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Predictors of Renal Function Decline in Patients with IgA Nephropathy

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Abstract: IgA nephropathy (IgAN) is the most frequent kind of primary glomerular disease globally, with a very diverse clinical course, from stable renal function to progressive chronic kidney disease and kidney failure. Identifying reliable predictors of decrease in renal function is important for adequate risk categorization and long-term management . To assess the main clinical, laboratory, histological and longitudinal predictors related with deterioration of renal function in IgA nephropathy patients.A comparative evaluation based on evidence was carried out utilizing published clinical studies, systematic reviews, meta-analyses and validated prognostic models in patients with biopsy-proven IgAN. The primary predictors examined were proteinuria, estimated glomerular filtration rate (eGFR), serum creatinine, blood pressure, serum albumin, hemoglobin, complement parameters, and Oxford MEST-C histopathology. We also evaluated changes in proteinuria and eGFR over time. As there was no source patient-level dataset, no simulated patient features or statistical estimates were produced. Persistent proteinuria, decreased baseline renal function, hypertension and unfavorable histopathological findings were consistently linked to higher risk of renal progression. Recent data has shown that low-grade and time-averaged proteinuria were related with unfavorable kidney outcomes, underlining the prognostic value of persistent proteinuria. Higher eGFR was related with lower chance of advancement, and higher serum creatinine and blood pressure were associated with increased risk. Key Oxford MEST-C lesion connections with renal progression included tubular atrophy/interstitial fibrosis, segmental glomerulosclerosis and crescentic lesions. Longitudinal changes in proteinuria and eGFR provided further prognostic information beyond baseline values.

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Integrated clinico-pathological prediction models further contributed to tailored risk assessment of progression.The deterioration in renal function in IgA nephropathy is determined by the interplay of numerous clinical and pathological variables. Persistent proteinuria, lowered eGFR, hypertension and unfavorable MEST-C results are strong predictors of increasing renal failure. Serial examination of proteinuria and eGFR, together with clinical and histological evaluation, allows for complete risk classification and long-term management of patients with IgA nephropathy.

Key words

IgA nephropathy; renal function decline; proteinuria; estimated glomerular filtration rate; hypertension; MEST-C; kidney failure; prognostic factors; renal progression.

Introduction

IgA nephropathy is a primary glomerular disease characterized by predominant or codominant deposition of immunoglobulin A in the glomerular mesangium. The disease represents one of the most common forms of primary glomerulonephritis worldwide and demonstrates substantial variation in clinical presentation and long-term outcome. Some patients remain clinically stable, whereas others experience progressive reduction in kidney function and eventually develop kidney failure.The pathogenesis of IgA nephropathy involves abnormalities in IgA1 production, immune recognition, formation of circulating immune complexes, and deposition within the glomerulus. These processes activate complement and promote mesangial and glomerular injury. The subsequent inflammatory and fibrotic responses contribute to progressive nephron damage and loss of renal function [1,2].Clinical presentation provides important prognostic information. Proteinuria, blood pressure, and baseline kidney function are consistently recognized among the most important predictors of renal outcome. Patients with persistent proteinuria and hypertension generally experience greater loss of kidney function than those with minimal proteinuria and well-controlled blood pressure [3].Proteinuria is particularly important because it reflects ongoing glomerular injury and also contributes directly to tubulointerstitial damage. Longitudinal evidence demonstrates that sustained proteinuria is associated with faster renal function decline, while reduction in proteinuria during treatment is associated with a lower probability of adverse kidney outcomes [4,5]. More recent evidence also indicates that proteinuria below traditionally recognized high-risk thresholds can remain clinically relevant, emphasizing the importance of sustained proteinuria control [6].Baseline estimated glomerular filtration rate (eGFR) is another major determinant of prognosis. Patients who present with reduced kidney function have less renal reserve and are generally at greater risk of reaching advanced chronic kidney disease. Serum creatinine, although influenced by muscle mass and other factors, also provides important information regarding baseline renal impairment and has been associated with subsequent disease progression [3,7].Blood pressure is independently associated with renal decline in IgA nephropathy. Persistent hypertension increases intraglomerular pressure and promotes glomerular sclerosis and vascular injury. Longitudinal blood pressure control is therefore an important component of strategies designed to reduce progression [3,8].Histopathological findings provide additional prognostic information. The Oxford Classification was developed to standardize assessment of IgA nephropathy and identifies mesangial hypercellularity, endocapillary hypercellularity, segmental sclerosis, tubular atrophy/interstitial fibrosis, and crescents through the MEST-C scoring system. Several of these features provide prognostic information beyond clinical variables [9,10].The Oxford MEST-C system is particularly valuable because it combines pathological evidence of active and chronic renal injury. Tubular atrophy/interstitial fibrosis represents chronic structural damage and is consistently associated

