

Erythropoietin receptor signal is crucial for periodontal ligament stem cell-based tissue reconstruction in periodontal disease

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(エリスロポイエチン受容体シグナルは歯周病における歯根膜幹細胞を用いた組織再生に必要である)

区分 : 甲

論文内容の要旨

Periodontal tissue regeneration is an essential biological process to recover periodontal diseases (PD). However, the mechanisms of human periodontal stem cell (PDLSC)-dependent regeneration are still unclear and unreachable through currently applied treatment methods. The functions and regeneration ability of PDLSCs are modifiable through microenvironment fine regulators. Here, we investigated the microenvironment modulating functions via erythropoietin receptor (EPOR) signal in PDLSCs through the periodontal tissue regeneration process. PDLSCs from patients with chronic periodontal disease (PD-PDLSCs) and healthy donors (Cont-PDLSCs) were isolated and used in this study. PD-PDLSCs exhibited suppressed EPOR expression and reduced periodontal tissue regenerative capacity compared to Cont-PDLSCs. Interestingly, EPOR-silenced Cont-PDLSCs resulted in similar phenotypes to PD-PDLSCs. Whereas EPO treatment rejuvenated the impaired regenerative potency of PD-PDLSCs. Furthermore, local transplantation of EPOR-silenced Cont-PDLSCs and EPOR-activated PD-PDLSCs in a ligature-induced PD mouse model improved the role of EPOR signal in the periodontal tissue maintenance of PDLSCs. EPOR signal-regulated functions also preserved periodontal immune suppression and bone metabolic balance via osteoclasts and osteoblasts in the PD model mice. In summary, these results suggest an indispensable role of EPOR in periodontal microenvironment modulation of PDLSCs and shed the light on novel treatments to achieve full periodontal tissue regeneration.