

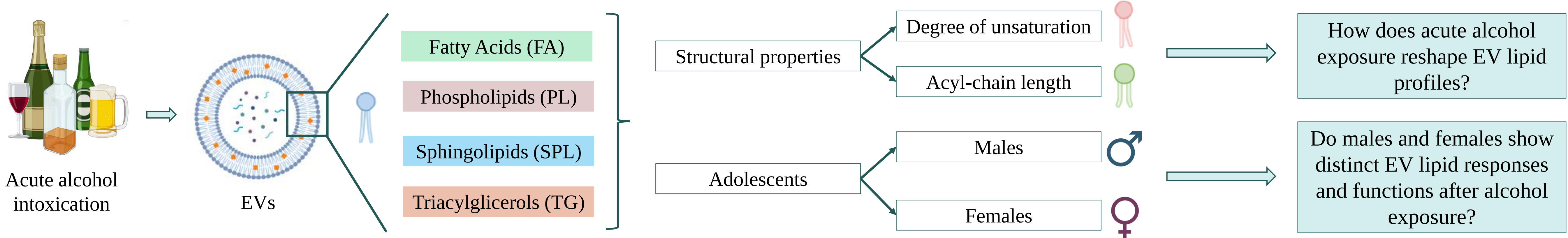
Sex-based differences in acyl-chain length and degree of unsaturation of lipids carried by plasma extracellular vesicles following acute ethanol intoxication in adolescents

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BACKGROUND

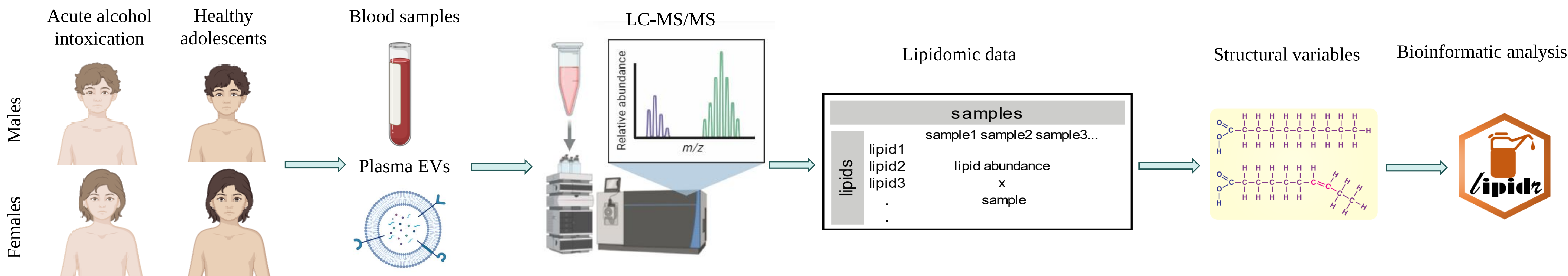
Lipids regulate EV biogenesis, uptake, and function, and alterations in EV lipid composition are linked to inflammatory, metabolic, and neurological disorders. Our group previously showed that plasma EV-derived microRNAs amplify and serve as biomarkers of ethanol-induced neuroinflammation in adolescence. However, it remains unknown whether acyl-chain length and unsaturation of key EV lipid classes change after acute alcohol exposure, and whether these changes differ between sexes.



