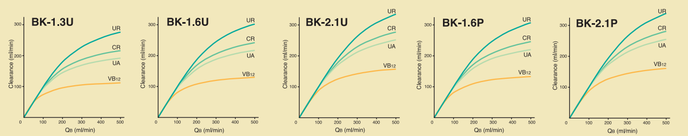
Technical Data; BK-U/P Series Filtryzer

Type			BK-1.3U	BK-1.6U	BK-2.1U	BK-1.6P	BK-2.1P
Housing	Material				Polystyrene		
	Length (mm)				283		
	Diameter (mm)		41	45	53	45	53
	Weight (filled) (g)		420	520	660	520	660
	Blood volume (mL)		76	94	126	94	126
	Filled fluid				Sterile water		
Fibers	Material				Polymethylmethacrylate (PMMA)		
	Quantity		10,700	12,800	16,900	12,800	16,900
	Inside diameter (μm)				200		
	Membrane thickness (μm)				30		
	Effective surface area (m^2)		1.3	1.6	2.1	1.6	2.1
	Effective length (mm)				195		
Potting	Material				Polyurethane		
Sterilization					Gamma-ray Irradiation		
Clearance in vitro (mL/min)*							
	Urea	designed	180	187	193	189	194
		not less than	171	177	183	179	184
	Creatinine	designed	157	169	179	171	180
	Uric acid	designed	145	157	171	159	173
	Phosphate	designed	140	153	168	153	168
	Vitamin B_{12}	designed	96	108	125	110	127
	Inulin	designed	50	59	71	60	72
UFR in vitro (mL/hr, at 100mmHg)**			2,600	3,100	4,000	3,300	4,100
Sieving coefficient of albumin**			less than 0.01			ca 0.01	

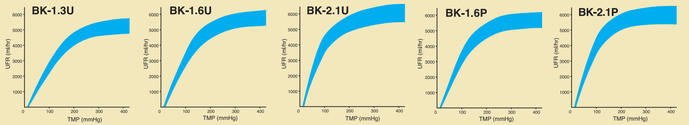
*Clearances are date with aqueous solution.
Q_B: 200 ±4mL/min, Q_D: 500 ±10mL/min, Q_F: 10 ±2mL/min, Temp.: 37 ±1°C
**UFR & SC are typical date with bovine blood. (Ht 30 ±3%, TP 6 ±0.5g/dl)
Q_B: 200 ±4mL/min, TMP: 13.3 ±1.3kPa (100 ±10mmHg), Temp.: 37 ±1°C

Allowable ranges:
Blood volume: ±13%
Designed clearance: Urea upper limit: +6%, Urea lower limit: see above, Creat: ±6%,
Others: ±13%
UFR in vitro: ±15%

Clearance



UFR



BK-1.3U					
QB	100	200	300	400	500
Urea	99	180	228	257	276
Creatinune	97	157	187	205	216
Uric acid	94	145	169	183	192
Vitamin B_{12}	74	96	104	109	112

BK-1.6U					
QB	100	200	300	400	500
Urea	100	187	245	280	302
Creatinune	98	169	206	228	242
Uric acid	97	157	188	206	217
Vitamin B_{12}	81	108	120	126	130

BK-2.1U					
QB	100	200	300	400	500
Urea	100	193	263	307	335
Creatinune	100	179	229	258	277
Uric acid	99	171	212	236	252
Vitamin B_{12}	88	125	142	152	157

BK-1.6P					
QB	100	200	300	400	500
Creatinune	99	171	208	231	246
Uric acid	97	159	190	208	220
Vitamin B_{12}	81	110	122	129	133

BK-2.1P					
QB	100	200	300	400	500
Urea	100	194	265	310	339
Creatinune	100	180	231	261	281
Uric acid	99	173	214	239	255
Vitamin B_{12}	88	127	145	154	161

TORAY

CE 0123

EC REP

Toray International Italy S.r.l.
Via Mecenate 86, 20138 Milan, ITALY
TEL: 39-02-580-39133 / FAX: 39-02-580-16317

