3D MRIは糖尿病患者における脳卒中リスクの早期徴候を示す (SSA17-05)

3D MRIを用いた動脈の画像診断は糖尿病患者の脳卒中リスクを判定するのに役立ち得る

Arterial imaging with 3-D MRI could help determine stroke risk among diabetics

糖尿病患者には、脳卒中リスクを上昇させ得る進行した血管疾患が内在している可能性がある、と2015年Radiological Society of North America（RSNA）年次集会で発表された。研究者らは3D MRIを用いて、進行した動脈硬化疾患を示す頸動脈プラーク内出血（IPH）所見を調べた。さらに、非糖尿病の人々よりも、転帰不良な脳卒中リスクが既に有意に高い糖尿病患者群に焦点を当てた。食事療法トライアルから組み入れられた平均年齢63歳の無症候性2型糖尿病患者159人を、3D MRIを用いて頸動脈IPH有病率を調査した。画像検査を受けた患者159人のうち、37人（23.3%）は少なくとも1本の頸動脈にIPHを有していた。これらの37人中5人が両側の頸動脈にIPHを有していた。IPHは頸動脈狭窄がなくても認められ、3D MRIで計測した頸動脈壁容積増加と関連があった。現時点ではIPHに対する治療法はないが、3D MRIはリスク層別化に役立つ可能性があり非糖尿病の人々においても適用し得る、と筆者らは指摘している。

Full Text

People with diabetes may be harboring advanced vascular disease that could increase their risk of stroke, according to new research presented at the 2015 annual meeting of the Radiological Society of North America (RSNA). The findings suggest that arterial imaging with 3-D MRI could be useful in helping to determine stroke risk among diabetics.

Narrowing of the carotid arteries is associated with risk of stroke, but less is known about stroke risk in people with little or no narrowing of these arteries. For the new study, researchers used 3-D MRI to study the carotid arteries for evidence of intraplaque hemorrhage (IPH), an indicator of advanced atherosclerotic disease.

"A recent analysis of multiple studies has shown that people with carotid artery narrowing and IPH have a five- to six-times higher risk of stroke in the near future compared to people without," said study author Tishan Maraj, M.B.B.S., imaging analyst at Sunnybrook Research Institute and M.Sc. candidate at the University of Toronto in Toronto, Canada.

Dr. Maraj and colleagues focused their study on people with diabetes, a group already facing a significantly increased risk of strokes with worse outcomes than the non-diabetic population. They used 3-D MRI to investigate the prevalence of carotid IPH in 159 asymptomatic type 2 diabetic patients, average age 63, recruited from a dietary trial between 2010 and 2013.

Of the 159 patients imaged, 37, or 23.3 percent, had IPH in at least one carotid artery. Five of the 37 patients had IPH in both carotid arteries. IPH was found in the absence of carotid artery stenosis and was associated with an increased carotid artery wall volume as measured by 3-D MRI.

"It was surprising that so many diabetic patients had this feature," Dr. Maraj said. "We already knew that people with diabetes face three to five times the risk of stroke, so perhaps IPH is an early indicator of stroke risk that should be followed up."

While 2-D MRI has been used for more than a decade to identify and characterize carotid artery plaques, the 3-D method brings an extra level of imaging power, Dr. Maraj noted. "The advantage of 3-D MRI is you can image the entire carotid artery and pinpoint the area of interest over a shorter period of time compared with multiple 2-D sequences," he said.

Dr. Maraj emphasized that the study did not look at outcomes for the patients and did not draw any conclusions on whether people with IPH will develop carotid artery blockages more quickly than those with no IPH present. However, it is already known that blood is a destabilizing factor of plaque that promotes rupture, setting off a chain of events that can lead to a stroke.

Although there is no treatment for IPH at this time, Dr. Maraj said identification of it may help with risk stratification and could even have applications in the non-diabetic population.

"Even though you can't treat IPH, you can monitor patients a lot more closely," he said.

Co-authors on the study are Alan R. Moody, M.D., FRCP, FRCR, Navneet Singh, M.D., Tina Binesh Marvasti, M.Sc., Mariam Afshin, Ph.D., M. Eng., Pascal N. Tyrrell, Ph.D., and David Jenkins, M.D., Ph.D., D.Sc.

