OBJECTIVE: We studied whether repetitive intracardiac shock discharges of implantable cardioverter defibrillators (ICDs) provoke an enduring enhancement of startle responses. METHODS: The study population comprised 134 patients with an ICD. Among those, 67 patients had experienced shock delivery. Thirty-five patients had received five or more shocks. We used the startle reflex paradigm, which consisted of 15 acoustic stimuli (95 dB, 1000 Hz, 500 ms duration). Skin conductance response was measured using a constant 0.5 V through 8-mm electrodes placed on each subject's nondominant palm. Response magnitude was calculated by subtracting the baseline response level of the 2 seconds immediately preceding tone onset from the maximum response level within 1 to 4 seconds after tone onset. The left orbicularis oculi electromyogram (EMG) response was calculated by subtracting the mean EMG level during the 2 seconds immediately preceding tone onset from the highest EMG level measured within 40 to 200 ms after tone onset. Habituation was defined by the response slope of the regression equation and by the number of trials required to reach the nonresponse criterion. RESULTS: Although EMG response measures of magnitude and habituation failed to yield differences between study
groups, patients who had experienced five or more ICD shocks exhibited a significantly larger skin conductance response magnitude in comparison to the patients who had experienced fewer than five shocks (median, interquartile range: 0.364, 0.209-0.618 vs. 0.512, 0.375-0.791; Mann-Whitney U test, p = .007). Poorer habituation in the group with five or more shocks in comparison with the low shock group was confirmed both by the number of trials needed to reach the nonresponse criterion (median, interquartile range: 10, 5-14 vs. 5, 2-13; p = .003) and by the response slope (median, interquartile range: 0.209, 0.116-0.274 vs. 0.262, 0.181-0.332; p = .008). After controlling for potential confounding factors (age, anxiety, aversiveness of stimuli, time since last shock experience, and use of beta-adrenoceptor antagonists), intracardiac shock discharges had the strongest impact on augmented skin conductance response magnitude (adjusted odds ratio = 3.0, 95% confidence interval = 1.3-7.2, p = .01) and impaired habituation (adjusted odds ratio = 2.8, 95% confidence interval = 1.2-6.3; p = .015). CONCLUSIONS: Intracardiac shock discharges are associated with augmented skin conductance responses and slower habituation, indicating sustained sympathetic arousability, which is presumably centrally mediated.