# Author Index

<table>
<thead>
<tr>
<th>Author</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albertazzi, A.</td>
<td>213, 233</td>
</tr>
<tr>
<td>Amore, A.</td>
<td>182</td>
</tr>
<tr>
<td>Andrulli, S.</td>
<td>173</td>
</tr>
<tr>
<td>Aoike, I.</td>
<td>205</td>
</tr>
<tr>
<td>Ballestri, M.</td>
<td>233</td>
</tr>
<tr>
<td>Benedetti, S.</td>
<td>133</td>
</tr>
<tr>
<td>Beninati, S.</td>
<td>133</td>
</tr>
<tr>
<td>Bonomini, M.</td>
<td>213</td>
</tr>
<tr>
<td>Bonucchi, D.</td>
<td>233</td>
</tr>
<tr>
<td>Brendolan, A.</td>
<td>41</td>
</tr>
<tr>
<td>Buoncristiani, U.</td>
<td>133</td>
</tr>
<tr>
<td>Cianciolo, G.</td>
<td>111</td>
</tr>
<tr>
<td>Cambi, V.</td>
<td>96</td>
</tr>
<tr>
<td>Campistol, J.M.</td>
<td>76</td>
</tr>
<tr>
<td>Canestrari, F.</td>
<td>133</td>
</tr>
<tr>
<td>Cansepari, G.</td>
<td>53</td>
</tr>
<tr>
<td>Cappelli, G.</td>
<td>233</td>
</tr>
<tr>
<td>Colli, L.</td>
<td>111</td>
</tr>
<tr>
<td>Coppo, R.</td>
<td>182</td>
</tr>
<tr>
<td>Dal Canton, A.</td>
<td>197</td>
</tr>
<tr>
<td>Dalmastri, V.</td>
<td>111</td>
</tr>
<tr>
<td>David, S.</td>
<td>96</td>
</tr>
<tr>
<td>De Pascalis, A.</td>
<td>111</td>
</tr>
<tr>
<td>De Sanctis, L.B.</td>
<td>111</td>
</tr>
<tr>
<td>Del Vecchio, L.</td>
<td>173</td>
</tr>
<tr>
<td>Di Felice, A.</td>
<td>233</td>
</tr>
<tr>
<td>Di Filippo, S.</td>
<td>86</td>
</tr>
<tr>
<td>Donati, G.</td>
<td>111</td>
</tr>
<tr>
<td>Errico, R.</td>
<td>133</td>
</tr>
<tr>
<td>Feliciangeli, G.</td>
<td>111</td>
</tr>
<tr>
<td>Fenollosa, R.</td>
<td>76</td>
</tr>
<tr>
<td>Floridi, A.</td>
<td>133</td>
</tr>
<tr>
<td>Galli, F.</td>
<td>133</td>
</tr>
<tr>
<td>Ghezzi, P.M.</td>
<td>25, 41, 53</td>
</tr>
<tr>
<td>Ghibelli, L.</td>
<td>133</td>
</tr>
<tr>
<td>Hoenich, N.A.</td>
<td>120</td>
</tr>
<tr>
<td>Kataoka, H.</td>
<td>159</td>
</tr>
<tr>
<td>Kawano, Y.</td>
<td>159</td>
</tr>
<tr>
<td>Kobayashi, H.</td>
<td>159</td>
</tr>
<tr>
<td>La Greca, G.</td>
<td>41</td>
</tr>
<tr>
<td>Locatelli, F.</td>
<td>65, 86, 173</td>
</tr>
<tr>
<td>Manzoni, C.</td>
<td>65, 86</td>
</tr>
<tr>
<td>Meineri, S.</td>
<td>25</td>
</tr>
<tr>
<td>Minakuchi, J.</td>
<td>159</td>
</tr>
<tr>
<td>Moriyama, K.</td>
<td>222</td>
</tr>
<tr>
<td>Ono, T.</td>
<td>159</td>
</tr>
<tr>
<td>Ponz, E.</td>
<td>76</td>
</tr>
<tr>
<td>Roneo, C.</td>
<td>25, 41, 53</td>
</tr>
<tr>
<td>Sakai, Y.</td>
<td>1, 9</td>
</tr>
<tr>
<td>Seabardi, M.</td>
<td>41</td>
</tr>
<tr>
<td>Sestigiani, E.</td>
<td>111</td>
</tr>
<tr>
<td>Soejima, Y.</td>
<td>222</td>
</tr>
<tr>
<td>Stefoni, S.</td>
<td>111</td>
</tr>
<tr>
<td>Sugaya, H.</td>
<td>1</td>
</tr>
<tr>
<td>Takeyama, T.</td>
<td>9</td>
</tr>
<tr>
<td>Torregrosa, J.V.</td>
<td>76</td>
</tr>
<tr>
<td>Yamada, S.</td>
<td>159</td>
</tr>
<tr>
<td>Zanchelli, F.</td>
<td>111</td>
</tr>
</tbody>
</table>
Subject Index

