Are Gene Polymorphisms of Fibroblast Growth Factor 10 Associated with Patent Ductus Arteriosus and Bronchopulmonary Dysplasia in Extremely Low Birth Weight Infants?

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**Background**

**GENETIC FACTORS**

- Altered lung development and immunity
- Predisposition to BPD

**BPD**

Roles of FGF 10 -

Fibroblast growth factor 10 (FGF10) plays a significant role in cardiac outflow tract formation and possible PDA. Downregulation of the FGF/Ras/Erk pathway are important for the differentiation of the progenitors and colonization of the cardiac outflow tract. FGF10 is also an integral part of the signaling required for distal lung branching morphogenesis in fetus. It is an alveolar epithelial cell (AEC) mitogen protects against cyclic stretch and oxidant injury via DNA repair. It regulates the mitogen activated protein kinase pathway (MAPK) that, in turn activates the Na-K-ATPase in AEC - protein responsible for fetal lung fluid resorption and immunity.

**FGF10 expression and lung bud morphogenesis**

- Mesenchyme
- Endoderm
- Distal Lung Bud

**FGF10 signaling pathway**

- Na, K-ATPase
- *FGF10 SNP* - rs2973644, rs900379, rs1011814 were chosen as the SNPs were studied in adult collagen disorders.
- Persistent PDA is defined as requiring medical treatment/surgery. It causes significant morbidity in the ELBW infants.
- Bronchopulmonary Dysplasia: Defined as an oxygen need at 36 weeks postmenstrual age. Incidence is about 40% for ELBW infants.
- Genetic variation may predispose to BPD in preterm infants about 30-80%.

**Hypothesis**

- FGF10 SNP - rs2973644, rs900379, rs1011814 are associated with susceptibility to PDA and or BPD in ELBW infants.

**Methods**

- **Inclusion criteria:**
  - ELBW infants (birth weight < 1kg)
  - Informed parental consent

- **FGF10 SNPs Analysis:** DNA was isolated from buccal swabs and real-time PCR was performed using Taqman probes

- BPD is defined by the need for oxygen supplementation at 36 weeks postmenstrual age.

**Statistics:** Student’s t-test, Chi-square, Mann-Whitney, z-test; p < 0.05

**Results**

<table>
<thead>
<tr>
<th>Demographic Characteristics- PDA</th>
<th>PDA</th>
<th>No PDA</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA (wk; median;IQR)</td>
<td>25 (24, 26)</td>
<td>25 (24, 26)</td>
<td>0.1</td>
</tr>
<tr>
<td>BW (gm; mean± SD)</td>
<td>742±171</td>
<td>737 ±175</td>
<td>0.9</td>
</tr>
<tr>
<td>Prenatal Steroid</td>
<td>52(78%)</td>
<td>17 (74%)</td>
<td>0.8</td>
</tr>
<tr>
<td>Female Gender</td>
<td>32(49%)</td>
<td>12(50%)</td>
<td>0.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Genotype Distribution - PDA</th>
<th>PDA</th>
<th>No PDA</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FGF10 SNPs rs2973644</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No BPD N=29</td>
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<td></td>
<td></td>
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<tr>
<td>PDA N=49</td>
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<td></td>
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<tr>
<td>PDA N=57</td>
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<td></td>
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<tr>
<td>PDA N=56</td>
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<tr>
<td>Wild allele</td>
<td>17(29%)</td>
<td>9(28%)</td>
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<tr>
<td>Heterozygous</td>
<td>22(28%)</td>
<td>11(24%)</td>
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<tr>
<td>Minor allele</td>
<td>25(28%)</td>
<td>11(24%)</td>
<td></td>
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<tr>
<td>Any variant allele</td>
<td>31(51%)</td>
<td>15(31%)</td>
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</tr>
</tbody>
</table>

**References**


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