Applying ultrasound therapies for recovery of cardiac stem cells

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A joint project of researchers from Universidad Politécnica de Madrid (UPM), Julius Wolff Institute and led by Spanish National Center for Cardiovascular Research shows that when cardiac stem cells undergo low-intensity pulsed ultrasound treatment, these cells can perform continuing modifications, tissue remodeling and regeneration of damaged cardiac tissue after a heart attack.

After suffering a heart attack with loss of muscle tissue, this tissue is usually replaced with scar tissue and the muscle loss is permanent. However, there are cardiac stem cells (mesoangioblasts) in the heart that are able to regenerate muscle tissue, but its capacity of remodeling and regeneration is very limited. Thus, major efforts have been made to understand the cell behavior and develop treatments to improve tissue regeneration.

This study, with the participation of Center for Biomedical Technology (UPM), was promoted by Dr. Aurora Bernal (CNIC) and based on the idea of applying ultrasound therapies to cardiac stem cells. In fact, this treatment is already used for the recovery of bone diseases or other soft tissues. In these cases, the ultrasound therapy can help increase cell differentiation and cytoskeleton reorganization. Researchers used human and mouse cardiac stem cells in order to analyze the changes produced by ultrasound treatments. It was shown that cells treated with ultrasounds were more deformable and had greater mobility. The changes are carried out through the biochemical signal that trigger (due to ultrasound excitation) proteins linked to cell adhesion (integrins). Besides, researchers injected mouse cells, with and without ultrasound treatments, in mice and they found better results in the case of cells treated with ultrasounds.

These results provide functional evidence that low-intensity pulsed ultrasound treatments might be a useful tool to explore in the field of heart cell therapy.

Source:
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