Predicting Dementia Risk 20 Years in Advance Using Blood Proteins

Key Points

- •Using a high through-put protein measurement technology (SomaScan), 25 proteins highly associated with the onset of dementia were identified. Based on these findings, a dementia risk prediction test (dSST) was developed. This test was confirmed to be applicable across races in both the United States and Japan.
- •The dSST demonstrated reliability equal to or greater than conventional genetic testing for predicting the onset of dementia within 20 years.
- •The analysis of proteins suggests that the risk of developing dementia could potentially be controlled through lifestyle improvements.

Summary

A research group consisting of the National Institutes of Health (NIH), National Institute on Aging (NIA), SomaLogic, Inc., NEC Solution Innovators, Ltd., FonesLife Inc., and the National Center for Geriatrics and Gerontology (NCGG), and Professor Masahisa Katsuno and Dr. Keita Hiraga from the department of Neurology, Nagoya University Graduate School of Medicine, has developed a predictive test for assessing the risk of developing dementia based on the analysis of proteins in peripheral blood.

Dementia is a serious social issue in Japan due to the aging population, with the number of patients increasing globally. Recent epidemiological studies revealed that dementia is greatly influenced by lifestyle and environmental factors, positioning it as a lifestyle-related disease. As a result, there is growing interest in understanding the risk of developing dementia before its onset.

This study utilized a technology called SomaScan, which measures ~7,000 blood proteins using aptamers to identify 25 types of proteins closely associated with the onset of dementia. Based on this, a test method (dSST: Dementia SomaSignal Test) was developed to predict the risk of developing dementia within 20 years. The test was validated using data from multiple large-scale cohort studies in the United States and Japan. The results confirmed that this test has accuracy equal to or greater than conventional genetic testing and is applicable across different races and regions.

Furthermore, the study categorized participants based on their level of risk and conducted long-term follow-up surveys. The results showed that approximately 20% of the participants converted to a lower risk category, and risk reduction was observed even in some participants initially classified as high risk. This suggests that dementia risk may fluctuate with lifestyle improvements, highlighting the importance of early intervention.

The research findings were published in the American scientific journal "Alzheimer's & Dementia" on February 12, 2025.

Research Background

Dementia is a serious social issue in Japan due to the aging population, with the number of patients increasing globally. Early prediction of dementia onset and appropriate interventions are considered crucial for extending healthy life expectancy and reducing the burden on medical and nursing care. Recent epidemiological studies have revealed that the onset of dementia is greatly influenced by lifestyle and environmental factors, not just genetic factors. Therefore, in addition to static risk assessments based on genetic testing, there is a growing demand for more dynamic and modifiable risk assessment methods. Conventional dementia risk assessments use methods such as PET (positron emission tomography) scans and biomarker measurements in cerebrospinal fluid. However, these methods are expensive and invasive, making them difficult to apply widely to the general population. As a result, there has been a pressing need for the development of a simple, non-invasive method that can predict the long-term risk of developing dementia.

Research Results

This study developed a dementia risk prediction test utilizing the analysis of blood proteins. Using the SomaScan technology, which measures blood proteins using aptamers, approximately 7,000 blood proteins were simultaneously measured. From these, 25 types of proteins strongly associated with the onset of dementia were identified. Based on this, a test method (dSST: Dementia SomaSignal Test) was constructed to predict the risk of developing dementia within 20 years, and its effectiveness was verified.

The study utilized large-scale cohort data from the United States and Japan to validate the accuracy of the developed risk prediction test. First, blood samples from approximately 15,000 individuals aged 45-64 years from four regions, enrolled in the US ARIC study, were analyzed to identify proteins associated with the onset of dementia. The effectiveness of this test method was then verified using samples from the US BLSA study and the Japanese NILS-LSA study. The results confirmed that this test can predict risk with accuracy equal to or greater than conventional genetic testing and functions with equivalent accuracy across different races and regions.

Moreover, the study results suggested that the risk of developing dementia dose not uniformly increase with age but many decrease with lifestyle improvements. When participants were classified into four categories based on their level of risk and subsequently followed up, approximately 20% of the participants shifted to a lower risk category, and there were instances where risk decreased even among participants initially classified as high risk. This indicates that risk assessments based on blood proteins may reflect the effects of preventive interventions through lifestyle improvements, suggesting that dementia is not inevitably progressive but has preventable aspects.

This research has shown that dementia risk assessment utilizing blood tests can be a more dynamic method that captures changes more easily compared to conventional genetic testing. This test is considered to have great significance from the perspective of preventive medicine, as it can reflect the possibility of risk reduction through lifestyle improvements.

Research Summary and Future Perspective

The dementia risk prediction test developed based on these research findings has been implemented in "FonesVisuas" by FonesLife Inc. and is being deployed as a service for the general public. This test is expected to enable individuals to understand their risk of developing dementia and make appropriate lifestyle adjustments and health management decisions. The research group will continue to develop new technologies and accumulate evidence for the prevention of dementia.

Publication

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