ケモブレイン現象の生理学的エビデンス（Abstract # LL-MIS-TU2A）

PET/CTの結果ケモブレイン現象の症状に関連した局所脳代謝が減少していることが示された

PET/CT demonstrates decreases in regional brain metabolism that are associated with symptoms of the chemo brain phenomenon

ポジトロン断層撮影とコンピューター断層撮影の組み合わせ（PET/CT）により、化学療法を施行されている患者に一般的にみられる副作用であるケモブレイン（集中力や記憶力に影響する）の生理学的エビデンスが認められたとの研究結果が2012年Radiological Society of North America学会で発表された。この愁訴は一般的であるかもしれないが、ケモブレイン現象の原因を特定するのはこれまで困難であった。磁気共鳴画像を用いた過去のいくつかのスタディでは、化学療法後の脳体積の小さな変化が検出されたが、決定的な関連は明らかにされなかった。脳の外観に対する化学療法の影響を調査するのではなく、研究者らはPET/CTを用いて化学療法後の脳代謝の変化を評価した。彼らは乳がんに対し化学療法を施行された患者128人のPET/CT画像の結果を解析した。彼らは化学療法前後の脳代謝の相違を識別するのに役立つ特別なソフトウエアを使用した。その結果を患者の病歴、神経学的所見および化学療法プロトコールと関連付けた。PET/CTの結果、ケモブレイン現象の症状と密接に関連する局所的脳代謝の統計学的有意な減少が示された。特に、計画を立てたり優先順位を付けたりする役割を担うと考えられている脳領域において、化学療法後にエネルギー使用が少なかった。筆者らは、PET/CTは臨床診断を容易にし早期介入を可能とするのに役立つと信じている。

Full Text

Chemotherapy can induce changes in the brain that may affect concentration and memory, according to a study presented at the 2012 annual meeting of the Radiological Society of North America (RSNA). Using positron emission tomography combined with computed tomography (PET/CT), researchers were able to detect physiological evidence of chemo brain, a common side effect in patients undergoing chemotherapy for cancer treatment.

"The chemo brain phenomenon is described as 'mental fog' and 'loss of coping skills' by patients who receive chemotherapy," said Rachel A. Lagos, D.O., diagnostic radiology resident at the West Virginia University School of Medicine and West Virginia University Hospitals in Morgantown, W.V. "Because this is such a common patient complaint, healthcare providers have generically referred to its occurrence as 'chemo brain' for more than two decades."

While the complaint may be common, the cause of chemo brain phenomenon has been difficult to pinpoint. Some prior studies using magnetic resonance imaging (MRI) have found small changes in brain volume after chemotherapy, but no definitive link has been found.

Instead of studying chemotherapy's effect on the brain's appearance, Dr. Lagos and colleagues set out to identify its effect on brain function. By using PET/CT, they were able to assess changes to the brain's metabolism after chemotherapy.

"When we looked at the results, we were surprised at how obvious the changes were," Dr. Lagos said. "Chemo brain phenomenon is more than a feeling. It is not depression. It is a change in brain function observable on PET/CT brain imaging."

For the study, Dr. Lagos and colleagues analyzed PET/CT brain imaging results from 128 patients who had undergone chemotherapy for breast cancer. They used special software to help discern differences in brain metabolism before and after chemotherapy. Results were correlated with patient history, neurologic examinations and chemotherapy regimens.

PET/CT results demonstrated statistically significant decreases in regional brain metabolism that were closely associated with symptoms of chemo brain phenomenon.

"The study shows that there are specific areas of the brain that use less energy following chemotherapy," Dr. Lagos said. "These brain areas are the ones known to be responsible for planning and prioritizing."

Dr. Lagos believes that PET/CT could be used to help facilitate clinical diagnosis and allow for earlier intervention.

Research has already shown that patients with chemo brain can benefit from the assistance of nutritionists, exercise therapists, massage therapists and counselors. In one study, cancer patients receiving chemotherapy complained of losing their ability to prepare family meals.

"When the researchers provided these patients with written and planned menus for each meal, the women were able to buy the groceries, prepare the meals and enjoy them with their families," Dr. Lagos said.

Dr. Lagos and her fellow researchers hope that future studies will lead the way to better treatment for patients experiencing this often debilitating condition.

"The next step is to establish a prospective study that begins assessing new patients at the time of cancer diagnosis," she said. "The prospective study has the potential to establish an understanding of the change in brain neurotransmitters during chemotherapy, which may lead to improved treatment or prevention."

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