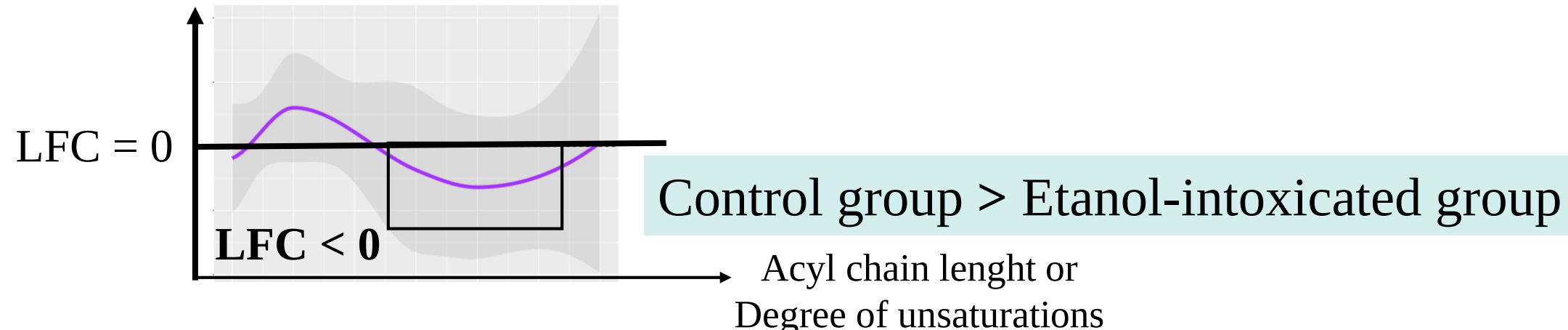
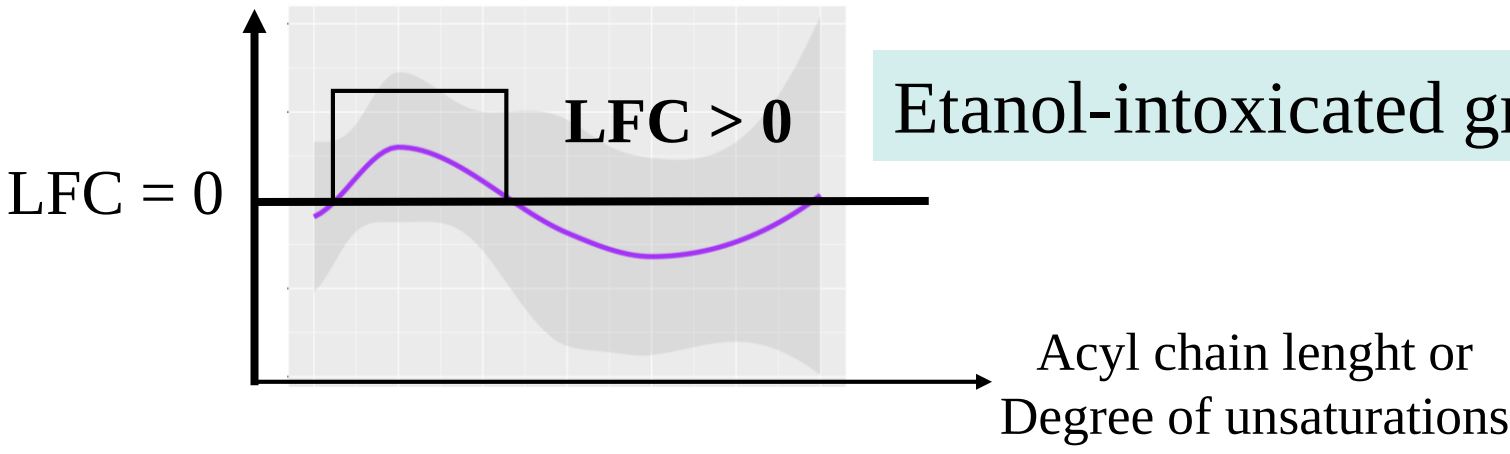
AIM

To investigate changes in acyl-chain length and degree of unsaturation across different lipid classes present in plasma EVs from adolescents with acute ethanol intoxication and to evaluate potential sex-dependent differences

