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Impact of L-carnitine pretreatment on intravenous iron administration-induced oxidative stress and inflammatory response in patients with CKD

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Background: Anemia is a common problem in CKD patients. It is attributed to decreased erythropoietin (EPO) production, low iron stores, and the chronic inflammatory milieu. Therefore, therapy includes not only recombinant EPO, but also irons replenishment. However, the latter induces oxidative stress as well as inflammation. Randomized, controlled studies suggested that L-carnitine supplementation might have positive effects on the response to EPO in long term hemodialysis patients. However, there is no evidence whether this approach is also beneficial in earlier-stage CKD patients. Thus, the present study examined whether L-carnitine prevents IVIR-induced oxidative stress and whether it improves response to EPO.

Aims: Our hypothesis is that: 1. Intravenous administration of iron (IVIR) to CKD patients at early stages of the diseases (Stage 2-4) provokes oxidative stress and inflammation; 2. Prophylactic L-carnitine supplementation could prevent the IVIR-induced oxidative stress and inflammatory responses in these patients.

Methods: The current study included 32 anemic CKD patients (stages 2-4) that were divided into 2 subgroups: Group of 16 patients was given a weekly IVIR (Sodium ferric gluconate, [125 mg/100 ml] for 12 weeks. Group 2: Sixteen patients received the same IVIR regimen but also carnitine (20 mg/kg, IV) was administered weekly 30 min prior to IVIR administration through the whole treatment period. Weekly blood samples were drawn before and after each IVIR for Hb, C-reactive protein (CRP), advanced oxidative protein products (AOPP), TBARS and neutrophil gelatinase-associated lipocalin (NGAL), in addition to routine complete blood count and biochemical analyses.

Results: Combined administration of IVIR and carnitine increased Hb more profoundly (+8%) than those treated with IVIR alone (+13%). While IVIR alone induced oxidative and inflammatory responses, patients who received carnitine did not exhibit these adverse effects, as was evident by abolishing IVIR-induced elevation in CRP, NGAL, AOPP, and TBARS.

Conclusion: Our finding demonstrated that co-administration of carnitine with IVIR preferentially attenuates the adverse consequences of IVIR, suggests a role for Carnitine therapy in these patients.

Biography

Zaher Armaly, Clinical Lecturer in the Faculty of Medicine, Bar Ilan University has been a member of the faculty since 2009. He received his MD degree from Padua, Italy in 1989. After one-year Medical Training in Nahariya Medical Center, he moved to Rambam Medical Center for Residency & Specialization in Internal Medicine and subsequently sub-specialization in Nephrology and Hypertension. Since 2003, he serves as Director of the Department of Nephrology and Hypertension at Nazareth Hospital, Nazareth, Israel. He has received several awards for his research and clinical activity including Dangur Family Award from Bar Ilan University. He has over 30 original publications in peer review journals and text books. Besides his recent and past achievements in research, he had excellent achievements as a Lecturer, expressed by a wide variety of prizes that he received for (constantly) excellence in teaching including the best Bar Ilan Lecturer Award. He has extensive experience in Nephrology research. His main interest is anemia and the impact of carnitine on iron-induced oxidative stress in CKD patients. Over the last 10 years his group has been studying the pathophysiology of inflammation and oxidative stress following IV iron administration. In addition, his research focuses on contrast-induced nephropathy and novel therapeutic approaches to this common disease state. Finally, he studies the incidence of depression in ESRD patients on hemodialysis and peritoneal dialysis and the factors underlying this phenomenon.

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