
Baxter
HDx
THERAPY
Enabled by MCO THERANOVA
Discover how HDx Expanded Hemodialysis
may make A WORLD OF DIFFERENCE for
patients, clinicians & healthcare systems
A WORLD OF DIFFERENCE

ONE CHANGE CAN TRANSFORM HD TREATMENT

Expanded Hemodialysis is a dialysis treatment where diffusion and convection are conveniently combined along a hollow fiber dialyzer equipped with a High Retention Onset (HRO) membrane[1] – defined as medium cut-off, with no special requirement of a particular hardware, preparation of replacement fluid, or additional nursing skill, compared to the necessary ones required to perform conventional hemodialysis (HD) in standard mode.[2]

WHAT A DIFFERENCE AN X MAKES

01
POSITIVE OUTCOMES

HDx therapy may reduce the burdens of hemodialysis therapy.[3,4]

Read more

02
REMOVING LARGE-MIDDLE MOLECULES

The efficient removal of large-middle molecules may reduce the risk of inflammation, toxicity, and organ damage.[2]

Read more

03
UNIQUE MEMBRANE

A different membrane design allows for a filtration profile that is close to that of the natural kidney.[1]

Read more

04
PROVEN RESULTS

HDx therapy's large and growing evidence-base.[47]

Read more

HOW CAN HDx OPEN UP A WHOLE WORLD IN HD THERAPY?

ANSWERING CRITICAL PATIENT NEEDS

Patient-reported symptom burden has a significant impact on patient quality of life.[7]

PATIENT-REPORTED OUTCOMES

UREMIC PRURITUS

HDx may significantly lower uremic pruritus, a predictor of poor sleep, in HD patients.[8]

Read more

RESTLESS LEGS SYNDROME

HDx may reduce the occurrence of restless legs syndrome (RLS), common in HD patients.[5,9]

Read more

RECOVERY TIME

HDx may significantly reduce recovery time, positively associated with hospitalization and mortality, after dialysis treatments.[10,11,12]

Read more

CREATING POSITIVE HEALTHCARE OUTCOMES

HDx can help free resources and relieve the strain on healthcare systems.[3,14,31]

ECONOMIC OUTCOMES

HOSPITALIZATION RATES

HDx may reduce hospitalization rates.[3,31]

Read more

MEDICATION USAGE

HDx has been associated with decreases in medication usage.[15,16,17]

Read more

COST OF CARE

HDx may reduce pressures on healthcare systems and total cost of care.[3,13,14,16,31]

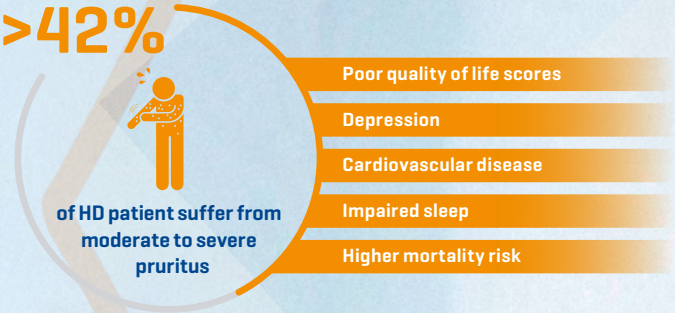
Read more

A BETTER NIGHT'S SLEEP CAN MAKE A WORLD OF DIFFERENCE

UREMIC PRURITUS

Daily bouts of itching that tend to worsen at night and may prevent sleep.[8]

IMPLICATIONS FOR PATIENTS[18]



HDx MAY IMPROVE PATIENT-REPORTED PRURITUS

One randomized clinical study found **HDx** to deliver statistically significant improvements in key aspects of patient-reported uremic pruritus compared to conventional HD.[8]

MOLECULE ASSOCIATION

IL-6 is a pleiotropic cytokine that regulates the immune and inflammatory response and affects hematopoiesis, metabolism and organ development.[19] IL-6 is commonly observed in Chronic Kidney Disease (CKD) patients and markedly increased in HD patients with uremic pruritus[20], which is caused by increased generation resulting from oxidative stress, chronic inflammation and fluid overload.[19]

THERANOVA dialyzers are indicated for treatment of chronic and acute renal failure by Hemodialysis

Do not use in Hemodiafiltration or Hemofiltration mode or isolated Ultrafiltration

HDx CAN GIVE PATIENTS A LEG UP

RESTLESS LEGS SYNDROME (RLS)

A neurological condition characterized by an irresistible urge to move the limbs accompanied by uncomfortable sensations.[23]

IMPLICATIONS FOR PATIENTS

20%

of patients with ESRD will have RLS[21,22]

- Poor quality of life scores[23]
- Depression[23]
- Evidence of muscle atrophy[23]
- Cardiovasular disease[24]
- Higher mortality risk[23]
- Impaired Sleep[23]

HDx MAY PREVENT DISCOMFORT

A large observational study in prevalent HD patients found an approximate 55% reduction in the number of patients meeting RLS criteria after 12 months on **HDx** therapy.[9]