Exporter:
Toray Medical Co., Ltd.
Dialysis Products Business Division
8-1, Mihama 1-chome, Urayasu, Chiba 279-8555, JAPAN
TEL: 81-47-700-7537 / FAX: 81-47-700-7558 / E-MAIL: TMC_INTL_FL@tmc.toray.co.jp

Manufacturer:
Toray Industries, Inc.
1-1, Nihonbashi-Muromachi 2-chome, Chuo-ku, Tokyo 103-8666, JAPAN
TEL: 81-3-3245-5144 / FAX: 81-3-3245-5609

Printed in Japan 0906G

TORAY

FILTRYZER® BK-U/P SERIES

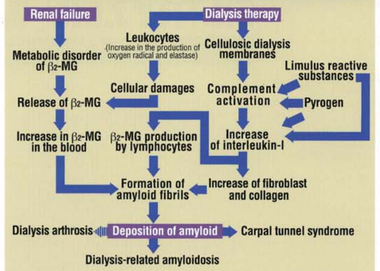
Hollow Fiber Dialyzer

PMMA for better quality of life

The PMMA membrane offers excellent clinical benefits to renal failure patients.

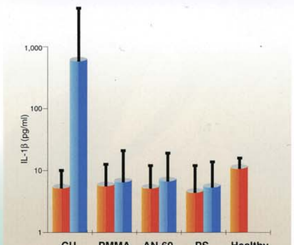
Dialysis-related Amyloidosis and BK Membrane

Hypotheses on the pathogenesis of dialysis-related amyloidosis[1]



Dialysis-related amyloidosis is a pathological condition induced by deposition in the tissues of β_2-microglobulin (called β_2-MG herein after) accumulated in the blood due to renal insufficiency[2]. The activation of complement is related to the production and the deposition of β_2-MG[3], and furthermore, the participation of endotoxins and cytokines have been suggested[4], too. This figure indicates the relationship of all of these.

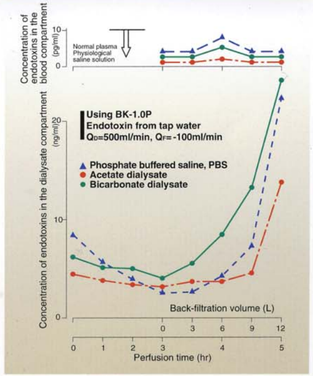
Comparison of the spontaneous release of IL-1β from monocytes contacting with each dialysis membrane[6]



Spontaneous release of IL-1β in the supernatants from short-term (6h) cultures of peripheral-blood monocytes obtained from blood samples drawn before (■) and after (■) hemodialysis with cuprophane (CU) or hemodiafiltration with polymethylmethacrylate (PMMA), AN-69 and polysulfone (PS).

Results of experiment of perfusion and back-filtration

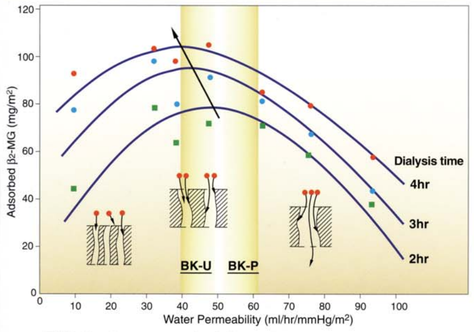
Impermeability of endotoxins[5]



Proven biocompatibility

PMMA has been proven to be a biocompatible membrane as represented by the facts that there are less activation of complements and less transient reduction of leukocyte[3], and that the production of IL-1β, is also suppressed with the PMMA membrane[6].

Relationship between water permeability and amount of β_2-MG adsorption per m^2 [5]



Efficient removal of β_2-MG

Not only is the performance of removing middle and large molecular weight substances much improved by the increased pore size, but it has also a structure which maximizes the PMMA's adsorption capability of β_2-MG.

