

Review Article | [OPEN](#)

# Mesenchymal stem cells to treat diabetic neuropathy: a long and strenuous way from bench to the clinic

J Y Zhou, Z Zhang & G S Qian 

*Cell Death Discovery* **2**, Article number: 16055 (2016)

doi:10.1038/cddiscovery.2016.55

Download Citation

Cellular neuroscience

Mesenchymal stem cells

Received: 24 March 2016

Revised: 23 May 2016

Accepted: 11 June 2016

Published online: 11 July 2016

## Abstract

## Abstract

As one of the most common complications of diabetes, diabetic neuropathy often causes foot ulcers and even limb amputations. In spite of continuous development in antidiabetic drugs, there is still no efficient therapy to cure diabetic neuropathy. Diabetic neuropathy shows declined vascularity in peripheral nerves and lack of angiogenic and neurotrophic factors. Mesenchymal stem cells (MSCs) have been indicated as a novel emerging regenerative therapy for diabetic neuropathy because of their multipotency. We will briefly review the pathogenesis of diabetic neuropathy, characteristic of MSCs, effects of MSC therapies for diabetic neuropathy and its related mechanisms. In order to treat diabetic neuropathy, neurotrophic or angiogenic factors in the form of protein or gene therapy are delivered to diabetic neuropathy, but therapeutic efficiencies are very modest if not ineffective. MSC treatment reverses manifestations of diabetic neuropathy. MSCs have an important role to repair tissue and to lower blood glucose level. MSCs even paracrinely secrete

neurotrophic factors, angiogenic factors, cytokines, and immunomodulatory substances to ameliorate diabetic neuropathy. There are still several challenges in the clinical translation of MSC therapy, such as safety, optimal dose of administration, optimal mode of cell delivery, issues of MSC heterogeneity, clinically meaningful engraftment, autologous or allogeneic approach, challenges with cell manufacture, and further mechanisms.

---

**Facts** ▼  
**Facts** ▼

---

**Open questions** ▼  
**Open questions** ▼

---

**Introduction** ▼  
**Introduction** ▼

---

**Diabetic neuropathy** ▼  
**Diabetic neuropathy** ▼

---

**Mesenchymal Stem Cells** ▼  
**Mesenchymal Stem Cells** ▼

---

**Mechanisms of MSC treatment for DN**  
**Mechanisms of MSC treatment for DN**

---



**Challenge and future perspective**  
**Challenge and future perspective**

---



**Conclusion**  
**Conclusion**

---



**References**  
**References**

---



**Acknowledgements**  
**Acknowledgements**

---



**Author information**  
**Author information**

---



**Glossary**  
**Glossary**

---



This work is licensed under a Creative Commons Attribution 4.0 International License. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in the credit line; if the material is not included under the Creative Commons license, users will need to obtain permission from the license holder to reproduce the material. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>

