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Differences in Long-Term Disease Activity and Treatment of Adult Patients With Childhood-and Adult-Onset Systemic Lupus Erythematosus

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Abstract

Objective—To compare differences in long-term outcome between adults with childhood-onset (age at diagnosis <18 years) systemic lupus erythematosus (SLE) and with adult-onset SLE.

Methods—Data were derived from the University of California Lupus Outcomes Study, a longitudinal cohort of 885 adult subjects with SLE (90 childhood-onset [cSLE], 795 adult-onset [aSLE]). Baseline and 1-year followup data were obtained via structured 1-hour telephone interviews conducted between 2002 and 2006. Using self-report data, differences in organ involvement and disease morbidity, current disease status and activity, past and current medication use, and number of physician visits were compared, based on age at diagnosis of SLE.

Results—Average disease duration for the cSLE and aSLE subgroups was 16.5 and 13.4 years, respectively, and mean age at followup was 30.5 and 49.9 years, respectively. When compared with aSLE subjects, cSLE subjects had a higher frequency of SLE-related renal disease, whereas aSLE subjects were more likely to report a history of pulmonary disease. Rates of clotting disorders, seizures, and myocardial infarction were similar between the 2 groups. At followup, cSLE subjects had lower overall disease activity, but were more likely to be taking steroids and other immunosuppressive therapies. The total number of yearly physician visits was similar between the 2 groups, although cSLE subjects had a higher number of nephrology visits.

Conclusion—This study demonstrates important differences in the outcomes of patients with cSLE and aSLE, and provides important prognostic information about long-term SLE disease activity and treatment.

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AUTHOR CONTRIBUTIONS

Dr. Hersh had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study design. Hersh, von Scheven, Yazdany, Katz, Criswell, Yelin.
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INTRODUCTION

Systemic lupus erythematosus (SLE) is a chronic autoimmune disease that affects individuals of nearly every age. Although more common in adults, 15–20% of SLE patients are diagnosed during childhood (1). Although it was once associated with significant mortality, 5-year survival rates for childhood-onset SLE (cSLE) have improved from 59–93% in the 1980s (2, 3) to 94–100% in the late 1990s (4). This likely reflects earlier diagnosis, treatment advances, and the initiation of multidisciplinary care. Despite this improvement in short-term survival, a significant percentage of cSLE patients die prematurely. In a 2004 study, the 10-year survival rate for cSLE patients was only 86% (5). In order to further improve treatment strategies for patients with cSLE, it is essential to characterize disease outcomes, understand prognosis, and identify potential predictors of increased morbidity. In addition, elucidating differences in outcomes between cSLE and adult-onset SLE (aSLE) may aid in developing tailored treatments based on age at disease onset.

Although the same criteria are used to classify SLE regardless of patient age (6), important distinctions between cSLE and aSLE have been observed. A limited number of prior studies have described substantial differences in the initial symptoms, organ manifestations, and severity of cSLE and aSLE at onset (7–11). In a recent study comparing the clinical presentation and short-term outcomes of cSLE and aSLE patients, Brunner et al (12) demonstrated that cSLE subjects, in comparison with aSLE subjects, had higher mean Systemic Lupus Erythematosus Disease Activity Index (SLEDAI) scores at presentation (16.8 versus 9.3), had a higher frequency of renal disease (78% versus 52%), and were more likely to require treatment with high-dose prednisone (97% versus 82%) and immunosuppressive therapies (66% versus 37%). This study was limited by a relatively short time to followup of ~3 years. It remains unclear whether these observed differences in disease severity are due to variation in the biology or genetics of cSLE and aSLE, or if there are other factors that contribute to these observations.

