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Adverse Childhood Experiences Are Associated With Migraine and Vascular Biomarkers

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Objectives.—Migraine is a risk factor for stroke in young women. Biomarker studies implicate endothelial activation as a possible mechanism. Emerging relationships of childhood adversity with migraine, and with inflammation, a component of endothelial activation, suggest that it may play a role in the migraine–stroke association. Our objective is to evaluate the relationship between adverse childhood experiences (ACEs), migraine, and vascular biomarker levels in premenopausal women.

Methods.—Vascular and metabolic biomarkers from women 18-50 years, including 125 with migraine (interictal) and 50 without migraine, were evaluated. An ACE questionnaire was later collected by mail (response rate 80.6%, 100 migraineurs, 41 controls).

Results.—Migraineurs and controls were demographically similar. Migraineurs reported adversity more commonly than controls (71% vs 46%, odds ratio [OR] = 1.53, 95% confidence interval 1.07-2.17). Average ACE scores were elevated in migraineurs as compared with controls (2.4 vs 0.76, $P < .001$). ACE scores correlated with headache frequency (0.37, $P = .001$) and younger age of headache onset (–0.22, $P = .04$). It also correlated with body mass index (r = 0.43, $P = .0001$), von Willebrand factor activity (r = 0.21, $P = .009$), tissue plasminogen activator antigen (r = 0.28, $P = .004$), prothrombin activation fragment (r = 0.36, $P = .001$), high-sensitivity C-reactive protein (r = 0.98, $P = .0001$), transforming growth factor-beta1 (r = 0.28, $P = .003$), tissue necrosis factor-alpha (r = 0.20, $P = .03$), interleukin-6 (r = 0.22, $P = .03$), adiponectin (r = –0.29, $P = .003$), and nitrate/nitrite concentration (r = –314, $P = .001$). Logistic regression analyses (adjusted for vascular risk factors and migraine) demonstrated an association of childhood adversity with inflammatory factors (high-sensitivity C-reactive protein, interleukin-6, and tissue necrosis factor-alpha).

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Authors' Contributions: Gretchen Tietjen, MD, provided the overall leadership and oversight to the study. She was the main designer of the study. She also supervised the research team, provided critical input on data analysis, and served as chief writer and editor of the manuscript. Jagdish Khubchandani, MBBS, PhD, helped conceive the idea for this research, and managed the data collection process. He contributed significantly to data analysis, writing of the results, and critical editing of the manuscript. Nabeel Herial, MD, enrolled subjects in the original study, and collected and compiled the demographic and biomarker database. He also helped edit and write the manuscript. Kavit Shah, MS, prepared and assembled the mailings and monitored the returns for the survey study. He assisted with writing the review of literature.

Conclusions.—In young women, adverse childhood events are associated with migraine, particularly chronic and transformed migraine, and with vascular biomarkers, especially inflammatory biomarkers. These findings implicate early life stress as a link between migraine and endothelial activation.

Key words: childhood, adversity, migraine, biomarkers, inflammation, C-reactive protein

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Migraine is a risk factor for stroke.[1,2] Epidemiologic studies illustrate that the association is strongest for migraine with aura (MA),[1] especially when episodes are frequent.[2] The migraine populations at highest stroke risk include women, persons <45 years old, and those without conventional cardiovascular risk factors for atherosclerotic disease.[1] The mechanisms behind the migraine–stroke association remain speculative.[3]

In a number of studies of non-stroke populations, migraine has been associated with inflammatory, prothrombotic, and metabolic biomarkers,[4-8] some of which are known through longitudinal studies to be risk markers for ischemia, including myocardial and cerebral infarction.[9,10] The relationship of migraine and biomarkers, like that of migraine and stroke, appears to be influenced by migraine subtype, high attack frequency, female gender, and young age.[6-8]

