Uremic toxins by class and linkage with clinical symptoms and outcomes

Classification of Molecules[1]	Representative Molecules[1,7,13]		Relevant Clinical Effects and Symptoms	Dialytic Clearance[1]
Small Molecules <0.5 kDa	**Urea**	(60 Da)	General Uremic Toxicity[2,3]	Removed by Low-Flux HD; Removed by High-Flux HD; Removed by HDF; Removed by HDx therapy; Kidney
	Phosphate	(95 Da)	Vascular Calcification[4] Chronic Kidney Disease-Mineral and Bone Disorder[5]	
Small-middle Molecules 0.5-15 kDa	**PTH**	(9.2 kDa)	Chronic Kidney Disease-Mineral and Bone Disorder[5]	
	Beta 2 microglobulin	(12 kDa)	Amyloidosis/Carpal Tunnel Syndrome[2,3]	
Medium-middle Molecules >15-25 kDa	**Myoglobin**	(17 kDa)	Oxidative Stress & Mitochondrial Dysfunction[3]	
	Kappa free-light-chains	(23 kDa)	Multiple Toxicity[3,6]	
	Complement factor D	(24 kDa)	Contributor to Proinflammatory Status of Uremia[7]	
	Interluekin-6	(25 kDa)	Pruritus[8], Recovery Time[9], Chronic Inflammation[10], CV Disease[10], Protein-Energy Wasting in CKD[10]	
Large-middle Molecules >25-45 kDa	**TNF-alpha**	(26 kDa)	Sepsis[3], Chronic Inflammation[10], CV Disease[10], Protein-Energy Wasting in CKD[10]	
	FGF-23	(32 kDa)	Secondary Immunodeficiency, CV Disease[10]	
	Alpha 1 microglobulin	(33 kDa)	Restless Legs Syndrome (RLS)[4,11]	
	YKL-40	(40 kDa)	Inflammation[12]	
	Lambda free-light-chains	(45 kDa)	Chronic Inflammation, Secondary Immunodeficiency[3]	
Large Molecules [>58 kDa]	**Albumin**	(69 kDa)	Toxin Binding[3]	

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