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THE RENAL ACTIVITY INDEX FOR LUPUS IDENTIFIES AND PREDICTS COMPLETE RENAL REMISSION OR ABSENCE OF KIDNEY INVOLVEMENT IN SYSTEMIC LUPUS ERYTHEMATOSUS

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BACKGROUND

- Effective, non-invasive disease activity and treatment response assessments are needed for patients with systemic lupus erythematosus (SLE), especially if associated with kidney disease, i.e. lupus nephritis (LN)
- The treatment goal of LN is the achievement of complete renal remission (CRR), and otherwise unexplained proteinuria of >0.5 gram which can prompt a kidney biopsy to diagnose LN
- The Renal Activity Index for Lupus (RAIL) measures the degree of kidney inflammation
- The RAIL-score is calculated from the creatinine-adjusted RAIL biomarkers (NGAL, KIM-1, MCP-1, adiponectin, hemopexin, ceruloplasmin)[1]
 - Higher scores indicate higher kidney inflammation

OBJECTIVE

- Evaluate the role of RAIL to distinguish CRR status and identify the cut-point for RAIL
- Evaluate the role of RAIL in predicting change in CRR status over time

METHODS

- Urine samples collected from 69 SLE adult patients with and without LN were studied longitudinally at enrollment into the GLADEL cohort (T0), at 6 months (T1) and 12 months (T2)
- Absolute scores and changes in RAIL-scores over time were assessed for achievement of CRR status [proteinuria of <0.5 grams] by logistical regression models
- The Youden Index optimal cut-points on the receiver operating characteristic (ROC) curves were calculated

RESULTS

- Patient characteristics at enrollment and disease course at 6 months and 12 months are shown for 51 patients with LN (74%; 91% female) and 18 (26%) patients without a diagnosis of LN over a total of 186 visits (**Table 1**)
- RAIL-scores were correlated with renal-SLEDAI (r=0.46; P<0.0001) and proteinuria (r=0.37; P=0.002)
- Considering all visits (CRR present/absent=146/40), mean ± SD RAIL-scores of patients with CRR-status were 1.17 ± 1.53 lower (P=0.023; area under the ROC curve=0.73) than those without CRR
- RAIL scores of no more than 3.4 identified CRR-status with 78% specificity (positive predictive value=0.77, sensitivity=62; **Figure 1**)
- Patients who newly achieved CRR status at the next visit had a RAIL-score mean ± SD decrease of 1.0 ± 1.524 since the last visit (P=0.0024), and patients with a RAIL-score decrease of >0.57 had a percentage variance value of 82% of achieving CRR at the next visit

TABLE 1: Patient characteristics & RAIL-scores over time

	Enrollment (T0) (n=69)	6 months (T1) (n=58)	12 months (T2) (n=59)
Gender, Female / Male, n (%)	63 (91) / 6 (9)		
Ethnicity, Caucasian / Mestizo, n (%)	10 (15.5) / 58 (84)		
Age at entry, years, median (IQR)	37 (25, 44)		
Time to diagnosis, months, median (IQR)	28 (21, 36)		
LN, Yes / No, n (%)	51 (74) / 18 (26)		
Complete Renal Response, n (%)	37 (54)	51 (88)	55 (93)
RAIL-Cr score, median (IQR)	3.74 (2.72, 4.88)	3.47 (2.47, 4.12)	3.46 (2.43, 4.62)
Proteinuria, median (IQR)	0.36 (0.12, 1.7)	0.16 (0.1, 0.3)	0.13 (0.1, 0.29)
Hematuria, n (%)	19 (28)	7 (12)	3 (5)
C3 / C4, low, n (%)	61 (88) / 57 (83)	14 (24) / 15 (26)	16 (27) / 18 (31)
SLEDAI total score, median (IQR)	6 (2, 13)	2 (0, 4)	2 (0, 4)
SDI total score, median (IQR)	0 (0, 1)	0 (0, 1)	0 (0, 1)
Treatments, n (%)			
ACE/ARB	37 (54)	28 (48)	23 (39)
Azathioprine	9 (13)	5 (9)	10 (17)
Prednisone / Pulsed Steroids	56 (81) / 12 (17)	44 (76) / 7 (12)	41 (69) / 3 (5)
Antimalarial	65 (94)	51 (88)	58 (98)
Cyclophosphamide	9 (13)	12 (21)	4 (7)
Mycophenolate mofetil	24 (35)	21 (36)	34 (58)
Tacrolimus	3 (4)	2 (3.5)	4 (7)