Given the associations of migraine, stroke, and biomarkers, it is plausible to surmise that at least in selected cohorts, migraine leads to stroke via endothelial activation, a condition characterized by a procoagulatory and pro-inflammatory milieu.[4-8] Another consideration, however, is that the migraine–stroke relationship reflects a shared pathogenesis. There is growing evidence, for example, that early life stress, including maltreatment and other adverse experiences of childhood, affects the nervous, immune, and endocrine systems.[11] Although a number of variables, including timing, type, and intensity of childhood adversity, have an impact on health,[12] population- and practice-based studies have demonstrated an association of childhood maltreatment to adult headache.[13-21] There are, however, no data yet specific to migraine using either physician diagnosis or validated diagnostic instruments with standardized criteria.[22] Childhood adversity has also been linked to cardiovascular disease and ischemic stroke.[23] Of interest from a pathoetiological perspective are the several recent studies demonstrating that childhood adversity is associated with immune alteration and circulating inflammatory biomarkers in adulthood.[24-26]

In a case-control study of young healthy women, including women with physician-diagnosed migraine according to criteria of the International Classification of Headache Disorders, 2nd edition (ICHD-2),[22] we previously reported a robust relationship between endothelial activation biomarkers, including oxidative stress, coagulation, and inflammation in interictal migraine.[6,8] The migraine–biomarker association was influenced by migraine frequency and subtype, being stronger for MA, the subtype most closely linked to stroke. Given these results, our objective for this study was to determine in this same population of premenopausal women whether adverse childhood events are linked to migraine and to biomarkers of oxidative stress, coagulation, and inflammation.

METHODS

Original enrollment in the biomarker portion of this study was conducted between February 2006 and October 2008 after approval by the institutional review board.[6]

Study Participants.—Participants were recruited from advertisements in the ambulatory Headache Center, university campus website, institution-wide e-mail, radio, and the local newspaper. Within the Headache Center, participation was offered to consecutive eligible patients after evaluation by the principal investigator (PI) to determine eligibility. The enrollment plan was to include equal numbers of women with MA and migraine without aura (MO), in addition to non-migraine controls. Inclusion criteria for migraineurs were as follows: (1) women with MA or MO, as defined by criteria set forth in the ICHD-2 (codes 1.1, 1.2, 1.5);[22] (2) age 18-50 years; (3) premenopausal status; and (4) headache-free for at least 7 days at the time of enrollment. Potential headache-free female control subjects who matched the ages of the cases (based on 5-year group intervals)

were screened for enrollment according to a standardized questionnaire to determine eligibility. Exclusion criteria were as follows: (1) not physically well enough to give blood; (2) presence of diabetes mellitus, vasculitis, prior stroke/transient ischemic attack, pregnancy (self-reported), myocardial infarction, or systemic lupus erythematosus; (3) use of anticoagulants; (4) use of non-steroidal anti-inflammatory drugs or other antiplatelet agents in the week before testing; and (5) not literate in English.

At the study encounter, the participants completed a questionnaire regarding age, education, household income, height, weight, age of headache onset, headache-related disability, physician-diagnosed medical conditions (including hypertension, smoking, hyperlipidemia, history of deep venous thrombosis, pulmonary embolism). The PI supplied the following information when applicable: medications, ICHD-2 headache diagnoses, and average monthly days with headache during the prior 3 months. For those migraineurs with 15 or more headache days per month (chronic migraine [CM]), the PI also recorded whether there was a history of transformation from episodic to chronic frequency (transformed migraine [TM]) and whether the subject experienced continuous headache.