MOLECULE ASSOCIATION

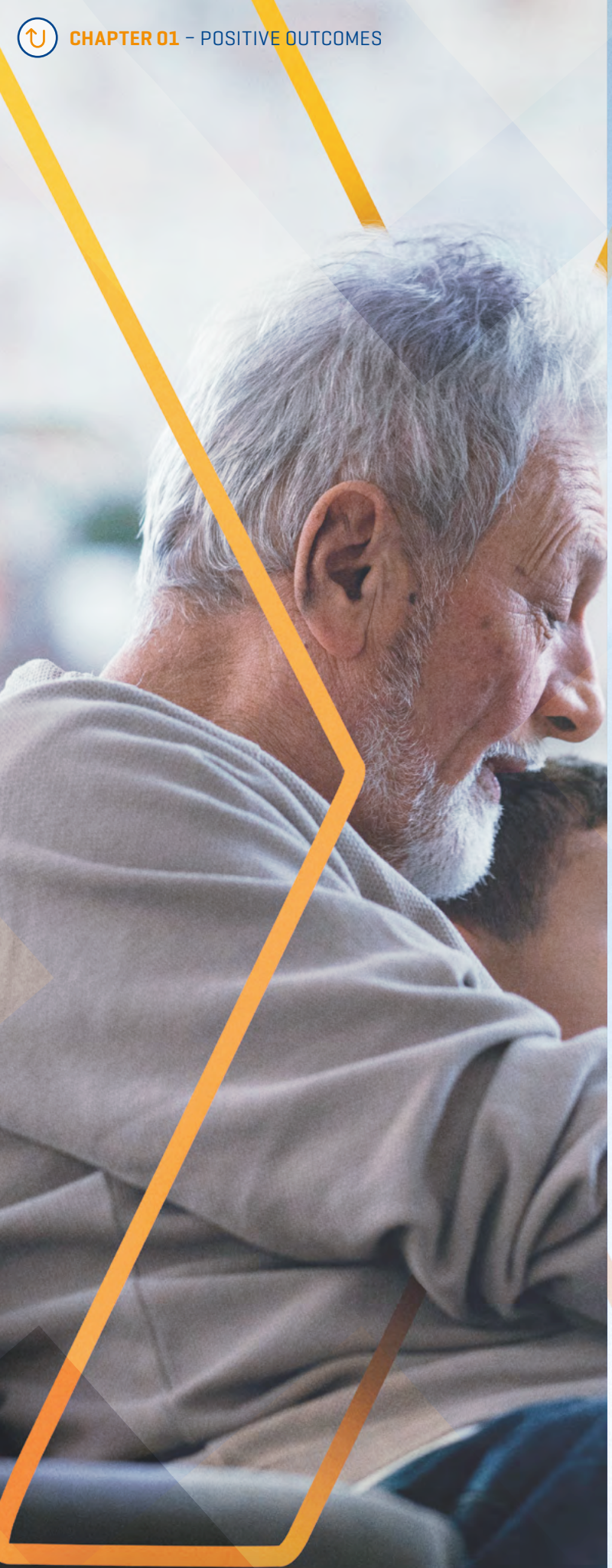
A1M is a microglobulin, belonging to a protein family. It is described as a circulating "waste bin" which continuously removes free radicals and oxidizing agents, particularly heme, from the tissues. It is subsequently transported to the kidneys, where it is broken down. A1M's urinary excretion is associated with faster Chronic Kidney Disease (CKD) progression and high mortality as well as restless syndrome.[25]

a1-MICROGLOBULIN (A1M)

[33 kDa]

THERANOVA dialyzers are indicated for treatment of chronic and acute renal failure by Hemodialysis

Do not use in Hemodiafiltration or Hemofiltration mode or isolated Ultrafiltration



HDx CAN HELP PATIENTS ENJOY MORE OF LIFE

RECOVERY TIME

The time in minutes that it takes a patient to recover after a hemodialysis session.[28]

IMPLICATIONS FOR PATIENTS

68%

patients report >2 hours to recover[12]

- Poor quality of life scores[12]
- Activities of daily living[12]
- Dialysis-related stress[12]
- Associated with hospitalization[12]
- Higher mortality risk[12,29]

FASTER RECOVERY WITH HDx THERAPY

HDx therapy may signficantly reduce dialysis recovery time and improve perceived fatigue level.[11]

MOLECULE ASSOCIATION

IL-6 is a pleiotropic cytokine that regulates the immune and inflammatory response and affects hematopoiesis, metabolism and organ development.[10] In people on chronic HD, fatigue appears associated with the serum level of interleukin, supporting that inflammation plays a role.[30]

INTERLEUKIN-6 (IL-6)

[25 kDa]

THERANOVA dialyzers are indicated for treatment of chronic and acute renal failure by Hemodialysis

Do not use in Hemodiafiltration or Hemofiltration mode or isolated Ultrafiltration

HELP PATIENTS SPEND LESS TIME IN YOUR WORLD

HOSPITALIZATION RATES

Research reveals that **HDx** is likely to significantly lower hospitalization rates.[3,31]

REDUCTION IN HOSPITALIZATION EVENTS

A randomized controlled trial of 171 prevalent HD patients showed a **45%** lower all-cause hospitalization rate over 12 months with **HDx** therapy compared to the control high-flux HD arm.[31]

Health resource utilization	THERANOVA (*n* = 86)	high-flux HD (*n* = 85)[a]	*p*-value
Hospitalization events	18	31	-
Total hospital days	74	139	-
Total patient-years	32.4	30.5	-
Hospitalization rate per PY (SE)	0.56 (0.13)	1.02 (0.12)	0.042
Hospital length of stay (mean days [SE])	4.11 (0.57)	4.63 (0.58)	0.406

a One high-flux HD randomized participant did not complete baseline.