Acetate buffer
  nitric oxide synthase stimulation 192, 193
  safety vs bicarbonate 105
Acute renal failure
  dialysis effects on recovery 65
  PMMA membrane biocompatibility and recovery 66–69, 106, 107
Advanced glycosylation end-products, removal by BK series membranes 152
Amyloidosis, see also β2-Microglobulin
  β2-Microglobulin deposition 25, 65, 76
  pathogenesis in dialysis 76–78, 107
  prevention with membrane biocompatibility 71, 72
  risk in peritoneal dialysis vs hemodialysis 77
Anemia, see also Erythropoiesis inhibitors
cardiac dysfunction in dialysis patients 174
causes in chronic renal insufficiency 175
Atherosclerosis, dialysis patients 111, 112

B1
development 9, 16
  performance characteristics 26–39
  physical properties 53

B2 1.5H
  clearances vs time 54, 55, 57
  diffusive permeabilities 57–60
  development 9, 15, 16
  performance characteristics 26–39, 54
  physical properties 53, 54

B3
  B3 1.3A
    clearances vs time 54, 55, 57
    diffusive permeabilities 57–60
    development 16
    performance characteristics 26–39
    physical properties 53, 54
B3.6A, hydraulic and flow dynamic characteristics 40–44, 46, 49–52
Back-diffusion
  minimization 20, 105, 106
  secondary layer formation and resistance to pyrogen backdiffusion 236, 237
BG series, development and features 20
Bicarbonate buffer, high clearance dialysis 96
Biocompatibility, see also specific markers
  acute renal failure, membrane biocompatibility and recovery 66–69, 106, 107
BK series 139–141
blood pathways activated in incompatibility 120, 121
chronic renal failure, importance of biocompatibility
  amyloidosis prevention 71, 72
  anemia correction 71
  infection incidence 70, 71
  mortality reduction 72, 73
  nutrition 69, 70
  residual renal function preservation 69
  clinical markers 104

Author Index
Biocompatibility (continued)
membrane hydrophobicity role 10
mortality studies 105, 106, 111
BK series, see also specific membranes
absorption properties, advantages 103, 104
biocompatibility 139–141
development 16
endotoxin back-filtration and back-diffusion 20, 105, 106
β2-microglobulin removal
acceleration effect 18
adsorption and permeation 16, 17, 26, 53, 78–80, 103
clinical studies 81, 82
measurement 80, 81
performance characteristics 26–39
physical properties 53
BK1.6P, hydraulic and flow dynamic characteristics 40–44, 46, 49–52
BK-F
advantages, summary 154, 155, 218–220
albumin loss 20, 169
applications in macromolecule removal advanced glycosylation end-products
152
apoptosis-triggering factors 148, 150
cytokines 152, 153
hypoproliferative toxins 145–147, 150
β2-microglobulin removal performance 134, 135
polyaminated proteins and polymers 150–152
toxins bound to plasma proteins 141, 143, 145
3-carboxy-4-methyl-5-propyl-2-furanpropionic acid removal 137
erthropoiesis inhibitor removal 146–148, 171
characterization of KR4-0
antibody neutralization 164, 165, 171
assay 160
gel electrophoresis 163, 164
gel filtration chromatography 160, 162
sequencing of amino terminus 164
size 169, 171
Western blot analysis 165–167
clinical trial design for effectiveness in removal
clinical and laboratory mechanisms 178
entry criteria 177, 178
informed consent 179
recruitment 179, 180
sample size calculation 178, 179
statistical analysis 179
erthropoietin therapy in dialysis patients 159, 161, 167–169, 171
furanicarboxylic acid removal 137
large uremic molecule removal 19, 217, 218
performance compared to their membranes 218–220
Blood flow
blood water flow estimation 89
calculation of rate 88
contrastographic analysis 42, 43, 46, 49, 50
effective whole blood rate estimation 89
PMMA membranes 26, 29, 41, 57, 60
Body clearance value (KB), determination 91, 92
3-Carboxy-4-methyl-5-propyl-2-furanpropionic acid, BK-F membrane removal 137
Cardiopulmonary recirculation, calculation 89, 90
Carpal tunnel syndrome, PMMA membrane dialysis effect on incidence 205–211
Cellulose acetate-diacetate, performance comparison with PMMA membranes 57, 60
Cellulose triacetate, performance comparison with PMMA, membranes 57, 60
Chronic renal failure, importance of membrane biocompatibility
amyloidosis prevention 71, 72
anemia correction 71
infection incidence 70, 71
mortality reduction 72, 73
nutrition 69, 70
residual renal function preservation 69

