Results 535 persons with SLE were interviewed in each year from 2003 to 2015 (94% female, 65% non-Hispanic whites, mean age in 2003 50 years, range 20–83, mean disease duration 17 years, range 1–51). Between 2003 and 2009, 81% were never poor, 8% exited poverty, and 11% were poor in every year. 89 of the 535 (16.6%) met the study definition of prevalent persistent depression; 23 (7.4%) of the 312 free of high levels of depressive symptoms from 2006–2009 had incident persistent depression as of 2015. Table 1, below, indicates that those who were poor in every year had significantly higher rates of prevalent and incident persistent depression than those exiting poverty or never poor.

Conclusions Public policy to help persons with SLE stay out of poverty or to exit poverty may lower their rates of prevalent and incident persistent depression. Attention to the economic status of persons with SLE should be part of an overall treatment strategy including treatment for depression since such attention may help reduce accumulation of damage as well as reduce the prevalence and incidence of persistent depression.

Abstract EF-02 Table 1 Odds ratios (95% CI) for effect of poverty status between 2003 and 2009 on prevalent and incident persistent depression (CESD score ≥24 in 3 or more years), between 2009 and 2015, with and without adjustment

Outcome	Poor every year	Exited poverty	Never poor
Prevalent Persistent Depression (n=535)			
Unadjusted	3.9 (2.1, 7.2) *	1.0 (0.4–2.2)	Ref.
Adjusted†	2.9 (1.4, 6.1) *	0.8 (0.3–1.8)	Ref.
Incident Persistent Depression (n=312)‡			
Unadjusted	4.5 (1.3, 15.4) *	0.9 (0.2–3.9)	Ref.
Adjusted†	4.1 (0.9–19.1)	0.7 (0.1–3.7)	Ref.

*p<0.01
† Adjusted for gender, age, marital status, race/ethnicity, education, disease duration, extent of accumulated damage as of 2009, smoking status, and BMI
‡ Excludes persons with high levels of depressive symptoms 2006–2009

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EF-03 MICROBIOTA-ASSOCIATED TRYPTOPHAN CATABOLISM INDUCES AUTOIMMUNE ACTIVATION IN A MOUSE MODEL OF LUPUS

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Background Tryptophan (Trp) is an essential amino acid that is used for the biosynthesis of key compounds such as serotonin (5HT), kynurenine (Kyn), and AhR ligands. The gut microbiome is a critical participant in Trp metabolism through which it modulates many biological pathways, including immune activation with the generation of AhR ligands. High Kyn and low 5HT levels have been found in patients with SLE. Disturbances in gut bacterial communities, defined as dysbiosis, have been found in lupus patients and lupus mice. Moreover, a recent study demonstrated that the translocation of gut pathobiont in a lupus mouse model as well as in SLE patients related with autoimmune pathogenesis. The hypothesis tested in this study is that the interplay between gut microbiota, Trp metabolism, and genetic susceptibility modulates systemic autoimmunity.

Methods We used the B6.Sle1.Sle2.Sle3 (TC) lupus-prone mouse model that shares over 95% of its genome with control B6 mice. Sequencing of fecal 16S rDNA was performed by standard methods. Serum and feces Trp metabolites were quantified by mass spectroscopy. Gnotobiotic (GF) B6 mice were colonized with feces from either TC or B6 mice, their immune phenotypes analyzed 4 weeks later. The immunophenotypes of TC mice analyzed after 4 month exposure to various levels of dietary Trp.

Results TC and B6 mice have a distinct gut microbiota, and transfers of TC fecal microbiota induce a transient autoimmunity in GF B6 mice. Autoimmune activation was also mitigated by horizontal microbiota transfers between co-housed TC and B6 mice. As SLE patients, TC mice present high Kyn and low 5HT levels in their serum and feces, and this metabolite imbalance was eliminated by a broad-spectrum antibiotic treatment. Furthermore, variations in dietary Trp modulated autoimmune pathogenesis: a low Trp diet prevented the development of autoimmunity while a high Trp diet accelerated disease progression, and the production of their anti-dsDNA IgG was positively correlated with their Kyn level. Finally, feces from TC mice fed with high Trp levels induced a higher autoimmune activation than feces from TC mice fed with low Trp levels in GF B6 mice.

Conclusions These results demonstrate the existence of interactions between lupus susceptibility genes and gut dysbiosis, where the full disease phenotype requires the presence of both. Furthermore, our results suggest that gut dysbiosis alters Trp metabolism in genetically lupus susceptible mice by expanding Trp-catabolizing bacteria and that some of these alterations contribute to autoimmune activation.

