Polymer-Protein Conjugates for the Treatment of Accelerated Bone Disorders

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This presentation will describe our recent work in the area of polymer-protein conjugates,1 with particular focus on the development of new synthetic strategies and the effect of polymer architecture on the in vivo properties of the proteins to which the polymers are attached. Our recent results in the application of controlled radical polymerization for the modification of osteoprotegerin (OPG) will be discussed. OPG is a protein that limits bone resorption by preventing the formation of mature osteoclasts. Accelerated bone loss disorders, such as osteoporosis, rheumatoid arthritis, and metastatic bone disease, occur as a result of increased osteoclastogenesis, leading to the severe weakening of the bone. OPG is a promising treatment for bone disorders; however, it is rapidly cleared from circulation through rapid liver uptake. We sought to improve the effectiveness of OPG by creating OPG-polymer bioconjugates, with particular attention on how the architecture of the polymer affects protein activity in vitro and in vivo.