Subject Index
Clearance rates
calculation 56
PMMA membranes 26, 29, 37, 38, 54, 55, 89
Coagulation, see Platelet
Complement activation, PMMA membrane effects 229
Creatinine, diffusive permeability values for PMMA membranes 30, 31, 33, 36–39
Cuprophan®, performance comparison with PMMA membranes 57, 60–62
Cuprophane, limitations 1
Cytokines
apoptosis induction 150
inflammatory cytokines in membrane biocompatibility 140, 182, 188–193, 228, 229
nitric oxide synthase induction 188–193
removal by PMMA membranes 148, 152, 153, 223, 225, 227, 228, 230, 231
Degranulation-inhibiting protein, removal by BK series membranes 147
Dialysate flow
calculation of rate 88
contrastographic analysis 42, 43, 46, 49, 50
Dialysis index, calculation 86
Differential scanning calorimetry, pore size measurement 13, 14
Diffusive permeability, PMMA membranes
B2 1.5H 57–60
B3 1.3A 57–60
calculation 56, 87
creatinine 30, 31, 33, 36–39
phosphate 30, 31, 33, 36–39
urea 30, 31, 33, 34, 36–39
uric acid 30, 31, 33, 36–39
vitamin B₁₂ 30, 31, 33, 34, 36–39
Direct quantification method, Kt/V determination 90, 91
Dose of dialysis, see Kt/V
Elastase, PMMA membrane effect on production 229
Elastase α₁-proteinase, neutrophil release in dialysis 128, 129
Electrostatic interference, PMMA transmembrane passage of pyrogens 234–236
Endothelin, release in dialysis 141
End-stage renal disease, cardiac dysfunction and mortality 173, 174
Erythropoiesis inhibitors
characterization of KR4-0
antibody neutralization 164, 165, 171
assay 160
gel electrophoresis 163, 164
gel filtration chromatography 160, 162
sequencing of amino terminus 164
size 169, 171
Western blot analysis 165–167
clinical trial design for BK-F effectiveness in removal
clinical and laboratory mechanisms 178
entry criteria 177, 178
informed consent 179
recruitment 179, 180
sample size calculation 178, 179
statistical analysis 179
fractionation 160, 162, 176
removal by BK-F 146–148, 171
types 175, 176
Erythropoietin, therapy in dialysis patients 159, 161, 167–169, 171, 174, 175
Factor XII, activation in dialysis 140
Filtryzer B31.6A, hydraulic and flow dynamic characteristics 51
Filtryzer BK1.6P hydraulic and flow dynamic characteristics 51
Furancarboxylic acid, BK-F membrane removal 137
Glass transition temperature, PMMA 1
Granulocyte inhibitory protein, removal by BK series membranes 147
Hagen-Poiseuille’s equation, pore radius and density calculation 6
Hematic priming volume, PMMA membranes 26–28
Hemofeel CH, continuous hemofiltration 21, 222, 223, 225
Hemophan, performance comparison with PMMA membranes 57, 60
Hepatocyte growth factor activities 197
PMMA membrane, dialysis effects on release 201–203
processing in activation 198, 199
role in kidney and liver disease 199–201
signal transduction of receptor 199
synthesis sites 197, 198
stimuli 198
Hydrostatic pressure, measurement 42–44, 46
Ionic membranes, modification of PMMA 21, 22
Joint pain, PMMA membrane dialysis effect on incidence 205–211
Kedem-Spiegler's equation, solute molecular cut-off characteristics 12
KR4-0, see Erythropoiesis inhibitors
Kt/V adequate dose identification 99, 100
determination techniques 90, 91
limitations in use 98
treatment dose quantification 100–102
Leucocyte activation in dialysis 128
kinetics of dialysis effects 127
morphology and function 126–128
neutrophil platelet interactions in dialysis 130
release/degranulation in dialysis 128–130
types 126
Litirulus amoebocyte lysate (LAL) assay clinical relevance 233
endotoxin size recognition 97
Malnutrition, uremic causes 216, 217
PMMA membrane dialysis effects 217
β2-Microglobulin, see also Amyloidosis catabolism in kidney 77
removal clinical studies 81, 82
comparison of different membranes 80, 81, 134, 135
importance in amyloidosis prevention 25, 65
kinetics 92–94
measurement 80, 81
mechanism 16, 17, 78, 79
membranes, see BK series theoretical evaluation 92
Middle molecules hypothesis 25, 87, 98
Multiple organ dysfunction syndrome continuous hemodiafiltration in treatment 222, 223
continuous hemofiltration in treatment 222
PMMA hemofiltration, inflammatory cytokine removal 223, 225, 228, 230, 231
Myeloperoxidase, PMMA membrane effect on production 229
Neurophil, see Leucocyte
Nitric oxide apoptosis induction 187
detoxification mechanism 187
dialytic vasculopathy role 182, 183, 190
S-nitrosylation 186, 187
reactive nitrogen species formation 185, 186
release in dialysis 140, 141, 188–190
synthesis arginine level manipulation 183
reaction 184
synthase acetate buffer stimulation 192, 193
isoforms 183, 184
PMMA membranes and activation 188–190, 228
regulation 184, 185
vasodilation 185
Oxygen saturation, PMMA membranes 56–58, 60–62
Subject Index

