

The Validation of a New Simple Disease Activity Tool in Systemic Lupus Erythematosus (SLE): The Lupus Activity Scoring Tool (LAST) as Compared to SELENA SLEDAI (SS) Modification

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ABSTRACT

We designed a new disease activity evaluation tool: the Lupus Activity Scoring Tool (LAST) that simplifies the approach to quantifying SLE activity while maintaining high sensitivity.

We have also developed an easy to use electronic application of this tool.

Patients were seen in a rheumatology clinic within the last 12 months and had the laboratory investigations done within 2 weeks of their visit. The SS was calculated for each visit. The patients met the SLE ACR 1997 criteria update.

Five different systems (algorithms) of weighting the different variables of disease activity were calculated. Apple iPad and Windows web-based applications were developed for the LAST and a clinical-only LAST (C-LAST).

The SLEDAI scores were consistent with the LAST scores at the baseline and follow-up visits.

The use of simple clinical variables as a measure of SLE activity seems to be valid.

INTRODUCTION

SLE is a chronic autoimmune disease with variable clinical manifestations. New developments in the understanding and treatment of SLE mandated closer monitoring of the disease activity and its response to treatment. Current disease activity indices (e.g. SELENA SLEDAI, BILAG & SLAM) have their own limitations. We designed a new disease activity evaluation tool, the Lupus Activity Scoring Tool (LAST), that simplifies the approach to quantifying SLE activity while maintaining high sensitivity.

We have also developed an easy to use electronic application of this tool.

OBJECTIVES

1. To validate a SLE activity tool with its correlation to the SELENA SLEDAI modification
2. To test the usability and the accuracy of electronic application of the same tool in clinical settings

RESULTS

Twenty eight patients (89.3% females) with 54 assessments were included. The mean (SD) age was 49.0 (14.4) years and the mean (SD) of disease duration was 14.0 (7.2) years.

Scores from five algorithms of the variables in addition to the SLEDAI scores were obtained at each visit. These algorithms varied from each other by their weighting coefficients for different Lupus activity and disease treatment parameters.

The LAST including all laboratory and treatment variables (algorithm # 3) was found to be the most accurate for the evaluation of the disease activity.

The algorithm scores were assessed on a scale from 0 to 100 with a maximum of 25 points each for Patient's Global (PtGA) and Physician's Global Assessments (PhGA), 30 points for the laboratory variables, and a maximum of 20 points for the immunosuppressive medication.

RESULTS

Although all algorithms were significantly correlated with the SELENA SLEDAI scores, we found that the best correlation ($r=0.839$) was between the SS and algorithm # 3 (or LAST) scores with $p<0.001$ (Table 1; Graph 1 & Scatter).

The SELENA SLEDAI scores were consistent with the LAST scores at the baseline and follow-up visits. Correlation between tools was as followed: SS scores from 0 to 4 (mild disease activity) corresponded to the LAST scores from 0 to 30 while SS scores of 8 or higher (moderate to severe disease activity) corresponded to 50 and higher, respectively. The mean (SD) SLEDAI score was 6.6 (3.6) and the mean (SD) LAST (with C3, C4 and Anti-ds Anti-DNA) score was 37.1 (18.1).

The correlation between the two new activity indices (LAST and C-LAST) was very high: $r=0.92$ with $p<0.001$ (Graph 2).

The electronic applications of the LAST were easy to use and no errors were found with their results as compared to the manually obtained scores.

CONCLUSIONS

The Lupus Activity Scoring Tool (LAST) is a new disease activity index correlated well with the SELENA SLEDAI (SS) modification.

The use of simple clinical variables as a measure of SLE activity seems to be valid and correlates well with the Lupus disease activity and response to treatment

The development of easy to use electronic apps will make the use of these activity tracking tools easier and can be possibly utilized in non-specialist settings.

METHODS and PATIENTS

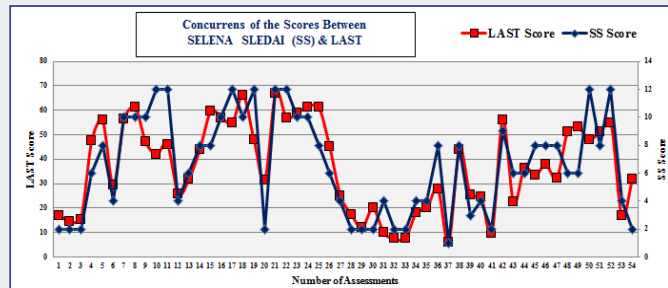
We developed a new SLE activity evaluation tool: the Lupus Activity Scoring Tool (LAST). The components of the LAST included patient global assessment of disease activity (PGA), physician global assessment of disease activity (PhGA), and a formula incorporating the current immunomodulating medication used as an indication of SLE activity. The LAST also included C3, C4 and Anti-ds Anti-DNA titre abnormality as disease activity indicators.

Patients who were seen in a rheumatology clinic within the last 12 months and met the SLE ACR 1997 criteria update were included in this study. The laboratory investigation was done within 2 weeks of their visit and the SS was calculated for each visit.

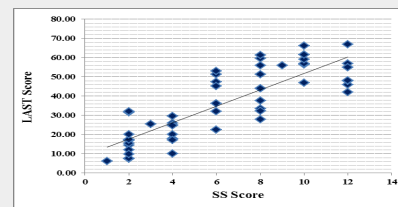
Five different systems (algorithms) of weighting the different variables of disease activity were evaluated. Apple iPad and Windows web-based applications were developed for the LAST and a clinical only LAST (C-LAST) without incorporating serological values.

Descriptive statistics and correlation bivariate (Pearson's) were conducted. Each algorithm result and the disease activity of patients with multiple assessments were compared to the SELENA SLEDAI scores.

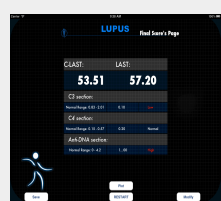
GRAPH 1: Correlation of the Scores Between SELENA SLEDAI & LAST



Scatter of Correlation Between SS & LAST Scores



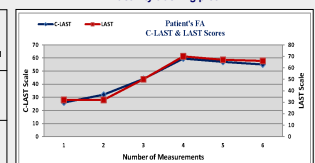
Screen-shot from the LAST & C-LAST iPad Application



GRAPH 2: An example of C-Last & LAST disease activity tracking plot

TABLE 1: Correlation of the Scores Between SS & Five Algorithms

SELENA SLEDAI	ALGORITHM 1	ALGORITHM 2	ALGORITHM 3 (LAST)	ALGORITHM 3A	ALGORITHM 4 (C-LAST)
Pearson's (r)	0.792	0.812	0.839	0.834	0.739
p-value	<0.001	<0.001	<0.001	<0.001	<0.001



NLRT Website QR code