早期段階の脳疾患と心疾患とに関連が認められた(ST09-01)

潜在性心機能低下はMRI上の潜在的な脳疾患の画像マーカーと関連がある

Subclinical cardiac dysfunction correlates to imaging markers of subclinical brain disease on MRI

数千人の健常成人を調査している研究者らが、非常に早期の脳疾患と心疾患との関連性を発見した。このスタディは2015年Radiological Society of North America年次集会で発表された。研究者らは、Rotterdamの高齢者における、慢性疾患を調査する地域住民を対象とした前向き研究であるRotterdam Studyの参加者2,432人（女性57.4%、平均年齢56.6歳）のデータを解析した。明らかな心疾患、認知症および脳梗塞を有する人々は解析から除外された。参加者は、拡散テンソル画像（DTI）と呼ばれる先進的技術を用いた脳MRI検査、およびN末端プロB型ナトリウム利尿ペプチド（NT-proBNP）の血中レベル計測を施行された。研究者らは脳容積の減少、微細構造変化および白質病変など、細胞領域が外傷や疾病により障害されていることを示すMRIの結果を早期脳疾患のマーカーとして評価した。DTIの結果から、NT-proBNPが高値の者は白質の微細構造組織が不良であることが示された。NT-proBNP高値は脳の容積が小さいこと、および白質病変容積が大きいことと関連があった。脳容積の減少は灰白質で優位であった。

Full Text

Researchers in the Netherlands studying thousands of healthy adults have found a connection between very early stages of brain and heart disease. Results of their study were presented at the 2015 annual meeting of the Radiological Society of North America (RSNA).

"Heart and brain diseases are big problems in aging individuals and are expected to grow even more," said Hazel Zonneveld, M.D., M.Sc., from the Department of Epidemiology and Radiology at Erasmus University Medical Center in Rotterdam, Netherlands. "We know that myocardial infarction, heart failure and atrial fibrillation are associated with an increased risk of stroke and dementia. Our study investigates whether the heart-brain link is present at an earlier stage of disease."

Dr. Zonneveld and colleagues analyzed data from 2,432 participants in the Rotterdam Study (57.4 percent women, mean age 56.6 years), a prospective, population-based study designed to investigate chronic diseases in Rotterdam's aging population. Participants with overt heart disease, dementia and brain infarcts were excluded from the analysis.

Participants in the study underwent brain MRI, which included the use of an advanced technique called diffusion tensor imaging (DTI), and blood testing to measure levels of N-terminal pro b-type natriuretic peptide (NT-proBNP), which is primarily used to help detect, diagnose and evaluate the severity of heart failure.

"NT-proBNP is released into the bloodstream in response to myocardial wall stress," Dr. Zonneveld said. "Studies have demonstrated that NT-proBNP provides information on cardiac dysfunction even in the absence of overt heart disease."

The researchers evaluated the brain MRI results for markers of early brain disease, including a loss of brain volume, microstructural changes and white matter lesions, which indicate areas of cells that have been damaged by injury or disease.

"Diffusion tensor imaging gives us information on the microstructural organization of the brain's white matter," Dr. Zonneveld said. "It is thought that microstructural brain changes precede brain changes, such as white matter lesions."

The results of DTI showed that participants with higher NT-proBNP levels had worse microstructural organization within the white matter. A statistical analysis revealed that higher NT-proBNP levels were also associated with smaller total brain volume and larger white matter lesion volume.

"The brain volume loss was predominantly in the gray matter," Dr. Zonneveld said.
According to Dr. Zonneveld, this study is the first to demonstrate an association between NT-proBNP and the microstructure of the brain.

"This implies that the heart and brain are intimately linked, even in presumably healthy individuals, and informs us importantly about development of disease as we age," she said.

Co-authors on the study are Wiro Niessen, Ph.D., Aad Van Der Lugt, M.D., Ph.D., Gabriel P. Krestin, M.D., Ph.D., Oscar H. Franco, M.D. Ph.D., M. Arfan Ikram, M.D, Ph.D., and Meike W. Vernooij, M.D, Ph.D.

