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Biodegradable synthetic polymers and their application in advanced drug delivery systems (DDS)

Ivana Soljic Jerbic
Pliva Croatia Ltd., CROATIA

Natural and synthetic polymers have been used in pharmaceutical industry for many years and have important role in the development of the conventional dosage forms or for manufacturing of various drug packaging materials. In recent years, their important application resides in the development of the most sophisticated drug delivery systems where polymers are used as a drug carrier. Biodegradable polymers are particularly attractive for application in drug delivery systems since, once introduced into the human body, they do not require removal or additional manipulation. Their degradation products are normal metabolites of the body or products that can be metabolized and easily cleared from the body. Among that, synthetic polymers offer a wide variety of compositions with adjustable properties. These materials open the possibility of developing new drug delivery systems with specific properties (chemical, interfacial, mechanical and biological) for a given application, simply by changing the building blocks or the preparation technique. Such designed complex drug delivery systems where polymers are used as functional excipients have numerous advantages such as localized delivery of drug, sustained delivery of drug, stabilization of the drug, prevention of drug's adverse side-effects, reduction of dosing frequency, minimization of drug concentration fluctuations in plasma level, improved drug utilization and patient compliance. There are range of differently designed drug delivery systems and their description and mechanism of action will be presented in this paper together with the prominent role of the polymers for each particular system. Additionally, most commonly used synthetic biodegradable polymers in drug delivery systems will be presented together with their degradation mechanism.

Figure 1. Classification of polymers used in drug delivery systems (DDS) based on their origin and bio-stability

Recent Publications:

1. Ghandi KJ, Deshmane SV, Biyani KR (2012) Polymers in pharmaceutical drug delivery system: a review. Int. J. Pharm. Sci. Rev. Res. 14: 57-66.
2. Pallerla S, Prabhakar B (2013) Review on Polymers in Drug Delivery. Am. J. Pharm. Tech Res. 3: 900-917.
3. Kaur R, Kaur S (2014) Role of polymers in drug delivery. J. Drug Deliv. Ther. 4: 32-36.
4. Coelho JF, Ferreira PC, Alves P, Cordeiro R, Fonseca AC, Góis JR, Gil MH (2010) Drug delivery systems: Advanced technologies potentially applicable in personalized treatments. EPMA Journal 1:164–209
5. Sackett CK, Narasimhan B (2011) Mathematical modeling of polymer erosion: Consequences for drug delivery. Int. J. Pharm. 418:104-114.

Biography

Ivana Soljic Jerbic, PhD has an expertise in the field of polymer chemistry and development and characterization of new synthetic polymeric materials. Most of her research work consists on investigation of reaction mechanism in complex copolymerization systems together with physico-chemical characterization of the produced copolymers as well as examination of their application properties mainly in advanced drug delivery systems. Most of her scientific work was published in internationally recognized journals in the field of polymer science. For excellence in scientific work in 2010 she won the national award "For woman in science", organized by L'Oréal Adria. She is also an active member of national and international scientific and professional organizations such as: Scientific Council in Croatian Academy of Sciences and Arts (HAZU) - Section for Petrochemistry, Croatian Society of Chemical Engineers and Technologists, International Society of Plastics Engineers etc.

Ivana.SoljicJerbic@pliva.com