読み書きおよびゲームをすることは脳を健康に保つのに役立つ可能性がある

老年期において認知機能活動が頻回であると多くの脳領域において微細構造の完全性が高い

Frequent late life cognitive activity linked to greater microstructural integrity in a number of brain regions

読み書きなどの知的活動は高齢者の脳組織の完全性を保持し得るとのスタディ結果が2012年Radiological Society of North America年次集会で発表された。このスタディではRush Memory and Aging Projectの高齢参加者152人（平均年齢81歳）を対象とした。参加者は認知症を有さないか軽度認知障害を有する者であった。研究者らは参加者に、知的な興味をもたせるような活動のリストから前年に参加した活動の頻度を1～5で評価させた。これらの知的活動は新聞や雑誌を読むこと、手紙を書くことおよびカードやボードゲームをすることなどであった。参加者は、臨床評価から1年以内に1.5-TMRスキャナーを用いた脳の磁気共鳴画像検査を施行された。研究者らは解剖学的および拡散テンソル画像データを収集し、それを用いて拡散異方性マップを作成した。解析の結果、老年期の認知活動の頻度と脳の拡散異方性の値が高いこととに有意な関連が認められた。筆者らによると、拡散異方性の値は年齢とともに低下する。認知活動頻度の高い高齢者において拡散異方性の値が高いことから、これらの人々は若年者と同様な脳特性を有することが示唆された。

Full Text

Mental activities like reading and writing can preserve structural integrity in the brains of older people, according to a study presented at the 2012 annual meeting of the Radiological Society of North America (RSNA).

While previous research has shown an association between late-life cognitive activity and better mental acuity, the new study from Konstantinos Arfanakis, Ph.D., and colleagues from Rush University Medical Center and Illinois Institute of Technology in Chicago studied what effect late-life cognitive activity might have on the brain's white matter, which is composed of axons that transmit information throughout the brain.

"Reading the newspaper, writing letters, visiting a library, attending a play or playing games, such as chess or checkers, are all simple activities that can contribute to a healthier brain," Dr. Arfanakis said.

The researchers used a magnetic resonance imaging (MRI) method known as diffusion tensor imaging (DTI) to generate data on diffusion anisotropy, a measure of how water molecules move through the brain. In white matter, diffusion anisotropy exploits the fact that water moves more easily in a direction parallel to the brain's axons, and less easily perpendicular to the axons, because it is impeded by structures such as axonal membranes and myelin. "This difference in the diffusion rates along different directions increases diffusion anisotropy values," Dr. Arfanakis said. "Diffusion anisotropy is higher when more diffusion is happening in one direction compared to others."

The anisotropy values in white matter drop, however, with aging, injury and disease.
"In healthy white matter tissue, water can't move as much in directions perpendicular to the nerve fibers," Dr. Arfanakis said. "But if, for example, you have lower neuronal density or less myelin, then the water has more freedom to move perpendicular to the fibers, so you would have reduced diffusion anisotropy. Lower diffusion anisotropy values are consistent with aging."

The study included 152 elderly participants, mean age 81 years, from the Rush Memory and Aging Project, a large-scale study looking at risk factors for Alzheimer's disease. Participants were without dementia or mild cognitive impairment, based on a detailed clinical evaluation. Researchers asked the participants to rate on a scale of 1 to 5 the frequency with which they participated in a list of mentally engaging activities during the last year. Among the activities were reading newspapers and magazines, writing letters and playing cards and board games.

Participants underwent brain MRI using a 1.5-T scanner within one year of clinical evaluation. The researchers collected anatomical and DTI data and used it to generate diffusion anisotropy maps.

Data analysis revealed significant associations between the frequency of cognitive activity in later life and higher diffusion anisotropy values in the brain.

"Several areas throughout the brain, including regions quite important to cognition, showed higher microstructural integrity with more frequent cognitive activity in late life," said Dr. Arfanakis. "Keeping the brain occupied late in life has positive outcomes."

According to Dr. Arfanakis, diffusion anisotropy drops gradually beginning at around age 30. "Higher diffusion anisotropy in elderly patients who engage in frequent cognitive activity suggests that these people have brain properties similar to those of younger individuals," he said.

The researchers will continue to follow the study participants with an eye toward comparing the diffusion anisotropy results over time.

"In these participants, we've shown an association between late-life cognitive activity and structural integrity, but we haven't shown that one causes the other," Dr. Arfanakis said. "We want to follow the same patients over time to demonstrate a causal link."

Coauthors are Anil K. Vasireddi, B.S., Shengwei Zhang, B.Eng., David A. Bennett, M.D., and Debra A. Fleischman, Ph.D.

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