

Fatty acid intake impacts gene expression of passerine nestlings

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Early life nutritional conditions are important for all organisms. The silver spoon effect predicts that an individual who has access to abundant resources during the early development and growth phase will benefit life-long fitness advantages. Fatty acids are essential elements for a number of developmental processes, including fundamental cell membrane construction, modifications of proteins, and signaling pathway. As fatty acids are a crucial component of nestlings' diet. We looked into arachidonic acid (also known as ω -6 polyunsaturated fatty acid) particularly, which is known playing an important role in immune responses.

Previous research in populations of great tits (*Parus major*) in southern Sweden also revealed that the proportion of fatty acid in egg yolks differs between rural and urban populations. This very likely reflects differences in food abundance between urban and rural environment. In this study, I investigated whether ω -6 polyunsaturated fatty acid impacts immunity and metabolism during early development stage. In field, a dietary manipulation was applied on great tit nestlings and in lab expression of one immune gene and one metabolic gene were measured, to see if environment or the studied fatty acid can cause differences in gene expression patterns.

An extra intake of fatty acid induced slightly in immune response after immune challenge, regardless to habitat conditions. Surprisingly, this extra fatty acid intake did also suppress metabolism. This is possibly because fatty acids affect function of cellular proteins and ion channels. Urban great tit nestlings have a more activative metabolism than rural nestlings after immune challenge. This might due to the higher stress level in urban environment such as human disturbances, air pollution and habitat fragmentation. Yet, we know very little about the contribution of diet to immune responses and metabolism in wild birds. To find out, we need to include more genes and apply other techniques (e.g. fatty acid extraction from blood plasma) for future study.

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