The Methods Of Drug Release

Since the discovery of nanomaterials, it has been used prevalently in multiple domains due their versatile structure and small size. There have been many developments done on various nanomaterials revolutionize drug delivery in the medical sphere. These particles can penetrate and transport drug to targeted areas much better than traditional drug carriers. Transporting drugs to the eye using nanocarriers to treat ocular diseases have been a less researched topic but not heavily neglected.

Past studies have examined the different nanomaterials as well as their unique properties that can effectively transport as well as control the rate at which the drugs are released.One of the more widely researched material is lipids, they occur naturally within the body which means that it has excellent biocompatibility allowing it to travel around the body with little rejection by the immune system, they aggregate to form spherical structures with a aqueous core called liposomes. The hydrophilic phosphate head and hydrophobic fatty acid tail of the lipids pack themselves a hollow spherical shape made up of bilayers. The aqueous core allows the user to load drugs within it without compromising the actual arrangement of the drug as well as their function, unlike solid polymer particles. However, liposomes are known to be unstable and degrades easily within the body. This makes controlled drug release within the body impossible.

Another significant material commonly used in drug delivery are solid polymer nanoparticles, as mentioned they do not have a hollow center to contain the drugs but rather the drugs are injected into the solid core and slowly released into the body as the polymer particle degrades gradually. This allows the drug to be released at a controlled rate. Although a controlled drug release is possible, in the case where the drugs to be inserted are of a significant size the drug itself is forcefully injected into the solid core. Its properties maybe altered due to the high compressive pressure of the surrounding polymer atoms causing the structure to change. With the drug’s structure changed, it makes it ineffective and unable to perform its original functions.

On the other hand, we have scientists that experimented on copolymers chains to mimic the hydrophobic and hydrophilic ends of lipids. By varying the concentration of solvent added to the copolymer it forms different aggregates and one of which is called vesicles, it mimics the structure of a liposome with its spherical shape as well as aqueous core. The copolymer does not degrade as easily compared liposomes hence, higher stability, not only that its aqueous core allows the user to input the required drug without sacrificing the quality of it.