

Diabetesity 2021: Curcumin improves bone formation under diabetic conditions by inhibiting the reactive oxygen species production

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Abstract

Excessive reactive oxygen species production caused by type 2 diabetes conditions can disrupt normal bone metabolism and greatly impair bone regeneration. Recently, curcumin was reported to protect mesenchymal stem cells from the oxidative injury caused by H₂O₂. However, it is still unknown whether curcumin can improve bone formation under diabetic conditions. With this in mind, we incorporated curcumin into a fish collagen/nano-hydroxyapatite scaffold and test its bone repair ability both in vitro and in vivo. The sustained curcumin release from the scaffold significantly decreased the production of reactive oxygen species in mesenchymal stem cells treated with diabetic serum by activating the Nrf2/HO-1 pathway. Moreover, the Curcumin-loaded scaffold also remarkably alleviated the negative effects of diabetic serum on the proliferation, migration, and osteogenic differentiation of mesenchymal stem cells. When implanted into bone defects in type 2 diabetic rats, the Curcumin-loaded scaffold also showed a greater bone formation capability compared to the pure scaffold. The results of our study suggested that incorporating curcumin into bone graft substitutes may be a promising route to improve bone regeneration in type 2 diabetic patients.

Biography

Yu Li got his master degree from Shanghai Jiaotong University in 2017. He is a doctoral student at Heidelberg University now. He has published 5 papers as first author and 3 papers as co-author in reputed journals.