Supplemental Table 1 – Guidelines, Expert Consensus Statements, and Quality Measure Documents Incorporated in DKD LLM

#	Journal	Year	Title
1	Journal of Molecular Histology	2025	miR-504-3p-HNF1B signaling axis aggravates podocyte injury in diabetic kidney disease[1]
2	Nature Communications	2025	CerS6 links ceramide metabolism to innate immune responses in diabetic kidney disease[2]
3	Diabetology & Metabolic Syndrome	2025	The kidney reabsorption-related magnesium depletion score is associated with cardiovascular disease and longitudinal mortality in diabetic kidney disease patients[3]
4	BMC Nephrology	2023	Urinary orosomucoid and retinol binding protein levels as early diagnostic markers for diabetic kidney Disease[4]
5	Scientific Reports	2025	Expression of urinary exosomal miR-136-5p in diabetic kidney disease and evaluation of its clinical diagnostic value[5]
6	Nature Communications	2024	Podocyte OTUD5 alleviates diabetic kidney disease through deubiquitinating TAK1 and reducing podocyte inflammation and injury[6]
7	Scientific Reports	2024	Association between blood heavy metals and diabetic kidney disease among type 2 diabetic patients: a cross-sectional study[7]
8	Nature cCommunications	2025	Branched-chain amino acids contribute to diabetic kidney disease progression via PKM2-mediated podocyte metabolic reprogramming and apoptosis[8]
9	Biological Trace Element Research	2025	Causal Relationship Between Serum Zinc Levels and Diabetic Kidney Disease (DKD): A Plasma Proteomics Mediation Study[9]
10	Environmental Health	2024	Exposure to cadmium and lead is associated with diabetic kidney disease in diabetic patients[10]
11	Endocrine	2024	Intestinal Trefoil Factor 3: a new biological factor mediating gutkidney crosstalk in diabetic kidney disease[11]
12	BMC Nephrology	2014	Urinary podocyte stress marker as a prognostic indicator for diabetic kidney disease[12]
13	BMC Nephrology	2024	Clinical practice guideline for the management of lipids in adults with diabetic kidney disease: abbreviated summary of the Joint Association of British Clinical Diabetologists and UK Kidney

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			Association (ABCD-UKKA) Guideline 2024[13]
14	International Urology and Nephrology	2025	Unraveling diabetic kidney disease: insights fromNsingle-cell RNA sequencing[14]
15	Scientific Reports	2025	Complement classical and alternative pathway activation contributes to diabetic kidney disease progression: a glomerular proteomics on kidney biopsies[15]
16	Endocrine	2024	Nicotinamide protects against diabetic kidney disease through regulation of Sirt1[16]
17	Acta Pharmacologica Sinica	2025	YY1/HIF-1α/mROS positive-feedback loop exacerbates glomerular mesangial cell proliferation in mouse early diabetic kidney disease[17]
18	Cell Reports	2025	TRIM65 as a key regulator of ferroptosis and glycolysis in lactate-driven renal tubular injury and diabetic kidney disease[18]
19	Diabetology & Metabolic Syndrome	2025	Diagnostic value of the correlation between urinary MDM2 and podocyte mitotic catastrophe in diabetic kidney disease[19]
20	International Urology and Nephrology	2025	Association between daily coffee intake and diabetic kidney disease: evidence from the 2007 to 2016 NHANES[20]
21	Cell Death Discovery	2024	C/EBPα-mediated ACSL4-dependent ferroptosis exacerbates tubular injury in diabetic kidney disease[21]
22	BMC Endocrine Disorders	2025	Incidence and predictors of diabetic kidney disease among type 2 diabetes mellitus adult patients in Ethiopia: a systematic review and meta-analysis[22]
23	Endocrine	2024	Association of dietary iron intake with diabetic kidney disease among individuals with diabetes[23]
24	Diabetologia	2024	The role of PCSK9 in glomerular lipid accumulation and renal injury in diabetic kidney disease[24]
25	Cellular and Molecular Life Sciences	2024	Cytosolic Hmgb1 accumulation in mesangial cells aggravates diabetic kidney disease progression via NFκB signaling pathway[25]
26	Acta Diabetologica	2025	NF-κB p65 mediated lnc-Traf3ip2 exacerbates renal fibrosis in diabetic kidney disease[26]
27	BMC Nephrology	2025	Associations between intercurrent events and cardiorenal clinical outcomes in non-

