ReCIVA breath sampling in paediatric asthma: a feasibility study

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BACKGROUND

- Investigating airway inflammation and pathology in children can be difficult from both a technical and ethical standpoint
- In the EMBER clinical trial a ReCIVA (Owlstone Medical) breath sampling device was used for collection of breath samples at the bedside
- These samples can then be analysed in advanced metabolomics studies to ascertain exhaled volatile organic compound (eVOC) profiles
- We aimed to assess the feasibility of collecting breath samples from children at the bedside for metabolomics analysis in the acute setting

METHODS

We recruited children aged 5 to 16 years attending Leicester Children’s Hospital with acute wheeze or stable asthma. Control subjects were also recruited. Parents provided written informed consent

Demographic and clinical data were collected. When clinically stable, children underwent breath sample collection

- Children breathed room air tidally into the ReCIVA mask device for up to 900 seconds.
- Two tubes of breath were collected from each child and they were transferred for analysis by means of gas-chromatography mass spectrometry
- Environmental air samples were simultaneously collected necessary for background subtraction

RESULTS

We would like to thank the children and parents who took part and acknowledge the support of the EMBER project (East Midlands Breathomics Pathology Node). KH graciously accepts the financial support of the Travel Award from MAARA to attend this conference. Thanks to Luke Bryant and Dr. Bo Zhao for their assistance in providing data on samples collected.

Table 1: characteristics of children recruited

<table>
<thead>
<tr>
<th>Type of recruit</th>
<th>Number of samples obtained</th>
<th>Median (range) age (years)</th>
<th>Male (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>58</td>
<td>10 (5-16)</td>
<td>43.6</td>
</tr>
<tr>
<td>Control</td>
<td>13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% tolerating procedure: 100

% giving an analysable sample: 98.5

ACKNOWLEDGEMENTS

DISCUSSION – KEY POINTS

- Non-invasive breath analysis in children of varying ages with both acute and chronic asthma is feasible
- Acceptability was universal
- All but one sample collected were analysable

DISCUSSION – ONGOING WORK

- Optimisation of metabolomics data workflow to create a breath matrix
- This will allow extraction of identifiable biomarkers and eVOC profiles
- Ultimately leading to the possibility of these biomarkers being investigated in terms of phenotyping children with asthma

Figure 1: Summary of methodology

Figure 2: Photograph of device and schematic diagram of apparatus used (Owlstone Medical)