Despite evidence of differences in the frequency and severity of organ manifestations and treatment between cSLE and aSLE at disease onset, it is not known whether cSLE patients continue to have more severe disease over time. In a retrospective study by Chalom et al, 29 adult cSLE patients were assessed after a mean disease duration of 13 years, and 15 (51.7%) were found to have active disease, defined as a SLEDAI score >4 (13). In addition, almost half of the subjects had organ system impairment. A more recent study by Tucker et al compared the outcomes of patients with adolescent- versus adult-onset SLE after a disease duration (followup) of 6.8 (5.1) years and 5.6 (4.0) years, respectively (14). Over the relatively short followup period, adolescent SLE patients had more active disease, higher damage accrual, and a 2-fold higher mortality rate. This preliminary work, in combination with the findings of other aSLE outcome studies (15–17), suggests that long-term remission in SLE is uncommon, and thus that patients with cSLE are susceptible to a lifetime of damage from disease flares and treatment side effects (12,18,19). For this reason, it is essential to understand the potential long-term consequences of cSLE and to identify risk factors for poor outcomes.

The primary objective of this study was to describe and compare long-term differences in health outcomes, including disease severity, activity, and treatment, of patients with cSLE and aSLE, utilizing the University of California, San Francisco (UCSF) Lupus Outcomes Study (LOS). To our knowledge, this is the first study to compare the distant effects of SLE in a group of cSLE and aSLE patients who have had disease for an average of 10 years or more.

SUBJECTS AND METHODS

Subjects

The study cohort consisted of 885 subjects participating in the first and second annual interviews of the LOS, an ongoing longitudinal survey of a large cohort of persons with SLE from the US. Details regarding eligibility and enrollment of participants have been described elsewhere (20). Briefly, subjects previously enrolled in the UCSF Lupus Genetics Project (21) were invited to enroll in the LOS. The original 957 participants enrolled in the first wave of LOS interviews were recruited from both clinical and community-based sources: 22% from UCSF-associated clinics, 11% from non-UCSF rheumatology offices, and 67% from various community-based sources (e.g., lupus support groups, conferences, newsletters, Web sites). All participants had a confirmed diagnosis of SLE according to chart review by a rheumatologist or a registered nurse working under the supervision of a rheumatologist. Of the 957 LOS subjects, 885 (92%) participated in the second annual interviews, which were conducted between January 2004 and January 2006. The data in this study include results from the both the first (i.e., the baseline) and the second annual interviews. The study protocol was approved by the UCSF Committee on Human Research.

Data collection

Data were derived from structured, 1-hour telephone interviews conducted by trained interviewers. The survey included validated items pertaining to demographic and socioeconomic characteristics, SLE disease activity and manifestations, medications, general health, mental health, cognition, employment, health care utilization, and health insurance coverage.

In order to validate the subject self-reported data on renal outcomes, a chart review of significant renal outcomes, including a history of biopsy, dialysis, and transplant, was completed on all subjects. The reported versus documented rate of each event was determined and a kappa coefficient was calculated for biopsy, dialysis, and transplant. The kappa coefficient was >0.80 for each of these outcomes, indicating high agreement between self-report and the outcomes documented in the medical record.

Demographics

Information regarding various demographic characteristics was collected, including age, sex, self-reported race/ethnicity, and education. Categories of race/ethnicity included white, African American, Hispanic/Latino, Asian/Pacific Islander, or other. In the multivariate analyses, race/ethnicity was dichotomized into white or nonwhite (including African American, Hispanic/Latino, Asian/Pacific Islander, and other). Education was categorized as less than high school, high school graduate, or at least some college or higher. Recruitment source was dichotomized to subject recruitment from either rheumatology practices or community-based sources.

Outcomes

The primary outcomes of interest in this analysis were differences in current disease status and activity, general health status, organ involvement and disease morbidity, past and current medication use, and health care utilization, based on age at diagnosis of SLE.