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			diabetic chronic kidney disease: a real-world retrospective cohort study in the United States[27]
28	Journal of Chromatography B	2025	Network pharmacology and untargeted metabolomics reveal the mechanisms of Bushen Kaixuan Tongluo formula in diabetic kidney disease[28]
29	Apoptosis	2024	IGFBP2 induces podocyte apoptosis promoted by mitochondrial damage via integrin α5/FAK in diabetic kidney disease[29]
30	Annals of Biomedical Engineering	2024	An In Silico Modelling Approach to Predict Hemodynamic Outcomes in Diabetic and Hypertensive Kidney Disease[30]
31	BMC Nephrology	2024	The advance of single cell transcriptome to study kidney immune cells in diabetic kidney disease[31]
32	Inflammation	2025	F2RL1 Inhibition Alleviates Lipotoxicity-Induced Kidney Injury Through the Hippo Pathway in Diabetic Kidney Disease[32]
33	International Urology and Nephrology	2025	Low-intensity extracorporeal shockwave therapy in patients with diabetic kidney disease: a matched cohort study[33]
34	Diabetology International	2025	Long-term effects of esaxerenone in patients with type 2 diabetes, diabetic kidney disease, and hypertension (JDDM77)[34]
35	Clinical and Experimental Nephrology	2025	New interpretation of diabetic nephropathy or diabetic kidney disease from kidney biopsy: review article[35]
36	Diabetes Ther	2024	Triglyceride Glucose Index for the Detection of Diabetic Kidney Disease and Diabetic Peripheral Neuropathy in Hospitalized Patients with Type 2 Diabetes[36]
37	Canadian Journal of Diabetes	2025	Chronic Kidney Disease in Diabetes: A Clinical Practice Guideline[37]
38	Diabetology International	2024	mTORC1 signaling and diabetic kidney disease[38]
39	Irish Journal of Medical Science	2024	Study of prevalence, clinical profile, and predictors of rapid progression in diabetic kidney disease[39]
40	International Urology and Nephrology	2025	Role and application prospective of non-steroidal MRA in the treatment of diabetic kidney disease[40]
41	Journal of the Formosan	2025	2024 Taiwan clinical practice guideline for

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	Medical Association		diabetic kidney disease – an executive summary[41]
42	Nature Communications	2022	Epigenome-wide meta-analysis identifies DNA methylation biomarkers associated with diabetic kidney disease[42]
43	Clinical and Experimental Nephrology	2025	Kidney lesions and risk of cardiovascular events in biopsy-proven diabetic kidney disease with type 2 diabetes[43]
44	Diabetologia	2025	BCKDK accelerates the progression of diabetic kidney disease by regulating leucine-mediated metabolic remodelling in renal tubular cells[44]
45	Egyptian Liver Journal	2024	Prevalence of metabolic dysfunction–associated fatty liver disease among patients with diabetic kidney disease: a systematic review and meta-analysis[45]
46	Scientific Reports	2025	DNMT3B aggravated renal fibrosis in diabetic kidney disease via activating Wnt/β-catenin signaling pathway[46]
47	Journal of Nephrology	2025	Performance of the Kidney Failure Risk Equation according to diabetic status in the CKD-CAREMEAU cohort of patients with chronic kidney disease[47]
48	BMC Nephrology	2025	Plasma proteome signatures of ASK1 inhibition by selonsertib associate with efficacy in the MOSAIC randomized trial for diabetic kidney disease[48]
49	Journal of Diabetes & Metabolic Disorders	2025	Association between the serum Klotho levels and diabetic kidney disease: results from the NHANES 2007–2016 and Mendelian randomization study[49]
50	Scientific Reports	2024	Identification of common biomarkers in diabetic kidney disease and cognitive dysfunction using machine learning algorithms[50]
51	Molecular Medicine	2025	Pyruvate kinase M2 activation maintains mitochondrial metabolism by regulating the interaction between HIF-1α and PGC-1α in diabetic kidney disease[51]
52	Journal of Translational Medicine	2025	EphrinB2 alleviates tubulointerstitial fibrosis in diabetic kidney disease[52]
53	Clinical and Experimental Nephrology	2025	Association of diabetic retinopathy with kidney disease progression according to baseline kidney function and albuminuria status in individuals with type 2 diabetes[53]
54	Nefrologia	2025	Clinical Practice Guideline for detection and management of diabetic kidney disease: A consensus report by the Spanish Society of Nephrology[54]

