Release of Active Pharmaceuticals Using Hyperbranched Polyesters

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Medical professionals have struggled to develop delivery systems for active pharmaceutical ingredients (APIs) to mitigate inconsistent dosage and inconvenience from traditional forms of drug delivery. Sustained release of these APIs through covalent bonding to hyperbranched polyesters (HBPEs) can serve as a solution to this problem. HBPEs, covalently bonded to the APIs through esterification, are an ideal platform for sustained release because the release rate of the API can be manipulated by adjusting the hydrophilic/hydrophobic balance and solubility of the HBPE using different HBPE compositions. Furthermore, these materials can be made with biodegradable and biobased monomers. HBPEs were synthesized with either hydroxyl or carboxyl end groups and were covalently bonded with the following APIs: naproxen, a nonsteroidal anti-inflammatory drug, salicylic acid, the metabolic product of aspirin, and hydrocortisone, a topic drug used for inflammation and swelling. In vitro enzymatic degradation of the hyperbranched polyesters bonded with APIs were performed using rat liver microsomes at 37°C in phosphate buffer at a pH of 7.4. It was found that these APIs were released at a linear rate. Altering the composition of the HBPE, such as changing from a glycerol-adipic acid HBPE conjugate to a glycerol-succinic acid HBPE conjugate, significantly changed the release rate of the API, demonstrating that this HBPE platform can be used for sustained release of APIs and to control the rate of enzymatic release.

Awards Won:
Drug, Chemical &amp
Associated Technologies Association (DCAT): First Award of $3,000.