Disease duration, activity, and general health status—Disease duration was calculated as the number of years since self-reported diagnosis of SLE. Disease activity was assessed using the Systemic Lupus Activity Questionnaire (SLAQJ, a validated, patient-reported assessment of disease activity in SLE (22). This measure correlates strongly with the

Systemic Lupus Activity Measure Revised and with the other self-report measures of SLE activity used in this study (23). In addition, disease activity was assessed by patient assessment of disease activity (reported on a scale of 0–10, where 0 = no activity and 10 = extremely active) and self-report of presence or absence of flare over the previous 3 months. Subjects who reported a recent flare were asked to categorize this flare as mild, moderate, or severe. General health status was assessed by the Medical Outcomes Study Short Form 12 physical component summary (PCS-12). The mean ± SD norm-based score is 50 ± 10 for the PCS-12 (24).

History of organ involvement and comorbidities—In the baseline interview, participants reported the type and frequency of organ involvement, including history of renal and pulmonary disease, clotting disorders (history of a deep venous thrombosis, pulmonary embolism, or stroke), and seizures. In addition, subjects with SLE-associated renal disease reported their history of renal biopsy, dialysis, and transplant. The frequency of myocardial infarction (MI) was measured, and the average time to first MI was calculated and compared among the cSLE and aSLE subgroups.

Medications—Subjects reported their use of common SLE medications, including nonsteroidal antiinflammatory drugs, cyclooxygenase 2 (COX-2) inhibitors, oral and intravenous (IV) steroids, hydroxychloroquine, azathioprine, cyclosporine, oral and injectable methotrexate, mycophenolate mofetil (MMF), and oral and IV cyclophosphamide (CYC). Medications were classified as ever prescribed if the subject had been receiving the medication prior to the baseline interview and currently prescribed if they had been receiving the medication in the 3 months prior to the second LOS interview.

Physician visits—Subjects provided detailed information regarding all physician visits (including physician specialty and frequency of visits) in the year prior to their second interview. In addition, subjects were asked to identify the physician (rheumatologist, nephrologist, internist, generalist/family practitioner, or other) who provided the majority of their SLE care.

Statistical analysis

The primary predictor variable for this study was age at diagnosis. The cohort was divided into groups based on the reported age at diagnosis: cSLE if the age at diagnosis was <18 years and aSLE if the age at diagnosis was ≥18 years. We compared the demographic and disease characteristics (disease activity, organ manifestations, medication use, and health care utilization) of the 2 groups. Demographic and disease characteristics were expressed using means, medians, SDs, and proportions, as appropriate, and statistical tests (rank sum, *t*-test, chi-square test) of comparison were employed.

In addition, multivariate logistic regression models were used to assess predictors of renal disease and MI. Covariates determined a priori for the model for renal disease included sex, ethnicity, recruitment source, and disease duration, and for MI included sex, ethnicity, recruitment source, and age. *P* values less than 0.05 were considered statistically significant. All statistical analyses were performed using STATA software, version 9.0 (StataCorp, College Station, TX).

RESULTS

Subject demographics

This study consisted of 885 subjects with SLE, including 90 (10.2%) with cSLE. The baseline characteristics of the cSLE and aSLE subgroups at the time of the second LOS interview are described in Table 1. The cSLE subjects were younger and included a higher percentage of

men (13.3% versus 7.4%; $P = 0.036$) and a lower percentage of white subjects (48.9% versus 69.9%; $P < 0.001$). The cSLE and aSLE subgroups had similar educational attainment. The cSLE subjects were more likely to be recruited from a UCSF-associated practice and less likely to be recruited from a community-based resource ($P < 0.001$).

Comparison of disease duration, activity, and general health status

A comparison of disease duration and disease activity is presented in Table 2. The mean age at diagnosis was 14.0 years for cSLE subjects versus 36.5 years for aSLE subjects. Seventeen (18.8%) of the cSLE subjects were diagnosed prior to the age of 13 years. The mean disease duration for the cSLE subgroup was 16.5 years versus 13.4 years for the aSLE subjects ($P = 0.001$).

Subjects with aSLE were more likely to have active disease on all measures of disease activity. They had higher SLAQ scores (13.0 versus 8.8; $P < 0.001$), higher ratings of disease activity (4.5 versus 3.0; $P < 0.001$), and were more likely to report a disease flare in the past 3 months (49.9% versus 23.7%; $P < 0.001$). The groups had similar PCS-12 scores, which were ~1 SD below the population mean.

