peanuts as it can be contained in many food products as simple as fried food as some companies use peanut oil. The use of epinephrine has changed the lives of those who go into anaphylaxis shock as these reactions need to be treated quickly, as may services cannot arrive that quickly. It makes their lives feel more at ease when they carry their EpiPens in their daily lives. Although this product can save many lives it comes with a price. Not everyone can afford the cost of EpiPens, especially now a days for those who not have health insurance, as for two EpiPens it can range from \$300-\$600 US dollars. This becomes an issue for those who rarely use EpiPens, but are still require an EpiPen as they can only last up to 18 months. This becomes very limited to everyone as not everyone can afford it. This becomes a political debate of what is morally right and wrong, and according to CNBC the EpiPen company is "morally bankrupt" causing families and schools not having enough money to pay for these treatments.

EpiPens are very useful as it helps with life threatening situations.

Unfortunately when it comes to the environment expired and used EpiPens

are hazardous medical waste, therefore they need to be disposed of properly. If they are not properly disposed it might fall in to the wrong hands and misuse it for different reasons. Aside from the fact that they are disposable due to sanitary issues, it does not have very large impact on the environment itself. In conclusion this treatment is very useful to those who suffer from allergies, but it is quite expensive for a treatment that could save lives, especially when the production cost so little. This creates a very greedy company also known as cash cows who only care about money rather than helping save lives.