RSNA2015特集

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MRIにより一流ダイバーの無呼吸中の心血管系変化が示された(SSK04_06)

一流のフリーダイバーにおける無呼吸の生理学的変化は心不全における血行動態変化と類似している

Physiological effects of apnea in elite free-divers similar to hemodynamic changes seen in heart failure

呼吸を止めて海面から数百フィート下に潜るフリーダイビングの過激なスポーツに従事するアスリートにおいては、有意な心血管変化が起きている、と2015年Radiological Society of North America年次集会で発表された。これらの変化は、特に経験の浅いまたは心臓が鍛えられていないダイバーにおいては危険な可能性がある。旧式の方法によるフリーつまり無呼吸ダイビング人口は過去10年の間に世界中で非常に増大している。このスポーツは、ダイバーが非常な水圧下で身体的変化を来しながら長時間にわたり呼吸を止めなくてはならないため危険であり得る。研究者らは17人の一流フリーダイバー（23～58歳）においてMRIを用いてフリーダイビングの心血管系に対する影響をシミュレーションした。ダイバーらは、呼吸を最大に止めている間およびその後の心臓MRIおよびMR位相コントラスト画像検査を施行された。呼吸を止めている平均は299秒（5分弱）であった。長時間の無呼吸はダイビング反応から予測された様に心臓に対する大きな血行動態変化をもたらし、脳血流を増加させた。特に、無呼吸は一過性の心拡大、左室駆出率および左室内径短縮率の減少-心不全患者において認められるパターン-を引き起こした。

Full Text

Athletes who engage in the extreme sport of free diving, descending hundreds of feet below the surface of the ocean while holding their breath, undergo significant cardiovascular changes, according to a new study presented at the 2015 annual meeting of the Radiological Society of North America (RSNA). These changes can pose potential dangers, particularly to inexperienced or cardiac untrained divers.

Apnea is the temporary suspension of breathing. The ancient practice of free or apnea diving has experienced immense growth worldwide over the past decade, due to coverage in the media and increased competition and training opportunities for elite and recreational divers. The sport can be dangerous, because divers must hold their breath for prolonged periods while undergoing massive water pressure and physiological changes.

Recreational divers are at greatest risk because of lack of conditioning, but even elite divers have suffered lasting or fatal effects resulting from free diving. Most recently, champion diver Natalia Molchanova was reported missing and presumed dead off the coast of Spain during a dive in August 2015.

Researchers at the University of Bonn in Bonn, Germany, used MRI to study the simulated effects of free diving on the cardiovascular systems of 17 elite free-divers from Germany and Austria (age range 23 to 58). To study the effects of a lack of oxygen on heart function and blood flow, respectively, the divers underwent cardiac MRI and MRI of the carotid arteries before, during and after a maximum breath hold.

"We wanted to look at the changes that occur in the heart during apnea in real time," explained study author Jonas Dörner, M.D., who is now a radiology resident at the University Hospital of Cologne.

The average apnea was 299 seconds (just under five minutes) and 279 seconds or about four and a half minutes for the first and second MRI exams, respectively. The maximum breath hold (or apnea) during the exams was eight minutes and three seconds.

"These athletes train to be able to hold their breath for long periods," Dr. Dörner said. "When they get into the water, they are able to hold their breath even longer due to the diving reflex."

When submerged underwater without access to oxygen, the body responds with what is called "diving reflex," which includes a decreased heart rate, a constriction of blood vessels in the extremities, and a shift in blood flow from the extremities to the brain. These changes also occur - to a lesser degree - during prolonged breath holding without being submerged. As oxygenated blood is diverted from the rest of the body to the brain, blood pressure increases.

The MRI exams allowed the researchers to observe the cardiovascular changes involved in the diving reflex in real time. During apnea, the amount of blood flowing to the brain through the carotid arteries increased and then leveled off.

Prolonged apnea led to massive hemodynamic changes to the heart and an increased blood-flow to the brain as expected from the diving reflex. In particular, apnea led to a transient cardiac dilation, decrease of left ventricular ejection fraction and fractional shortening – a pattern seen in patients with heart failure.