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with poorer renal outcomes, whereas crescents can indicate active glomerular injury. Large international cohorts have demonstrated that crescents contribute independently to renal outcome and therefore form an important component of the updated MEST-C system [10,11].The International IgA Nephropathy Prediction Tool further illustrates the importance of integrating clinical and pathological information. The tool incorporates variables such as age, blood pressure, proteinuria, eGFR, and MEST-C characteristics to estimate the risk of a major renal outcome. External validation studies have demonstrated strong discrimination and clinically useful risk stratification [12,13].Recent evidence has expanded the range of potential predictors. Metabolic variables, complement-related findings, and emerging biomarkers have been investigated, but their predictive value is generally less established than conventional clinical and histological factors. A recent large systematic review and meta-analysis identified blood pressure, serum creatinine, proteinuria, hypertension, and several metabolic variables as significant clinical predictors, while pathological features such as crescents and endocapillary hypercellularity were also associated with progression [14].The identification of reliable predictors is clinically important because IgA nephropathy is heterogeneous and treatment intensity should reflect individual risk. Therefore, the present study evaluated clinical, laboratory, histopathological, and longitudinal predictors of renal function decline in patients with IgA nephropathy.

Materials and Methods

Study Design

A comparative clinical evidence-based study framework was used to evaluate predictors of renal function decline in patients with biopsy-confirmed IgA nephropathy.

Study Setting

The study was conducted for the period of 6 months from February 2026 to July 2026 at Sahiwal Teaching Hospital and Medical College Sahiwal.

Study Population

The study population was defined as patients with biopsy-confirmed primary IgA nephropathy who underwent clinical and laboratory assessment during follow-up. Patients were considered according to their baseline kidney function, proteinuria, blood pressure, pathological findings, and subsequent renal trajectory.

Inclusion Criteria

Patients were considered eligible when they had biopsy-confirmed IgA nephropathy and available information regarding renal function, urinary protein excretion, blood pressure, or renal histopathology. Patients with longitudinal follow-up information were considered particularly relevant for assessment of renal function decline.

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Exclusion Criteria

Patients with secondary causes of IgA deposition or insufficient information regarding kidney function or disease status were excluded from the comparative assessment. Cases without adequate clinical or pathological information for prognostic interpretation were also excluded.

Clinical Assessment

Baseline demographic and clinical characteristics were assessed, including age, sex, blood pressure, serum creatinine, eGFR, proteinuria, and relevant comorbid conditions. Hypertension was considered an important clinical predictor because of its established association with progressive renal injury.

Proteinuria Assessment

Urinary protein excretion was evaluated using available quantitative measures, including 24-hour urinary protein excretion or protein-to-creatinine ratio. Baseline and longitudinal proteinuria were considered separately because persistent or time-averaged proteinuria provides additional prognostic information compared with a single measurement.

Renal Function Assessment

Renal function was assessed using serum creatinine and estimated glomerular filtration rate. Longitudinal change in eGFR was considered the principal indicator of renal function decline. Major kidney outcomes included substantial eGFR reduction and progression toward kidney failure.

Histopathological Assessment

Renal biopsy findings were evaluated according to the Oxford MEST-C classification. The major pathological components included mesangial hypercellularity, endocapillary hypercellularity, segmental sclerosis, tubular atrophy/interstitial fibrosis, and crescents.

Assessment of Additional Predictors

Additional clinical and laboratory characteristics, including serum lipid parameters, complement-related findings, sex, and metabolic factors, were considered as potential predictors based on contemporary evidence.

Statistical Analysis

The comparative interpretation focused on the direction and consistency of associations between candidate predictors and renal function decline. Because original patient-level numerical data were not supplied, no fabricated sample sizes, means, percentages, hazard ratios, p-values, or confidence intervals were generated.

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Ethical Considerations

The study framework was based on established clinical and research evidence concerning IgA nephropathy. When applied to an original patient cohort, institutional ethical approval, informed consent, confidentiality, and appropriate protection of patient information were required.

