

## Early detection of dementia using AI-based eye-tracking technology. 認知症早期診断に向けたアイトラッキング式認知機能評価アプリの開発と 社会実装・国際展開



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- 2004年 北海道大学医学部医学科 卒業
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- 2010年 大阪大学大学院医学系研究科 博士課程修了（加齢医学教室）
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- 2011年 日本学術振興会 特別研究員PD（米国ハーバード大学医学部）
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- 2015年 米国ハーバード大学医学部・マサチューセッツ総合病院 研究員
- 2016年 大阪大学大学院医学系研究科 寄附講座准教授（臨床遺伝子治療学講座）

Dr. Takeda is an associate professor at Osaka University Medical School. He graduated from Hokkaido University Medical School in Japan in 2004 and moved to Osaka University Hospital for his early internship. Upon completion of his internship, he began his PhD studies at Osaka University Medical School in Geriatric Medicine. He obtained his PhD degree in 2010 and then conducted postdoctoral research for the next five years at Harvard Medical School and Massachusetts General Hospital (MGH). His postdoctoral work involved basic research on the molecular biology of Alzheimer's disease, with a focus on tau protein. He was also involved in clinical research on dementia at MGH. He returned to Japan and Osaka University in 2016 and has continued his basic and clinical research on dementia. His primary research interest is in developing biomarkers and therapeutics for Alzheimer's disease.

高齢化に伴う認知症の患者は世界的な問題となっており、認知症の早期発見と予防的介入の重要性が指摘されている。演者らはこれまでに、アイトラッキング法を利用した簡易認知機能評価法を開発し、その有用性の実証と社会実装を進めてきた。約3分のタスク映像を眺める被検者の視線をアイトラッキング法で記録し、視線位置情報の解析から認知機能を定量化するシステムであり、従来の問診法による認知機能スコアと高い相関を示す。更にこの技術を汎用スマート端末で実装するアプリ開発を行い、医療機器プログラム治験や海外展開に向けた準備を進めている。本演題では、次世代型認知機能評価法としてのアイトラッキング式検査アプリの開発経緯と将来展望について概説する。

Responding to the rapid rise in the number of dementia cases is becoming increasingly urgent. A great deal of medical evidence indicates that early diagnosis and timely intervention lead to beneficial outcomes. A diagnostic method for the easy and accurate detection of mild symptoms of dementia is necessary to provide early intervention. We have developed a novel cognitive assessment method that uses eye-tracking technology. The method involves tracking and recording the subject's gaze as they watch a series of task movies of about three minutes' duration and using the eye-tracking data to quantify the subject's cognitive function. The results correlate well with scores obtained using a conventional cognitive test (MMSE). This easy-to-administer cognitive assessment application for smart devices provides effective screening for early symptoms of dementia. This will facilitate early intervention, leading to the prevention of the onset of dementia. We are currently conducting a medical device clinical trial in Japan and preparing for the global extension of this service.

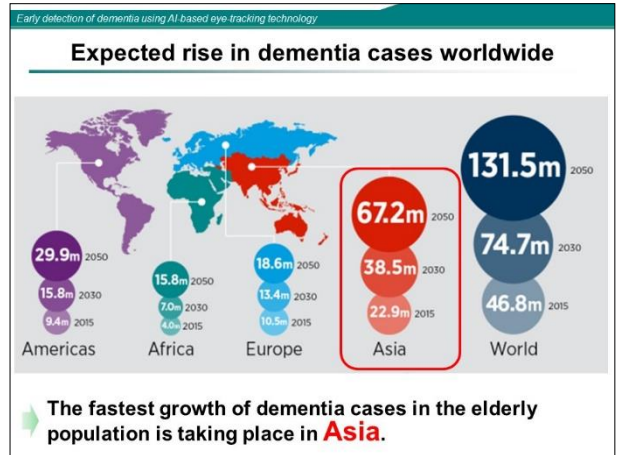
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## Early detection of dementia using AI-based eye-tracking technology

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### Early diagnosis is key to tackling dementia

- **Early (timely) diagnosis** of dementia allows people to...
  - Plan for the future
  - Receive symptomatic treatment
  - Access social and voluntary care
  - Help family carers
  - Delay care home entry for people with dementia

Dementia prevention, intervention, and care

**35% of all dementia cases could potentially be prevented by early intervention.**

Livingston et al. *The Lancet* 2017

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### Rapid cognitive assessment by "gaze analysis"

Rapid cognitive assessment using a high-performance eye-tracking technology

1. Presents visual stimuli (short movies) to assess cognitive function
2. Records gaze points using the corneal reflection technique
3. Quantitatively scores gaze patterns

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### Smart-device app for eye-tracking-based cognitive test

Press Release  
2019年12月5日

認知症の早期診断に向けた新技術の事業化  
大阪大学発ベンチャー「株式会社アイ・ブレインサイエンス」が設立

A university-launched start-up company, **Ai-BrainScience Inc.**, was established in Nov. 2019.

**Ai-BrainScience**  
Started in Nov. 13<sup>th</sup>, 2019

- 1<sup>st</sup> Gen • Rapid screening tool
- 2<sup>nd</sup> Gen • AI-assisted diagnosis
- 3<sup>rd</sup> Gen • Digital therapeutics

START  
Program For Creating Start-ups from Advanced Research and Technology  
大阪大学発ベンチャープログラム

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### For early diagnosis and intervention

Dementia screening at medical checkups

Care homes

Medical insurance

Driver's license

Hospital research clinical trials

Regular checkups for public transportation drivers

**Rapid**  
**Easy**  
**Reliable**

Healthy → MCI → Prevention → Recovery

**Low-stress cognitive test**

**Strengthen Cognitive Health**

Global Expansion  
Language-independent approach for cognitive testing

Dementia driving test