"At the beginning of the apnea period, the heart pumped more strongly than when the heart was at rest," Dr. Dörner said. "Over time, the heart dilated and began to struggle." By the end of the apnea period, Dr. Dörner said the divers' heart function began to fail. At that point, not enough blood is being pumped to the brain," he said. "The heart is unable to pump against the high resistance of the blood vessels."

Although the changes in the divers' systolic heart function during apnea are similar to those in patients with systolic heart failure, Dr. Dörner said that the condition was transient in the divers.

"The divers' heart function recovered within minutes of breathing again," said Claas Nähle, M.D., head of this cardiac magnetic resonance research group. "It appears that elite divers develop compensatory mechanisms that help them adapt to the cardiovascular changes that occur during apnea."

However, for individuals with less training, free diving may be problematic.
"As a recreational activity, free diving could be harmful for someone who has heart or other medical conditions and is not well trained for the activity," said one of the study's leaders, Lars Eichhorn, M.D., from the Department of Anesthesiology and Intensive Care Medicine at the University Hospital of Bonn.

Dr. Eichhorn added that deaths among highly trained divers are mostly seen in the discipline called deep diving, a special type of apnea diving that combines the risk of prolonged apnea with changes of ambient pressure.

Other co-authors on the study are Jean-Marc Lunkenheimer, Julian A. Luetkens, M.D., Juergen Gieseke, D.Sc., Rainer Meyer, Ph.D., Andreas Hoeft, M.D., and Hans H. Schild, M.D.

Subsolidの肺結節は男性よりも女性におけるがんリスクを増大させる (SSA04-02)

CTスタディの結果、すりガラス状結節を有する女性はこれを有する男性よりもより綿密な追跡が必要であることが示唆された

CT study suggests that women with ground glass nodules may need closer follow-up than men

肺がんスクリーニングCT検査においてあるタイプの肺結節を有する女性は同様の結節を有する男性よりも肺がんリスクが高い、と2015年Radiological Society of North America年次集会で発表された。研究者らはNational Lung Screening Trial（NLST）のCTスキャンの結果をレビューした。CTで検出された4～30mmの結節全てを硬度で特徴付け、各々の硬度サブタイプの肺がん発症相対リスクを計算した。参加者26,455人のうち9,994人、つまり37.8%がトライアル中の1以上の時点においてスクリーニング陽性であった。すりガラス状結節を有する女性は同様の結節を有する男性よりも肺がん相対リスクが有意に高く、part-solid noduleに関しても同様の傾向が認められた。対照的に、solid noduleの肺がん相対リスクでは性差はなかった。Part-solid noduleのがん予測能は男女ともに最大であり、solid noduleは女性においては予測能が最も低く、男性においてはすりガラス状結節の予測能が最も低かった。

Full Text

Women with a certain type of lung nodule visible on lung cancer screening CT exams face a higher risk of lung cancer than men with similar nodules, according to a new study presented at the 2015 annual meeting of the Radiological Society of North America (RSNA).

Lung nodule consistency is considered an indicator of lung cancer risk, with part solid nodules being most strongly associated with lung cancer in the screening setting.

"We know there are differences in cancer risk among different lung nodule consistencies, but we were unaware of any published reports that looked at the differences in lung cancer risk for nodule subtypes between women and men," said study lead author Phillip Boiselle, M.D., from Beth Israel Deaconess Medical Center and Harvard Medical School in Boston, Massachusetts, USA.

For the new study, Dr. Boiselle and colleagues reviewed CT scans from the National Lung Screening Trial (NLST), a large, randomized control study that demonstrated the value of CT screening in reducing lung cancer mortality. The NLST included more than 40 percent women, giving the research team a rare opportunity to look for statistically significant differences in lung nodules and lung cancer between the sexes.

The researchers characterized all CT-detected nodules measuring 4 to 30 millimeters by consistency using the NLST database and calculated the relative risk of developing a lung cancer for each nodule consistency subtype.

Out of 26,455 participants, 9,994, or 37.8 percent, had a positive screen at one or more points during the trial. Women with ground-glass nodules had a significantly higher relative risk of lung cancer than men with the same type of nodules, and a similar trend was observed for part-solid nodules. In contrast, the relative risk of lung cancer for solid nodules was comparable for both sexes.

