

# Association of Dietary Omega-6 to Omega-3 Ratio and Inflammation in Maintenance Hemodialysis Patients

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## INTRODUCTION

- The literature has reported that higher levels of C-reactive protein (CRP) is present in malnourished hemodialysis patients.
- These data suggest that pro-inflammatory cytokines play a role in the pathogenesis of protein-energy wasting (PEW) in advanced renal failure including chronic kidney disease (CKD) Stage 5D.
- It is not known, however, whether diet has a bearing on inflammation.
- Many maintenance hemodialysis (MHD) patients eat fast food, which is known to have an unfavorably high ratio of omega-6 to omega-3 poly-unsaturated fatty acids (PUFA) and which may activate pro-inflammatory cytokines.
- We hypothesized that the anti-inflammatory and cardio-protective benefits of dietary omega 3, compared to omega 6, polyunsaturated fatty acids (PUFAs) may modulate the inflammatory processes and reduce pro-inflammatory cytokines in MHD patients.

## METHODS & RESULTS

- Using 3-day dietary record supplemented with dietary interview we examined the correlation of serum CRP changes during the first year and the estimated dietary omega-6 to omega-3 PUFA ratio at the start of the cohort of 145 MHD patients.
- Higher omega-3 intake per se was associated with a non-significant trend towards decreased serum CRP. However, a higher omega-6 to omega-3 PUFA ratio was associated with a significant increase in serum CRP over 12 months, after adjustment for case-mix (age and gender), diet (energy, saturated fatty acids, trans fat, cholesterol and fiber intakes), body mass index, and history of hypertension (HTN) (r=0.20, p=0.03) (see Table 1).

**Table 1: Correlation coefficients between omega 3 and omega 6 to 3 PUFA ratio with serum CRP changes during the first year of follow up**

|                               | Omega 3 PUFAs | Omega 6 to omega 3 PUFA ratio |
|-------------------------------|---------------|-------------------------------|
| Age and gender adjusted       | -0.13         | 0.16                          |
|                               | P=0.16        | P=0.09                        |
| Case-mix + diet adjusted      | -0.11         | 0.19                          |
|                               | P=0.25        | P=0.04                        |
| Previous + BMI + HTN adjusted | -0.10         | 0.20                          |
|                               | P=0.33        | P= 0.03                       |

## CONCLUSIONS

- Higher omega-6 to omega-3 PUFA intake ratios were associated with increased inflammation in MHD patients, even after adjustments for other dietary components.

## KEY LEARNINGS

- ✓ Dietary modulation of inflammation is possible in dialysis patients, a hypothesis which requires confirmation from a randomized controlled trial.
- ✓ These findings, if verified, suggest that the lower ratios of omega 6 to omega 3 PUFA intakes should be recommended to MHD patients
- ✓ Future studies should also examine the association of different kinds of omega 3 PUFAs; i.e., EPA and DHA intakes with inflammatory status in MHD patients.

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