THERANOVA dialyzers are indicated for treatment of chronic and acute renal failure by Hemodialysis

Do not use in Hemodiafiltration or Hemofiltration mode or isolated Ultrafiltration

WHERE LESS CAN BE MORE

FEWER MEDICATIONS

HDx has the potential to reduce the need for medication for conditions related to uremic toxins such as anemia and inflammation.[16]

LOWER DOSES

Research has shown that patients under **HDx** therapy may have a decreased Erythropoietin Resistance Index (ERI). Also, these patients may need a lower ESA dose over time without a concomitant reduction in hemoglobin level, when compared with patients under High-Flux HD and HDF therapies.[14,15,16,17]

MEDICATION UTILIZATION PER PATIENT YEAR

ESA - INTERNATIONAL UNITS[a]

HD HF mean (95% CI) N = 81	**HDx** mean (95% CI) N = 81	Percent change **HDx** vs HD HF
181318	**168124[a]**	**-7%**

IRON - MILIGRAMS

HD HF mean (95% CI) N = 81	**HDx** mean (95% CI) N = 81	Percent change **HDx** vs HD HF
959	**759[a]**	**-21%**

INSULIN - INTERNATIONAL UNITS

HD HF mean (95% CI) N = 81	**HDx** mean (95% CI) N = 81	Percent change **HDx** vs HD HF
5383	**3434[a]**	**-36%**

HYPERTENSION MEDICATIONS - TABLETS

HD HF mean (95% CI) N = 81	**HDx** mean (95% CI) N = 81	Percent change **HDx** vs HD HF
1183	**731[a]**	**-38%**

a Statistically significant difference found in corresponding univariate GLM analysis of outcome on **HDx**. All had a P-value <0.01.

Adapted after Ariza: An initial evaluation of **HDx** on hospitalizations, drug utilization, costs, and patient utility in Colombia.[16]

LOWER USE

Patients receiving **HDx** therapy may have a decreased use of supportive medications such as iron, insulin and antihypertensive medications vs those treated with conventional high-flux HD.[16]

THERANOVA dialyzers are indicated for treatment of chronic and acute renal failure by Hemodialysis

Do not use in Hemodiafiltration or Hemofiltration mode or isolated Ultrafiltration

BETTER CARE CAN LOWER EXPENSES

FREEING UP RESOURCES

Recently published research has shown promising signs that **HDx** has the potential to positively impact the burden on healthcare systems.[14,16,31]

REDUCING THE COST OF CARE

HDx therapy may offer health care systems the opportunity to reduce the total cost of care, primarily driven by potential reduction of cardiovascular events, infections, medication usage, all-cause hospitalizations, hospitalization rate and length of stay.[3,13,14,16,17,31]

ECONOMIC OUTCOMES

HOSPITALIZATION EVENTS[31]

Probabilistic analysis determined that **THERANOVA** was associated with lower costs in **96%** of the 10,000 simulations.

		Per-patient cost		
Item	Unit cost (USD)	THERANOVA	high-flux HD	Difference
All-cause Hospitalization[a]	$2518 per day	$5756	$11,853	-$6097
Dialyzer cost[b]	$15.00 ea/ $6.50 ea	$2340	$1014	$1326
Cumulative		$8096	$12,867	-$4771

a All-cause hospitalization was defined as any serious adverse event that resulted in hospitalization

b **THERANOVA** dialyzer was priced at $15 in the United States and high-flux dialyzer was assumed to cost $6.50

Adapted after Blackowicz: Economic evaluation of expanded hemodialysis with the **THERANOVA 400** dialyzer: A post hoc evaluation of a randomized clinical trial in the United States.[31]

MEDICATION UTILIZATION[16]

Percentage change in average annual cost analysis HDx vs HD-HF			
ESA*	IRON	INSULIN	ANTIHYPERTENSIVES
-7.27%	-20.83%	-32.64%	-30.16%

*Erythropoietin stimulating agents

Adapted after Ariza: An initial evaluation of **HDx** on hospitalizations, drug utilization, costs, and patient utility in Colombia.[16]

CARDIOVASCULAR EVENTS

A retrospective, observational study found that **HDx** compared to HD-HF is likely to significantly lower nonfatal cardiovascular events by **35%**.[3]

THERANOVA dialyzers are indicated for treatment of chronic and acute renal failure by Hemodialysis

