

A web-based system randomized participants to receive either the regular standard care with saline placebo (n=38), or to receive intravenous FCM at study initiation and again 8 to 14 days later, if necessary, based on hemoglobin levels (n=37). Participants were treated with FCM or placebo saline only at baseline and then called back after 3 months for endpoint analysis. To ensure both investigators and participants were blind to which group was receiving FCM, measures were taken to camouflage the bags of either FCM or saline, as saline is a clear liquid while FCM is dark brown.

For their purposes, investigators defined persistent LVEF as less than 45% at least 6 months after implantation of a CRT device, as determined by 3D echocardiography. Authors noted that while MRI may be a more reliable measure of LVEF, both at baseline and endpoint, it was not an option due to the patients' CRT implant. Researchers defined ID as a blood serum ferritin level of less than 100ng/mL, or between 100 and 300ng/mL if transferrin saturation (amount of functional iron in the blood) was under 20%.

At the 3-month conclusion of the study period participants were evaluated by: 3D echocardiogram to assess cardiac structure and function; force-frequency relationship evaluation through noninvasive biventricular pacing; oxygen consumption by means of cardiopulmonary exercise test; Kansas City Cardiomyopathy Questionnaire (KCCQ) score; and blood levels of N-terminal pro B-type natriuretic peptide (a measure of congestive heart failure).

FINDINGS

Results from the IRON-CRT trial showed improved cardiac function after FCM treatment for HFrEF patients with ID, CRT implant and persistently reduced LVEF. Participants who received FCM showed significant improvement in LVEF (4.22% increase), force-frequency relationship (0.018 cardiac contractility increase), better peak oxygen consumption (0.87mL/kg/min improvement), and higher KCCQ score (up 1.2 points).

DISCUSSION

Iron levels are a well-recognized marker in the pathophysiology of heart failure. Identifying the benefits of intravenous FCM for HFrEF patients with reduced LVEF after CRT implant has valuable implications for patients who have already undergone CRT implantation. This study is the first to suggest that FCM treatment for ID patients with HFrEF improves LVEF and cardiac contractility, however, a larger-scale trial might be needed to further confirm these findings. Additionally, more research is needed to determine whether iron repletion would be beneficial before CRT implant, and for HF patients with preserved ejection fraction (HFpEF).

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