Part-solid nodules had the highest predictive value of cancer in both sexes, whereas solid nodules had the lowest predictive value in women and ground glass nodules had the lowest predictive value in men.

"The main difference we found was that women were 50 percent more likely than men to have ground-glass nodules and, when these nodules were present, women had a substantially higher risk of developing lung cancer," Dr. Boiselle said.

Current lung cancer screening guidelines do not take into account gender differences when managing nodules of different consistencies. While more research is needed before changes are made to clinical practice, the results suggest that women with ground glass nodules may need closer follow-up than men.

"By looking at the rate at which lung cancers grow on serial CT scans, we can develop a better understanding of how often to obtain follow-up CT scans in men and women," Dr. Boiselle said.

The researchers plan to continue studying the NLST data to further understand the significance of these cancers, especially with respect to their influence on lung cancer mortality.

Co-authors on the study are Fenghai Duan, Ph.D., Stavroula Chysanthopoulou, Ph.D., Sarah DeMello, M.S., Denise R. Aberle, M.D., and Caroline Chiles, M.D.

乳腺密度のみではがんのリスクファクターにならない (BR-5A-01)

乳腺密度のみでは乳がんの強力な独立したリスクファクターにはならない可能性がある

Breast density alone may not be strong independent risk factor for breast cancer

乳腺密度は乳がんの強力な独立したリスクファクターではない可能性がある、と2015年Radiological Society of North America年次集会で発表された。研究者らは、50～69歳の女性に施行された5年間のマンモグラフィー検査52,962件のデータを調査した。2人の放射線科医が別々にマンモグラムを読影し、標準診断基準に従い乳腺密度を判定した。検出された乳がん230件のうち約半数は乳腺密度が最も低い群から検出され、一方最も乳腺密度が高い群から検出されたのは3%未満であった。がんが検出された患者とがんを有さない同年代の参加者コントロールとでマッチさせたところ、マンモグラフィー上の密度に有意差はなかった。マンモグラフィー上の密度が低い女性（乳腺実質<50%）は乳がん患者群の83%を構成したのに対し、コントロール群では89%であり、マンモグラフィー上の密度が高い（乳腺実質>50%)女性は乳がん患者の17%に認められ、コントロール群では11%であった。今回のスタディでは、閉経後女性においてマンモグラフィー上の高密度と乳がん高リスクとの間に強力な関連性は認められなかった。

Full Text

Breast density may not be a strong independent factor for breast cancer risk, according to a new study presented at the 2015 annual meeting of the Radiological Society of North America (RSNA).

Prior research has shown an association between breast density and breast cancer. In addition, cancers in dense breast tissue are more difficult to see on mammograms. As a result, some women with dense breasts are advised to get supplementary screening with ultrasound or MRI.

"In our study, we found that there was no significant difference in breast density between breast cancer patients and the control group in the screening program," said Natasa Katavic, M.D., from the Department of Radiology at Health Center Osijek in Osijek, Croatia.

For the study, Dr. Katavic and colleagues looked at data from 52,962 mammography exams performed in women ages 50 to 69 over five years at five different mammography facilities. Women in Croatia in this age group are invited every two years for mammography by the country's Institute of Public Health.

"We wanted to find out if breast cancer patients had more dense breast tissue than the healthy women," Dr. Katavic said. "Also, we wanted to see what the percentage of dense breasts was in our postmenopausal population and, consequently, determine the value of mammography screening for this group."

Two radiologists read the mammograms independently and determined breast density according to standard criteria. The researchers compared data between patients in the low-density breast tissue group and the high-density group.

The majority of screened woman had low breast density. Of the 230 detected breast cancers, almost half were from the group with the lowest ranked breast density, while slightly less than 3 percent came from women in the highest breast density category.

When the researchers matched the women who had a detected cancer with control participants of the same age and from the same locales who did not have cancer, they found no significant difference in mammographic density. Women with low mammographic density (<50 percent parenchyma) made up 83 percent of the patients in the breast cancer group, compared with 89 percent in the control group, while high mammographic density (>50 percent parenchyma) was found in 17 percent of the breast cancer patients and 11 percent of women in the control group.

