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Hair Cortisol and the Risk for Acute Myocardial Infarction

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Background: The role of chronic stress in developing acute myocardial infarction (AMI) is inconclusive, mainly due to the lack of an objective and quantitative marker for chronic stress. We have developed a method to measure the stress hormone cortisol in hair, which allows longitudinal assessment of cortisol levels prior to an acute event. Several reports have demonstrated an association between high hair cortisol levels and chronic stress in both animal models and in humans. We aimed to examine whether chronic stress, evidenced by elevated hair cortisol, is a risk factor for AMI.
Methods and results: A prospective case-control study including 60 patients admitted to hospital with AMI and 60 control patients, admitted to internal medicine wards for other indications. An enzyme immunoassay technique was used to measure cortisol in the most proximal 3cm of hair, representing the most recent 3 months of exposure. Median hair cortisol levels (range) were 295.3 (105.4-809.3)ng/g in AMI patients and 224.9 (76.58-949.9)ng/g among controls ($p=0.006$). After controlling for other risk factors of AMI using multiple logistic regression, hair cortisol remained the strongest predictor ($p=0.004$). When we divided the entire study population into quartile according to the hair cortisol concentrations, the occurrence of AMI increased with hair cortisol concentration, escalating from 32% to 68% from the first (lowest hair cortisol levels) to the fourth quartile (highest hair cortisol levels) ($P<0.01$).
Conclusions: We demonstrated elevated hair cortisol concentrations in patients with AMI, suggesting that chronic stress, as assessed by increased hair cortisol in the 3 months prior to the acute event, may be a contributing factor for AMI.