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### **Antioxidant ability of phenolic compounds in drug delivery against glaucoma**

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**F**unctionalization of therapeutic drug carriers with phenolic compounds can potentially provide additional benefits in drug delivery for disease treatment. Given that this modification determines final therapeutic efficacy of drug carriers, we investigate the role of the grafting amount of antioxidants onto *in situ* gelling copolymers for intracameral delivery of pilocarpine in antiglaucoma treatment. As expected, increasing grafting of the phenolic compounds increased total antioxidant activities and free radical scavenging abilities of synthesized carrier biomaterials. The hydrophilic nature of antioxidant molecules strongly affected physicochemical properties of carrier materials, thereby dictating *in vitro* release behaviors and mechanisms of pilocarpine. *In vitro* oxidative stress challenges revealed that biocompatible carriers with high antioxidant content alleviated lens epithelial cell damage and reduced reactive oxygen species. Intraocular pressure and pupil diameter in glaucomatous rabbits showed correlations with antioxidant-mediated release of pilocarpine. Additionally, enhanced pharmacological treatment effects prevented corneal endothelial cell loss

during disease progression. Increasing content of the phenolic compounds increased total antioxidant level and decreased nitrite level in the aqueous humor, suggesting a much improved antioxidant status in glaucomatous eyes. This work significantly highlights the dependence of physicochemical properties, drug release behaviors, and bioactivities on intrinsic antioxidant capacities of therapeutic carrier biomaterials for glaucoma treatment.

#### **Speaker Biography**

Shih-Feng Chou is an Assistant Professor in the Department of Mechanical Engineering at The University of Texas at Tyler. He completed his PhD from Auburn University in 2011 followed by working as a Research Associate at Dartmouth College from 2012 to 2013 and a senior fellow at University of Washington from 2014 to 2016. He has 21 publications that have been cited over 140 times, and his publication H-index is 6 and has been serving as a reviewer of reputed journals.

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