

# n-3 Polyunsaturated Fatty Acids in Plasma Phospholipids and Adipose Tissue in Patients on Chronic Dialysis

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## Introduction

The marine n-3 polyunsaturated fatty acids (PUFA), docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA) and docosapentaenoic acid (DPA) are essential fatty acids mainly derived from fatty fish.

Dietary intake of fish and fish oil containing n-3 PUFAs have several possible health benefits including a positive influence on the lipid profile and an anti-inflammatory, antithrombotic, antiarrhythmic, and antihypertensive effect. n-3 PUFAs has also been associated with a reduced mortality and a reduced risk of sudden cardiac death in patients with end-stage renal disease (ESRD). Furthermore, a reduction in arterio-venous-graft thromboses and uremic pruritus have also been observed.

Information on long-term n-3 PUFA intake normally requires adipose tissue biopsies, which are more difficult to obtain and associated with more discomfort for the patient than the short-term marker measured in plasma phospholipids. Little is known about the association between plasma phospholipid and adipose tissue content of n-3 PUFAs in patients with ESRD.

## Aim

To investigate the association between the content of n-3 PUFAs in plasma phospholipids and adipose tissue in patients on chronic dialysis.

## Methods

A cross-sectional study of 169 unselected chronic dialysis patients with age > 18 years and dialysis > 3 months.

Non-fasting blood samples were drawn from the hemodialysis access or venipuncture. Adipose tissue biopsies were obtained from the subcutaneous adipose tissue in the gluteal area with a small needle (18G) using a surface analgesic (**Figure 1 and 2**). Samples were flushed with liquid nitrogen to avoid oxidation and stored at -80 °C.

## Analysis of content of n-3 PUFAs

Total lipids were extracted from the plasma sample and the phospholipid fraction was isolated. The fatty acid composition was measured in the phospholipid fraction of plasma and in adipose tissue by gas chromatography (Varian 3900, Varian, Middleburg, The Netherlands) and the results expressed as weight percent (wt %) of total fatty acids.