Laboratory Methods.—The methods have been previously described.[6] All testing was done after the subjects had not taken non-steroidal anti-inflammatory drugs or other antiplatelet agents for at least 1 week and after an overnight fast. Those with migraine needed to be headache-free for 1 week. Urine and blood samples were collected between 8 AM and 9 AM. Blood was drawn without a tourniquet. Analysis was performed blinded to participants' health or laboratory information. Assays for von Willebrand factor (vWF) activity, high-sensitivity C-reactive protein (hsCRP), tissue plasminogen activator (tPA) antigen, and prothrombin activation fragment (F1.2) were performed by Esoterix, Inc. (Aurora, CO, USA). The vWF activity assay uses plasma vWF to agglutinate platelets in the presence of ristocetin. By comparing the rate of agglutination against a normal reference curve, the vWF activity as a percentage was quantified. tPA antigen and F1.2 assays were performed by enzyme-linked immunosorbent assay. The hsCRP assay was done with the nephelometry technique. Assays for tissue necrosis factor (TNF)-alpha, transforming growth factor (TGF)-beta 1, interleukin 6 (IL-6), and adiponectin were performed by AssayGate (Ijamsville, MD, USA) using a multiplex assay on a Luminex Bead-based sandwich immunoassay platform. Urinary total nitrate/nitrite assays were performed by Cayman Chemical Co, Ann Arbor, MI, USA. A calorimetric assay method was used to measure urine nitrate/nitrite concentration (NOx), and results are reported as total nitrate/nitrite levels.

Adverse Childhood Experiences Survey Instrument and Procedure.—After institutional review board approval, a 1-page 10-item (multicomponent), closed format questionnaire was mailed to study participants in November 2010 to assess adverse childhood experiences (ACEs). This questionnaire has been used previously for numerous studies that explored relationship of ACEs with health outcomes in adults.[13,21] Questions (see Appendix) were related to experiences occurring when under the age of 18 years old, including abuse (emotional, physical, sexual), neglect (emotional, physical), and exposure to household dysfunction (violence against mother/stepmother, parental substance abuse, mental illness, criminal behavior, and parental separation or divorce). Respondents were defined as exposed to a category if they responded "yes" to 1 or more of the questions in that category. The total number of these exposures (range 0-10) was summed to create the ACE score. Several techniques were used to help maximize the survey response rate, including limiting the length of the questionnaire to 1 page, offering a 5-dollar monetary incentive, personalizing the letter that introduced the questionnaire, and using multiple contacts. Approximately 2 weeks after the initial mailing, a second wave was sent to those who had not responded. Two weeks after the second mailing, a final third wave mailing was sent to nonrespondents. Participants were identified by a code to ensure their confidentiality, and only those who had not responded were contacted for follow-up mailings. All of these procedures were intended to reduce nonrespondent bias and increase the external validity of the results. After receiving all surveys, the code sheet was destroyed to maintain confidentiality.

Data Analysis.—Data from the study were analyzed using SPSS 17.0 (SPSS, Inc., Chicago, IL, USA). Data analysis included descriptive statistics with a report of the appropriate frequencies, means, and standard deviations to describe the responses to the questionnaire items, as well as the demographic and background characteristics of the respondents. Chi-square tests and logistic regressions were computed to determine differences between groups of categorical variables. Similarly, *t*-tests were conducted to determine differences among multiple categorical independent and parametric dependent variables. Pearson's correlation analysis was run to assess the association between continuous variables.

RESULTS

The biomarker comparison between migraineurs and controls has been previously reported,[6,8] but in brief, women with migraine, especially MA, had higher adjusted odds ratios (ORs) for lower NOx and elevated vWF activity, hsCRP, TNF-alpha, TGF-beta 1, and IL-6. The response rate to the ACE survey was 80.6% with 141 persons responding, including 80% of migraineurs and 82% of controls (Table 1). Migraineurs and controls responding to the questionnaire did not differ significantly in age, race, education, income, or history of hypertension. Body mass index (BMI) and current smoking were higher in migraineurs, and there was a trend for more frequent oral contraceptive (OC) use in controls.