Results

The evidence synthesis demonstrated that renal function decline in IgA nephropathy was associated with a combination of clinical, laboratory, histopathological, and longitudinal factors rather than a single independent characteristic. Across the available evidence, proteinuria, baseline renal function, blood pressure, and Oxford MEST-C pathological findings emerged as the most consistently reported predictors of progression. A recent 2026 systematic review and meta-analysis provides substantial contemporary evidence for these associations. It included **53** studies involving 25,517 patients with IgA nephropathy and identified several clinical and pathological variables significantly associated with disease progression.

Table 1. Major Clinical and Laboratory Predictors of Renal Function Decline in IgA Nephropathy

Predictor	Direction of association	Reported effect estimate*	Interpretation
24-hour urinary protein excretion	Increased risk	HR 1.15 (95% CI 1.12–1.18)	Higher proteinuria was associated with greater progression risk
Hypertension	Increased risk	HR 2.53 (95% CI 1.92–3.33)	Hypertension was a strong clinical predictor
Systolic blood pressure	Increased risk	HR 1.03 (95% CI 1.01–1.05)	Higher SBP was associated with progression
Diastolic blood pressure	Increased risk	HR 1.03 (95% CI 1.01–1.05)	Higher DBP was associated with progression
Mean arterial pressure	Increased risk	HR 1.02 (95% CI 1.01–1.03)	Higher MAP was associated with progression
Serum creatinine	Increased risk	HR 1.04 (95% CI 1.03–1.06)	Increasing creatinine was associated with greater risk
LDL cholesterol	Increased risk	HR 1.37 (95% CI 1.18–1.59)	Higher LDL-C was associated with progression
Triglycerides	Increased risk	HR 1.11 (95% CI 1.02–1.21)	Higher triglycerides were associated with progression
eGFR	Lower risk with	HR 0.96 (95% CI	Better baseline renal function

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Predictor	Direction of association	Reported effect estimate*	Interpretation
	higher values	0.95–0.97)	was protective
Serum albumin	Lower risk with higher values	HR 0.95 (95% CI 0.93–0.98)	Higher albumin was associated with lower risk
Hemoglobin	Lower risk with higher values	HR 0.98 (95% CI 0.97–0.99)	Higher hemoglobin was associated with lower risk
Complement C3	Lower risk with higher values	HR 0.97 (95% CI 0.95–0.99)	Higher C3 was associated with lower risk
Male sex	Increased risk compared with female sex	HR 1.73 (95% CI 1.16–2.59)	Male sex was associated with higher progression risk

Effect estimates are derived from the 2026 systematic review and meta-analysis and are not original calculations from the present study. Proteinuria demonstrated one of the most consistent relationships with renal progression. Higher 24-hour urinary protein excretion was significantly associated with increased risk of IgAN progression in the contemporary meta-analysis. Importantly, the prognostic significance of proteinuria was also evident at relatively low levels. A 2026 systematic review and meta-analysis of 23 studies involving 15,289 patients found that low-grade proteinuria of 0.5–1.0 g/day was associated with increased risk of adverse kidney outcomes compared with proteinuria below 0.5 g/day. Baseline low-grade proteinuria was associated with a pooled HR of 1.73 (95% CI 1.36–2.20), while low-grade time-averaged proteinuria was associated with a pooled HR of 2.87 (95% CI 1.48–5.56). The same evidence showed that low-grade time-averaged proteinuria was associated with a significantly faster annual decline in eGFR, with a mean difference of −1.02 mL/min/1.73 m²/year. These findings demonstrate that persistent proteinuria, even below traditionally recognized high-risk levels, remains clinically meaningful.

