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Review of preclinical and clinical studies of cell-based therapy for secondary lymphedema

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Abstract

Secondary lymphedema is related to impairment in normal lymph fluid drainage. Accumulation of lymph fluid at peripheral parts results in tissue swelling, inflammation and fibrosis. It will bring not only various symptoms but also affect patients' quality-of-life and body image. Although current treatment modalities for secondary lymphedema include non-surgical and surgical methods, lymphedema is still incurable. Combined treatment may be needed and seeking for other effective treatment is necessary.

Cell-based therapy, especially stem cells, paves another way for the treatment of secondary lymphedema. Stem cells may have both autocrine and paracrine abilities to improve lymphatic duct regeneration and increase lymphatic flow. Since 2008, there were continuing preclinical and clinical studies using cell-based therapy in lymphedema treatment. We searched and summarized the articles for this category for future application.

Till 2018, there were 9 animal studies and 6 human studies. The major stem cell types were mesenchymal stem cell and adipose stem cell. The cell source could be autologous or allogeneic. In human studies, both upper and lower extremity lymphedema were noted. In animal models, mouse, rat and rabbit models were used in the described studies. Most studies showed this treatment modality has so far shown great potential. Despite cell injection-only treatment, there were emerging studies which adding cell therapy in lymph node transfer, adding growth factors in cell therapy or using gene editing technique. However, more preclinical studies and large-scale high quality clinical trials are needed to demonstrate the role of cell therapy in the treatment of secondary lymphedema.