

# Cardiac stem cells from heart disease patients may be harmful

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Patients with severe and end-stage heart failure have few treatment options available to them apart from transplants and "miraculous" stem cell therapy. But a new Tel Aviv University study finds that stem cell therapy may, in fact, harm heart disease patients.

The research, led by Prof. Jonathan Leor of TAU's Sackler Faculty of Medicine and Sheba Medical Center and conducted by TAU's Dr. Nili Naftali-Shani, explores the current practice of using cells from the host patient to repair tissue—and contends that this can prove deleterious or toxic for patients. The study was recently published in the journal *Circulation*.

"We found that, contrary to popular belief, tissue stem cells derived from sick hearts do not contribute to heart healing after injury," said Prof. Leor. "Furthermore, we found that these cells are affected by the inflammatory environment and develop inflammatory properties. The affected stem cells may even exacerbate damage to the already diseased heart muscle."

Tissue or adult stem cells—"blank" cells that can act as a repair kit for the body by replacing damaged tissue—encourage the regeneration of [blood vessel cells](#) and new heart muscle tissue. Faced with a worse survival rate than many cancers, many heart failure patients have turned to [stem cell therapy](#) as a last resort.

"But our findings suggest that stem cells, like any drug, can have adverse

effects," said Prof. Leor. "We concluded that stem cells used in cardiac [therapy](#) should be drawn from healthy donors or be better genetically engineered for the patient."

## Hope for improved cardiac stem cell therapy

In addition, the researchers also discovered the molecular pathway involved in the negative interaction between stem cells and the immune system as they isolated stem cells in mouse models of heart disease. After exploring the molecular pathway in mice, the researchers focused on cardiac stem cells in patients with heart disease.

The results could help improve the use of autologous stem cells—those drawn from the patients themselves—in cardiac therapy, Prof. Leor said.

"We showed that the deletion of the gene responsible for this pathway can restore the original therapeutic function of the cells," said Prof. Leor. "Our findings determine the potential negative effects of inflammation on stem cell function as they're currently used. The use of autologous stem cells from patients with heart disease should be modified. Only stem cells from healthy donors or genetically engineered [cells](#) should be used in treating cardiac conditions."

The researchers are currently testing a gene editing technique (CRISPER) to inhibit the gene responsible for the negative inflammatory properties of the [cardiac stem cells](#) of [heart disease](#) patients. "We hope our engineered [stem cells](#) will be resistant to the negative effects of the immune system," said Prof. Leor.

**More information:** Nili Naftali-Shani et al, Left Ventricular Dysfunction Switches Mesenchymal Stromal Cells Toward an Inflammatory Phenotype and Impairs Their Reparative Properties Via Toll-Like Receptor-4 Clinical Perspective, *Circulation* (2017). [DOI](#):

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