

脳画像が扁桃体の活性と心臓発作のリスクを関連付ける (Abstract 1275M-03)

画像を用いたスタディにおいてストレス応答と心血管リスクの背後にあるメカニズムが初めて研究された

Study uses imaging to gain a first look into mechanisms behind stress response and cardiovascular risk

脳内のストレス中枢が活性化されるほど動脈の炎症所見も多く有し、心筋梗塞、脳卒中および死亡などの心血管イベントリスクも高い、と第65回American College of Cardiology年次集会で発表された。PET/CT画像を調査することで研究者らは、脳ストレス活性測定値が1単位増加することにより心血管イベントリスクが14倍上昇することを明らかにした。5年間で、ストレス中枢の活性が高い患者の35%が心血管イベントを発症したのに対し、ストレス中枢の活性が低い者におけるその割合は5%であった。

Full Text

New research shows that individuals with a greater degree of activity in the stress center of the brain also have more evidence of inflammation in their arteries and were at higher risk for cardiovascular events, including myocardial infarction (MI), stroke and death, according to a study presented at the American College of Cardiology's 65th Annual Scientific Session.

While there has been mounting evidence of the strong link between stress and heart disease, relatively little is understood about the mechanisms behind this stress response and what might put someone at risk for cardiovascular disease. This is the first study to use medical imaging to show a possible association between biochemical activity in the brain and arterial inflammation. Arterial inflammation is a key component of atherosclerotic disease and is highly predictive of future cardiovascular events and stroke.

"Our study illuminates, for the first time, a relationship between activation of neural tissues – those associated with fear and stress – and subsequent heart disease events," said Ahmed Tawakol, M.D., co-director of the cardiac MR PET CT program at Massachusetts General Hospital and co-author of the study. "There is a need to develop greater knowledge in terms of the mechanism that translates stress into cardiovascular disease risk, given the prevalence and potency of stress as a risk factor."

Data show the more activity occurring in the amygdala – the stress center of the brain – the more inflammation patients had in their arteries and the greater the likelihood of having cardiovascular events. There was also a corresponding activation of the bone marrow. Bone marrow releases immune cells called monocytes that can trigger inflammation in other parts of the body.

Researchers examined PET/CT scans for 293 patients (average age of 55 years) who originally received the test between 2005 and 2008 for cancer evaluation but were found to be free of active disease. The scans allowed researchers to objectively measure activity in regions of the brain, as well as the bone marrow and arteries. Patients were excluded if they had evidence of cancer, established cardiovascular disease or were younger than 30 years old. An hour before the scan, patients were injected with a radioactive atom attached to a glucose molecule as a tracer; tissues that were more active would metabolize more of the glucose and glow more brightly on the scan. A radiologist who had no knowledge of the patient's history or identifying characteristics measured the images. Activity in the amygdala was compared to other regions in the brain. Researchers then grouped patients based on the relative magnitude of brain stress activity.

After correcting for age, gender and other cardiovascular risk factors using the Framingham Risk Score, there was a 14-fold greater risk of cardiovascular events for every unit increase in measured brain stress activity. Over the approximately five-year study period, 35 percent of the patients in the high stress center activity group later suffered a cardiovascular event, compared to just 5 percent of the low stress center activity group.

Tawakol and his colleagues found the subjects' amygdala activity – as seen on brain scans – indicated whether they would suffer a major cardiac event in the near future. Increased amygdala activity corresponded to greater activity in the bone marrow and increased inflammation in arteries.

The researchers further observed that activation of the brain's fear centers, bone marrow activation and arterial inflammation may together contribute to a mechanism that provokes cardiovascular events. Tawakol said this points to the need for future studies to test whether interrupting this mechanism reduces the burden of cardiovascular disease associated with stress.

"Over the past several years, it's become clear that stress is not only a result of adversity but may itself also be an important cause of disease. The risks of heart disease linked to stress is on par with that for smoking, high blood pressure, high cholesterol and diabetes, yet relatively little is done to address this risk compared to other risk factors," Tawakol said. "We are hopeful studies like this bring us closer to understanding how stress may lead to heart disease."

While researchers were able to objectively measure stress activity in the brain, the retrospective nature of the study meant that they could not compare it to subjective measures of patients' stress levels. Additionally, the patient population is limited to individuals who received PET/CT scans to screen for cancer.

Still, Tawakol said the study findings prompt the question of whether treating stress and reducing the activation of the fear center of the brain may lead to less atherosclerotic inflammation and, ultimately, reduce cardiovascular events. Larger prospective studies are needed.

Doctors need to be aware of the heart-health consequences of current events such as the Syrian crisis and this week's terror attacks in Brussels, said Dr. Richard Becker, director of cardiovascular health and disease at the University of Cincinnati College of Medicine. He is also director of the university's Heart, Lung & Vascular Institute.

"After there's an earthquake or a tsunami, the incidence of heart attacks over the next six to eight weeks increases substantially," said Becker, an American Heart Association spokesman, citing prior research. "The same thing happens with human disasters, with terrorism, particularly if it's on a large scale."

ACC2016特集

[News01]

脳画像が扁桃体の活性と心臓発作のリスクを関連付ける

[News02]

心疾患患者においてうつ病は予後不良と関連している

[News03]

心疾患疑いの症状は男女で差がない

[News04]

午睡はメタボリック症候群のリスクを上昇させる

[News05]

バイスタンダーによるCPRは生存率向上および神経学的転帰が良好であることと関連がある

[News06]

マンモグラムは心疾患の新たなスクリーニング法となり得る

[News07]

スタチンの広範な使用がスタディにより支持された

[News08]

中等度リスクの患者においてTAVRは手術に代わる妥当な代替療法である

[News09]

PCSK9阻害薬はスタチン不耐性患者のコレステロール値を低下させる

[News10]

心臓検査における性差

[News11]

Evacetrapibトライアルは早期中断された

[News12]

肥満手術の血糖値に対する効果は時間が経過しても持続する

[News13]

幹細胞治療は心不全の転帰を改善する

[News14]

院外心停止に対する抗不整脈薬投与が疑問視される

[News15]

ステント留置を遅らせても臨床的有益性は示さなかった

[News16]

心筋梗塞後のlosmapimod投与により改善は認めなかった

[News17]

クライオアブレーションは高周波アブレーションに匹敵する

[News18]

CABGは心不全患者の寿命を延長させる