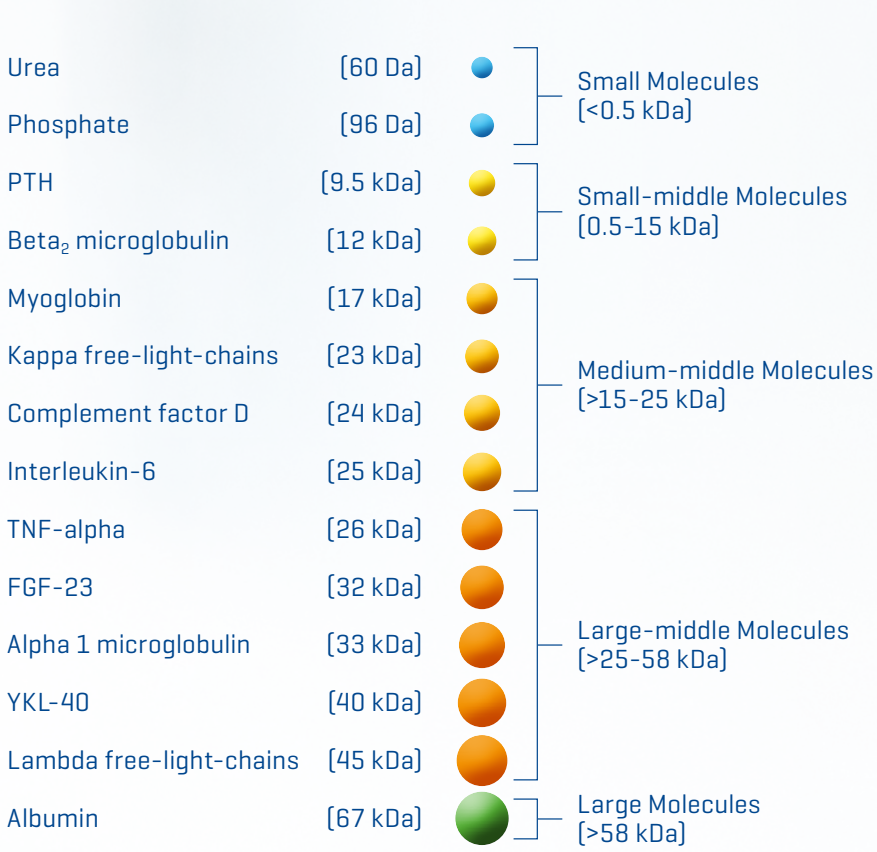
Do not use in Hemodiafiltration or Hemofiltration mode or isolated Ultrafiltration

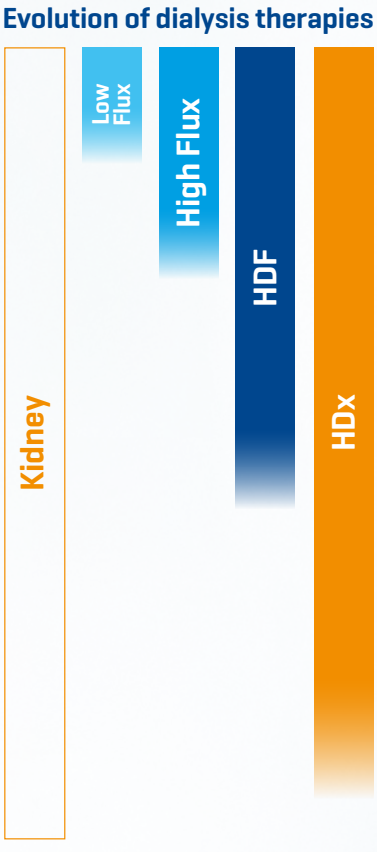
IS IT POSSIBLE TO GET CLOSER TO THE NATURAL KIDNEY?

USING A MEMBRANE WITH EXPANDED PERMEABILITY AND SELECTIVITY[1]

Until now, current dialytic therapies have had limited capability in removing large-middle molecule uremic toxins.[32,48] Large-middle molecules can contribute to inflammation, cardiovascular events and other dialysis-related co-morbidities.[48]

Uremic Toxin Classes by molecular weight (Daltons)[32,50]





Adapted after Rosner M, et al. Classification of Uremic Toxins and Their Role in Kidney Failure. *Clin J Am Soc Nephrol.* 2021;16(12):1918-1928[32]
EUTOX Uremic Solutes Database. June 2022. Uremic-toxins.org[50]

GOING BEYOND UREA AND BETA$_2$ MICROGLOBULIN

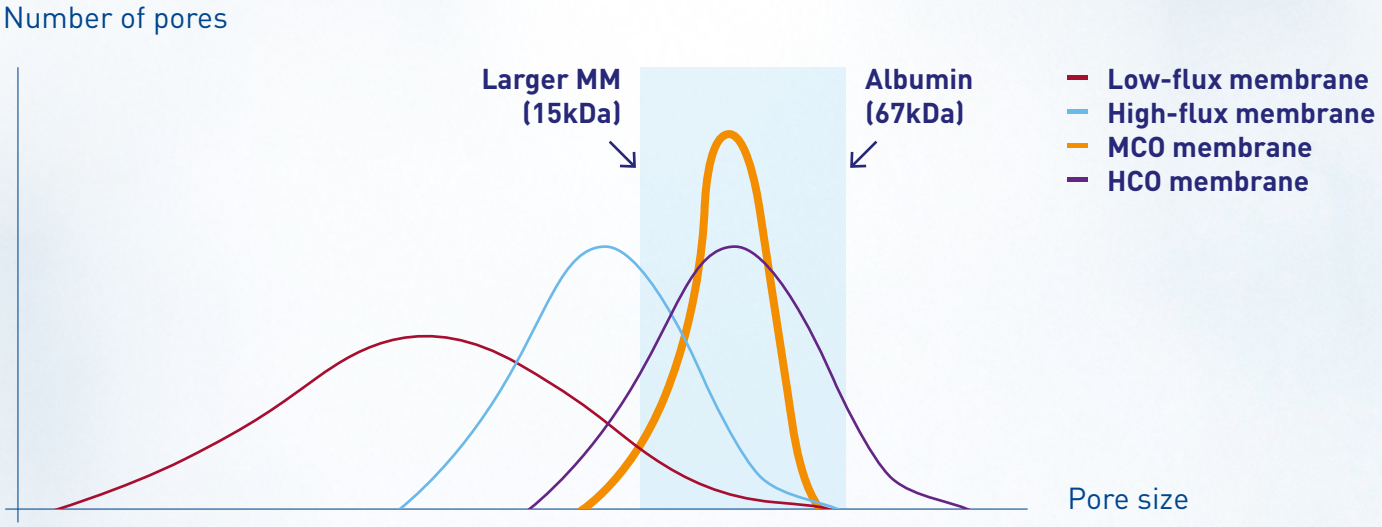
The clinical symptoms and conditions associated with uremic toxins differ according to their molecular weight, with the large-middle molecules being linked to several clinical effects.[32]

