SP 269

Lipophilic index, Kidney Function, and Kidney Function Decline

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OBJECTIVES

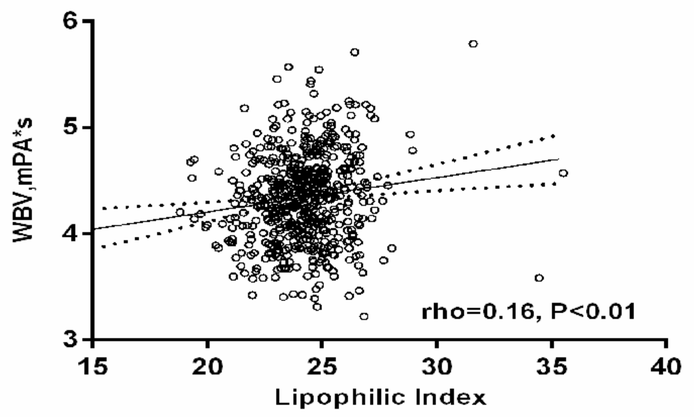
Unhealthy dietary fats are associated with faster kidney function decline. The cell membrane composition of phospholipid fatty acids (FAs) is a determinant of membrane fluidity and rheological properties such as blood plasma viscosity and erythrocyte deformability. These properties, which have been linked to kidney damage, are thought to be reflected by the lipophilic index (LI). We prospectively investigated the associations of LI with kidney function and its decline.

METHODS

Observational study from the Prospective Investigation of Vasculature in Uppsala Seniors (PIVUS) including 975 men and women (aged 71 years) with plasma phospholipid FAs composition and cystatin-C estimated glomerular filtration rate (eGFR). Of these, 780 attended re-examination after 5 years, and eGFR changes were assessed. Participants with a 5-year eGFR reduction ≥30% were considered chronic kidney disease (CKD) progressors (n=198). LI was calculated as the sum of the products of the FA proportions with the respective FAs melting points. Blood rheology/viscosity measurements were performed in a random subsample of 559 subjects at baseline.

RESULTS

Increased LI directly correlated with blood and plasma viscosity (both Spearman rho=0.16, p<0.01), and negatively correlated with erythrocyte deformability (rho= -0.09, p<0.05). In cross-sectional analyses, LI directly associated with lower eGFR (regression coefficient 3.00 ml/min/1.73m^2 per 1 standard deviation (SD) increment in LI, 95% CI: -4.31, -1.69, p<0.001). In longitudinal analyses, 1 SD increment in baseline LI associated with a faster eGFR decline (-2.13 [95% CI -3.58, -0.69] ml/min/1.73m^2, p<0.01) and with 32% increased odds of CKD progression (adjusted OR 1.32 [95%, CI 1.05-1.65]).



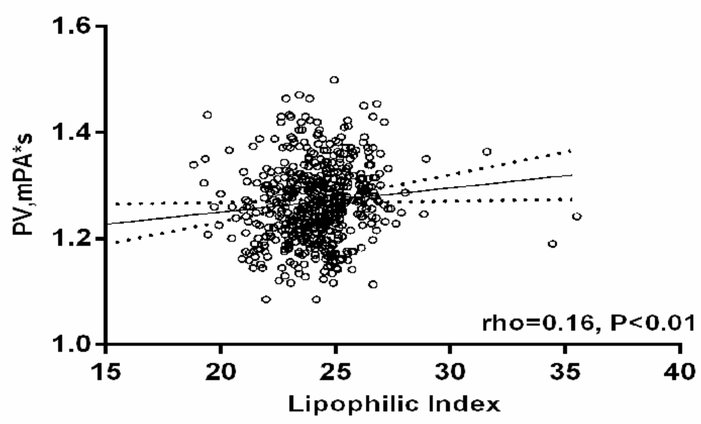


Figure 1. Spearman's correlation coefficients between lipophilic index and a) whole blood viscosity (WBV, n=559), b) plasma viscosity (PV, n=540), and c) erythrocyte deformability (EF, n=540).

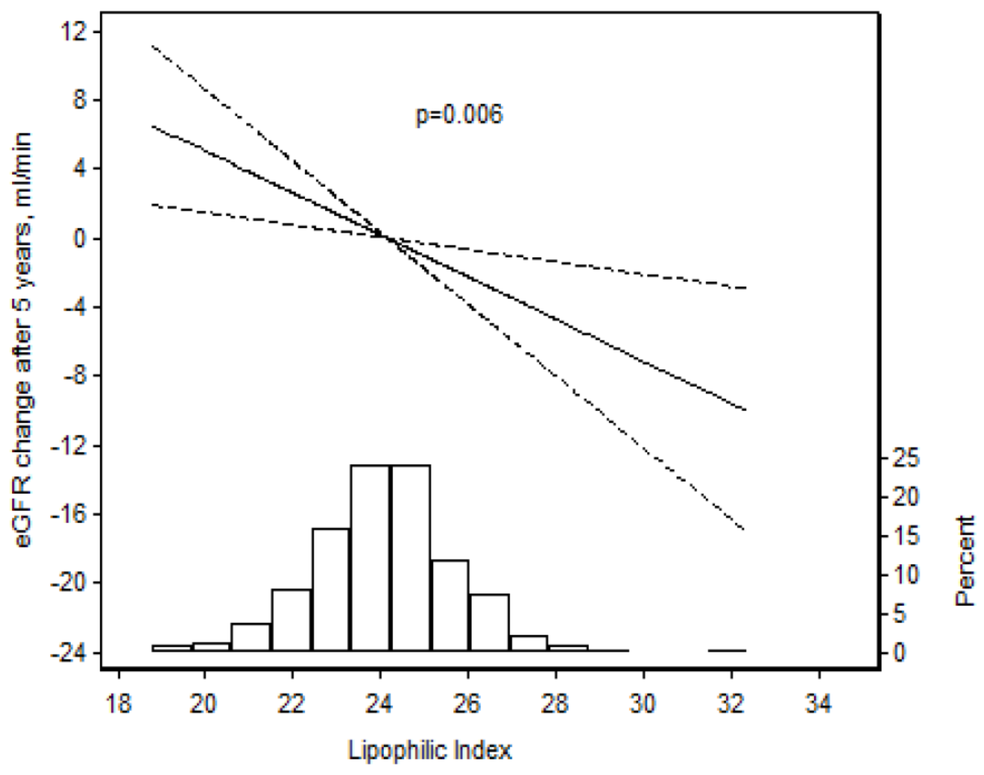


Figure 2. Association between lipophilic index (LI, per SD 1.7 increase) and 5-year change in eGFR. Results from generalized linear models adjusting for age, age at follow-up, time between re-examinations, sex, eGFR at baseline, CVD risk factors (BMI, smoking, systolic blood pressure, HDL, cholesterol, diabetes, and antihypertensive and lipid treatment), and CRP (n=780). The median LI value of 24.1 was used as reference in both models. Bold line represent regression coefficient. Dashed lines represent 95% confident intervals. The distribution of lipophilic index levels is shown at the bottom of the plot. Abbreviations: eGFR, estimated glomerular filtration rate; SD, standard deviation; CKD, chronic kidney disease.

CONCLUSIONS

A high LI was associated with lower kidney function, kidney function decline, and CKD progression. We speculate that the quality of dietary fat, reflected by LI, may influence CKD risk, potentially by influencing membrane fluidity and plasma viscosity.

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