The study did not find a strong association between higher mammographic densities and a higher risk of breast cancer among postmenopausal women, according to Dr. Katavic.

"Our study suggests that breast density alone might not be strong independent risk factor for breast cancer," she said. "In risk assessment, all risk factors should be considered before decisions on additional examinations."

The findings also support mammography as an efficient method for early detection of non-palpable breast cancer, Dr. Katavic said.

Co-authors on the study are Kristina Bojanic, M.D., Prof. Kristina Kralik, Tibor Santo, M.D., Kristina Vidacic, M.D., Mirta Pacovski, M.D., and Miroslav Sikora, D.M.D.

RSNA2015特集

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小児において親がいないことは脳の発達を遅延させる可能性がある (PD01A-02)

長期間にわたり親族に世話をされた小児の灰白質が大きいことがMRIにより示された

MRI reveals larger gray matter volumes in children left in care of relatives for extended periods of time

長期にわたり親の直接的な世話が得られない状態であった小児の灰白質容積が大きいことが示された、と2015年Radiological Society of North America年次集会で発表された。世界中で、政治的混乱、経済的必要性または他の理由により、親は時に数か月または数年間にわたり子供を置いて家を離れざるを得ない。親に置いて行かれた女児および男児(7～13歳)38人のMRI所見が親と共に生活しているコントロールの女児および男児(7～14歳)のMRI所見と比較された。その後、研究者らはそれぞれの参加者群における知能指数(IQ)を計測し、認知機能を評価した。その結果、置いて行かれた小児においては親と共に生活している小児に比べ、複数の脳領域、特に感情の脳回路において灰白質容積が大きいことが明らかにされた。記憶の暗号化や回復に関連する灰白質容積はIQと反比例した。灰白質容積は脳の刈り込みおよび成熟が不十分であることを反映する可能性があり、灰白質容積とIQスコアとの反比例は、親によるケアがない状態での成長は脳の発育を遅延させる可能性があることを示唆する。

Full Text

Researchers in China have found that children who have been left without direct parental care for extended periods of time show larger gray matter volumes in the brain, according to a study presented at the 2015 annual meeting of the Radiological Society of North America (RSNA).

Throughout the world, due to political upheaval, economic necessity or other reasons, parents sometimes are compelled to travel away from home for months or years at a time, leaving their children behind.

In China, large numbers of workers are migrating away from their children in pursuit of better jobs. Researchers wanted to study how this migration has affected the millions of children who have been left in the care of relatives for a period of more than six months without direct parental care from their biological parents.

"We wanted to study the brain structure in these left-behind children," said study author Yuan Xiao, Ph.D. candidate at the Huaxi MR Research Center and the Department of Radiology at West China Hospital of Sichuan University in Chengdu, Sichuan, China. "Previous studies support the hypothesis that parental care can directly affect brain development in offspring. However, most prior work is with rather severe social deprivation, such as orphans. We looked at children who were left behind with relatives when the parents left to seek employment far from home."

For the study, which was led by Professor Su Lui and conducted at the Second Affiliated Hospital & Yuying Children's Hospital of Wenzhou Medical University, MRI exams from 38 left-behind girls and boys (ages 7 to 13) were compared to MRI exams from a control group of 30 girls and boys (ages 7 to 14) living with their parents. The researchers then compared the gray matter volume between the two groups and measured the intelligence quotient (IQ) of each participant to assess cognitive function.

The researchers found larger gray matter volumes in multiple brain regions, especially in emotional brain circuitry, in the left-behind children compared to children living with their parents. The mean value of IQ scores in left-behind children was not significantly different from that of controls, but the gray matter volume in a brain region associated with memory encoding and retrieval was negatively correlated with IQ score.

Since larger gray matter volume may reflect insufficient pruning and maturity of the brain, the negative correlation between the gray matter volume and IQ scores suggests that growing without parental care may delay brain development.

"Our study provides the first empirical evidence showing that the lack of direct parental care alters the trajectory of brain development in left-behind children," Xiao said. "Public health efforts are needed to provide additional intellectual and emotional support to children left behind by parents."