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55	Nature Communications	2024	NDUFS4 regulates cristae remodeling in diabetic kidney disease[55]
56	Journal of Nephrology	2025	Diabetic kidney disease and cardiac autonomic neuropathy: insights on exercise rehabilitation[56]
57	Diabetologia	2025	Differences in biopsy-proven diabetic kidney disease in individuals from Polynesia vs mainland France: a retrospective cohort study[57]
58	Journal of Nutritional Biochemistry	2025	Ketone bodies in renal function and diabetic kidney disease Hamza Mechchate[58]
59	Nature Communications	2025	Urinary Complement proteome strongly linked to diabetic kidney disease progression[59]
60	Cell Death and Disease	2025	Nedd4-2 ablation in kidney improves glycaemic control in diabetic mice[60]
61	BMC Oral Health	2025	Characteristics of tongue coating microbiota in diabetic and non-diabetic kidney patients receiving hemodialysis[61]
62	Chinese Medicine	2024	Total flavonoids of Astragalus protects glomerular filtration barrier in diabetic kidney disease[62]
63	Free Radical Biology and Medicine	2025	Novel coumarin derivative SZC-6 as an allosteric activator of SIRT3 alleviates diabetic kidney disease via the SIRT3-Foxo3a signaling axis[63]
64	BMC Medical Imaging	2025	Magnetic resonance imaging for noninvasive assessment of renal fat deposition and hypoxia in diabetic kidney disease[64]
65	Nephrology	2025	Asian Pacific Society of Nephrology Clinical Practice Guideline on Diabetic Kidney Disease—2025 Update[65]
66	Journal of Advanced Research	2025	Podocyte TLR4 deletion alleviates diabetic kidney disease through prohibiting PKCd/SHP-1-dependent ER stress and relieving podocyte damage and inflammation[66]
67	Cell Communication and Signaling	2024	Inhibition of SGLT2 protects podocytes in diabetic kidney disease by rebalancing mitochondria-associated endoplasmic reticulum membranes[67]
68	Inflammation	2025	Canagliflozin Attenuates Podocyte Inflammatory Injury through Suppressing the TXNIP/NLRP3 Signaling Pathway in Diabetic Kidney Disease Mice[68]

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69	Nature Communications	2023	DNA methylation markers for kidney function and progression of diabetic kidney disease[69]
70	BMC Nephrology	2025	CTSS and CD53: Emerging m6A methylation markers in diabetic kidney disease pathogenesis and their clinical implications[70]
71	Applied Biological Chemistry	2025	Effect of advanced glycation end products formed methylglyoxal, a food-borne dicarbonyl precursor, on the exacerbation of diabetic kidney disease by NOX4/Nrf2/ NLRP3 inflammasome signaling pathway in db/db mice[71]
72	Nature Communications	2024	Profiling of insulin-resistant kidney models and human biopsies reveals common and cell-type-specific mechanisms underpinning Diabetic Kidney Disease[72]
73	Egyptian Journal of Radiology and Nuclear Medicine	2023	Renal resistive index as a marker of histopathological damage in diabetic and non-diabetic chronic kidney disease[73]
74	Scientific Reports	2025	The biosensor using the target urine volatile organic compounds for detecting diabetic kidney disease[74]
75	Clinical and Experimental Nephrology	2025	The health-economic impact of urine albumin-to-creatinine ratio testing for chronic kidney disease in Japanese non-diabetic patients[75]
76	Diabetologia	2024	Spatial proteomics of human diabetic kidney disease, from health to class III[76]
77	Scientific Reports	2025	Glucagon like peptide-1 modulates urinary sodium excretion in diabetic kidney disease via ENaC activation[77]
78	Journal of Nephrology	2025	The role of hypoxia-inducible factors 1 and 2 in the pathogenesis of diabetic kidney disease[78]
79	Renal Replacement Therapy	2024	Effectiveness of educational programs for patients with diabetic kidney disease: a systematic review and meta-analysis[79]
80	Clinical and Experimental Nephrology	2024	Diabetic kidney disease: the kidney disease relevant to individuals with diabetes[80]
81	Cell Death Discovery	2024	EHHADH deficiency regulates pexophagy and accelerates tubulointerstitial injury in diabetic kidney disease[81]
82	Diabetologia	2025	Health economic evaluation of a risk-stratified intervention in diabetic kidney disease[82]
83	Scientific Reports	2024	ASK-1 activation exacerbates kidney dysfunction via increment of glomerular