Endotoxin back-filtration is most unlikely

In back-filtration experiments that were conducted under extremely severe conditions with a large amount of endotoxin challenged to the dialysate compartment, the concentration of endotoxin in the blood compartment was minimal; the endotoxin level there was equal to or lower than that of the normal plasma or physiological saline solution commercially available.

Long-term Multicenter Clinical Evaluation

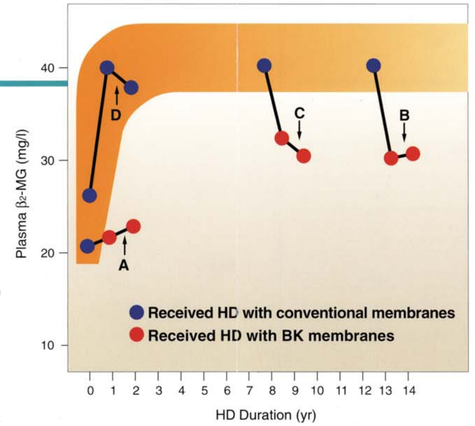
Blood concentration of β_2-MG

Subjects[7]

Group	HD duration*	Patients (n)	Age (years)	Joint pain
A	<2 months	10	54 ± 13	-
B	>5 years	43	55 ± 11	+
C	>1 year	11	56 ± 13	-
D	0	9	49 ± 15	-

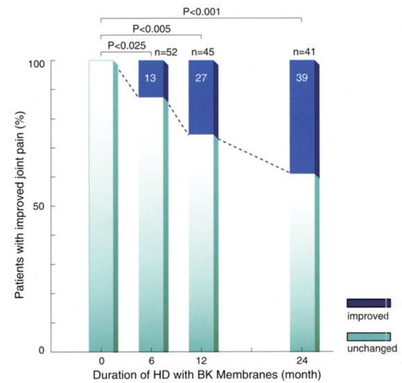
* "HD duration" means a period of time that the patients had been receiving hemodialysis therapy when this clinical trial started.

Changes in plasma β_2-MG levels in patients of group A to D[7]



Pain reduction[7]

Pain reduction by the use of the BK membrane



Approximately 40% of the patients who had been receiving dialysis 5 years or longer with conventional membranes and who were experiencing pain had less pain after using the BK membrane for 24 months.

The following findings were obtained from the above study.

1. When the BK membrane was used by the group of patients with an HD duration of 5 years or longer who were experiencing pain (Group B) and the group of patients with an HD duration of 1 year or longer who were experiencing no pain (Group C), the plasma β_2-MG concentration fell 1-3 months after the BK membrane was employed and it remained low thereafter.

2. Although the β_2-MG concentrations of patients in Group D rose significantly 4-6 months after the onset of the trial, patients in Group A showed no significant increase even after 24 months.

Based on these results, it can be said the plasma β_2-MG concentration is reduced when the BK membrane is adopted to patients who have received dialysis for a long period of time with a conventional membrane and exhibited high blood β_2-MG concentrations. Moreover these results suggest that if the BK membrane is used early from the introduction of hemodialysis, the β_2-MG concentrations may be maintained at lower levels.

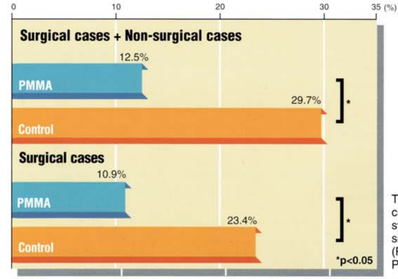
Delay and prevention of dialysis-related complications

The results shown below suggest that the onset of dialysis-related complications is delayed or prevented by the use of the BK membrane.
Sixty-four patients that had used PMMA membrane dialyzers for a long period of time (86 ± 9.9 months) were selected as the PMMA group from the patients receiving hemodialysis who had an HD duration of 87 months or longer. For the control group, 64 patients were selected that had used cellulosic membrane dialyzers and were matched to the PMMA group in age, sex, and underlying diseases.