PAN AN 69 HF, performance comparison with PMMA membranes 57, 60–62
Phosphate, diffusive permeability values for PMMA membranes 30, 31, 33, 36–39.
Platelet activation
  atherosclerosis role 111, 112
  kinetics 123
  mechanism 123
  PMMA membrane evaluation
    activation assay 113, 115, 117, 118, 123, 124
    coagulation assay 113, 115
    dialysis conditions 112, 113
    patient selection 112
  aggregation 125
  coagulation reaction 125, 126
  morphology and function 122
  neutrophil interactions in dialysis 130
  release reaction 123, 124
  responses in artificial surface contact, overview 120–122
Platelet factor 4
  characteristics 123, 124
  platelet activation assay of PMMA membranes 112, 113, 115, 117, 118, 123, 24
PMMA, see Polymethylmethacrylate
Polyaminated proteins and polymers
disease pathogenesis role 151
removal by BK series membranes 150–152
sources 150, 151
Polymethylmethacrylate, see also specific membranes
chemical components 2
glass transition temperature 1
membrane structure and physical properties 4–6, 10, 103
postspinning process 7, 9
solubility parameter 2–4
stereocomplex gel
  formation 2, 4, 8, 9
  structure and properties 3, 4
structure 2
Polyneuropathy, uremic causes 214
classification 214
incidence 214
PMMA membrane dialysis effects 215, 216
Polysulfone PS 400, performance comparison with PMMA membranes 60, 61
Pore structure
  permeability equations 11
  radius and density calculation 6, 13–15
  size measurement
differential scanning calorimetry 13, 14
  hydrodynamic method 12, 13
  solute molecular cut-off characteristics 12
  symmetry 10
  synthesis of membranes 5, 6, 10
Postspinning process 7, 9
Protein kinase C, activation by membranes 148
Pyrogen, see also Limulus amoebocyte lysate
  assay
electrostatic interference on PMMA transmembrane passage 234–236
prevalence of dialysis water contamination 233
secondary layer formation and resistance to back-diffusion 236, 237
types and activities 233, 234
Quality of life, hemodialysis patients in Japan 205–211
Radiolucent bone cyst, PMMA membrane dialysis effect on incidence 205–211
Reactive oxygen species, neutrophil release in dialysis 129, 139–141
Residence time, PMMA membranes 32, 34, 35
Single-pool variable volume, Kt/V determination 90, 91
Solubility parameter, PMMA 2–4
Stereo complex gel
  formation 2, 4, 8, 9
  structure and properties 3, 4
Surface area, PMMA membranes 26–28
Systemic inflammatory response syndrome
continuous hemodiafiltration in treatment
222, 223
continuous hemofiltration in treatment
222
PMMA hemofiltration
biocompatibility 228, 229
blood purification 229, 230
inflammatory cytokine removal 223, 225, 227, 230, 231
pathogenic substance filtration
225–228
Thickness, PMMA membranes 26–28
β-Thromboglobulin
characteristics 124
platelet activation assay of PMMA membranes 112, 113, 115, 117, 124
Treatment time, calculation 87, 98, 99
Ultrafiltration coefficient, PMMA membranes 26–28, 30, 32, 33, 46, 97
Ultrafiltration rate, measurement 42
Urea
clearance value estimation 89
diffusive permeability values for PMMA membranes 30, 31, 33, 34, 36–39
high clearance 96
Uremia
malnutrition
causes 216, 217
PMMA membrane dialysis effects 217
polyneuropathy
causes 214
classification 214
incidence 214
PMMA membrane dialysis effects 215, 216
toxin identification 213
Uric acid, diffusive permeability values for PMMA membranes 30, 31, 33, 36–39
Vitamin B₁₂, diffusive permeability values for PMMA membranes 30, 31, 33, 34, 36–39
Water, total body estimation 91