METHODS

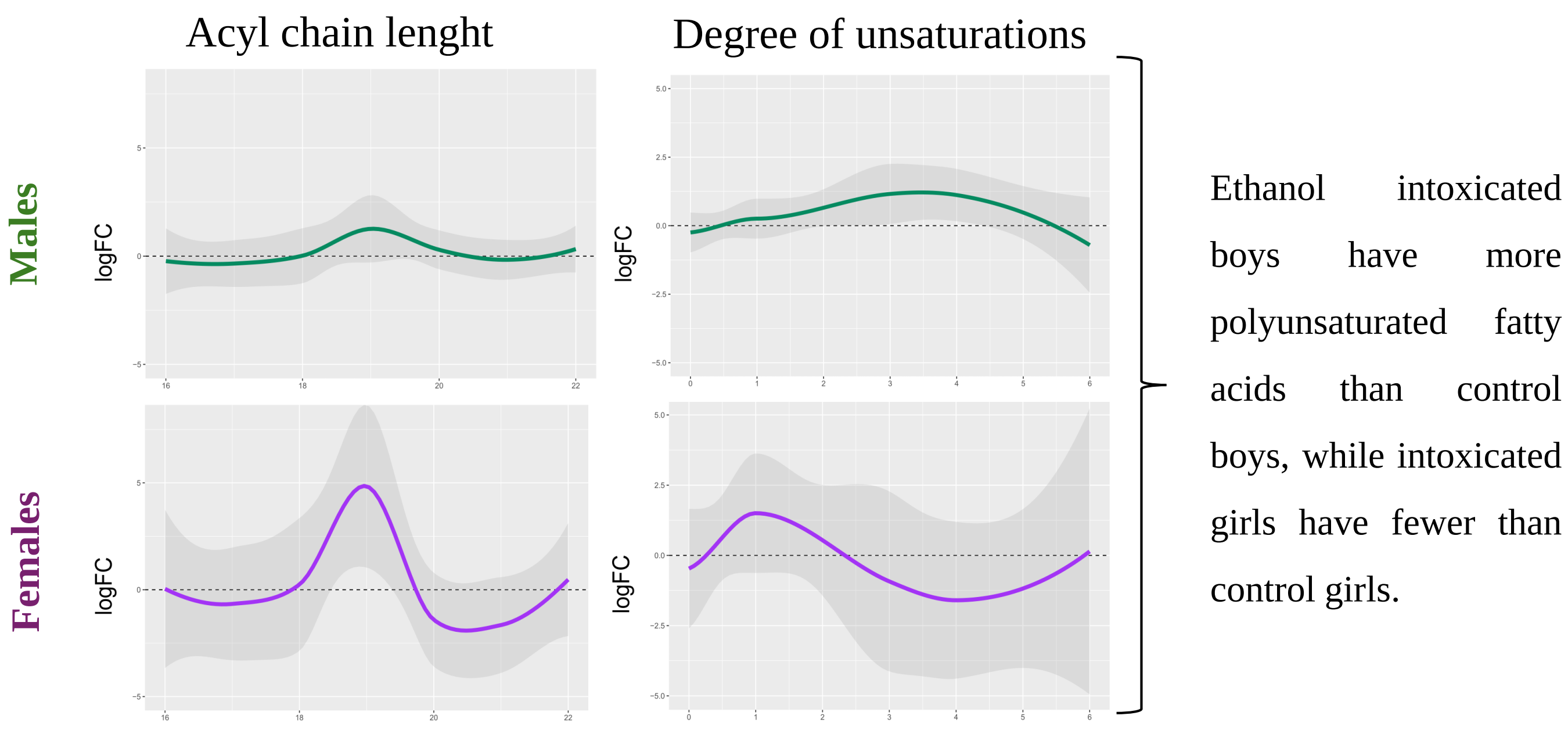


General considerations for interpreting the results

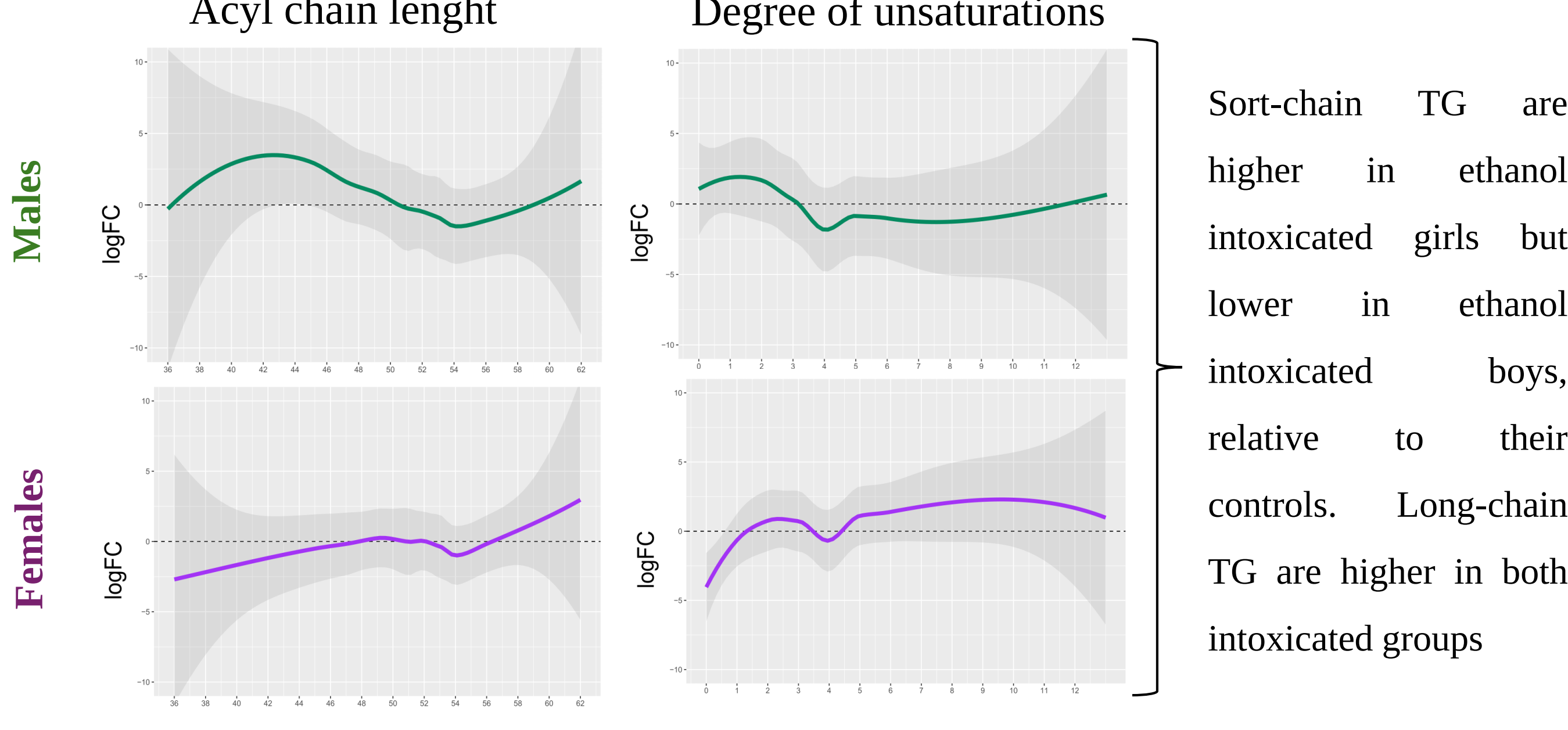


Females showed **enrichment of long-chain and highly unsaturated lipid species**, particularly within fatty acids, sphingomyelins, and triacylglycerides, whereas males displayed **increased abundance of saturated and less unsaturated species** across several lipid classes. **Opposite patterns** were also observed in ceramides and phosphatidylethanolamines. These alterations affected fatty acids, sphingolipids, glycerophospholipids, and triacylglycerides, indicating extensive sex-specific remodeling of EV lipid structure after acute alcohol exposure.