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EF-04 ASSOCIATION OF ULTRAVIOLET-B RADIATION AND RISK OF SLE AMONG WOMEN IN THE NURSES' HEALTH STUDIES

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Background Ultraviolet-B radiation (UV-B) exposure may lead to worsened photosensitivity, rashes, and systemic flares among SLE patients. Although UV-B radiation damages keratinocytes and may result in production of novel forms of autoantigens, it remains unknown whether UV-B exposure increases the risk of developing SLE. We aimed to examine the association of UV-B exposure with risk of incident SLE in a large

Abstract EF-04 Table 1 Association between cumulative average ultraviolet-B radiation and risk of incident SLE, overall and by subtypes characterized by anti-Ro/La antibodies (+Anti-Ro/La) and cutaneous manifestations, among participants in nurses' health study and nurses' health study II (1976–2014)

	Cumulative Average Ultraviolet-B Radiation (mW/m^2)			
	T1	T2	T3	p-trend
SLE overall (n=286)				
Cases/Person-Years	86/22856321	97/20171088	103/25959040	
MV-Adjusted HR (95% CI)[a]	1.00 (ref)	1.19 (0.89–1.60)	1.27 (0.94–1.70)	0.17
SLE with±Anti Ro/La (n=38)				
Cases/Person-Years	10/22855418	10/20169348	18/25958172	
MV-Adjusted HR (95% CI)[a]	1.00 (ref)	0.99 (0.40–2.42)	1.75 (0.79–3.87)	0.10
SLE with Malar Rash (n=131)				
Cases/Person-Years	33/22855609	46/20169693	52/25958442	
MV-Adjusted HR (95% CI)[a]	1.00 (ref)	1.44 (0.92–2.26)	**1.68 (1.08–2.62)**	**0.04**
SLE with Photosensitivity (n=164)				
Cases/Person-Years	49/22855817	57/20170566	58/25958484	
MV-Adjusted HR (95% CI)[a]	1.00 (ref)	1.23 (0.83–1.81)	1.29 (0.87–1.90)	0.29
SLE with±Anti Ro/La and/or Malar Rash and/or Photosensitivity (n=224)				
Cases/Person-Years	64/22856035	75/20170825	85/25958826	
MV-Adjusted HR (95% CI)[a]	1.00 (ref)	1.24 (0.89–1.75)	**1.44 (1.03–2.00)**	**0.05**

Tertiles T1 (lowest), T2 (middle), T3 (highest). Tertile range: T1: 2–171 mW/m^2 ; T2: 171–183 mW/m^2; T3:183–285 mW/m^2.
[a]Adjusted for age (months), race (white, non-white), questionnaire cycle, cohort, body mass index (20 to <25, 25 to <30,>30), cigarette smoking (never/past/current), alcohol intake (0,>0 to<5 grams per day)
HR=hazard ratio; CI=confidence interval; MV=multivariable; P-trend derived by treating median value of each category as a continuous variable
p for heterogeneity between the cohorts>0.05 for all analyses

prospective cohort of women, examining SLE risk overall and by subtypes defined by presence of anti-Ro/La antibodies (+anti Ro/La) and/or cutaneous manifestations most associated with UV exposure in SLE patients.

Methods The Nurses' Health Study (NHS) enrolled 121,701 U.S. female nurses in 1976; NHSII enrolled 116,430 in 1989. Biennial questionnaires collected lifestyle, environmental, and medical data. Residential addresses were geocoded. Incident SLE was confirmed by medical record review. National Aeronautics and Space Administration Total Ozone Mapping Spectrometer and Ozone Monitoring Instrument gridded remote sensing images scaled to a 1 km spatial resolution predicted average July noon-time erythemal UV-B (mW/m^2) annually starting in 1980. Participants without UV-B data at baseline were excluded. Hazard ratios (HR) and 95% confidence intervals (CI) were estimated using Cox regression models across tertiles of cohort-specific, time-varying cumulative average UV-B through one cycle prior to SLE onset. We examined SLE risk overall and stratified by presence of anti-Ro/La or cutaneous manifestations (malar rash and/or photosensitivity) at diagnosis through 2014 (NHS) or 2013 (NHSII), controlling for potential confounders. We also conducted a 'lagged' analysis by ending the exposure window two cycles prior to SLE diagnosis, as SLE symptoms may develop insidiously pre-diagnosis.

Results Mean age at SLE diagnosis was 49.3 (10.4) years among 286 SLE cases in NHS/NHSII. At SLE diagnosis, 13% of women had +anti Ro/La whereas 80% had either +anti Ro/La or at least one cutaneous manifestation. Compared to the lowest tertile of UV-B exposure, risk of overall SLE, SLE with +anti Ro/La, or SLE with photosensitivity in the highest UV-B tertile were increased, but not statistically significant in the main analysis (table 1) or in lagged analyses. However, women in the highest UV-B tertile had statistically significantly increased risks of SLE with malar rash (HR 1.68 [95% CI 1.08 to 2.62]) (table 1), but this was no longer significant in the lagged analysis (HR 1.39 [95% CI 0.92 to 2.10]).

Conclusions Increasing cumulative UV-B exposure was not associated with risk of developing overall SLE. However, among women at risk for SLE, living in areas with higher UV-B exposure was associated with increased risk of developing SLE presenting with malar rash. Further studies are warranted to determine whether high UV-B exposure may play a role in triggering SLE onset with malar rash.

EF-05 ANDROGENS REGULATE MICROBIOTA COMPOSITION, FUNCTION AND PROTECTIVE PROPERTIES IN LUPUS-PRONE MICE

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Background Dysbiosis (alterations in microbiota composition) is associated with autoimmune diseases, including lupus. Factors that are thought to influence gut microbiota include diet, age and more recently, sex. Like humans, female NZBxNZWF1 (BWF1) mice spontaneously develop lupus-like disease, and exhibit much greater incidence of disease than males. Castration of male BWF1 mice increases disease onset/incidence and decreases survival suggesting that male sex steroids, androgens, play an important role in protection of males from disease.