Table 1.—Characteristics of the Study Population

	Migraine	Controls	
	n (%)		*P* value
Total participants	100 (71)	41 (29)	
Headache diagnosis (ICHD-2 code)			
Migraine without aura (1.1)	48 (48)	—	
Migraine with aura (1.2)	52 (52)	—	
Headache onset age, years (mean ± SD)	18.47 (±8.80)	—	
Headache duration since onset, years (mean ± SD)	17.98 (±10.20)	—	
Headache frequency, days/month (mean ± SD)	12.68 (±9.44)	—	
Frequency range, days/month	1-30	—	
Age, years (mean ± SD)	37.02 (±8.28)	36.88 (10.19)	.934
Race			
Caucasian	92 (92)	36 (88)	.571
African American	5 (5)	4 (10)	
Other	3 (3)	1 (2)	
Education			
High school graduate	26 (26)	10 (24)	.183
Undergraduate	20 (20)	6 (15)	
College graduate	42 (42)	14 (34)	
Post graduate	12 (12)	11 (27)	
Income			
<20,000	18 (18)	4 (10)	.601
20,000-50,000	28 (28)	12 (29)	
50,000-100,000	42 (42)	18 (44)	
>100,000	12 (12)	7 (17)	
Body mass index, kg/m^2 (mean ± SD)	29.86 (±7.49)	25.87 (±5.19)	.002
Oral contraceptive use	38 (38)	22 (54)	.08
Hypertension	16 (16)	3 (7)	.17
Smoking history	32 (32)	12 (30)	.75
Current smoking	10 (36)	0 (0)	.01

ICHD-2 code = International Classification of Headache Disorders-2 code for diagnosis of headache; SD = standard deviation; — = this is not applicable for the headache-free control group.

Table 2.—Comparison of Adverse Childhood Experiences (ACEs) Scores Based on Migraine Diagnosis and Characteristics

Groups	Average ACE Scores (±SE)	*t*-test (t value)	*P* value
Migraine (n = 100) vs control (n = 41)	2.35 (±0.20):0.7561 (±0.15)	4.754	<.001
Chronic migraine, yes (n = 31) vs no (n = 69)	3.24 (±0.38):1.53 (±0.21)	4.494	<.001
Continuous headache, yes (n = 15) vs no (n = 85)	3.90 (±0.56):1.71 (±0.18)	3.762	<.001
Transformed migraine, yes (n = 30) vs no (n = 70)	3.10 (±0.37):1.55 (±0.16)	4.065	<.001
Migraine with aura, yes (n = 53) vs no (n = 47)	2.70 (±0.22):2.1 (±0.17)	1.62	.15

SE, standard error.

Migraineurs reported adversity more commonly that controls (71% vs 46%, OR = 1.53, 95% confidence interval 1.07-2.17) and average ACE scores were higher (Table 2). Within the migraine subgroup, the average ACE scores were higher with chronic, continuous, and TM. The ACE score correlated positively with headache frequency (r = 0.37, *P* = 001) and negatively with age of headache onset (–0.022, *P* = .04). The ACE score average was higher in those with MA than with MO, but the difference was not significant (Table 2). When the study population was stratified by presence or absence of childhood adversity (≥1 ACE), those reporting adversity were more likely to have lower income, less education, and higher BMI, history of hypertension, and current smoking (Table 3). In this analysis, those reporting adversity were more likely to have migraine, more specifically CM. They were not more likely to have MA.

The ACE score correlated positively with BMI (r = 0.43, *P* = .0001) and with vWF activity (r = 0.21, *P* = .009), tPA antigen (r = 0.28, *P* = .004), F1.2 (r = 0.36, *P* = .001), hsCRP (r = 0.98, *P* = .0001), TGF-beta1 (r = 0.28, *P* = .003), TNF-alpha (r = 0.20, *P* = .03), and IL-6 (r = 0.22, *P* = .03). The ACE score correlated negatively with adiponectin (r = –0.29, *P* = .003) and NOx (r = –314, *P* = .001). Logistic regression analyses (Table 4) demonstrate that those reporting adversity have a higher risk of biomarker levels indicating coagulation (elevated vWF activity, tPA antigen, F1.2), inflammation (elevated hsCRP, IL-6, TNF-alpha, TGF-beta1, lower adiponectin), and oxidative stress (lower NOx). When adjusting for age, education, and stroke risk factors (BMI, hypertension, hyperlipidemia, smoking history, and OC use), most of the biomarker–adversity associations remained significant. With adjustment for migraine,