Fatty Acids (FA)

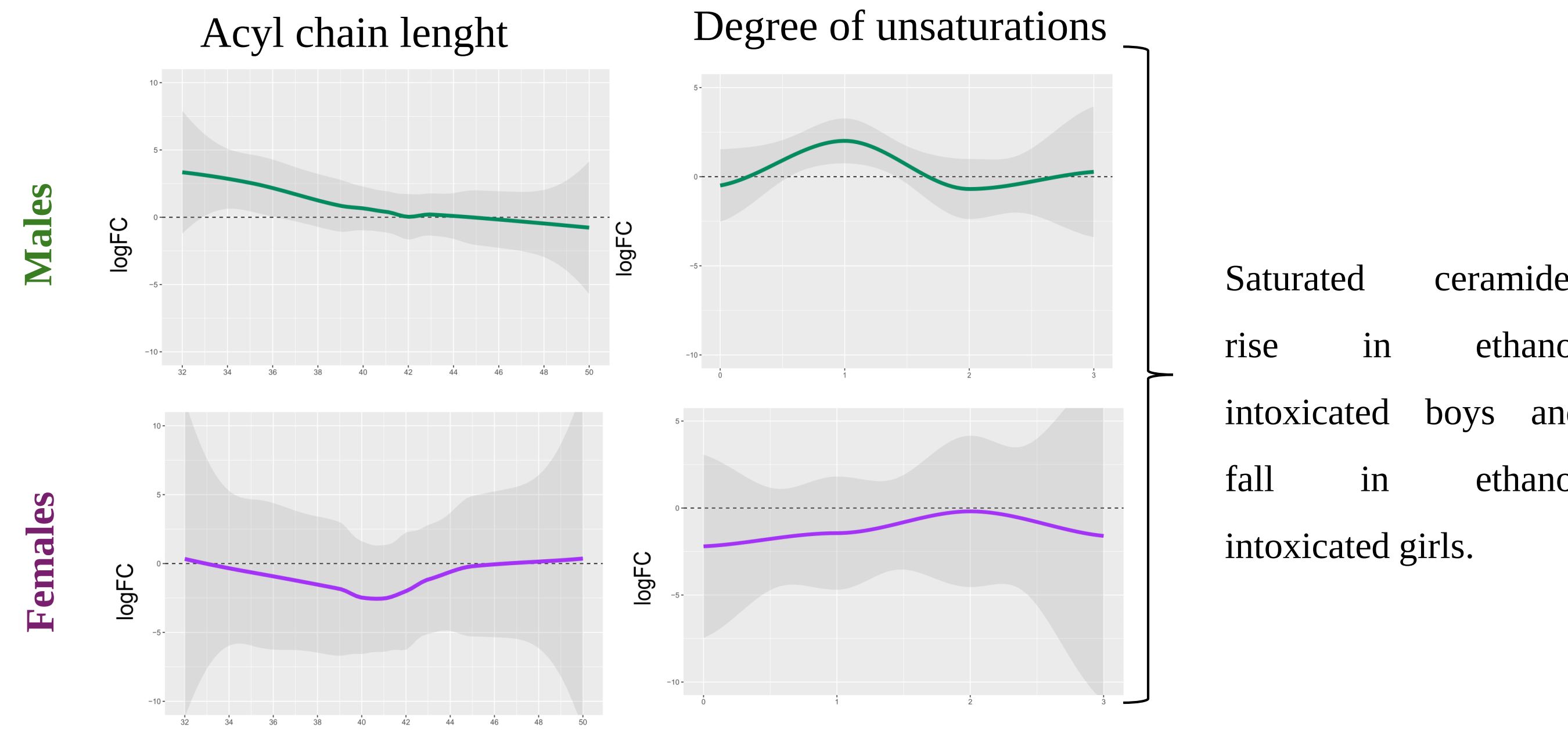


Triacylglycerols (TG)