Organ involvement and comorbidities

Differences in organ system involvement are also presented in Table 2. A higher percentage of the cSLE cohort reported a history of renal disease, and cSLE subjects were more likely to have had a renal biopsy, have been on dialysis, or have had a renal transplant. In the cSLE subgroup, 25% had ≥2 renal biopsies, as opposed to 6% in the aSLE subgroup (latter data not shown).

Adult-onset subjects were more likely to have pulmonary disease. There was no difference in the frequency of clotting disorders, but there was a trend toward a more frequent history of seizures in the cSLE subgroup, which is consistent with findings in other studies (7).

The frequency of MI in the cSLE and aSLE subgroups is presented in Table 2. Despite a significantly lower mean age, the frequency of MIs in the cSLE (7.9%) subgroup was similar to that of the aSLE subgroup (4.5%). Seven of the 90 subjects in the cSLE group had had at least 1 MI, and one of these subjects had had 2 MIs. Six of the 7 subjects who reported a history of an MI in the cSLE group were women. The average age at first MI was 32.2 years (range 24–43 years) in the cSLE cohort versus 48.1 years (range 19–75 years) in the aSLE cohort.

Multivariable analysis

Multivariate models were constructed to determine whether cSLE was independently associated with a history of renal involvement or MI. After controlling for sex, ethnicity, recruitment source, and disease duration, cSLE was significantly associated with a history of renal involvement (odds ratio [OR] 1.62, 95% confidence interval [95% CI] 1.02–2.56; $P = 0.04$). Childhood-onset SLE was also a predictor of MI (OR 6.8, 95% CI 2.3–20.02; $P < 0.001$), independent of sex, ethnicity, recruitment source, and age.

Medication use

Differences in prior and current history of medication use between subjects with cSLE and aSLE are summarized in Table 3. The cSLE and aSLE subgroups reported similar frequencies of previous and current use of nonsteroidal antiinflammatory medications and hydroxychloroquine. Subjects in the cSLE subgroup were significantly less likely to have been on a COX-2 inhibitor such as celecoxib or rofecoxib, which may reflect a more limited use of this medication in the pediatric rheumatology community.

One hundred percent of cSLE subjects reported a history of prednisone use, and 68% reported that they were still taking oral steroids at the time of followup, versus 43% for aSLE subjects. More than 10% of cSLE subjects also reported that they had received IV methylprednisolone within the 3 months prior to the followup interview, which was this study's definition of currently prescribed.

Similar trends were observed with the other nonsteroid immunosuppressive therapies. The cSLE subjects were more likely to report prior and current use of MMF and IV CYC. These 2 drugs are commonly used to treat organ disease in SLE, including lupus nephritis, which was more common among cSLE subjects.

Comparison of physician visits

A comparison of health care utilization between the cSLE and aSLE subjects is shown in Table 4. The total number of physician visits, and visits to a rheumatologist, was similar between the 2 groups. In addition, similar percentages of subjects in the cSLE and aSLE groups reported that a rheumatologist was the main physician for their SLE care. However, a significantly higher proportion of cSLE subjects reported receiving their primary SLE care from a nephrologist, and cSLE subjects had a higher mean number of visits to a nephrologist (3.0 versus 0.7; $P < 0.001$). In contrast, a higher percentage of aSLE subjects reported that an internist was their primary SLE physician.

DISCUSSION

SLE is a chronic disease that rarely remits and for which there is no cure. Patients who acquire SLE in childhood or adolescence have the potential to face a lifetime of complications related to their disease and its treatment. Characterizing the long-term outcomes of these patients can provide important prognostic information and help identify strategies to improve care for all SLE patients. The present study was designed to examine several important outcomes of cSLE, and to compare long-term outcomes between subjects with cSLE and aSLE utilizing the UCSF LOS.