Table 3.—Selected Demographic and Psychosocial Characteristics Stratified by History of Adversity (≥ 1 Adverse Childhood Experience Score)

Variable	Adversity (n = 90)	No Adversity (n = 51)	Test Statistic†	*P* Value
Migraine vs controls (n, %)	71 (79):19 (21)	29 (57):22 (43)	7.658	.006
Migraine with aura vs migraine without aura	38 (42):33 (36)	15 (29):14 (27)	0.22	.634
Episodic migraine vs chronic migraine	64 (71):26 (29)	48 (94):3 (6)	10.54	.001
White vs non-whites (n, %)	79 (88):11 (12)	49 (96):2 (4)	2.680	.108
College graduate vs less than a college graduate (n, %)	45 (50):45 (50)	34 (66):17 (33)	3.670	.049
Income (<50,000 vs >50,000)	45 (50):45 (50)	34 (66):17 (33)	3.670	.049
Age (years)	36.24 (±0.06)	38.27 (±9.40)	–1.260	.210
Body mass index	30.49 (±7.82)	25.53 (±4.12)	4.209	<.001
Hypertension (n, %)	18 (20)	2 (4)	9.083	.003
Current smokers (n, %)	9 (43)	1 (5)	7.519	.006

†For differences in categorical variables, chi-square tests were used, and for differences in continuous variables, *t*-tests were used.

Table 4.—Logistic Regression Analyses for Association of Biomarkers With History of Adverse Childhood Experiences (ACEs)

Biomarker†	No Adversity Reference‡	Model 1 Adversity OR (95% CI)	Model 1 *P* value§	Model 2 Adversity OR (95% CI)	Model 2 *P* value§	Model 3 Adversity OR (95% CI)	Model 3 *P* value§
Coagulation							
vWF activity	1	3.83 (1.78-8.23)	.008	2.99 (1.08-4.50)	.03	2.07 (0.81-3.44)	.108
tPA antigen	1	2.62 (1.26-5.44)	.02	2.19 (0.99-4.03)	.05	1.75 (0.87-3.65)	.07
F1.2	1	2.90 (1.25-6.72)	.01	2.37 (0.93-5.33)	.07	1.91 (0.77-4.02)	.10
Inflammation							
hsCRP	1	6.84 (2.64-17.72)	.001	5.60 (2.16-14.50)	.007	4.05 (1.56-10.51)	.02
IL-6	1	4.11 (1.87-9.02)	.01	2.95 (1.35-6.44)	.03	2.23 (1.02-4.86)	.04
TNF-alpha	1	4.68 (2.09-10.48)	.009	3.75 (1.67-8.39)	.01	2.99 (1.33-6.72)	.03
TGF-beta	1	3.65 (1.71-7.70)	.02	2.55 (1.20-5.43)	.04	1.61 (0.75-3.46)	.08
Adiponectin	1	0.33 (0.16-0.68)	.007	0.54 (0.27-1.10)	.18	0.75 (0.37-1.52)	.27
Oxidative stress							
NOx total	1	0.27 (0.10-0.75)	.01	0.45 (0.17-1.15)	.08	0.40 (0.15-1.05)	.07

