# Blood Extraction and Dispensing Device for Guthrie Card PKU Test

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## Medical Need

Nurses screen every newborn for PKU. Inaccurate blood quantities and rejection lead to delays in results and burden for healthcare workers.

**Objective:** Collect 315 μL of blood in a capillary action tube and dispense it equally onto the center of each Guthrie card circle.

## Requirements

- **R.1.1** Dispense 63 microliters of blood to each circle  
- **R.2** Minimum Extraction tube flow rate of 1.75 μL/s

## Verification

- **V.1.1:** Blood Dispensing Test  
- **V.1.2:** Blood Extraction Test  
- **V.2:** Tube Diameter Test  
- **V.3:** Hemolysis Test

## Solution

**Extraction**

- Tube Diameter: 70 mm

**Dispensing**

- Tube Length: 240 mm

## Results

<table>
<thead>
<tr>
<th>Req.</th>
<th>Pass/Fail</th>
<th>Result (Trials)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Pass</td>
<td>105.5 ± 6.6% fill or 66.5 ± 4.4 μL (N=25)</td>
</tr>
<tr>
<td>2</td>
<td>Pass</td>
<td>35.2 μL/s (N=8)</td>
</tr>
</tbody>
</table>

## Societal Impact

A controlled method for PKU screening alleviates stress on healthcare workers and increases the likelihood of a conclusive result, allowing for earlier dietary restriction of newborns.