In the UCSF LOS, ~10% of the subjects were diagnosed with SLE in childhood. Childhood-onset SLE subjects were more likely to be nonwhite and male than aSLE subjects, which is consistent with reported differences in the epidemiology of cSLE and aSLE (25).

After a mean disease duration of 16.5 years and 13.4 years, respectively, almost one-quarter of the cSLE cohort and nearly half of the aSLE cohort reported a disease flare within the 3 months prior to their second LOS interview. Additionally, 68% of the cSLE cohort and 43% of the aSLE cohort were taking oral steroids. Taken together, these findings suggest that a significant percentage of both cSLE and aSLE subjects have continued disease activity despite a long disease duration. A limited number of prior studies have examined ongoing disease activity in SLE of subjects with similar disease duration. Although different measurements of disease activity were used, the findings in this study were similar to the study by Chalom et al, in which 50% of adult cSLE patients were found to have active disease after 13 years of followup (13). Similarly, in a multicenter European study designed to examine the disease course of aSLE patients who had had SLE for 10 years or more, Swaak et al reported that 72% of subjects were still being treated with corticosteroids and 24% with an immunosuppressive and/or cytotoxic drug after a mean disease duration of 16 years (16).

Comparison of disease activity using 3 self-reported tools demonstrated reduced disease activity among cSLE versus aSLE subjects. Given the lower disease activity in the cSLE subgroup, we were surprised to find that a significantly higher proportion of cSLE subjects (68%) versus aSLE subjects (43%) were still receiving oral steroids at the time of followup.

Additionally, cSLE subjects were more likely to have received IV steroids and MMF in the months prior to followup, suggesting more intensive therapy overall. The reasons for the discrepancy between disease activity and increased immunosuppressive treatment in the cSLE cohort are unclear. Because cSLE subjects are more likely to have a history of renal disease, there may be reluctance on the part of the prescribing physician to alter medication regimens for patients who have had severe organ involvement. Alternatively, this difference in disease activity and steroid use could suggest that cSLE patients continue to need more medications than aSLE patients to maintain disease remission. A final possibility we explored was that cSLE subjects, who were more likely to be recruited from UCSF-affiliated practices, would also be more likely to be prescribed steroids because of differences in prescribing patterns between study recruitment sites or the primary SLE physician. However, after excluding subjects recruited from UCSF-affiliated clinics from the analysis, the use of steroids was still significantly higher in the cSLE subgroup (61.7 versus 39.9; $P = 0.003$). In addition, independent of the primary SLE physician, cSLE subjects were more likely to be receiving steroids.

Analysis of differences in past medication use between the cSLE and aSLE cohorts revealed that 100% of the subjects in the cSLE cohort had previously received steroids, which is consistent with findings in other studies of cSLE in which the majority of patients require steroids for disease control (3,26). It is also possible that higher rates of steroid use in the cSLE cohort maybe be due to differences in prescribing patterns between pediatric and adult rheumatologists.

Our study demonstrated that subjects with cSLE were more likely to have renal disease than subjects with aSLE, and in multivariate analysis cSLE was found to be an independent predictor of renal disease. We found that nearly 20% of the cSLE subjects required dialysis and 12% had had a renal transplant. Thus, not only are patients with cSLE more likely to develop renal disease than those with aSLE, but those that do develop renal involvement have poor outcomes. These findings are similar to previous observations regarding the outcomes of lupus nephritis in children. In a 1992 study by McCurdy et al, 22% of patients with cSLE and nephritis progressed to end-stage renal disease (27). These findings underscore the need for aggressive management of renal disease in cSLE patients. The high number of nephrology visits among the cSLE cohort suggests that cSLE patients continue to have an ongoing need for close monitoring by a nephrologist, either as a result of active disease or chronic damage from SLE.