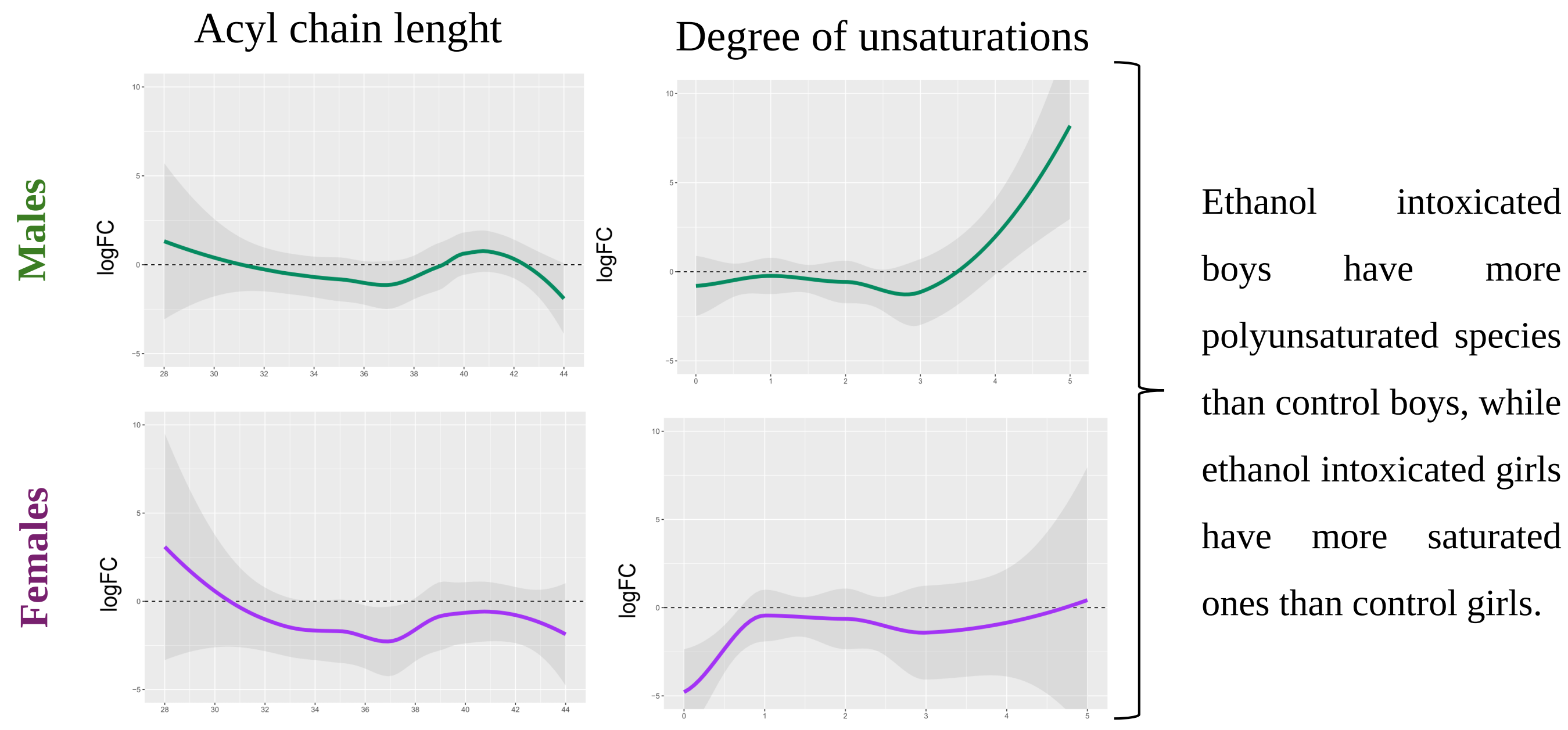


Sphingolipids (SPL)

Ceramides (Cer)

