# 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

Close

## Background

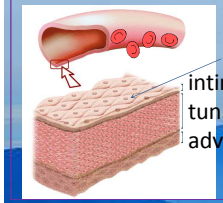
It is well known that hemodialysis patients have high risks for cardiovascular disease. The AN69 membrane is known as a new membrane resulting from coating polyethyleneimine upon the polyacrylonitrile surface, binds heparin. There are some reports that AN69 membrane affected some cytokines that relate 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 copolyper.
・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.)

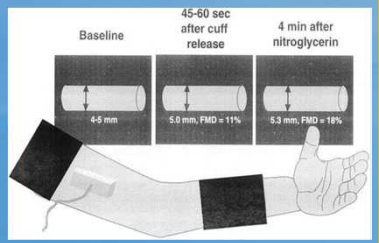
### Endothelial cell function

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.




### 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.




(Corretti MC et al. JACC, 2002)

## Results

### Clinical characteristice of the study population

| Hemodialysis patients numbers | 11 |
|---|---|
| Origin of kidney disorders | DM nephropathy 7<br>Non-DM nephropathy 4 |
| Age | 76.2±7.6 years old |
| Duration time of hemodialysis | 3.55 years |
| Hemofilter before changing to AN69 | PS membrane or CTA membrane |

### Study design

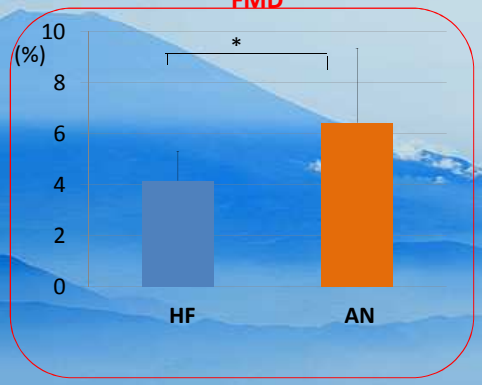
Evaluation (FMD, MCP-1 et al.) before and after hemodialysis

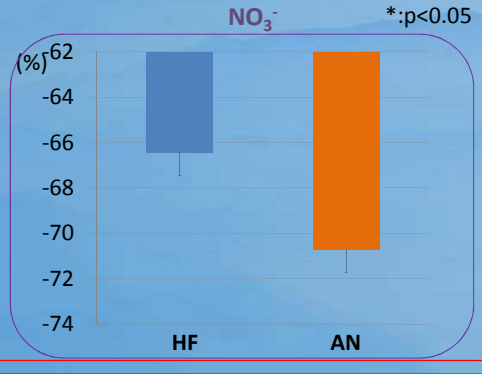
1 week or more

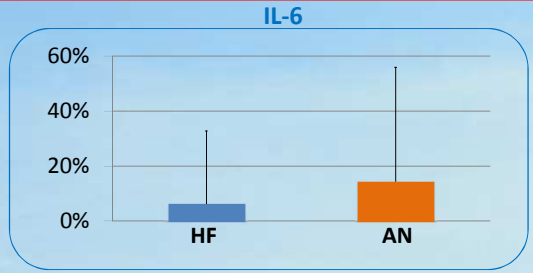
Pts. → change to

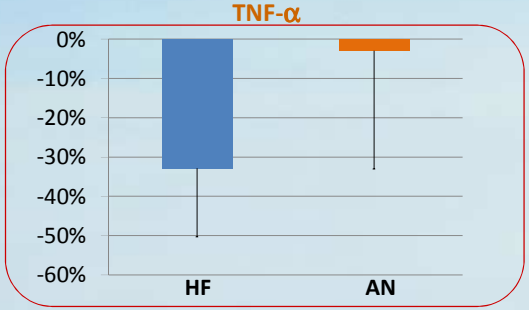
HF(high-flux) (PS membrane or CTA membrane) → AN (AN 69 membrane)

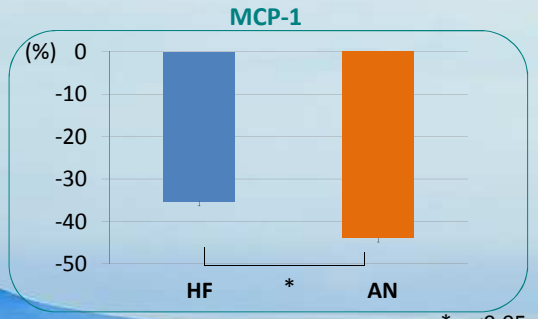
### Results




*:p<0.05

### VAS score (Visual Analogue Scale)

| symptom | score |
|---|---|
| peripheral coldness | −1.70±1.89 |
| numbness of inferior limb | −0.52±2.14 |
| General fatigue | −0.55±2.03 |
| Quality of life | −0.6±1.04 |

### Result summary

・FMD was improved in the AN compared to HF significantly.
・MCP-1 on AN was significantly decreased lower than HF. However, we could not observed significant change as TNF or IL-6.
・The clinical symptom, such as peripheral coldness or numbness of inferior limb decreased on AN compared to HF.

## Discussion

### schema

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.

↓ absorption — AN 69 membrane

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

・Jankowski J et al. The AN69 hemofiltration membrane has a decreasing effect on the intracellular diadenosine pentaphosphate concentration of platelets. Kidney Blood Press Res. 2003;26(1):50-4.
・Peter Rogiers et al. Comparison of polyacrylonitrile (AN69) and polysulphone membrane during hemofiltration in canine endotoxic shock. Crit Care Med Vol. 31, No. 4, 2003.
・Mary C Corretti et al. Guidelines for the ultrasound assessment of endothelial-dependent flow-mediated vasodilation of the brachial artery. *J Am Coll Cardiol*. 39(2):2002.