A Single Nucleotide Polymorphism In The EPHX1 Gene, TYR113HIS T/C rs1051740, Is Associated With Low Birth Weights In Neonates Exposed To Pollution In Utero

INTRODUCTION

- Activation & detoxification of exogenous chemicals
- Benzo(a)pyrene, Benzo(a)anthracene, Dibenzo(a,h)anthracene, Carcinogens found in Cigarette Smoke & Charred Red Meat

Microsomal Epoxide Hydrolase 1 (EPHX1) Gene:

2 Single Nucleotide Polymorphisms (SNPs):
- Exon 3 TYR113HIS T/C rs1051740 → “Slow Allele” → Decreases EPHX1 activity by 40%
- Exon 4 HIS139ARG A/G rs2234922 → “Fast Allele” → Increases EPHX1 activity by 25%

AIMS AND OBJECTIVES

To investigate the association between pollution, specifically to oxides of nitrogen (NOx), and SNPs in the EPHX1 gene in pregnant women and to correlate with their Blood Pressure (BP), Haemoglobin (Hb) and infants’ Birthweights (BWs)

To profile the gene expression of EPHX1 and microRNAs that targets them among their suitable genotypes to demonstrate that they could be biomarkers for adverse birth outcomes

RESULTS

Table 1: Association between NOx pollution and BP, HB and infants’ BWs amongst different genotypes (HIS139ARG SNP)

<table>
<thead>
<tr>
<th>NOx (µg/m³)</th>
<th>Birth Weight</th>
<th>Blood Pressure</th>
<th>Haemoglobin</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>332.10 ± 0.66</td>
<td>360.68 ± 0.20</td>
<td>10.79 ± 0.44</td>
</tr>
<tr>
<td>AG</td>
<td>332.87 ± 0.66</td>
<td>360.68 ± 0.20</td>
<td>10.79 ± 0.44</td>
</tr>
<tr>
<td>GG</td>
<td>332.87 ± 0.66</td>
<td>360.68 ± 0.20</td>
<td>10.79 ± 0.44</td>
</tr>
</tbody>
</table>

P Values: 0.0271, 0.0271

Table 2: Association between NOx pollution and BP, HB and infants’ BWs amongst different genotypes (TYR113HIS SNP)

<table>
<thead>
<tr>
<th>NOx (µg/m³)</th>
<th>Birth Weight</th>
<th>Blood Pressure</th>
<th>Haemoglobin</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT</td>
<td>360.68 ± 0.20</td>
<td>10.79 ± 0.44</td>
<td>10.79 ± 0.44</td>
</tr>
<tr>
<td>TC</td>
<td>360.68 ± 0.20</td>
<td>10.79 ± 0.44</td>
<td>10.79 ± 0.44</td>
</tr>
<tr>
<td>CC</td>
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The University of KwaZulu-Natal (UKZN), National Research Foundation (NRF) and Medical Research Council (MRC) of South Africa for funding this project

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References

MicroRNAs
- Negatively regulates gene expression post-transcriptionally
- Organogenesis
- Embryogenesis
- Placental functionality
- Inflammation
- Apoptosis
- Haematoepoiesis

Biomarkers:
- Blood, saliva and tissues
- Diagnosing pre- and post-natal disorders

EPHX1 gene:
- mir-26b-5p
- mir-193b-3p
- mir-1207-5p