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Effect of dimethyloxalylglycine-embedded poly(ϵ -caprolactone) fiber meshes on odontoblastic differentiation of human dental pulp-derived cells

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Recovering odontoblastic layer and vital pulp tissue are essential but challenging parts in regeneration of the dentin-pulp complex. These two parts have close interactions during dentinogenesis, and thus, angiogenesis is considered to be an integral part of dental pulp regeneration. Regarding previous reports about *in vitro* effect of prolyl hydroxylase inhibitors on angiogenesis, we investigated the effect of DMOG-embedded poly(ϵ -caprolactone) fiber (PCLF/DMOG) on odontoblastic differentiation of human dental pulp-derived cells (hDPCs) by transplantation of the dentin slice model. PCLF served as drug-delivering scaffold and cellular niche. hDPCs were seeded onto electrospun PCLF and PCLF/DMOG in dentin slices and then transplanted into nude mice. The surface topography was evaluated for both PCLFs, and DMOG release from the PCLF/DMOG was examined. The effects of the PCLF/DMOG were assessed by histology and RT-qPCR. The PCLF/DMOG treated dentin slices showed higher cellularity with a palisading arrangement of hDPCs and organized collagen fibers. We found that the PCLF/DMOG significantly stimulated the expression of VEGF, DSP, and BSP in the hDPCs ($P < 0.05$) and mVegfa, mPecam 1, and mNefl in the surrounding host cells ($P < 0.05$). These results show that PCLF/DMOG has potential in pulp-dentin complex regeneration by promoting odontoblastic differentiation of hDPCs and by enhancing host cell recruitment, angiogenesis, and neurogenesis, through the released DMOG-mediated cell responses.

Biography

Yeon Jee Yoo has completed her PhD from Seoul National University, Republic of South Korea. She is a Clinical Professor at the Dental Hospital, Department of Conservative Dentistry & Endodontics in Comprehensive Treatment Center at the same university, Seoul, Republic of South Korea.

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