Systemic Leukocyte Reduction
Summary

The prophylactic use of the Pall LeukoGuard™ LG Leukocyte Reduction Arterial Blood Filter reduces the number of activated neutrophils and dampens the whole body inflammatory response in patients undergoing cardiopulmonary bypass (CPB). This translates into improved clinical outcomes:

• Reduction in perioperative blood loss and the need for blood transfusion.1,9
• Improved pulmonary protection4,9,11
• Improved myocardial protection2,5,10
• Improved neurological protection2,17
• Reductions in length of hospital stay and costs.1,4,5,13

Reduction in Blood Transfusions/ Blood Loss

Significant reductions in blood loss and the requirement for allogeneic blood transfusions in routine elective CABG patients have been demonstrated.1,9

A study at the Hammersmith Hospital, London UK reported a reduction in blood transfusion requirement of 1.2 units in routine elective CABG patients when Pall LeukoGuard™ LG filters were used.

The authors commented that:

*In an era of increasing awareness of costs, the saving of one unit of blood per patient, as demonstrated in our study, equals to the amount of £85. This amount neutralises the cost of application of leukocyte-depleting technology instead of the conventionally used filters*.

Similar reductions in red cell transfusion requirements were noted by Mathies et al.2

The Pall LeukoGuard™ LG can be used in conjunction with other anti-inflammatory techniques to reduce drainage loss and transfusion requirement.2

<table>
<thead>
<tr>
<th>Drainage Loss</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heparin coated circuit + LG 526 +/- 333mL</td>
<td>0.1</td>
</tr>
<tr>
<td>Noncoated, standard filter 716 +/- 514mL</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Red Cell Transfusions</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heparin coated circuit + LG 92 +/- 224mL</td>
<td>0.06</td>
</tr>
<tr>
<td>Noncoated, standard filter 348 +/- 609mL</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Adapted from Martens et al2

This improvement in post-operative bleeding and reduction in red cell transfusions may partially be explained by the preservation of platelet reactivity that has been noted by Shagalian and co-workers.12
Pulmonary Protection

Improvements in arterial oxygenation indexes have been noted in numerous papers. Significant improvements in lung function being most apparent in patients with longer bypass times, poor pre-operative lung function or complex surgery.

These improvements in pulmonary function result in shorter periods of mechanical support and reduced length of ICU stay.

Cerebral Protection

By reducing cerebral microemboli and the inflammatory response to CPB the Pall LeukoGuard™ LG may further improve cerebral protection levels when compared to standard arterial line filters.

Activated Neutrophil Reduction

The Pall LeukoGuard™ LG filter has specialised media designed to remove potentially harmful leukocytes and emboli from the bypass circuit. Nanson and co-workers have demonstrated that the leukocyte filter media effectively removes activated neutrophils during the period of CPB bypass.

Myocardial Protection

Reductions in the release of CPK-MB and Tropinin (T and I) have been recorded when the Pall LeukoGuard™ LG arterial line filter has been used.
Reductions in Length of Stay and Costs

Improved patient outcome has been demonstrated with the use of the Pall LeukoGuard (R) LG arterial line filter that may contribute to reductions in length of stay and associated hospital costs.\(^{4,5,13}\)

When compared to other anti-inflammatory strategies, leukocyte reduction has been demonstrated to be superior for the majority of cardiac patients.\(^{13}\)

<table>
<thead>
<tr>
<th>Predicted Mortality Rate</th>
<th>Standard Treatment</th>
<th>Standard plus Aprotinin</th>
<th>Leukocyte Depletion Filters</th>
<th>Centrifugal Pumps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Risk Elective Patients</td>
<td>LOS (days)</td>
<td>Cost (US$)</td>
<td>LOS (days)</td>
<td>Cost (US$)</td>
</tr>
<tr>
<td>(&lt;5% mortality)</td>
<td>6.8</td>
<td>39,000</td>
<td>6.0</td>
<td>36,000</td>
</tr>
</tbody>
</table>

LOS = Length of stay

**Summary**

By selectively removing activated neutrophils during CPB, the Pall LeukoGuard (R) LG Leukocyte Reducing Arterial Line Blood Filter reduces the whole body inflammatory response. This leads to a reduced requirement for blood transfusions, improved pulmonary, myocardial and cerebral protection that may all contribute to a cost-effective approach to improving the clinical outcome of CPB patients.

**References**

For a complete reference list please see "Summary of data" available from your PALL representative or distributor.


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