Cardiovascular disease is emerging as a significant cause of early morbidity and mortality in patients with cSLE (28). In our study, 7 subjects in the cSLE cohort reported a history of at least 1 MI. These findings are consistent with previous studies noting a high rate of cardiovascular disease among young adults with SLE (29). Additionally, in our cohort, cSLE was an independent risk factor for MI. It should be noted that this model included demographic risk factors only, and did not include other traditional and disease-related cardiovascular risk factors such as history of hypertension, smoking, disease activity, and steroid use.

In this study, we compared the long-term outcomes (average disease duration >10 years) of nearly 900 adult subjects with childhood- and adult-onset SLE utilizing self-reported outcomes. The primary strength of this study is that the LOS is a large cohort, diverse in regard to the demographics of the study population and the range of both medical and psychosocial burden of disease. In addition, the LOS includes one of the largest known cohorts of subjects with cSLE.

As with any cross-sectional, observational study, the results need to be interpreted with caution. Because this study relies on subject self-reported outcomes, inaccuracies in subject reporting

may occur. This limitation was addressed in part by validating a subset of the self-reported outcomes through chart review.

At present, we are not able to assess cumulative disease damage in the LOS, although an effort is underway to address this limitation. A limited number of prior studies have demonstrated that cSLE patients have more permanent damage than aSLE patients when followed over similar time periods, and that cSLE patients are more likely to have disease damage in the renal and neuropsychiatric domains (14,18,19). In a retrospective study by Miettenun et al, 51 patients with cSLE had a mean Systemic Lupus International Collaborating Clinics/American College of Rheumatology Damage Index score of 2.1 after only 7.2 years of followup, and 69% had damage in at least 1 organ or system (5). In comparison, in a study of aSLE subjects, only 54% of the cohort had damage after 11.9 years (30). Ongoing disease activity and high-dose steroid use have been identified as predictors of disease damage in cSLE (18). Although damage was not directly assessed in this study, given the high rates of end-stage renal disease in the cSLE cohort, the high disease activity, and the prolonged use of steroids, it is likely that the disease-related damage would be higher in the cSLE subgroup of the LOS as well.

Despite these limitations, the study design of the LOS is ideal for examining the late outcomes of a rare chronic disorder and provides unique insight into the long-term outcomes of both cSLE and aSLE. In contrast, a prospective inception cohort study of similar size could be significantly more difficult and costly.

In conclusion, although cSLE subjects in the LOS reported lower disease activity than their adult counterparts, they were more likely to be on immunosuppressive therapies associated with active disease and had frequent encounters with medical providers. In addition, cSLE subjects had a higher frequency of renal involvement and a higher than expected risk of MI. These findings highlight the high burden of disease associated with cSLE, and the need to provide ongoing and comprehensive clinical support for these patients as they transition from pediatric to adult rheumatology care. This study demonstrates important differences in cSLE and aSLE outcomes, and underscores the potential need for identifying specific strategies for the treatment of cSLE that may differ from traditional therapeutic strategies for management of aSLE.

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Table 1

Subject demographics by age at SLE diagnosis in the Lupus Outcomes Study (n = 885)*

	Childhood onset (n = 90)	Adult onset (n = 795)	*P*
Age, mean ± SD (range) years	30.5 ± 12.8 (19–60)	49.9 ± 11.6 (20–83)	< 0.001
Men, n (%)	12 (13.3)	59 (7.4)	0.036
Ethnicity			
White	48.9	69.9	
Asian/Pacific Islander	16.7	8.6	
Hispanic/Latino	15.6	8.6	< 0.001
African American	7.8	7.9	
Other	11.0	5.0	
Education			
Less than high school	4.4	3.2	NS
High school graduate	10.0	12.3	
Some college/college graduate or advanced degree	85.6	85.5	
Recruitment source			
Rheumatology practice	57.8	31.5	
Community	42.2	68.5	< 0.001

* Values are the percentage unless otherwise indicated. SLE = systemic lupus erythematosus; NS = not significant.