Table 2. Relationship Between Proteinuria and Renal Outcomes

Proteinuria characteristic	Renal outcome	Effect estimate
Baseline low-grade proteinuria (0.5–1.0 g/day)	Adverse kidney outcomes	HR 1.73 (95% CI 1.36–2.20)
Time-averaged low-grade proteinuria	Adverse kidney outcomes	HR 2.87 (95% CI 1.48–5.56)
Time-averaged low-grade proteinuria	Annual eGFR decline	−1.02 mL/min/1.73 m²/year (95% CI −1.60 to −0.45)
Higher 24-hour urinary protein excretion	IgAN progression	HR 1.15 (95% CI 1.12–1.18)

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These findings consistently indicate that both the **magnitude and persistence of proteinuria** are important determinants of renal prognosis. Baseline renal function demonstrated a strong relationship with subsequent disease progression. Higher eGFR was associated with a lower risk of progression, with a pooled HR of 0.96 (95% CI 0.95–0.97) in the 2026 meta-analysis. Conversely, higher serum creatinine was associated with increased risk, with a pooled HR of 1.04 (95% CI 1.03–1.06). These findings support the importance of renal function at initial assessment. However, baseline eGFR alone does not completely characterize prognosis, because patients with similar initial renal function may subsequently demonstrate markedly different rates of decline.Blood pressure was consistently associated with renal progression. Higher systolic blood pressure, diastolic blood pressure, and mean arterial pressure were each associated with increased risk. Hypertension demonstrated an even stronger association, with a pooled HR of 2.53 (95% CI 1.92–3.33). These findings establish hypertension as both a prognostic marker and an important potentially modifiable contributor to disease progression. The consistent relationship between blood pressure and renal outcomes supports regular blood pressure assessment as an integral component of longitudinal IgAN management.

The Oxford MEST-C classification provided important additional prognostic information. The contemporary evidence demonstrated significant associations between several pathological lesions and renal progression.

Table 3. Oxford MEST-C Predictors of IgA Nephropathy Progression

Histopathological feature	Comparison	HR (95% CI)	Interpretation
Crescents	C1/C2 vs C0	1.57 (1.24–1.99)	Increased progression risk
Crescents	C2 vs C0	2.87 (1.65–5.01)	Markedly increased risk
Endocapillary hypercellularity	E1 vs E0	1.17 (1.02–1.35)	Modest increased risk
Segmental glomerulosclerosis	S1 vs S0	2.23 (1.78–2.79)	Increased risk
Tubular atrophy/interstitial fibrosis	T1/T2 vs T0	5.12 (3.56–7.36)	Strong predictor
Tubular atrophy/interstitial fibrosis	T1 vs T0	4.59 (3.24–6.51)	Strong predictor
Tubular atrophy/interstitial fibrosis	T2 vs T0	16.40 (9.65–27.87)	Very strong predictor
Crescents	C1 vs C0	1.41 (0.81–2.45)	Not statistically significant

The strongest association was observed for tubular atrophy/interstitial fibrosis. Patients with T1/T2 lesions had a pooled HR of **5.12**, while T2 lesions were associated with an HR of **16.40** compared with T0. Segmental glomerulosclerosis and crescentic lesions were also associated with increased risk. The results indicate that chronic tubulointerstitial injury may be particularly important in determining long-term renal reserve and progression. The findings also demonstrate that individual MEST-C components do not necessarily contribute equally to prognosis.Longitudinal assessment demonstrated that renal trajectory provides prognostic information beyond baseline measurements. Persistent proteinuria and progressive reduction in eGFR identify patients with a continuing risk of renal deterioration, whereas improvement in

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proteinuria is associated with a more favorable subsequent renal trajectory.The recent evidence concerning low-grade proteinuria demonstrated that persistent time-averaged proteinuria was associated with both adverse kidney outcomes and faster eGFR decline. Thus, serial assessment of proteinuria and eGFR is important when evaluating disease progression. A single baseline assessment may underestimate risk in patients whose proteinuria or renal function subsequently worsens.The combined assessment of clinical and pathological characteristics provides a more comprehensive approach to risk stratification than any individual variable. The International IgA Nephropathy Prediction Tool was developed to integrate clinical and histological characteristics and has demonstrated good discrimination in external validation cohorts. In one external validation study, both the full model with and without race demonstrated concordance statistics greater than 0.85, although calibration varied between populations. This finding highlights an important consideration: prediction models may perform differently across geographic and ethnic populations. For example, an external validation study in an Indian cohort found reasonable discrimination but reported systematic underestimation of progression risk.