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			permeability and accelerates cellular aging in diabetic kidney disease model mice[83]
84	Phytomedicine Plus	2025	Recent advances in Tripterygium wilfordii Hook F against diabetic kidney disease: A review of preclinical and clinical evidences[84]
85	BMC Nephrology	2025	Characterization of diabetic kidney disease in 235 patients: clinical and pathological insights with or without concurrent nondiabetic kidney disease[85]
86	Cardiovascular Diabetology	2025	A validated multivariable machine learning model to predict cardio-kidney risk in diabetic kidney disease[86]
87	Cardiovascular Diabetology	2025	Diabetic kidney disease phenotypes and the risk of cardiovascular events: The Silesia Diabetes-Heart Project[87]
88	Scientific Reports	2025	Impact of optimal anti-proteinuric therapy on the prevention of diabetic kidney disease progression[88]
89	Diabetology & Metabolic Syndrome	2024	Association of haemoglobin glycation index with all-cause and cardiovascular disease mortality in diabetic kidney disease: a cohort study[89]
90	International Urology and Nephrology	2025	Metformin attenuates endoplasmic reticulum stress in diabetic kidney disease: mechanistic insights and future perspectives[90]
91	Cell Communication and Signaling	2024	DOT1L protects against podocyte injury in diabetic kidney disease through phospholipase C-like 1[91]
92	Scientific Reports	2025	Predicting diabetic kidney disease with serum metabolomics and gut microbiota[92]
93	Scientific Reports	2024	Physical activity and renal outcome in diabetic and non-diabetic patients with chronic kidney disease stage G3b to G5[93]
94	eClinicalMedicine	2025	Familial clustering of diabetic kidney disease and retinopathy in offspring of parents with type 1 diabetes: a populationbased study[94]
95	International Urology and Nephrology	2025	SGLT2 inhibitors do not cause de novo urinary incontinence in diabetic female patients with chronic kidney disease[95]
96	Diabetology & Metabolic Syndrome	2024	Tadalafil versus pentoxifylline in the management of diabetic kidney disease: a randomized clinical trial[96]
97	International Urology and Nephrology	2025	Discussion on the treatment of diabetic kidney disease based on the “gut–fat–kidney” axis[97]
98	BMC Nephrology	2024	Effect of multidisciplinary care on diabetic

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			kidney disease: a retrospective cohort study[98]
99	Hypertension Research	2024	Pulse pressure and kidney outcomes in diabetic kidney disease[99]
100	Journal of Molecular Medicine	2024	The therapeutic effect of mesenchymal stem cells in diabetic kidney disease[100]
101	Journal of Nanobiotechnology	2025	RGD-HSA-TAC nanoparticles targeted delivery of tacrolimus and attenuation of podocyte injury in diabetic kidney disease[101]
102	Nature Communications	2024	Podocyte-specific KLF6 primes proximal tubule CaMK1D signaling to attenuate diabetic kidney disease[102]
103	Chinese Journal of Integrative Medicine	2025	Modified Hu-Lu-Ba-Wan Alleviates Early-Stage Diabetic Kidney Disease via Inhibiting Interleukin-17A in Mice[103]
104	Scientific Reports	2025	Alvespimycin is identified as a novel therapeutic agent for diabetic kidney disease by chemical screening targeting extracellular vesicles[104]
105	Molecular Genetics and Genomics	2025	DNA methylation biomarkers in diabetic kidney disease: insights and implications[105]
106	Cell Death and Disease	2024	Mitochondrial metabolic reprogramming in diabetic kidney disease[106]
107	Journal of Nephrology	2025	Targeting endothelin signaling in podocyte injury and diabetic nephropathy-diabetic kidney disease[107]
108	Nature Communications	2024	Factor XII signaling via uPAR-integrin β1 axis promotes tubular senescence in diabetic kidney disease[108]
109	Diabetology & Metabolic Syndrome	2025	Decoding diabetic kidney disease: a comprehensive review of interconnected pathways, molecular mediators, and therapeutic insights[109]
110	Journal of Cardiovascular Magnetic Resonance	2025	Highly efficient, free-breathing whole-chest equilibrium phase bT1RESS MR angiography: Initial clinical experience[110]
111	Nutrition, Metabolism & Cardiovascular Diseases	2020	Indications for renal biopsy in patients with diabetes.Joint position statement of the Italian Society of Nephrology and the Italian Diabetes Society[111]
112	Diabetologia	2025	Sex differences in the efficacy of angiotensin receptor blockers on kidney and cardiovascular outcomes among individuals with type 2 diabetes and diabetic kidney disease: post hoc analyses of the RENAAL and IDNT trials[112]
113	Abdominal Radiology	2025	Evaluation of iron deposition in diabetic