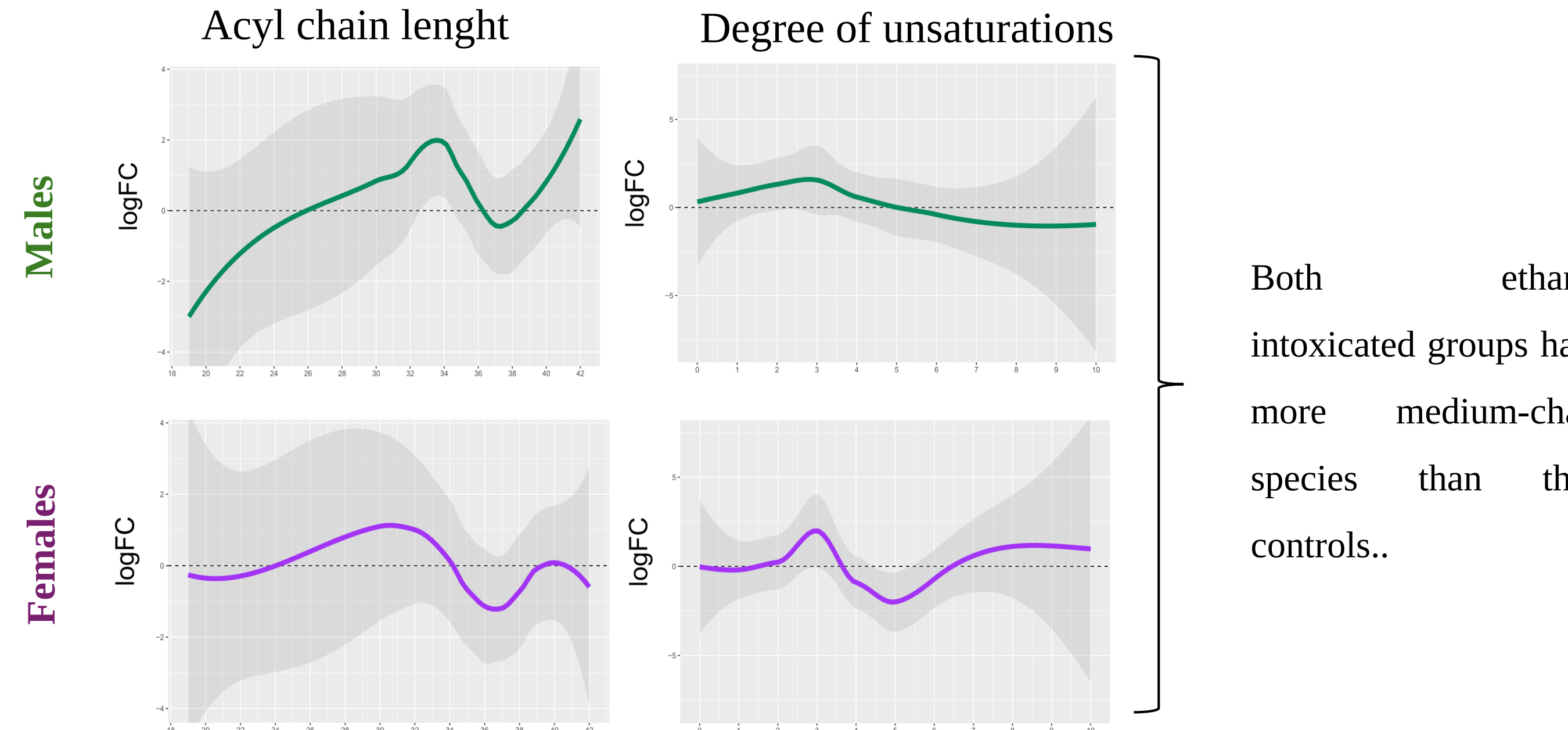


Sphingomyelins (SM)