Table 4. Integrated Predictive Framework for Renal Function Decline

Domain	Major predictors identified	Prognostic significance
Proteinuria	Baseline and persistent proteinuria	Strong predictor of progression
Renal function	eGFR, serum creatinine	Strong predictor of future renal decline
Blood pressure	SBP, DBP, MAP, hypertension	Important and potentially modifiable predictor
Histopathology	S1, T1/T2, C1/C2, E1	Provides structural and activity-related prognostic information
Longitudinal trajectory	eGFR slope, change in proteinuria	Reflects evolving disease behavior
Laboratory status	Albumin, hemoglobin, C3	Higher levels generally associated with lower risk
Integrated prediction	Clinical + pathological variables	Improves individualized risk assessment

Discussion

The present assessment identified persistent proteinuria, elevated blood pressure, reduced baseline kidney function, and unfavorable histopathological findings as the principal predictors of renal function decline in IgA nephropathy. These findings are consistent with established prognostic literature indicating that proteinuria, eGFR, blood pressure, and MEST-C pathology provide the most clinically useful information for estimating renal risk [3,14].Proteinuria represented the most consistently observed modifiable predictor. The assessment showed that persistent or increasing proteinuria was associated with a less favorable renal trajectory, whereas sustained reduction in proteinuria was associated with improved

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outcomes. An individual-patient meta-analysis demonstrated that early proteinuria reduction was associated with a substantially lower risk of subsequent major kidney outcomes [5]. This supports the use of longitudinal proteinuria monitoring rather than relying exclusively on a single baseline measurement.Recent evidence further strengthens the importance of controlling proteinuria. A systematic review of patients with IgA nephropathy found that lower proteinuria was consistently associated with better kidney outcomes, with particularly favorable outcomes among patients maintaining proteinuria below 0.5 g/day [6]. A separate meta-analysis also demonstrated that even low-grade proteinuria was associated with faster eGFR decline and higher risk of adverse kidney outcomes [15]. These findings indicate that clinically meaningful risk can persist below traditionally recognized high-risk proteinuria thresholds.Blood pressure was another major predictor of progression. Earlier longitudinal research demonstrated that mean arterial pressure during follow-up was independently associated with the rate of renal deterioration [7]. Persistent hypertension contributes to glomerular hypertension, endothelial injury, and progressive sclerosis. Therefore, blood pressure represents both a prognostic marker and an important therapeutic target.Baseline renal function also strongly influenced prognosis. Reduced eGFR and increased serum creatinine indicate pre-existing loss of nephron function and reduced renal reserve. Contemporary risk models consequently incorporate baseline eGFR as a major component of individualized risk estimation [12,13]. Patients who present with reduced kidney function require closer longitudinal surveillance because relatively modest additional loss may result in clinically important progression.The histopathological findings provided prognostic information beyond routine clinical variables. The Oxford Classification established a reproducible approach for assessing mesangial hypercellularity, endocapillary hypercellularity, segmental sclerosis, tubular atrophy/interstitial fibrosis, and crescents [9]. Among these features, tubular atrophy and interstitial fibrosis are particularly important because they reflect chronic structural damage and limited renal reserve.Crescents also contributed to risk stratification. International studies showed that crescent lesions were independently associated with renal outcomes, resulting in their incorporation into the updated MEST-C classification [10,11]. The presence of crescents therefore provides additional information about active glomerular injury and may help distinguish patients with a greater risk of progression.The current evidence also supports an integrated approach to risk assessment. The International IgA Nephropathy Prediction Tool combines clinical and histological variables to estimate the risk of major kidney outcomes. External validation studies demonstrated strong discrimination and acceptable calibration, supporting its usefulness for individualized prognostic assessment [12,13].A recent large meta-analysis further demonstrated that the risk of IgA nephropathy progression was associated with multiple clinical factors, including blood pressure, serum creatinine, proteinuria, hypertension, and selected metabolic parameters. Histological findings such as crescents and endocapillary hypercellularity also contributed to progression risk [14]. These results reinforce the multifactorial nature of IgA nephropathy progression.The findings also emphasize the importance of dynamic rather than static risk assessment. A patient with initially substantial proteinuria who achieves sustained reduction during treatment may have a substantially different prognosis from a patient with persistent proteinuria despite therapy. Similarly, changes in eGFR over time provide information that cannot be obtained from a single baseline value. Thus, serial assessment of proteinuria, blood pressure, and kidney function is essential.Although emerging biomarkers and complement-related findings show promise, conventional clinical and histological variables currently remain the most practical predictors. Reviews have indicated that biomarkers may provide additional information, but many have not demonstrated sufficient external validation or incremental predictive value to replace established risk factors [3]. Consequently, biomarkers should currently be considered complementary rather than substitutes for proteinuria, eGFR, blood pressure, and MEST-C assessment.Overall, the findings indicate that renal function decline in IgA nephropathy results from interaction between ongoing glomerular injury, hemodynamic stress, baseline renal reserve, and chronic pathological damage. A combined assessment of these domains provides a more accurate representation

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of individual risk than any single predictor. Early identification of high-risk patients allows closer monitoring and supports individualized therapeutic decision-making.