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			kidney disease using the kidney-to-muscle signal intensity ratio on routine MRIT2WI sequences[113]
114	Clinical and Experimental Nephrology	2025	Ultrasonic renal length as an indicator of renal fibrosis severity in non-diabetic patients with chronic kidney disease[114]
115	International Journal of Diabetes in Developing Countries	2025	Evaluating intra-renal resistive index as a non-invasive marker for declining eGFR and progression of diabetic kidney disease[115]
116	BMC Nephrology	2025	Non-linear relationship between urinary creatinine and diabetic kidney disease: implications for clinical practice[116]
117	Cardiovascular Diabetology	2025	The association between stress-induced hyperglycemia ratio and cardiovascular events as well as all-cause mortality in patients with chronic kidney disease and diabetic nephropathy[117]
118	Chinese Medicine	2025	Traditional Chinese medicine in diabetic kidney disease: multifaceted therapeutic mechanisms and research progress[118]
119	Journal of Nephrology	2025	From bytes to nephrons: AI's journey in diabetic kidney disease[119]
120	BMC Nephrology	2024	Glomerular crescents are associated with the risk of type 2 diabetic kidney disease progression: a retrospective cohort study[120]
121	Diabetology International	2023	Lost in translation: assessing the nomenclature change for diabetic kidney disease in Japan[121]
122	International Journal of Diabetes in Developing Countries	2025	Optimized multiparametric approach for early detection of kidney disease in diabetic patients[122]
123	Kidney International Reports	2025	Intraarterial Autologous Mesenchymal Stem Cell Therapy for Diabetic Kidney Disease[123]
124	Nature Communications	2022	Reversal of the renal hyperglycemic memory in diabetic kidney disease by targeting sustained tubular p21 expression[124]
125	Scientific Reports	2025	Protein-bound uremic toxin clearance as biomarker of kidney tubular function in diabetic kidney disease[125]
126	Beni-Suef University Journal of Basic and Applied Sciences	2025	Exploring the combined diagnostic role of serum MBL in association with renal resistive index and renal shear wave elastography in diabetic kidney disease patients[126]
127	BMC Nephrology	2025	Kidney transcriptomics signature of

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			prospective rapid diabetic kidney disease progression[127]
128	Journal of Beijing University of Traditional Chinese Medicine	2024	Diagnosis and treatment guideline of integrated traditional Chinese andwestern medicine for diabetic kidney disease[128]
129	Internal Medicine: Theory and Practice	2023	Interpretation of the Chinese Expert Consensus on the Understanding and Management of Renal Anemia in Diabetic Kidney Disease (2023 Version)[129]
130	Chin J Diabetes Mellitus	2025	Expert consensus on early screening and management of diabetic kidney disease (2025 edition)[130]
131	Diagnostic Atlas of Renal Pathology，3rd edition	2021	Renovascular Lesions: Diabetic Nephropathy[131]
132	Clinical Renal Pathology	2021	Metabolic Glomerulopathy: Diabetic Nephropathy[132]
133	Chinese Journal for Clinicians	2020	Expert Consensus on Multidisciplinary Diagnosis, Treatment and Management of Diabetic Kidney Disease[133]
134	Chinese Research Hospitals	2024	Expert consensus on integrated traditional Chinese and Western medicine treatment and follow-up management of diabetic kidney disease in primary care clinicians[134]

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Supplementary Note 1: Standardized Prompt Templates and Hyperparameter Configurations

To guarantee an equitable, unbiased, and highly reproducible comparative evaluation across all language models, strict control over the generation parameters and prompt structures was maintained throughout the validation process. The following decoding hyperparameters were uniformly applied to all baseline models (DeepSeek-Base, GPT-4o, GPT-o3) and the proposed DeepSeek-RAG system:

- **Temperature:** 0.1 (selected to minimize probabilistic hallucinations and ensure deterministic, factual medical generation)
- **Top-p:** 0.90
- **Frequency Penalty:** 0.0
- **Max Tokens:** 2048

During the retrospective evaluation of the 267 cases, the exact de-identified clinical vignettes were provided to all models without any model-specific manual rephrasing, formatting alterations, or prompt engineering biases. Below is the complete prompt template utilized during the inference phase, using the representative case from Figure 2A as the clinical input example.