**Figure 1.** Adipose tissue biopsy taken from hemodialysis patient



**Figure 2.** Adipose tissue biopsies obtained with 18 G needle (outer diameter 1.27 mm)

## Results

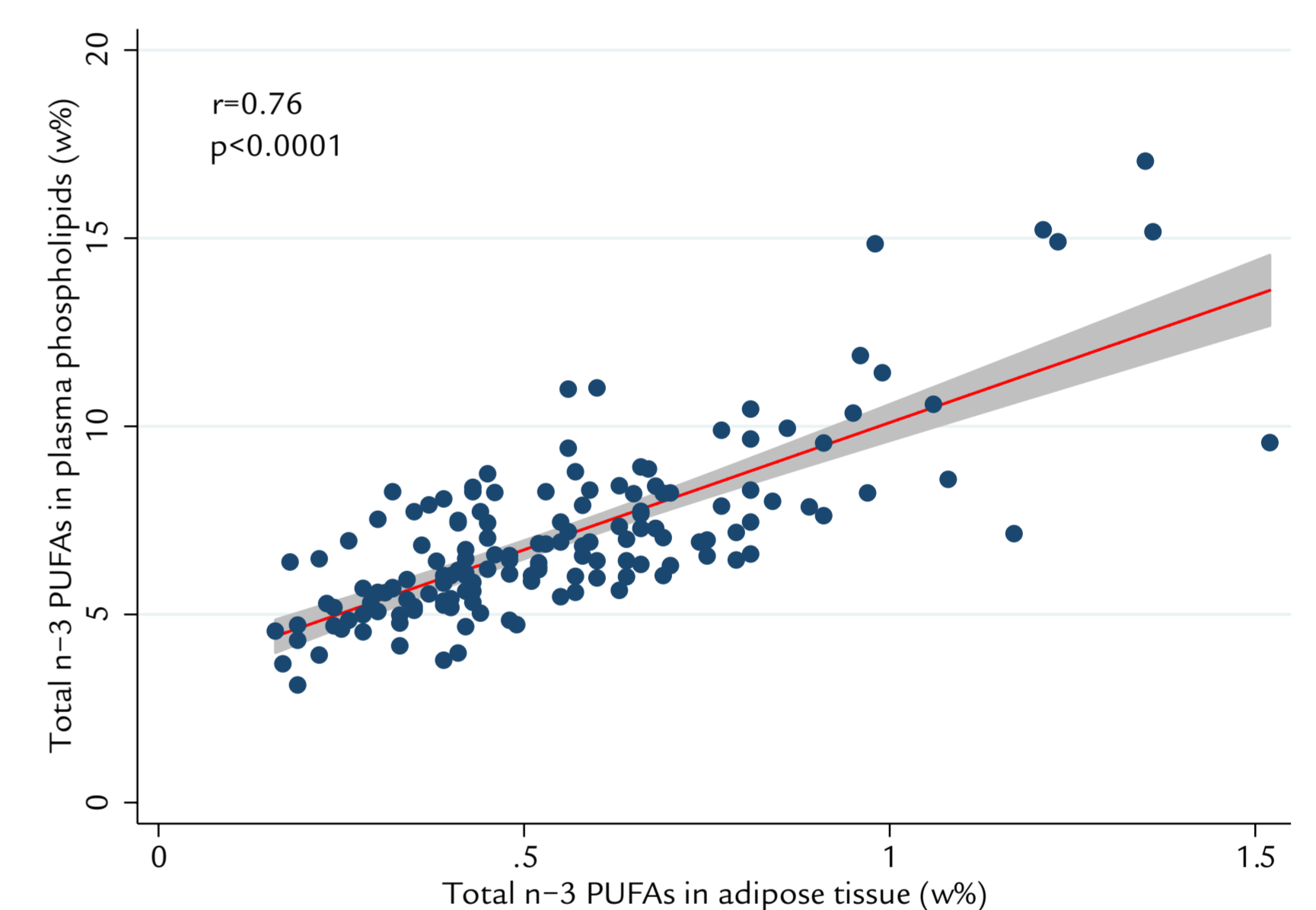
Baseline characteristics are summarized in **Table 1**.

Samples were available in plasma phospholipids (n=169) and adipose tissue (151 patients).

The mean total marine n-3 PUFA content was 13 times higher in plasma phospholipids compared to adipose tissue (**Table 2**), but the contents of total marine n-3 PUFAs in phospholipids and adipose tissue were strongly correlated (**Figure 3 & table 2**).

Variable	
Age, years	62.3 ± 14.1
Sex, male	110 (65.1%)
Diabetes mellitus	60 (35.5%)
Coronary heart disease	52 (30.8%)
Dialysis vintage, years	1.8 [0.6; 5.7]
Dialysis modality	
In-center dialysis (HD & HDF)	141 (83.4%)
Home hemodialysis	16 (9.5%)
Peritoneal dialysis	12 (7.1%)

**Table 1.** Baseline characteristics



**Figure 3.** n-3 PUFAs in plasma phospholipids and adipose tissue

	Plasma Phospholipids	Adipose Tissue	Correlations coefficients	P-value
EPA, wt%	1.70 ± 1.21	0.078 ± 0.049	0.79	<0.0001
DHA, wt%	4.25 ± 1.23	0.21 ± 0.13	0.76	<0.0001
DPA, wt%	1.11 ± 0.22	0.26 ± 0.10	0.19	0.02
Total Marine n-3 PUFAs (EPA+DHA+DPA), wt%	7.07 ± 2.28	0.55 ± 0.25	0.76	<0.0001

**Table 2.** Mean contents of marine n-3 PUFAs (n=151)

## Conclusion

The contents of marine n-3 PUFAs in plasma phospholipids and adipose tissue were strongly correlated in patients on chronic dialysis. This finding suggests that the more easily obtainable measurement of n-3 PUFAs in plasma phospholipids can be used instead of adipose tissue biopsies to evaluate longer-term intake of the most important marine n-3 PUFAs in patients on chronic dialysis.



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**Disclosures**  
None.

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