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Controlled release technology for anti-angiogenesis treatment of posterior eye diseases: current status and challenges

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Abstract

Antiangiogenic therapeutics, such as corticosteroids, VEGF targeting antibodies and aptamers have been demonstrated effective in controlling retinal and choroidal neovascularization related vision loss. However, to manage the chronic conditions, it requires long term and frequent intravitreal injections of these drugs, resulting in poor patient compliance and suboptimal treatment. In addition, emerging drugs such as tyrosine kinase inhibitors and siRNAs received much expectations, but the late stage clinical trials encountered various obstacles. Controlled release technology could improve the existing treatment regimen by extending therapeutic duration, reducing risks and burdens caused by frequent injections, and enabling new drugs to overcome the hurdles of translation.

Here, we give qualitative and quantitative discussions about the principle mechanisms of polymeric reservoir, polymeric matrix and hydrogel systems. We also reveal the design rationales of the existing drug delivery and release systems in preclinical and clinical stages. Lastly, the animal models of ocular angiogenesis diseases are critically reviewed, which could help to facilitate the translation of controlled release technologies from bench to bedside.

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