Large-middle molecule linkage with clinical symptoms and outcomes

Large-middle molecules		Relevant clinical effects
TNF-alpha	(26 kDa)	· Sepsis[33] · Chronic Inflammation[33] · Cardiovascular Disease[34] · Protein-energy wasting in CKD[34]
FGF-23[50]	(32 kDa)	· Secondary Immunodeficiency · Cardiovascular Disease[34]
Alpha 1 microglobulin	(33 kDa)	· Restless Legs Syndrome (RLS)[35,36]
YKL-40	(40 kDa)	· Inflammation[37]
Lambda free-light-chains	(45 kDa)	· Chronic Inflammation · Secondary Immunodeficiency[34]

EXPERTISE IN MEMBRANE MANUFACTURING: MCO TO PERFORM HDx

Membrane formation technologies have enabled precise control of pore size distribution which results in a narrow pore size distribution with a significant number of pores that are large enough for middle molecules to penetrate, but small enough for albumin to not pass through.[38,39]

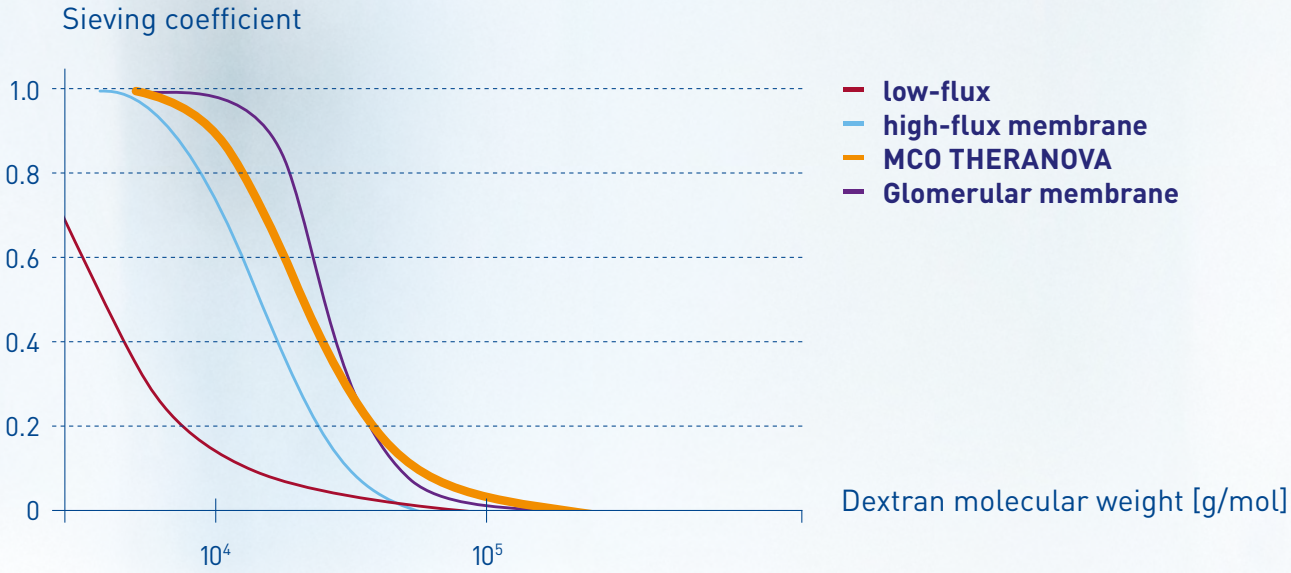


Adapted after Wolley: Exploring the Clinical Relevance of Providing Increased Removal of Large Middle Molecules.[49]

HDx: DIFFUSION AND CONVECTION COMBINED INSIDE A DIALYZER

A HEMODIALYZER WITH AN EXPANDED SOLUTE REMOVAL PROFILE

HDx is a dialysis treatment where diffusion and convection are conveniently combined inside a hollow fiber dialyzer.[1] **MCO THERANOVA's** membrane provides the patented Molecular Weight Retention Onset (MWRO) and Molecular Weigh Cut-Off (MWCO) range to target the efficient removal of large-middle molecules.[5,6,38] This results in a sieving curve closer to the natural kidney.[1,38]



