**Micro-particulate Vaccine for Transdermal Measles Immunization**

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**INTRODUCTION**

Transdermal immunization offers several advantages over subcutaneous delivery:
- Reduced sharps waste
- Painless self-administration of the vaccine
- Exploitation of the rich population of antigen-presenting cells (APCs)
- Better suited for under-developed and developing parts of the world
- Controlled release of antigen
- Improved biological stability

**OBJECTIVES**

- Microparticulate formulation of Measles Vaccine
- In-Vitro evaluation of microparticulate measles vaccine
- Transdermal Immunization using P.L.E.A.S.E. ablative laser
- Comparison of efficacy of subcutaneous and transdermal immunization

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**METHODS**

- Formulation of spray dried vaccine and adjuvant microparticles using pre-crosslinked BSA polymer matrix
- Characterization and In-Vitro evaluation of the microparticles for their immunogenicity, cytotoxicity and cell uptake
- In-Vivo evaluation of microparticulate vaccine in Swiss Webster mouse model via subcutaneous and transdermal (laser ablation) routes
- Comparison of efficacy of subcutaneous and transdermal routes of administration by comparing the serum antibody levels

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**RESULTS**

**Characterization of Microparticles**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery yield (%)</td>
<td>91.37 ± 3.1</td>
</tr>
<tr>
<td>Particle size (µm)</td>
<td>3.197 ± 0.8361</td>
</tr>
<tr>
<td>Zeta potential (mV)</td>
<td>-29.4 ± 6.2</td>
</tr>
</tbody>
</table>

**In-vitro immunogenicity evaluation**

<table>
<thead>
<tr>
<th>Vaccine Type</th>
<th>Serum IgG Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaccine MP : SC</td>
<td>8000</td>
</tr>
<tr>
<td>Vaccine + Adj MP : SC</td>
<td>10000</td>
</tr>
<tr>
<td>Laser Ablation Technology</td>
<td>15000</td>
</tr>
</tbody>
</table>

**In-vitro cytotoxicity evaluation**

<table>
<thead>
<tr>
<th>Vaccine Type</th>
<th>CD40 Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaccine MP : SC</td>
<td>8</td>
</tr>
<tr>
<td>Vaccine + Adj MP : SC</td>
<td>16</td>
</tr>
<tr>
<td>Laser Ablation Technology</td>
<td>32</td>
</tr>
</tbody>
</table>

**Expression of antigen-presenting molecules**

- **MHC I Expression**
  - Vaccine MP : SC
  - Vaccine + Adj MP : SC
  - Laser Ablation Technology
- **MHC II Expression**
  - Vaccine MP : SC
  - Vaccine + Adj MP : SC
  - Laser Ablation Technology

**Evaluation of serum antibody levels**

- Serum IgG Levels
  - Vaccine MP : SC
  - Vaccine + Adj MP : SC
  - Laser Ablation Technology

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**CONCLUSION**

- Novel, industrially scalable formulation
- Immunogenic, non-cytotoxic microparticles
- Ability to induce both, humoral and cellular adaptive immune response
- Effective transdermal immunization using P.L.E.A.S.E. ablative laser

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**Transdermal Delivery**

- Laser Ablation Technology
  - Laser (ER:YAG) emits light at 2940 nm, corresponds to a major absorption peak of water molecules enabling cold ablation
  - Excitation and evaporation leads to formation of aqueous micropores with a diameter of approx. 150 µm

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**Microparticulate Vaccine for Transdermal Measles Immunization**

Highly contagious infectious disease by Measles virus