1. Standardized Prompt Configuration for Baseline Models (DeepSeek-Base, GPT-4o, GPT-o3)

For the unaugmented foundation and cloud-based reasoning models, a uniform zero-shot clinical instruction was applied to establish the medical persona and standardize the output format.

- **System Prompt:**

  "You are an expert nephrologist specialized in Diabetic Kidney Disease (DKD). Based on the provided patient information, please conduct a comprehensive clinical analysis. You must provide a precise diagnosis, evaluate the risks, and recommend an individualized, guideline-compliant management plan including pharmacotherapy, necessary further diagnostic tests, and lifestyle interventions.

Do not output fabricated information."

- **User Prompt (Clinical Input Example from Fig. 2A):**

  "Patient, male, 58 years old, admitted for 'bilateral lower limb edema with increased nocturnal urination for 3 months, worsening with fatigue for 1 week.' The patient was diagnosed with type 2 diabetes mellitus 20 years prior. Long-term oral metformin therapy has been ineffective, with blood glucose fluctuating between 8–14 mmol/L. Over the past six months, foamy urine has significantly increased, and bilateral lower limb edema has recently worsened. Physical examination: Blood pressure 156/92 mmHg, pitting edema of both lower limbs, no significant abnormalities in cardiac or pulmonary examination. Laboratory findings: Fasting blood glucose 11.2 mmol/L, glycated hemoglobin (HbA1c) 8.7%, urinary protein 3.2 g/24h , serum creatinine 165 μmol/L, estimated glomerular filtration rate (eGFR) 45 ml/min/1.73 m^2, and markedly elevated urinary albumin-to-creatinine ratio (ACR). Diabetic retinopathy was observed on fundus examination. Renal color Doppler ultrasound showed normal bilateral kidney size with increased cortical echogenicity."

2. Context-Injected Prompt Configuration for the Proposed System (DeepSeek-RAG)

For the proposed hierarchical multi-agent system (specifically the Tier 2 Enhanced Reasoning Agent), the identical base instruction and clinical vignette were utilized. However, the system prompt was augmented with dynamically retrieved context from the curated DKD evidence corpus.

- **System Prompt:**

  "You are an expert nephrologist specialized in Diabetic Kidney Disease (DKD). Based on the provided patient information AND the retrieved authoritative clinical guidelines in the context block below, please conduct a comprehensive clinical analysis. Your diagnostic and therapeutic recommendations must strictly adhere to the provided reference context, paying specific attention to quantitative thresholds (e.g., eGFR contraindications). You must provide a

precise diagnosis, evaluate the risks, and recommend a management plan. Explicitly cite the references used for your medical decisions at the end of each specific recommendation."

- **Retrieved Context Block:**

  "[The top-k most semantically relevant text chunks dynamically retrieved from the Milvus vector database, such as specific KDIGO 2024 guideline clauses regarding SGLT2i initiation and metformin discontinuation thresholds at eGFR < 45 ml/min/1.73 m².]"

- **User Prompt (Clinical Input Example from Fig. 2A):**

  "Patient, male, 58 years old, admitted for 'bilateral lower limb edema with increased nocturnal urination for 3 months, worsening with fatigue for 1 week.' The patient was diagnosed with type 2 diabetes mellitus 20 years prior. Long-term oral metformin therapy has been ineffective, with blood glucose fluctuating between 8–14 mmol/L. Over the past six months, foamy urine has significantly increased, and bilateral lower limb edema has recently worsened. Physical examination: Blood pressure 156/92 mmHg, pitting edema of both lower limbs, no significant abnormalities in cardiac or pulmonary examination. Laboratory findings: Fasting blood glucose 11.2 mmol/L, glycated hemoglobin (HbA1c) 8.7%, urinary protein 3.2 g/24h , serum creatinine 165 μmol/L, estimated glomerular filtration rate (eGFR) 45 ml/min/1.73 m², and markedly elevated urinary albumin-to-creatinine ratio (ACR). Diabetic retinopathy was observed on fundus examination. Renal color Doppler ultrasound showed normal bilateral kidney size with increased cortical echogenicity."