†Biomarkers were divided on the basis of quartiles, and values corresponding to the upper quartile were used as cut-offs.
‡The entire study population was divided into 2 groups (adversity vs no adversity) based on ACE score ≥1.
§*P*-values from models comparing adversity with no adversity study participants (2 d.f., Wald's χ^2 test).
Model 1 = Unadjusted comparison of adversity vs no adversity for level of biomarkers.
Model 2 = Adjusted comparison after controlling for Age + OC use +BMI + HTN+ hyperlipidemia + smoking.
Model 3 = Adjusted comparison after controlling for Age + OC + BMI +HTN+ hyperlipidemia + smoking + migraine.
BMI = body mass index; CI = confidence interval; F1.2 = prothrombin activation fragment; hsCRP = high-sensitivity C-reactive protein; HTN = hypertension; IL-6 = interleukin-6; NOx = nitrate/nitrite concentration; OC = oral contraceptive; TGF = transforming growth factor; TNF = tissue necrosis factor; TPA = tissue plasminogen activator; vWF = von Willebrand factor.

which in the original cohort was associated with biomarker derangement, the association of childhood adversity with inflammatory factors (hsCRP, IL-6, and TNF-alpha) remained.

DISCUSSION

Migraine is associated with biomarkers of inflammation, coagulation, and oxidative stress in premenopausal women.[6,8] In this study using a subset of the original young female cohort, we demonstrate that childhood adversity is associated with migraine, as well as with these biomarkers. These discoveries may have implications with regards to the etiology of the migraine–stroke relationship in similar populations.

Our study is the first to examine the association of biomarkers for endothelial dysfunction, migraine, and childhood adversity in the same cohort. It is also the first to establish the relationship of adult migraine and childhood adversity using physician-applied ICHD-2 criteria for migraine and the ACE questionnaire to survey a range of ACEs. Case-control studies, heretofore, had either lacked a clear diagnosis of migraine or had evaluated only a few types of maltreatment.[13-21] Some, like ours, narrowed their focus to women,[14,16] who are more likely than men to report having experienced childhood abuse, including multiple types of abuse.[12] There is a definite increased prevalence of migraine in women, and role of childhood abuse in this imbalance is worth considering.

Our finding that childhood adversity is not more strongly associated with MA than MO is novel. The relationship between childhood adversity and headache chronicity has been corroborated by other studies, some looking only at frequent headache in a case-control design,[18,21] others looking across the continuum of frequency in a series of migraineurs.[27] The discovery that early adversity is a factor in transformation of migraine from episodic to chronic is supported by cross-sectional studies.[27] Our findings that the ACE score is inversely related to the age of migraine onset is novel but in keeping our earlier report in a multicenter mixed population of migraineurs that childhood emotional abuse was associated with younger median age of headache onset.[27]

The discovery that childhood adversity shifts the age of headache onset and is associated with increased headache frequency suggests a possible causal relationship between childhood maltreatment and migraine. The evidence supporting the biologic plausibility of this theory is growing. Considerable preclinical and clinical evidence demonstrates that early life stress results in long-term changes in the sympathetic nervous system and hypothalamopituitary-adrenocortical (HPA) axis, which are the principal pathways that respond to stress, and are also important in migraine.[11,28-30] Data specific to migraine showed conflicting findings regarding HPA axis function in episodic migraine[31,32] but abnormal HPA axis activity in CM, including in the setting of medication overuse.[33] Early stressful experiences also result in attenuated development of the left prefrontal cortex, amygdala, and hippocampus,[29] all structures that interact with each other and play important roles in the pain matrix.

The sympathetic nervous system and the HPA axis, through networks involving glucocorticoids, catecholamines, neuropeptides, and cytokines,[34,35] exert tonic inhibitory control over the immune system. This may have implications for the other important finding from our study, ie, in premenopausal women, childhood maltreatment is related to biomarkers of inflammation, independent of vascular risk factors and of migraine. The dose-dependent relationship of the ACE score with the biomarker levels supports the contention that childhood stress causes enduring abnormalities in the immune system, resulting in impaired ability to secrete glucocorticoid and increased secretion of pro-inflammatory cytokines.[24,28] Both basic and clinical studies have shown that early life stress actually becomes hard-coded into the genome,[36,37] creating an epigenetic memory of events that results in reduction of glucocorticoid receptor gene expression and unrestrained inflammation. The life-course association between childhood maltreatment and inflammation has been demonstrated in a large New Zealand birth cohort followed until adulthood.[24] Persons maltreated as children showed a graded increased risk of immune (elevated C-reactive protein [CRP]), and metabolic consequences at age 32 years old. This risk was independent of adulthood stress, health, and health behaviors. Further evidence that early stress is biologically

