Reduced serum lipid levels in patients receiving ECT – Preliminary findings

Andrea Stautland1, Ute Kessler2, Leif Oltedal1,3, Jan Haavik2,4, Ketil J Oedegaard1,2
1Department of Clinical Medicine, University of Bergen, Norway, 2Division of Psychiatry, Haukeland University Hospital, Bergen, Norway, 3Department of Radiology, Haukeland University Hospital, Bergen, Norway, 4K.G. Jebsen Centre for Neuropsychiatric Disorders; Department of Biomedicine, University of Bergen, Norway

Introduction

• Major depressive disorder (MDD) is a highly prevalent and debilitating mental illness1.
• Altered clinical lipid parameters in MDD have been assessed in several studies with inconsistent results2.
• Lipidomics research supports an altered lipid metabolism in MDD3.
• Electroconvulsive therapy (ECT) is the most effective acute treatment of MDD4.
• The mechanisms of action of ECT are not fully understood.
• Previous studies have found altered serum lipid profiles after ECT5–7.
• Lipidomics approaches have not been applied in ECT research.
• The present study assessed changes in serum lipid metabolite concentrations in MDD patients undergoing ECT, in an attempt to elucidate the role of lipids in MDD pathology and ECT effect.

Results

• In total, 401 lipid metabolite compounds were investigated, of which 69 were significantly altered after ECT.
• Post-treatment samples showed reduction of serum concentration in several classes of lipid metabolites, especially free fatty acids (FFAs) – saturated, monounsaturated and polyunsaturated.
• Significant decreases were found in:
  • Nearly all of the detected monoacylglycerol species
  • Several diacylglycerol species
  • Several lysolipids and other phospholipid breakdown products
  • A number of fatty acid dicarboxylates

Table 1: Patient demographics and clinical features.

| Number of patients | 16 |
| Age in years, mean ± SE (min-max) | 47.3 ± 3.7 (25-76) |
| Sex (F/M) | 10/6 |
| MADRS pre ECT, mean ± SE (min-max) | 33.4 ± 1.7 (18-44) |
| MADRS post ECT, mean ± SE (min-max) | 13.4 ± 2.3 (0-29) |
| Number of ECT sessions, mean ± SE (min-max) | 10.1 ± 1.0 (4-20) |

MADRS: Montgomery-Asberg Depression Rating Scale, SE: Standard error of the mean.

Discussion

The observed changes in lipid levels can be mediated by different processes, including changes in biosynthesis and breakdown rates of FFAs. This can be related to altered levels of exercise, distribution and storage of lipids or dietary changes, which could reflect lifestyle changes made during treatment and recovery. More investigations are needed to explore the contributions of these processes and possible relation to MDD and ECT.

Interestingly, several of the observed lipid alterations were opposite to previous lipidomics findings in MDD5, perhaps suggesting a reversal of a pathological state.

Conclusion

Concentrations of several lipid metabolites were reduced in MDD patients after ECT. This study supports previous findings on ECT’s effect on lipid metabolism. Further investigations in larger samples should be performed to confirm these results and evaluate the clinical significance of the findings.

REFERENCES


CONTACT

Andrea Stautland
University of Bergen
andreastautland@gmail.com

Figure 1: Illustration of the relationship between DNA and the phenotype expressed, via the metabolome. Metabolomics technology, including lipidomics, can be utilized to better understand phenotype expression (e.g. MDD.)