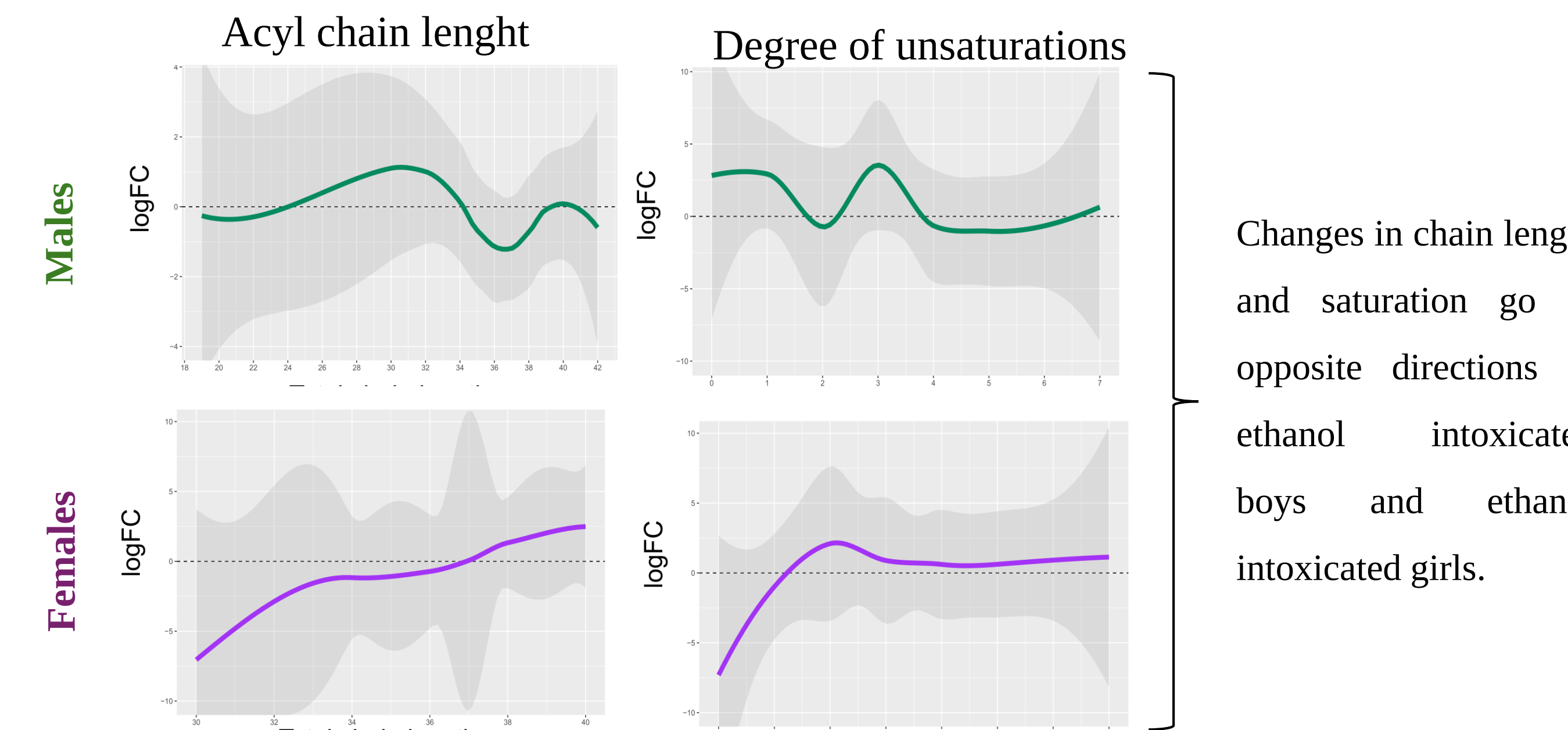


Phospholipids (PL)

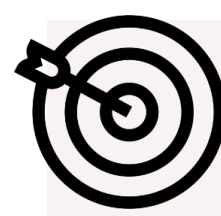
Phosphatidylcholine (PC)



Phosphatidylethanolamine (PE)



Acute ethanol intoxication during adolescence alters the structural properties of lipids transported by plasma EVs in a sex-dependent manner. Acyl-chain length and degree of unsaturation emerge as relevant parameters for understanding the biological mechanisms underlying alcohol-induced damage and may represent novel sources of biomarkers associated with neuroinflammatory and metabolic processes.



Alcohol intoxication in adolescence changes the structure of lipids carried in blood vesicles, and it does so differently in boys and girls.

TAKE HOME MESSAGE

CONCLUSIONS