Co-authors on the study are Lili Yang, M.D., Zhihan Yan, M.D., Yuchuan Fu, M.D., Meimei Du, M.D., and Su Lui, M.D.

RSNA2015特集

肥満小児において食物のにおいは脳の衝動性領域を活性化させる(PD01A-02)

機能的MRI検査の結果、肥満は神経学的障害の側面を有していることが示された

Functional MRI exams show obesity has a neurological disorder component

肥満小児が食物の匂いに出くわすと衝撃性や強迫性障害の発症に関連する脳領域が活性化される、と2015年Radiological Society of North America年次集会で発表された。研究者らは30人の小児(6～10歳)を調査した。これらの小児のうち半数はボディーマスインデックス(BMI)が19～24と正常であった。その他の半数はBMIが30を超えていた。各小児に対し3つの匂い標本(チョコレート、玉ねぎおよびアセトンを希釈したニュートラルな匂い)が提示された。参加者が標本の匂いを嗅いでいる時に2つのMRI技術-機能的MRI(fMRI)および機能的結合MRI(fcMRI)-を用いて脳活性度が計測された。食物の匂いは、肥満小児において衝撃性や強迫性障害の発症に関連する脳領域の活性化のきっかけとなったが、衝撃性コントロールに関連した脳領域においては活性化が示されなかった。しかしBMIが正常な小児においては、快楽制御、組織および計画、そして感情処理または記憶機能の管理領域がより活性化した。

Full Text

The area of the brain associated with impulsivity and the development of obsessive-compulsive disorder is activated in obese children when introduced to food smells, according to a study presented at the 2015annual meeting of the Radiological Society of North America (RSNA).

"In order to fight obesity, it is crucial to understand the brain mechanisms of odor stimulus," said Pilar Dies-Suarez, M.D., chief radiologist at the Hospital Infantil de México Federico Gómez. "This study has given us a better understanding that obesity has a neurological disorder component, and the findings have the potential to affect treatment of obese patients."

Obese children are at a higher risk to develop high blood pressure, type 2 diabetes, and breathing and joint problems, among many other health issues. They are also more likely to become obese adults.

The researchers studied 30 children between the ages of 6 and 10 years old. Half of the children had a normal body mass index (BMI) between 19 and 24, and the other half exhibited a BMI over 30, which is classified as obese. Each child was presented with three odor samples: chocolate, onion and a neutral odor of diluted acetone. As the participants smelled the samples, two MRI techniques—functional MRI (fMRI) and functional connectivity MRI (fcMRI)—were used to measure brain activity.

An evaluation of the fMRI results showed that in the obese children, the food odors triggered activation in the areas of the brain associated with impulse and the development of obsessive-compulsive disorder, while the areas of the brain associated with impulse control exhibited no activity. However, in the children with a normal BMI, the areas of the brain associated with pleasure regulation, organization and planning, as well as regions governing emotional processing or memory function, became more active.

In addition, the fcMRI results showed that when the normal-weight children smelled the onion, there was a connection between the gustatory cortex, which processes taste, and the area of the brain linked to reward anticipation. This connection did not occur in the obese children.

The chocolate smell elicited significant brain connections in obese children, compared to the normal-weight children.

"If we are able to identify the mechanisms that cause obesity, we will be able to change the way we treat these patients, and in turn, reduce obesity prevalence and save lives," Dr. Dies-Suarez said.

Co-authors on this study were Silva Hidalgo-Tobon, Ph.D., Benito De Celis IV, Eduardo Barragan, Eduardo Castro, M.D., Samuel Flores, M.D., Porfírio Ibanez and Manuel Obregon.

