AN69 membrane improved vascular endothelial functions and arteriosclerosis by decreasing the serum level of MCP-1 on hemodialysis patients.

Shinji Kitamura, Syouzou Tamura, Toshihiko Nagao
Hemodialysis center, Ako central hospital, Hyogo, Japan

Background

It is well known that hemodialysis patients have high risks for cardiovascular disease. The AN69 membrane is known as a new membrane resulting from coating polyethyleneimine upon the polyacrylonitrile surface, binds heparin. There are some reports that AN69 membrane affected some cytokines that relate to vascular functions. However, there is no report that whether AN69 membrane effected to vascular endothelial cell function or not.

AN69 hemofiltration membrane

- AN69 membrane is composed by acrylonitrile and sodium methallyl sulfonate copolymer.
- The AN69 membranes have been reported to have good adsorptive abilities and may be effective at the point of removing tumor necrosis factor (TNF), interleukin (IL)-6, and IL-18. (Bouman CS et al. Blood Purif 1998.)

Endothelial cell function

The endothelium is the thin layer of cells that lines the interior surface of blood vessels. The endothelial cells make many roles. One of the roles is vasodilation which are occurred by the NO secretion from endothelial cells.

Results

**Clinical characteristics of the study population**

<table>
<thead>
<tr>
<th>Hemodialysis patients numbers</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin of kidney disorders</td>
<td>DM nephropathy 7, Non-DM nephropathy 4</td>
</tr>
<tr>
<td>Age</td>
<td>76.2 ± 7.6 years old</td>
</tr>
<tr>
<td>Duration time of hemodialysis</td>
<td>3.55 years</td>
</tr>
<tr>
<td>Hemofilter before changing to AN69 membrane</td>
<td>PS membrane or CTA membrane</td>
</tr>
</tbody>
</table>

**Study design**

Evaluation (FMD, MCP-1 et al.) before and after hemodialysis

<table>
<thead>
<tr>
<th>Pts.</th>
<th>1 week or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF(high-flux) (PS membrane or CTA membrane)</td>
<td>change to AN (AN 69 membrane)</td>
</tr>
</tbody>
</table>

**Results**

Evaluation for the vascular endothelial cell function

When blood flow increases through a vessel, the vessel dilates. This phenomenon has been coined flow-mediated dilatation (FMD). Schematic drawing of ultrasound imaging below of the brachial artery

With upper versus lower cuff placement and transducer position above the antecubital fossa. BP = blood pressure; FMD = flow-mediated vasodilation.

**Discussion**

Blood contact directly to hemofiltration membrane.

Activation of complement

Inflammatory Activation of vascular endothelial cell, monocyte lymphocyte et al.

Inflammatory cytokine production, such as MCP-1, TNF and IL.

Vascular endothelial cell damage

- Vascular endothelial cell dysfunction

It is suggested that AN 69 membrane absorbed the inflammatory cytokine, MCP-1. The reduction of MCP-1 may effected the endothelial cell function recovery.

**Conclusion**

These findings suggested that the AN69 membrane improved endothelial functions by decreasing the level of MCP-1 after hemodialysis and the improvement may lead to alter the arteriosclerosis and the clinical symptoms which relate to peripheral circulation on hemodialysis patients.

**Reference**