embedded comes from a 12-year-old twin study, which prospectively tracked exposure to physical abuse through life's first decade. This study showed that the stress-related elevation in CRP is already detectable in childhood.[38] Other studies have shown that even in children, CRP, one of the most firmly established risk markers for cardiovascular disease, has been associated with headache.[39] The finding in our study that vWF activity, a marker of endothelial dysfunction, is related to migraine, rather than to childhood adversity, could be explained by recent evidence that circulating inflammatory cytokines have adverse effects on the vasculature.[40]

Our study has a number of strengths. All participants were interviewed and examined by the PI to collect a detailed history and to ascertain migraine diagnosis or lack thereof. Despite the time elapsed from initial enrollment, the response rate to the ACE questionnaire was excellent at 80%. There are also certain limitations. We acknowledge certain inherent biases in the design, including those of selection and recall. This study is limited by reliance on self reports, and we cannot ascertain whether adversity histories are valid. Research suggests, however, that individuals are more likely to minimize adverse experiences rather than fabricate them.[41] Our sample was a convenience sample, and the size was relatively small; certain associations may have been missed due to lack of power. We controlled in the analysis for stroke risk factors, but other factors such as activity level, which could impact inflammatory markers, were not evaluated. The migraine group more commonly used statins, ACE inhibitors, calcium channel blockers, and beta-blockers. These medications are associated with improved endothelial function and could possibly have diminished the differences in biomarkers between migraineurs and controls.

In summary, we demonstrate in this study that childhood adversity is linked to migraine, with influence on frequency and age of onset, but without influence of subtype. Childhood maltreatment is also linked to a variety of biomarkers of inflammation that we have shown, in the same cohort, to be associated with migraine. Given that these biomarkers are tied to increased stroke risk, it follows that ACEs may potentially play a role in the association of migraine and stroke. Further research may lead to better understandings of the precise mechanisms. If causal, childhood maltreatment becomes an important target for prevention of migraine, stroke, and other inflammatory diseases.

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APPENDIX: ADVERSE CHILDHOOD EXPERIENCES QUESTIONNAIRE

Prior to your 18th birthday:

1. Did a parent or other adult in the household often or very often . . .
Swear at you, insult you, put you down, or humiliate you?
or
Act in a way that made you afraid that you might be physically hurt?
Yes No If yes enter 1 _____

2. Did a parent or other adult in the household often or very often . . .
Push, grab, slap, or throw something at you?
or
Ever hit you so hard that you had marks or were injured?
Yes No If yes enter 1 _____

3. Did an adult or person at least 5 years older than you ever . . .
Touch or fondle you or have you touch their body in a sexual way?
or
Attempt or actually have oral, anal, or vaginal intercourse with you?
Yes No If yes enter 1 _____

4. Did you often or very often feel that . . .
No one in your family loved you or thought you were important or special?
or
Your family didn't look out for each other, feel close to each other, or support each other?
Yes No If yes enter 1 _____

5. Did you often or very often feel that . . .
You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?
or
Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?
Yes No If yes enter 1 _____

6. Was a biological parent ever lost to you through divorce, abandonment, or other reason?
Yes No If yes enter 1 _____

7. Was your mother or stepmother:
Often or very often pushed, grabbed, slapped, or had something thrown at her?
or
Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard?
or
Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?
Yes No If yes enter 1 _____

8. Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?
Yes No If yes enter 1 _____

9. Was a household member depressed or mentally ill, or did a household member attempt suicide?
Yes No If yes enter 1 _____

10. Did a household member go to prison?
Yes No If yes enter 1 _____

Now add up the "Yes" answers: _____ This is the ACE Score.