Adapted after Boschetti-de-Fierro: MCO Membranes: Enhanced Selectivity in High-Flux Class.[38]

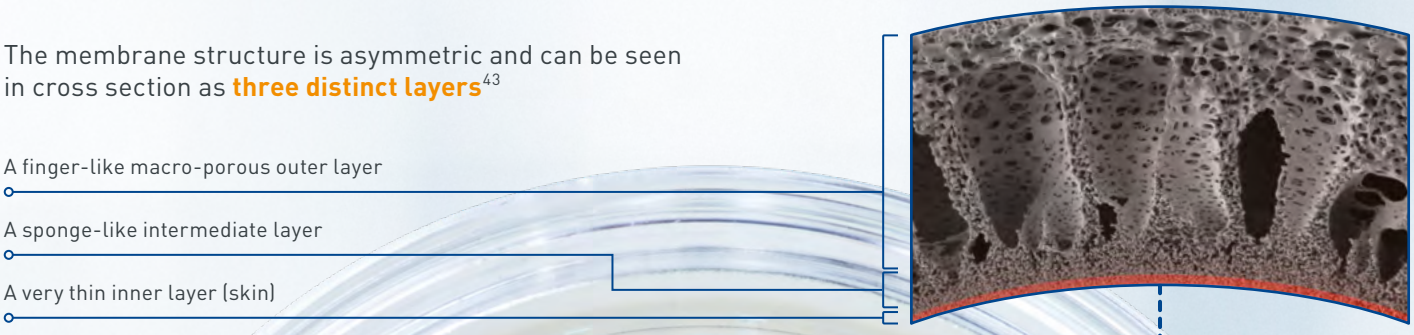
A NEW CLASS OF DIALYZERS

THERANOVA is the only device falling in the classification of Hemodialyzers with an expanded solute removal profile, as defined by the US Food and Drug Administration (FDA).[40] **THERANOVA** also falls into the new class of medium cut-off dialyzers, based on the in vitro and clinical use methodology published by the Chinese Nephrology & Blood Purification Innovation Alliance.[45]

FOUR THERAPEUTIC PRINCIPLES THAT MAKE HDx POSSIBLE

The clearance profile provided by **HDx** therapy enabled by **MCO THERANOVA** is made possible using regular HD workflow and infrastructure[6] thanks to the combination of 4 principles in a single dialyzer device design.

The membrane structure is asymmetric and can be seen in cross section as **three distinct layers**[43]



1 HIGH PERMEABILITY TO LARGE-MIDDLE MOLECULES

Membrane with increased nominal pore size that provides significantly higher permeability for large-middle molecules when compared to high-flux membranes used for conventional HD and HDF.[1,2,38]

2 EFFECTIVE SELECTIVITY BY SIZE EXCLUSION

A unique asymmetric 3-layer structure controls the distribution of pore sizes for a stable separation profile.[38]

3 AUGMENTED INTERNAL FILTRATION

A reduced inner diameter increases the convective transport along the membrane, within the same hollow fiber dialyzer performing diffusion.[1,2,38]

4 RETENTION OF ENDOTOXINS

The adsorptive properties of the **MCO** membrane make it a safe and effective barrier against potential dialysis fluid contaminants despite the higher permeability.[2,38,42]

Internal filtration IF at 500mL/min Qd	THERANOVA 400		THERANOVA 500	
Blood flow (QB), mL/min	300	400	300	400
IF mL/min	29.7	41.6	31.6	53.1

Adapted after Lorenzin: Classification of hemodialyzer clinical performance.[44]

HOW HDx IS CHANGING DIALYSIS ONE STUDY AT A TIME

HDx therapy evidence on patient-reported, clinical and economic outcomes continues to grow.[46]

If you want to visit the Compendium of Studies click here

HDx

A WORLD OF DIFFERENCE

Visit the HDx therapy website
click here

THERANOVA dialyzers are indicated for treatment of chronic and acute renal failure by Hemodialysis.
Do not use in Hemodiafiltration or Hemofiltration mode or isolated Ultrafiltration
Medical devices of class IIb – Notified body: BSI, NL (CE 2797) – Legal manufacturer: Gambro Dialysatoren GmbH – Hechingen, Germany.[1]
For single use only. For safe and proper use of these devices refer to the Instructions for Use.