RSNA2015特集

患者の気分は医療処置の結果に影響を及ぼし得る (SSQ21-08)

インターベンショナルラジオロジーを施行中の患者の否定的な感情は転帰に影響し得る

Patient's negative feelings during interventional radiology procedure can affect outcome

血管形成術またはその他のインターベンショナルラジオロジーの施行前に、高度の苦悩、恐怖および敵意の感情は転帰不良につながる可能性がある、と2015年Radiological Society of North America年次集会で発表された。研究者らは、血管および腎臓インターベンションなどの画像誘導下インターベンショナルラジオロジーを施行された女性120人および男性110人計230人（平均年齢55歳）を解析した。患者は、強気、キビキビとしている、決断力がある、およびその他の肯定的な感情、さらに罪悪感、緊張感または怒りっぽさなどの否定的な感情をどの程度有しているかを5点満点の評価尺度を用いて報告した。患者は肯定的な感情の高スコアおよび低スコアと、否定的な感情の高スコアと低スコアに基づきグループ分けされた。これらのグループは、施術中の遷延性低酸素症、高血圧、低血圧、術後出血または徐脈などの有害事象発現と関連した。否定的な感情が高スコアの患者104人のうち、23人（22%）が有害事象を発現したのに対し、低スコアの患者126人では15人（12%）であった（p=0.04）。肯定的な感情の度合いは有害事象発現率に有意な差をもたらさなかった。

Full Text

Feeling high levels of distress, fear and hostility prior to undergoing an angioplasty or other interventional radiology procedure may lead to a poor outcome, according to new research presented at the 2015 annual meeting of the Radiological Society of North America (RSNA).

"I was surprised by this result," said study author Nadja Kadom, M.D., currently acting associate professor of radiology at Emory University School of Medicine and Children's Healthcare of Atlanta. "Prior to this study, I did not believe patient mood could have an effect on outcome."

In the study, researchers analyzed the results of 230 patients, including 120 women and 110 men (mean age 55 years) who underwent image-guided interventional radiology procedures including vascular and kidney interventions.

Upon arriving for their procedure, patients were asked to complete a questionnaire called the Positive Affect Negative Affect Schedule (PANAS) to assess their mood. Using a five-point rating scale, the patients reported to what extent they felt strong, alert, determined and other positive feeling states and to what degree they were experiencing negative feelings, such as guilt, nervousness or irritability.

Dr. Kadom and fellow researchers Elvira V. Lang, M.D., Ph.D., and Gheorghe Doros, Ph.D., grouped the patients based on high and low scores for positive affect and high and low scores for negative affect. Those groups were then correlated with the occurrence of adverse events during the procedures, such as a prolonged hypoxia, hypertension, hypotension, postoperative bleeding or bradycardia.

A statistical analysis of the data revealed that patients with a high negative affect experienced significantly more adverse events than patients with low negative affect. Of the 104 patients with high negative affect, 23 (22 percent) had an adverse event, compared to 15 (12 percent) of the 126 patients with low negative affect. The degree of positive affect did not make a significant difference in the incidence of adverse events.

"Our study shows that mood matters," noted Dr. Lang, an interventional radiologist in Boston. "You don't need to have a chipper, cheery attitude prior to your procedure. You just have to overcome negative emotions and get to a neutral level."

Unlike surgical procedures in which patients are not conscious, interventional radiology procedures are often performed on patients who are sedated but awake and able to talk with the physician and healthcare team.

"This is a real issue," Dr. Lang said. "The procedure room is a two-way street in which the patient can affect the healthcare professional and vice versa. Any time the team must manage an adverse event, it takes attention away from the procedure."

Dr. Kadom said that although the tendency in radiology is to focus on improving equipment and techniques to minimize adverse outcomes, there is a growing awareness of what patients bring to the table. Dr. Lang suggested that healthcare teams should be trained in resilience and techniques to create their own positive emotional states, as well as coping strategies to help patients modify negative emotions and reframe their mindset prior to undergoing a procedure.

"We need to help staff show patients how to manage their own emotions to help create an environment for a better outcome," she said.

RSNA2015特集

Cardiology
3D MRIは糖尿病患者における脳卒中リスクの早期徴候を示す

早期段階の脳疾患と心疾患とに関連が認められた

MRIにより一流ダイバーの無呼吸中の心血管系変化が示された

Oncology
Subsolidの肺結節は男性よりも女性におけるがんリスクを増大させる

乳腺密度のみではがんのリスクファクターにならない

Psychiatry
小児において親がいないことは脳の発達を遅延させる可能性がある

肥満小児において食物のにおいは脳の衝動性領域を活性化させる

患者の気分は医療処置の結果に影響を及ぼし得る