UTILIZATION AND CHANGE OF ALZHEIMER’S DISEASE DIAGNOSTIC TOOLS OVER A 3-YEAR PERIOD IN THE US AND EUROPE

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  - Diagnostic tools used in clinical practice

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  - What has changed in utilization of diagnostic tools for AD?
  - Which factors drove the use of certain tests in 2013 among physicians?

• Conclusions
**Background**

- **Current AD Diagnostic Scenario**

  - *Early detection* of Alzheimer’s disease (AD) is critical for early treatment initiation, and better planning and managing the needs of the patient
  - However, *a definitive tool for diagnosing AD during life is lacking*
  - This results in a complex work-up to *identify the core clinical symptoms* of the disease while *excluding other possible causes of cognitive impairment (CI)*.

*Functions tested to establish severity of impairment*

- Memory
- Functional ability
- Affect
- Intellectual capacity
- Reasoning
- Logic
- Language
- High/low IQ benchmarking

*Tests to rule out other causes*

- Cholesterol
- Glucose
- Thyroid
- Vitamin deficiency
- Tumors
- Strokes
- Vascular events
- Inflammation

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**AD diagnosis**

- Patient History
- Cognitive tests
- Complex cognitive tests
- Blood tests
- Scans

**PCP**

**Neurologist**
Background
- AD Diagnostic Tools

**Cognitive tests**
- Full MMSE *(Mini Mental State Examination)*
- Clock Draw test
- ADAS-Cog *(Alzheimer's Disease Assessment Scale - Cognition)*
- Mini-Cog
- CIBIC *(Clinician's Interview-Based Impression of Change)*
- CAMDEX *(Cambridge Mental Disorders of the Elderly Examination)*
- GP COG *(General Practitioner Assessment of Cognition)*
- CDR *(Clinical Dementia Rating)*
- BIMC *(Blessed Information-Memory-Concentration)*

**Blood tests**
- ApoE *(Apolipoprotein E genotyping)*
- B12 *(vitamin B12 level)*
- Thyroid

**Scans**
- MRI *(Magnetic Resonance Imaging)*
- CT *(Computerised Tomography)*
- PET *(Positron Emission Tomography)*
- SPECT *(Single-Photon Emission Computed Tomography)*

**Lumbar puncture**
- CSF testing *(Cerebrospinal fluid beta-amyloid and tau proteins)*
Background
- AD Diagnostic Tools

**Cognitive tests**
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How frequently are these diagnostic tools used by physicians to aid the diagnosis of AD patients and has the utilization of these tools changed over a 3-year period?
Methodology

- Adelphi Real World Dementia Disease Specific Programme (DSP)

- Multinational and cross-sectional surveys of patients over 50 with CI and their physicians in 2010 and 2013
  - France
  - USA
  - Spain
  - Germany
  - Italy
  - UK

- Physicians completed a patient record form for their next nine consecutive consulting patients with CI and one additional patient in the early stages of CI

- Diagnostic tools used to aid the diagnosis were recorded and compared between the 2010 and 2013 DSP data

- 2013 data were further stratified by
  - MMSE at diagnosis
  - Age at diagnosis
  - Time since diagnosis

- This analysis focused only on patients with an AD diagnosis.
What has changed in utilization of AD diagnostics?

