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Mallotus philippinensis bark extracts promote preferential migration of mesenchymal stem cells and improve wound healing

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Mesenchymal stem cells (MSCs) have the ability to differentiate into various cells and secrete a number of proregenerative factors, thereby contributing to tissue repair. Recent studies have indicated that MSCs migrate to the wound site during the wound healing process. Therefore, methods that enhance the mobilization and homing of MSCs to wounds have the potential to accelerate wound healing. Here, we report the effects of the ethanol extract from *Mallotus philippinensis* bark (EMPB) on MSC proliferation, migration, and wound healing *in vitro* and in a mouse model. Chemotaxis assays demonstrated that EMPB acted as an MSC chemoattractant and that the main chemotactic activity of EMPB may be due to the effects of cinnamtannin B-1. Flow cytometric analysis of peripheral blood mononuclear cells in EMPB-injected mice indicated that EMPB enhanced the mobilization of endogenous MSCs into blood circulation. Bioluminescent whole-animal imaging of luciferase-expressing MSCs revealed that EMPB augmented the homing of MSCs to wounds. In addition, the efficacy of EMPB on migration of MSCs was higher than that of other skin cell types, and EMPB treatment also improved wound healing in a diabetic mouse model. The histopathological characteristics of tissue regeneration demonstrated that the effects of EMPB treatment resembled MSC-induced tissue repair. Taken together, these results suggested that EMPB activated the mobilization and homing of MSCs to wounds and that enhancement of MSC migration may improve wound healing. Thus, EMPB may represent novel therapeutic potential for the regulation of MSC dynamics during wound healing.

Biography

Akito Maeda has completed his PhD in Medical Chemistry from Kyoto University (1992). Then he worked as Research Scientist at Boehringer Ingelheim, Lecturer in Kansai Medical University, Assistant Professor in Kyoto University, and Director at University-launched venture Genomidea. Now he is the Professor of PIAS Collaborative Research Skin Regeneration in Osaka University. His research interest includes the identification of compounds with tissue regeneration-inducing activity derived from natural products, and the creation of advanced technology for tissue regeneration. He is serving as an editorial board member of Phytomedicine.

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