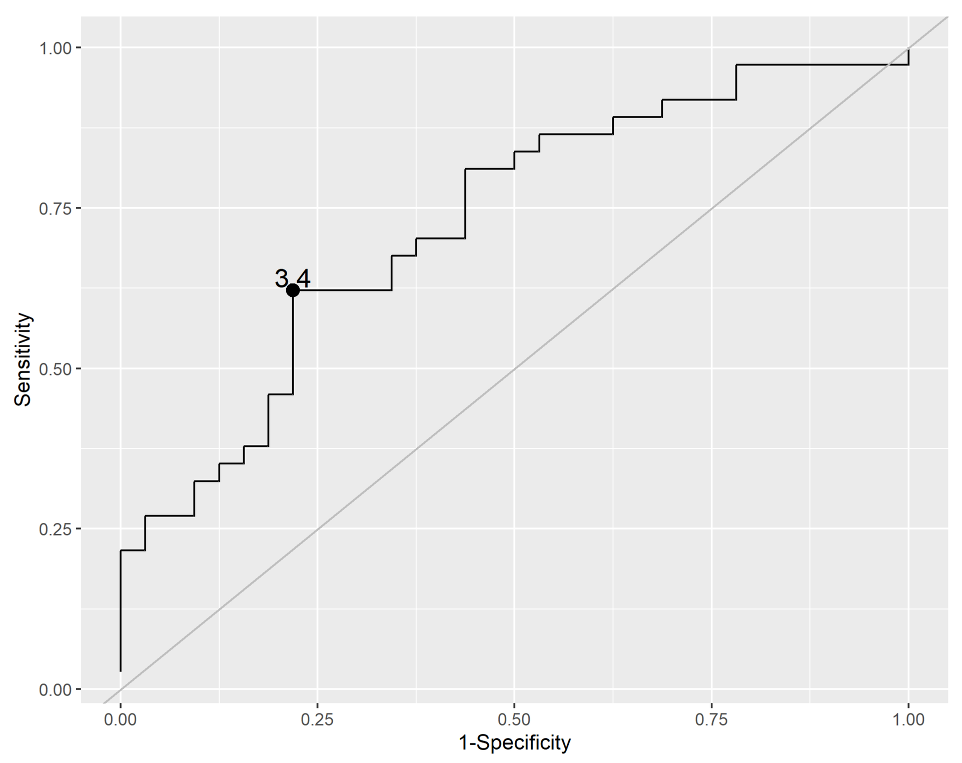
__ACE__=Angiotensin-converting enzyme, __ARB__=Angiotensin receptor blockers, __Cr__=creatinine, __IQR__=Interquartile range, __LN__=Lupus nephritis, __RAIL__=Renal Activity Index for Lupus, __SDI__=SLICC/ACR Damage Index, __SLE__=Systemic lupus erythematosus, __SLEDAI__=Systemic Lupus Erythematosus Disease Activity Index.

CONCLUSIONS

In patients with SLE, CRR status is associated with lower RAIL scores; RAIL score decreases of >0.57 between follow-up visits are predictive of future CRR achievement

FIGURE 1: ROC Curve for Model

Area Under the Curve=0.7264


Sensitivity
1-Specificity
3.4
0.00
0.25
0.50
0.75
1.00

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