



Interactions between the lipidome and genetic and environmental factors in autism

Lipids are fat molecules that play important roles in neurodevelopment and metabolism.



Background

Autism diagnosis is associated with differences in lipid (fat) metabolism.

There is some evidence that autistic people are at higher risk of treatable cardiometabolic disease. However, it's often unclear why this is the case. This could be due to conditions that commonly co-occur with autism such as feeding problems and sleep disturbances. In rare cases there may be a shared genetic basis.



Aim

To characterise differences in the lipidome related to autism diagnosis and neurodevelopmental traits such as IQ and sleep problems. We also wanted to understand how these differences relate to diet, the microbiome and genetics in the largest and richest paediatric lipidomics dataset to date.



Who took part

765

A total of 765 children from the Australian Autism Biobank and Queensland Twin Adolescent Brain Project who provided a blood sample.



How we did the research

A total of 783 different lipids (fat molecules) were measured in each plasma sample.

The lipidomics data was integrated with clinical, dietary, microbiome and genetic data. Importantly, we carefully considered factors that can affect lipid measures, including age and sex.



Who did the research



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA





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What we found



Various plasma lipids were associated with autism diagnosis, IQ and sleep disturbances.



We found that sleep problems had the strongest lipid associations, whereas autism had weaker associations with lipids. Notably, lower levels of some long-chain polyunsaturated fatty acids appeared to contribute to sleep problems.



Interestingly, the profile of lipids associated with sleep problems mirrored changes associated with an unhealthy diet.



In one child with an autism diagnosis and a striking lipid profile high in low density lipoprotein (LDL), we found a unifying explanation: a large genetic deletion spanning the LDL receptor gene and two high-confidence autism genes.



What this means



Plasma lipidomics captures the complex interplay between autism, neurodevelopment, sleep, diet, the microbiome and genetics.



This work highlights the need to screen for and manage sleep disturbances among children with neurodevelopmental differences. This appears to be important for long-term health.



It was also interesting to see that the lipid signatures for traits such as sleep problems and dietary preferences were stronger than for autism diagnosis. This suggests that these molecular studies may be better suited to understanding co-occurring conditions associated with autism, rather than finding diagnostic biomarkers for autism itself.

Australian Autism Biobank

The Australian Autism Biobank is Australia's largest collection of biological, behavioural, environmental and medical information of children on the autism spectrum and their families. Almost 3,000 autistic and non-autistic children and adults participated from across Australia.

The Australian Autism Biobank is an initiative of Autism CRC.

For more information, visit autismcrc.com.au/biobank

