Peripheral cell collection after mobilization with plerixafor in children: don’t wait the sixth hour!

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WAA/SFH – April 2016 - Paris
Introduction

Plerixafor

- CXCR4 antagonist – acts by disrupting anchorage of stem cells in BM
- Recommended to be administered from 6 to 11 hours before apheresis
- In children: one author 10 to 14 hours

Not much publications including pediatric population
Kinetics of mobilization induced by Plerixafor alone in children
Introduction

Outpatient unit opening

Plerixafor

Apheresis

Lab closure

Results

7h 11h 15h 17h
Introduction

Question: is it efficient to start the apheresis before h4, when patient received plerixafor + G-CSF, in pediatric population?
Patients and Methods

• Restrospective study (2010-2015) - Pediatric apheresis in Universitary Hospital of Clermont Ferrand, France

• Children with cancer. Mobilization with G-CSF in hematological steady state, bad–mobilizers on day 4

• Plerixafor at 7 am on day 5

• CD34\(^+\) cells blood count:
  – at the plerixafor injection
  – at the beginning of apheresis
  – at the end of apheresis
# Results - patients

<table>
<thead>
<tr>
<th>Patient nb</th>
<th>Gender</th>
<th>Age</th>
<th>Weight (kg)</th>
<th>Diagnosis</th>
<th>Nb of apheresis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>22 m</td>
<td>11</td>
<td>Neuroblastoma</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>13 y</td>
<td>30</td>
<td>Hepatoblastoma</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>4.5 y</td>
<td>17.5</td>
<td>Neuroblastoma</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>18 y</td>
<td>46</td>
<td>Hodgkin Disease</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>2 y</td>
<td>13</td>
<td>Neuroblastoma</td>
<td>2</td>
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<tr>
<td>6</td>
<td>F</td>
<td>16 y</td>
<td>39</td>
<td>Osteosarcoma</td>
<td>1</td>
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<tr>
<td>7</td>
<td>M</td>
<td>14 y</td>
<td>56</td>
<td>Ewing Sarcoma</td>
<td>1</td>
</tr>
</tbody>
</table>
Results

Delay between plerixafor and apheresis: 4 hours [2:40 - 5:15]

Apheresis duration: 216 min [145 - 276]

Blood volume processed: 206 mL/kg [46 - 298]
Results - CD34+ blood count

CD34+ cells /µL

Median

Plerixafor

Apheresis
## Results - collection

<table>
<thead>
<tr>
<th>Pt nb</th>
<th>Age</th>
<th>Weight (kg)</th>
<th>Diagnosis</th>
<th>CD34 at day 4 (/µL)</th>
<th>Nb of apheresis</th>
<th>Overall collection (x10e6 CD34/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22 m</td>
<td>11</td>
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<td>28</td>
<td>1</td>
<td>4.6</td>
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<td>1</td>
<td>7.5</td>
</tr>
</tbody>
</table>
Results - Collection efficiency

- Considering morning CD34+ blood count : 157% [41% - 453%]

- Considering start of apheresis CD34+ blood count : 100% [20% - 378%]
Results - Cell harvest depending on the blood count at the beginning of apheresis

CD34+ cells collected $\times 10^6$/kg

CD34+ cells/μL
Results – Collection efficiency depending on the interval plerixafor - apheresis
Discussion

• No data about:
  - pharmacokinetics of plerixafor in children
  - kinetics of mobilization induced by plerixafor in children

• Our study suggests that mobilization peak occurs early after plerixafor injection

• but
  - CD34 blood content after apheresis should be impacted by:
    - Hemodilution induced by apheresis
    - CD34 harvest

  - We did not follow the CD34 blood count after apheresis
Conclusion

• Apheresis start 2 to 4 hours after plerixafor is feasible and efficient in children
• Allows better apheresis organization
• Mobilization plateau seems to be reached as soon as 3 hours after plerixafor in children
• Questions remain:
  1. What is the kinetics of plerixafor-induced mobilization in children without apheresis?
  2. Is the kinetics of mobilization dose-dependent?
  3. What is the optimal dose of plerixafor in children?