Subjects[8] (mean ± SD)

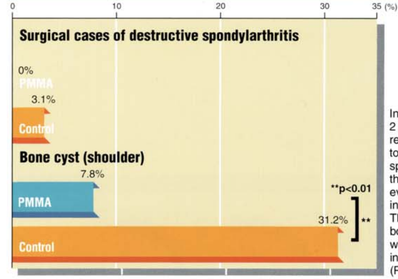
	PMMA	Control
Number of patients (n)	64	64
Underlying diseases	Chronic glomerulonephritis	Chronic glomerulonephritis
Sex	29 males, 35 females	29 males, 35 females
Age (year)	52.7 ± 11.1	52.4 ± 10.8
Duration of HD (months)	154.0 ± 40.2 (PMMA:86.0 ± 9.9)	153.8 ± 40.3

Incidence of carpal tunnel syndrome[8]



The incidence of carpal tunnel syndrome was significantly lower (P<0.05) in the PMMA group.

Incidence of destructive spondylarthritis and bone cyst[8]



In the control group, 2 patients (3.1%) received surgery due to severe destructive spondylarthritis, while there was no such evidence in patients in the PMMA group. The incidence of bone cyst (shoulder) was significantly lower in the PMMA group (P<0.01).

REFERENCES:

1) Kitaoka T, Akizawa T. Issues in Hemodialysis Therapy. Kidney and Dialysis 1986; 20: 495-499.
2) Gejyo F, Yamada T, Odani S, et al. A new form of amyloid protein associated with chronic hemodialysis was identified as β2-microglobulin. Biochemical and Biophysical Research Communications 1985; 129: 701-706.
3) Hakim RM, Fearon DT, Lazarus JM, et al. Biocompatibility of dialysis membranes: Effects of chronic complement activation. Kidney International 1984; 26: 194-200.
4) Henderson LW, Koch KM, Dinarello CA, Shaldon S: Hemodialysis hypotension: The interleukin hypothesis. Blood Purif. 1983; 1: 3-8.
5) Sakai Y, Kobayashi T, Kataoka H, et al. Development and Future Prospects of Polymethyl-methacrylic High-Flux Membranes. Kidney and Dialysis 1990; 13-16.
6) Tetta C, Camussi G, Turello E, et al. Production of cytokines in Hemodialysis. Blood Purif. 1990; 8: 337-346.
7) Arakawa M, et al. Long-Term Multicentre Study on β2-Microglobulin Removal by PMMA BK Membrane. Nephrol. Dial. Transplant. 1991; 6: [Supple 2] 69-74.
8) Nakamoto M, Goya T, Takahashi H, et al. Comparative Study on Morbidity of Dialysis-related Amyloidosis between High-flux PMMA Membrane and Cellulose Membrane. J. Jpn. Soc. Dialy. Ther. Suppl. 1992; 25: 268.

INSTRUCTIONS:

Filtryzer BK-U, and -P series are medical devices intended for hemodialysis (HD) and hemodiafiltration (HDF). HDF of higher ultrafiltration rate is not recommended.
These devices must be used by or at the direction of a physician.
Patients with bleeding tendencies or coagulation disorders must be carefully evaluated by the physician.
When adverse reactions are observed, the patients must be promptly treated under the direction of the physician. For some reactions, manipulation of blood flow rate, ultrafiltration rate, and electrolytic balance can be applied.
The "Instructions for Use" should be read thoroughly prior to the use of these medical devices.

Filtryzer is manufactured in accordance with "Approval Standard of Artificial Kidney" issued by the Ministry of Health and Welfare of Japanese Government.
Each unit is carefully tested, sterilized and packaged prior to shipment. Toray cannot assume any responsibility for damage that may occur during transport or due to mishandling.
Filtryzer is filled with sterile water. Before starting dialysis, rinse it out with one liter or more of physiological saline solution.
Filtryzer is designed for single use only.
Since Filtryzer BK-U and BK-P series have high ultrafiltration rates, it is necessary to use a dialysis machine equipped with a volumetric ultrafiltration rate controller.