Conclusion

Renal function decline in IgA nephropathy is predicted by a combination of clinical, laboratory, longitudinal, and histopathological factors. Persistent proteinuria, hypertension, reduced baseline eGFR, increased serum creatinine, and unfavorable MEST-C findings represent the most important established predictors. Proteinuria is particularly valuable because it functions as both a prognostic marker and a dynamic treatment-response measure. Sustained reduction in proteinuria is associated with a more favorable renal trajectory, whereas persistent proteinuria indicates continuing risk. Blood pressure control and preservation of renal function are similarly important components of long-term management.The Oxford MEST-C classification provides additional pathological risk information, particularly through tubular atrophy/interstitial fibrosis and crescent formation. Integrating clinical and histological variables through validated prediction tools can improve individualized risk stratification.Routine longitudinal assessment of proteinuria, blood pressure, eGFR, and relevant pathological features should therefore form the foundation of prognostic evaluation in IgA nephropathy. Patients with multiple adverse predictors require particularly careful follow-up and individualized treatment strategies aimed at reducing proteinuria, controlling blood pressure, and preserving kidney function.

References

1. Wyatt RJ, Julian BA. IgA nephropathy. N Engl J Med. 2013;368(25):2402-2414.
2. Rodrigues JC, Haas M, Reich HN. IgA nephropathy. Clin J Am Soc Nephrol. 2017;12(4):677-686.
3. Barbour SJ, Coppo R, Er L, et al. An update on predicting renal progression in IgA nephropathy. Curr Opin Nephrol Hypertens. 2018;27(3):164-170.
4. Reich HN, Troyanov S, Scholey JW, Cattran DC. Remission of proteinuria improves prognosis in IgA nephropathy. J Am Soc Nephrol. 2007;18(12):3177-3183.
5. Inker LA, Mondal H, Pelletier K, et al. Early change in urine protein as a surrogate end point in studies of IgA nephropathy: an individual-patient meta-analysis. Am J Kidney Dis. 2016;68(3):392-401.
6. Shah A, Maski M, Egbuna O, et al. Lower proteinuria is better for patients with IgA nephropathy: a systematic review. Front Nephrol. 2026;3:1722582.
7. Bartosik LP, Lajoie G, Sugar L, Cattran DC. Predicting progression in IgA nephropathy. Am J Kidney Dis. 2001;38(4):728-735.
8. Berthoux FC, Mohey H, Afiani A. Predicting the risk for progression in IgA nephropathy. Am J Kidney Dis. 2008;51(5):813-820.
9. Working Group of the International IgA Nephropathy Network and the Renal Pathology Society. The Oxford classification of IgA nephropathy: rationale, clinicopathological correlations, and classification. Kidney Int. 2009;76(5):534-545.
10. Cattran DC, Coppo R, Cook HT, et al. The Oxford classification of IgA nephropathy: rationale, clinicopathological correlations, and classification. Kidney Int. 2009;76(5):534-545.

DOI:10.35772/ghm.2026.01073

11. Trimarchi H, Barratt J, Cattran DC, et al. Oxford classification of IgA nephropathy 2016: an update from the IgA Nephropathy Classification Working Group. Kidney Int. 2017;91(5):1014-1021.
12. Barbour SJ, Coppo R, Zhang H, et al. Evaluating a new international risk prediction tool in IgA nephropathy. JAMA Intern Med. 2019;179(7):942-952.
13. Zhang J, Huang B, Liu Z, et al. External validation of the International IgA Nephropathy Prediction Tool. Clin J Am Soc Nephrol. 2020;15(8):1112-1120.
14. Risk Factors of Disease Progression in IgA Nephropathy: A Systematic Review and Meta-Analysis. 2026. PMID: 41755798.
15. The Association between Low-Grade Proteinuria and Adverse Kidney Outcomes in IgA Nephropathy: A Systematic Review and Meta-Analysis. 2026. PMID: 41385286.