Gut Microbiome alterations in Major Depressive Disorder: Relevance to Pathophysiology


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Introduction

- The biological mechanisms underlying the pathophysiology of MDD involve immune [1], endocrine [2] and neurotransmitter dysregulation.
- Pre-clinical findings suggest that the gut microbiota can modulate brain development, function and behaviour by recruiting the same immune network, neuroendocrine and neural pathways of the brain-gut axis which are dysfunctional in MDD [3].
- However, the extent to which these pre-clinical findings translate to clinical populations is currently unknown.

Aim

Determine the composition of the gut microbiota in patients with MDD compared to healthy control participants and its relationship to psychiatric and psychological outcomes.

Methods

Study Population: 34 patients with OMMI IV MDD (MDD microstate characteristics measured) and 30 healthy controls matched for gender, age and ethnicity (see Table 1 for demographics & clinical characteristics).

Measures:
- Gut Microbiota Structure & Diversity
- In-fluence Phenotyping
- Hypothalamic-Pituitary-Adrenal (HPA) Axis
- Subjective Mood & Stress
- Psychotropic Medications
- Diet 

Sample Characteristics

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean (SD)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>24.58 (2.1)</td>
<td>0.97</td>
</tr>
<tr>
<td>Anxiety</td>
<td>8 (23.5)</td>
<td>0.51</td>
</tr>
<tr>
<td>Stress</td>
<td>26 (78.8)</td>
<td>0.18</td>
</tr>
<tr>
<td>Sleep</td>
<td>21 (61.8)</td>
<td>0.43</td>
</tr>
<tr>
<td>Violence X</td>
<td>0.43</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Results

Altered Gut Microbiota Composition & Influence on Blood biomarkers in MDD compared to Controls

- Figure 1: Significant differences in the gut microbiota between the MDD group compared to the Control group.

Altered Stress Response in MDD compared to Controls

- Figure 2: A significant reduction in SCFAs in MDD compared to Controls.

Inflammatory Profile in MDD compared to Controls

- Figure 3: The MDD group had significantly higher IL-8 levels compared to the Control group.

Tryptophan Metabolite Profile in MDD compared to Controls

- Figure 4: There was a significant increase in kynurenic acid in the MDD group compared to the Control group.

Conclusions

- Alterations in the gut microbiota in patients with MDD are pronounced and may drive the prominent pathophysiological features of this disorder. The mechanisms underpinning these effects require further investigation. Ultimately, these findings may pave the way for therapeutic targeting of the gut microbiome as a viable strategy for novel antidepressant development.

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References


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