- 2010 and 2013 data comparison: Cognitive tests

<table>
<thead>
<tr>
<th>Test</th>
<th>2010 Data</th>
<th>2013 Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full MMSE*</td>
<td>86.5%</td>
<td>89.5%</td>
</tr>
<tr>
<td>Psychological exam*</td>
<td>60.1%</td>
<td>63.2%</td>
</tr>
<tr>
<td>Clock Draw test*</td>
<td>23.4%</td>
<td>28.6%</td>
</tr>
<tr>
<td>ADAS Cog*</td>
<td>11.6%</td>
<td>8.1%</td>
</tr>
<tr>
<td>Mini-Cog*</td>
<td>4.8%</td>
<td>5.9%</td>
</tr>
<tr>
<td>CDR*</td>
<td>4.4%</td>
<td>5.9%</td>
</tr>
<tr>
<td>GP COG*</td>
<td>0.5%</td>
<td>1.6%</td>
</tr>
<tr>
<td>CIBIC</td>
<td>0.6%</td>
<td>1.0%</td>
</tr>
<tr>
<td>CAMDEX*</td>
<td>2.2%</td>
<td>1.0%</td>
</tr>
<tr>
<td>BIMC*</td>
<td>0.3%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

- The majority of cognitive tests were conducted more frequently to aid diagnosis in 2013 compared to 2010, with the exception of the ADAS-Cog and CAMDEX (Cambridge Mental Disorders of the Elderly Examination)
- Over time, MMSE and psychological exams have remained as the two most frequently used cognitive tests

N=4,041 (median age [IQR] 79.0 [73.0, 84.0], 57.7% female)
N=4,337 (median age [IQR] 78.0 [73.0, 83.0], 57.8% female)
What has changed in utilization of AD diagnostics?
- 2010 and 2013 data comparison: ApoE, CSF and B12 testing

- CSF testing as one of the state-of-art clinical diagnosis of AD was used more frequently in patients in 2013, almost double the number of patients in 2010

- ApoE ε4, a major genetic risk factor for AD, was also more frequently tested in patients in 2013, but only in a small number of patients
What has changed in utilization of AD diagnostics?
- 2010 and 2013 data comparison: **Scans**

- **PET scan** as an effective tool to reveal the presence of amyloid plaques was only utilized in approximately **3% of patients**
- In 2013 there was still a considerable proportion of patients where the physician didn’t use any scans to aid the diagnosis AD

*p<0.05*
Which factors drove the use of certain tests?

- 2013 data stratified by age at diagnosis: ApoE and CSF testing

The older a patient was at diagnosis, the less likely they were to receive an ApoE or CSF test to aid their diagnosis.
Which factors drove the use of certain tests?
- 2013 data stratified by age at diagnosis: *Scans*

- **CT**
  - **p<0.0001**
  - <65: 25.2%
  - 65-69: 33.7%
  - 70-74: 34.7%
  - 75-79: 36.2%
  - 80-84: 41.4%
  - 85+: 46.5%

- **Volumetric MRI**
  - **p<0.0001**
  - <65: 52.3%
  - 65-69: 43.1%
  - 70-74: 41.0%
  - 75-79: 41.0%
  - 80-84: 36.8%
  - 85+: 30.1%

- **SPECT**
  - **p<0.0001**
  - <65: 13.2%
  - 65-69: 6.4%
  - 70-74: 5.7%
  - 75-79: 3.2%
  - 80-84: 2.2%
  - 85+: 1.1%

- The **older** a patient was at diagnosis
  - the **more likely** they were to receive **CT scan** to aid their diagnosis
  - the **less likely** they were to receive **volumetric MRI** or **SPECT** to aid their diagnosis
Which factors drove the use of certain tests?
- 2013 data stratified by **MMSE at diagnosis**: No scans/imaging

Patients with a **worse MMSE at diagnosis** were **more likely** to have no scans/imaging conducted to aid diagnosis.
Conclusions

- implications from the results

- Severity of CI and age at diagnosis appear to drive the likelihood of physicians using certain tests to aid the diagnosis of AD in patients

- More advanced diagnostic tools like scans are still not widely utilized in clinical practice – highlighting the need to increase physician awareness

- Early diagnosis of AD will be aided by reliable diagnostic tools that enable physicians to make a diagnosis before symptoms are clinically evident; such advances can lead to early detection and opportunity for early intervention

- However it should be noted that none of these tests are yet able to prove a diagnosis of AD on their own, highlighting the continued importance of a detailed case history in making the diagnosis of AD