総 説

生体内修復幹細胞：Muse 細胞の作る新しい医療の可能性

An expect for paradigm shift of medical treatment by endogenous reparative Muse cells

出澤　真理
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Class 専門医向け ★★★★

Key Words

- 多能性
- 点滴投与
- 修復効果
- スフィンゴシン１リン酸
- 抗炎症効果

Summary

Multilineage-differentiating stress enduring (Muse) cells are naturally existing unique endogenous stem cells that are non-tumorigenic and are pluripotent-like. They express pluripotent markers, can generate cells representative of all three germ layers from a single cell and are able to self-renew. Since they express specific receptor for damage signal, they can preferentially home into damaged site after topical injection or intravenous injection with lower entrapment in the lung and spleen. After integration, they replenish lost cells by spontaneous differentiation into tissue-compatible cells, leading to robust tissue regeneration and functional recovery. The unique reparative functions of Muse cells were demonstrated in animal models of liver cirrhosis, partial hepatectomy, stroke, skin ulcer of diabetes mellitus and chronic kidney disease.

They can be collected as cells positive for SSEA-3, a surface marker for pluripotent stem cells, from readily accessible sources such as the bone marrow (~0.03% of the total mononucleated cell population), and from cultured fibroblasts (several %), as well as from the dermis and adipose tissue. Recently, Muse cells are shown to circulate in peripheral blood in healthy donors, and the number increases in stroke and acute myocardial infarction patients in an acute phase, suggesting that endogenous Muse cells are mobilized into peripheral blood to repair tissues while their number is insufficient to recover, and that the supply of exogenous Muse cells is expected to deliver statistically meaningful functional recovery. Overall, Muse cells are a feasible source for cell-based approaches, and may safely provide clinically relevant regenerative effects compatible with the 'body's natural repair systems' by simple cost-effective strategy-collection of Muse cells from sources, large scale expansion and intravenous injection.