REFERENCES

1. Zweigart C, Boschetti-de-Fierro A, Hulko H, et al. Medium cut-off membranes – closer to the natural kidney removal function. *Int J Artif Organs.* 2017; 40(7):328-334.
2. Ronco, C. The Rise of Expanded Hemodialysis. *Blood Purif.* 2017:44:I-VIII.
3. Molano-Trivino A, Sanabria M, Vesga J, Buitrago G, Sanchez R, Rivera A. Effectiveness of medium cut-off vs high flux dialyzers: a propensity score matching cohort study. *In Nephrol Dial Transport.* 2021;36:486-U948.
4. Penny JD, Jarosz P, Salerno FR, Lemoine S, McIntyre CW. Impact of Expanded Hemodialysis Using Medium Cut-off Dialyzer on Quality of Life: Application of Dynamic Patient-Reported Outcome Measurement Tool. *Kidney Medicine.* 2021;3(6):992-1002.
5. Hutchison CA, Wolley M. The Rationale for Expanded Hemodialysis Therapy (HDx). *Contrib Nephrol.* 2017; 191:142-52.
6. Kirsch AH, Lyko R, Nilsson LG, et al. Performance of hemodialysis with novel medium cut-off dialyzers. *Nephrol Dial Transpl.* 2017; 32(1):165-72.
7. Zhang JC, El-Majzoub S, Li M, et al. Could symptom burden predict subsequent healthcare use in patients with end stage kidney disease on hemodialysis care? A prospective, preliminary study. *Ren Fail.* 2020;42(1):294-301.
8. Lim JH, Park Y, Yook JM, et al. Randomized controlled trial of medium cut-off versus high-flux dialyzers on quality of life outcomes in maintenance hemodialysis patients. *Sci Rep.* 2020;10(1):1-11.
9. Alarcon J.C, Bunch A, Ardila F, et al. Impact of Medium Cut-Off Dialyzers on Patient-Reported Outcomes: COREXH Registry. *Blood Purif.* 2021;50:110-118.
10. Anwar N, Naz N, Reynolds A, Chamber. HDx: is it a better way to dialyse? *Nephrol Dial Transplant.* 2020;35(3):1109.
11. Bolton S, Gair R, Nilsson LG, Matthews M, Stewart L, McCullagh N. Clinical Assessment of Dialysis Recovery Time and Symptom Burden: Impact of Switching Hemodialysis Therapy Mode. *Patient Relat Outcome Meas.* 2021;12:315-321.
12. Rayner HC, Zepel L, Fuller DS, et al. Recovery time, quality of life, and mortality in hemodialysis patients: the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Am J Kidney Dis.* 2014;64:86–94.
13. Cozzolino M, Magagnoli L, Ciceri P, Conte F, Galassi A. Effects of a medium cut-off (THERANOVA®) dialyser on haemodialysis patients: a prospective, cross-over study. *Clin. Kidney J.* 2021;14(1):382-389.
14. Sanabria RM, Hutchison CA, Vesga, JI, Ariza JG, Sanchez R, Suarez AM. Expanded Hemodialysis and Its Effects on Hospitalizations and Medication Usage: A Cohort Study. *Nephron.* 2021;145(2):179-187.
15. Lim JH, Jeon Y, Yook JM, et al. Medium cut-off dialyzer improves erythropoiesis stimulating agent resistance in a hepcidin-independent manner in maintenance hemodialysis patients: results from a randomized controlled trial. *Sci Rep.* 2020;10(1):1-10.
16. Ariza JG, Walton SM, Suarez AM, Sanabria M, Vesga JI. An initial evaluation of expanded hemodialysis on hospitalizations, drug utilization, costs, and patient utility in Colombia. *Ther Apher Dial.* 2021;25(5):621-627.
17. Hadad-Arrascue F, Nilsson LG, Rivera AS, Bernardo AA, Cabezuelo Romero JB. Expanded hemodialysis as effective alternative to on-line hemodiafiltration: A randomized mid-term clinical trial. *Ther Apher Dial.* 2022;26(1):37-44.
18. Pisoni RL, Wikström B, Elder SJ, et al. Pruritus in haemodialysis patients: International results from the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Nephrol Dial Transplant.* 2006;21(12):3495-3505.
19. Su H, Lei C.T, Zhang C. Interleukin-6 Signaling Pathway and Its Role in Kidney Disease: An Update. *Front Immunol.* 2017;8:405.
20. Kimmel, M, Alscher DM, Dunst R, Braun, et al. The role of micro-inflammation in the pathogenesis of uraemic pruritus in haemodialysis patients. *Nephrology Dialysis Transplantation.* 2006;21(3):749-755.
21. Lin XW, Zhang JF, Qiu MY, et al. Restless legs syndrome in end stage renal disease patients undergoing hemodialysis. *BMC Neurol.* 2019.19:47.
22. Freire de Menezes A, et al. *Int J Nephrol.* 2018;25;2018:1414568.
23. Giannaki CD, et al. Epidemiology, impact and treatment options of restless legs syndrome in end-stage renal disease patients; an evidence based review. *Kidney Int.* 2014;85(6):1275-1282.
24. La Manna G, Pizza F, Persici E et al. Restless legs syndrome enhances cardiovascular risk and mortality in patients with end-stage kidney disease undergoing long- term haemodialysis treatment. *Nephrol Dial Transplant.* 2011;26:1976–1983.
25. Olsson M.G, Allhorn M, Bulow L, et al. Pathological conditions involving extracellular hemoglobin molecular mechanisms, clinical significance, and novel therapeutic opportunities for alpha-1-microglobulin. *Antioxid Redox Signal.* 2012;17:813–846.
