Polymers Used in Medicine: Common Types and Benefits of Drug Delivery Systems

Camille Andrews
Parkland College

Recommended Citation
http://spark.parkland.edu/nsps/37

Open access to this Poster is brought to you by Parkland College's institutional repository, SPARK: Scholarship at Parkland. For more information, please contact spark@parkland.edu.
Polymers Used in Medicine
Common Types and Benefits of Drug Delivery Systems

Introduction
Polymers are found in every facet of life, they make up many of the items and products that people use on a daily basis. Polymers can be either natural or synthetic, and are used to make up everything from plastics, fabrics, contact lenses, disposable diapers, construction materials, and many different types of medical applications as well. Polymers used in medicine have great potential and various applications, including surgical devices, implants and prosthetics, tissue replacement (mesh implants), and drug delivery systems.

Types of polymers used in medications can be genetically engineered, protein-based, or synthetically engineered. Both natural and synthetic polymers can be used for varying types of drug delivery, such as hydrogels, microspheres and nanoparticles. Which type of polymer is best depends on the target of the medication and its overall desired effect.

Versatab Technology
Versatab technology, the same idea behind multi-layered tablet design, allows the medication to be protected by outer polymeric layers that slowly dissolve away first before the inner layer. This delay in degradation of the inner layer allows for the medication to reach specific target sites in the body without being degraded first, such as in the acidic conditions of the stomach. This type of tablet design also allows for a more controlled and extended release of the tablet at a more consistent rate. Traditional tablets often reach their peak performance relatively quick and must be taken more frequently in order to maintain the same effectiveness. Extended-release mechanisms such as multi-layered tablets can last 8, 12 or even 24 hours with one dose.

Drug Delivery Techniques

Multi-layered tablets—commonly used layers include the enteric layer, the rate-determining layer, and the core layer. The enteric layer is designed to be resistant to stomach acid, allowing the tablet to survive the acidic environment of the stomach and dissolve in the more alkaline environment of the intestine. The rate-determining layer controls the release of the active ingredient, and the core layer contains the active ingredient.

Drug delivery techniques also include rate controlling, controlled-release, sustained-release, entrapment, and encapsulation. Examples include

- Rate-controlling dosage forms: Tablets, capsules
- Controlled release dosage forms: Coated tablets, enteric coated tablets, osmotic dosage forms
- Sustained release dosage forms: Matrix tablets, enteric coated tablets, osmotic dosage forms
- Entrapment dosage forms: Liposomes, albumin
- Encapsulation dosage forms: Microspheres, nanoparticles

Conclusion
Polymeric medications are critical for efficacy and safety of delivery of many types of medications. Polymers are vital in controlling toxicity of medications; they are able to respond to certain stimuli in the human body such as temperature, pH levels and ionic compositions in order to make sure that the medication is performed at optimal levels. Ability of smart polymers to react to changing stimuli means that patients are less likely to experience adverse reactions to certain types of medications.

The use of polymers in medication therapy has come a long way since polymers first started to be used in medications, but there is still much that can be learned from continued experimentation. It's the idea that certain side effects and adverse reactions can be avoided with a little polymer engineering that is both exciting and has potentially endless possibilities for medications yet to be developed.

References