Table 2

Disease duration, activity, and organ manifestations by age at SLE diagnosis in the Lupus Outcomes Study (n = 885)*

	Childhood onset (n = 90)	Adult onset (n = 795)	*P*
Age at diagnosis, mean ± SD (range) years	14.0 ± 2.7 (2–17)	36.5 ± 11.9 (18–75)	< 0.001
Disease duration, mean ± SD (range) years	16.5 ± 8.5 (3–17)	13.4 ± 8.5 (1–46)	0.001
Disease activity			
SLAQ score, median ± SD	8.8 ± 7.8	13.0 ± 8.1	< 0.001
Subject global assessment			
Rating of disease activity (range 0–10)	3	4.5	< 0.001
Flare in past 3 months, %	23.7	49.9	< 0.001
Severe flare, %	6.7	13.4	< 0.001
PCS-12 score, mean ± SD (range)	37.2 ± 6.2 (19–50)	38.3 ± 6.4 (16–55)	0.24
Organ involvement and morbidities, %†			
Renal	56.2	37.1	< 0.001
Biopsy	48.3	18.8	< 0.001
Dialysis	19.1	5.7	< 0.001
Transplant	12.4	4.0	< 0.001
Pulmonary	23.6	43.3	< 0.001
Clotting disorders	11.3	13.8	0.46
Seizures	23.6	16.8	0.11
Myocardial infarction	7.9	4.5	0.23

*SLE = systemic lupus erythematosus; SLAQ = Systemic Lupus Activity Questionnaire; PCS-12 = Medical Outcomes Study Short Form 12 physical component summary.

†Data collected from baseline interview.

Table 3

Comparison of medication use by age at SLE diagnosis in the Lupus Outcomes Study (n = 885)*

Medications	Ever prescribed†			Currently prescribed		
	Childhood onset	Adult onset	*P*	Childhooc onset	Adult onset	*P*
Antiinflammatories						
Nonsteroidals	81.8	88.1	0.09	45.5	48.7	0.57
COX-2 inhibitors	23.0	49.9	< 0.001	10.3	16.9	0.12
Hydroxychloroquine	87.6	83.8	0.35	53.9	51.3	0.64
Steroids						
Prednisone	100.0	89.3	0.001	67.8	42.7	< 0.001
Methylprednisolone (IV)	48.8	38.4	0.064	14.3	7.1	0.02
Immunosuppressives						
Mycophenolate mofetil	28.1	13.0	< 0.001	13.5	7.5	0.052
Cyclophosphamide (oral)	3.5	7.5	0.16	0.0	0.13	0.74
Cyclophosphamide (IV)	30.7	14.1	< 0.001	6.8	1.7	0.002
Azathioprine	33.7	28.4	0.29	5.6	9.3	0.25
Cyclosporine	18.6	9.9	0.014	2.3	2.7	0.81
Methotrexate (oral)	20.2	23.8	0.44	5.6	8.7	0.32
Methotrexate (injectable)	6.7	7.1	0.89	1.1	1.8	0.65

*SLE = systemic lupus erythematosus; COX-2 = cyclooxygenase 2; IV= intravenous.

†Data collected from baseline interview.

Table 4

Differences in the specialty of the main physician and frequency of health care encounters by age at SLE diagnosis in the Lupus Outcomes Study (n = 885)*

	Childhood onset (n = 90)	Adult onset (n = 795)	*P*
Health care encounters in past year			
Total, median (25th, 75th percentile)	11 (4,20)	13 (8, 21)	0.74
With a rheumatologist, mean ± SD	4.2 ± 4.0	3.7 ± 4.7	0.38
With a nephrologist, mean ± SD	3.0 ± 0.9	0.7 ± 0.9	< 0.001
With a general physician, mean ± SD	3.2 ± 0.8	4.6 ± 0.2	0.07
Primary physician for SLE care, %			
Rheumatologist	71.1	73.3	
Nephrologist	15.6	3.7	< 0.001
Internist	2.2	10.1	
Generalist/family practitioner	5.6	6.4	
Other†	5.5	6.5	

*SLE = systemic lupus erythematosus.

†Neurologist, hematologist/oncologist, pain management specialist.