26. Bossola M, Tazza L. Postdialysis fatigue: a frequent and debilitating symptom. *Semin Dial.* 2016;29:222–227.
27. Bossola M, Vulpio C, Tazza L. Fatigue in chronic dialysis patients. *Semin Dial.* 2011;24:550–555.
28. Lindsay RM, Heidenheim PA, Nesrallah G, Garg AX, Suri R. Daily hemodialysis study group London health sciences centre: Minutes to recovery after a hemodialysis session: a simple health-related quality of life question that is reliable, valid, and sensitive to change. *Clin J Am Soc Nephrol.* 2006;1:952–959.
29. Bossola M, Di Stasio E, Monteburini T, et al. Recovery Time after Hemodialysis Is Inversely Associated with the Ultrafiltration Rate. *Blood Purif.* 2019;47(1-3):45-51.
30. Bossola M, Di Stasio E, Giungi S, Rosa F, Tazza L. Fatigue is associated with serum interleukin-6 levels and symptoms of depression in patients on chronic hemodialysis. *J Pain Symptom Manag.* 2015;49:578–585.
31. Blackowicz MJ, Falzon L, Beck W, Tran H, Weiner DE. Economic evaluation of expanded hemodialysis with the THERANOVA 400 dialyzer: A post hoc evaluation of a randomized clinical trial in the United States. *Hemodialysis International.* 2022. https://doi.org/10.1111/hdi.13015.
32. Rosner M, Reis T, Husain-Syed, et al. Classification of Uremic Toxins and Their Role in Kidney Failure. *Clin J Am Soc Nephrol.* 2021;16(12):1918-1928.
33. Ronco C, Marchionna N, Brendolan A, Neri M, Lorenzin A, Martínez Rueda AJ. Expanded haemodialysis: from operational mechanism to clinical results. *Nephrology Dialysis Transplantation.* 2018;33(3):iii41–iii47.
34. Wolley M, Jardine M, Hutchison CA. Exploring the Clinical Relevance of Providing Increased Removal of Large Middle Molecules. *Clin J Am Soc Nephrol.* 2018;13(5):805-814.
35. Ronco,C. *Expanded Hemodialysis: Innovative Clinical Approach in Dialysis.* Vol.191. Karger Medical and Scientific Publishers. 2017.
36. Sakurai K. Biomarkers for Evaluation of Clinical Outcomes of Hemodiafiltration. *Blood Purif.* 2013;35(1):64-68.
37. Lorenz G, Schmalenberg M, Kemmner S, et al. Mortality prediction in stable hemodialysis patients is refined by YKL-40, a 40-kDa glycoprotein associated with inflammation. *Kidney Int.* 2018;93(1):221-230.
38. Boschetti-de-Fierro A, Voigt M, Storr M, et al. MCO Membranes: Enhanced Selectivity in High-Flux Class. *Sci Rep.* 2015;5(1):18448.
39. Ronco C, Clark WR. Haemodialysis membranes. *Nat Rev Nephrol.* 2018;14(6):394-410.
40. Device Classification Under Section 513(f)(2)(De Novo). Accessdata.fda.gov. https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/denovo.cfm?id=DEN190042. Published 2020. Accessed April 26, 2022.
41. Mazairac AH, Blankestijn PJ, Grooteman MP, et al. The cost-utility of haemodiafiltration versus haemodialysis in the Convective Transport Study. *Nephrol Dial Transplant.* 2013;28(7):1865-1873.
42. Schepers E, Glorieux G, Eloot S, et al. Assessment of the Association Between Increasing Membrane Pore Size and Endotoxin Permeability Using a Novel Experimental Dialysis Simulation Set-Up. *BMC Nephrol.* 2018;19:1.
43. Boschetti-de-Fierro A, Beck W, Krause B, Hildwein H. Membrane Innovation in Dialysis. *Contrib Nephrol.* 2017;191:100-114.
44. Lorenzin A, Neri M, Lupi A, et al. Quantification of internal filtration in hollow fiber hemodialyzers with medium cut-off membrane. *Blood Purification.* 2018:46(3);196-204.
45. Zuo L, Wu J, Yao Q, et al. Classification of hemodialyzer clinical performance. Zhongguancun Nephropathy Blood Purification Innovation Alliance. 2021:1-4.
46. Clinical Data. Baxter Renal Care. https://renalcare.baxter.com/data-insights/clinical-data. Accessed April 26, 2022.
47. Kandi M, Brignardello-Petersen R, Couban R, Wu C, Nesrallah G. Clinical Outcomes with Medium Cut-Off Versus High-Flux Hemodialysis Membranes: A Systematic Review and Meta-Analysis. *Can J Kidney Health Dis.* 2022:9;1-16. DOI: 10.1177/20543581211067087
48. Ronco C, La Manna G. Expanded Hemodialysis: A New Therapy for a New Class of Membranes. *Contrib Nephrol.* 2017;190:124-133. doi:10.1159/000468959
49. Wolley M, Jardine M, Hutchison CA. Exploring the Clinical Relevance of Providing Increased Removal of Large Middle Molecules. *Clin J Am Soc Nephrol.* 2018;13(5):805-814. doi:10.2215/CJN.10110917
50. EUTOX Uremic Solutes Database. June 2022. Uremic-toxins.org

CE 2797

GBU-RC46-220058 5/2022

MANUFACTURER
Gambro Dialysatoren GmbH
Holger-Crafoord-Strasse 26
72379 Hechingen
Germany

renalcare.baxter.com/therapies/hdx
Baxter Healthcare Corporation
One Baxter Parkway
Deerfield, IL 60015
1-800-422-9837