Information Sheet for cerebrospinal fluid (CSF) testing for Alzheimer's disease

Scottish Brain Sciences
Better brain health for all.

Laboratory Information

NAME AND ADDRESS OF LABORATORY:	Scottish Brain Sciences Building 1 Eden Campus Guardbridge KY16 0US
OPENING HOURS:	9:00am-5:00pm Monday -Friday
CONTACT INFORMATION:	Tel no: 07745 520319 Email: labenquiries@brainsciences.scot
DIRECTOR OF LABORATORY:	Dr Lewis K Penny
CSF TESTS:	Phosphorylated tau181 (pT181 / pTau181); β-amyloid$_{42}$ (Aβ$_{42}$); Total tau (t-tau)
TURNAROUND TIME:	5-20 working days

Purpose of CSF Biomarker Testing:

The primary goal of CSF biomarker testing is to enhance diagnostic accuracy for individuals experiencing memory problems or mild cognitive impairment. By measuring levels of amyloid-beta and tau proteins in the CSF, clinicians can assess the likelihood of Alzheimer's disease (AD), facilitating early and appropriate interventions.

Procedure Overview:

- **Lumbar Puncture:** A needle is inserted into the lower back to collect a teaspoon of CSF, approximately 5 mL. This procedure is generally safe, but some individuals may experience side effects like headaches.

  Lumbar puncture using gravity drip method should be performed and use of syringes or tubing avoided

- **Informed Consent:** It's essential to understand the purpose, benefits, and potential risks of the test. Clinicians should provide clear information, considering the patient's

cognitive status, and may need to repeat explanations to ensure comprehension. It is the responsibility of the external client to obtain informed consent.

- **Role in Diagnosis:** Understand that CSF biomarker results complement other assessments, such as cognitive tests and imaging studies, and are not standalone
- **CSF collection tubes:** Discard the first 2 mL of CSF and CSF visibly contaminated with blood should also be discarded. Collect additional 2 mL clear CSF into a separate tube. We recommend Sarstedt 2.5 mL low bind false bottom tubes (Sarstedt. 63.614.625). Do not invert, mix, aliquot or centrifuge. Minimally, screwtop low-bind polypropylene tubes (NOT polystyrene) and must be ≥75% full to reduce surface adsorption**.**
- **CSF Storage and transportation**: We recommend that CSF samples are sent to us either at 2°C-8°C or frozen at -20°C/-80°C. CSF samples should not be stored or sent at room temperature as this limits the timeframe for stability and testing. All samples must be sent in UN 3373 biological substance category B compliant packaging. We recommend using a same/next day delivery.

  It is recommended as risk mitigation that referring laboratories retain a sample sent in the event of damage or loss en route.
- **CSF sample shipment:** The CSF sample must be sent to:

  Scottish Brain Sciences
  Building 1
  Eden Campus
  Guardbridge KY16 0US

- **CSF Request Information:** A Request form can be found at the Scottish Brain Sciences website under Laboratory Services. Complete the request form fully, print and send with the sample shipment. It is important that the request form is completed as fully as possible to avoid a delay in processing the samples due to missing essential information.

  Any deviation from the guidance provided in this document, particularly relating to sample collection and sample storage, must be recorded on the request form so the potential impact to any results and the patient can be assessed.

  Each sample must be accompanied by a request form with the following information:

  Patient Name
  Patient Date of Birth
  NHS/Hospital number
  CHI number, if known
  Sex

Date and time of sample collection
Name and contact information of Requesting Doctor
Address for result report
Clinical Information

- **Acceptance/Rejection Criteria:** To be accepted by the laboratory for analysis. CSF samples must meet the criteria below:
    - The sample must be clearly labelled with patient name, date of birth, date of collection
    - Be collected into a low-bind screwtop polypropylene tube as described above
    - Collection tube must be ≥75% full to reduce surface adsorption
    - Minimum volume of at least 0.5 mL CSF

- **CSF analysis:** Each CSF sample is analysed for pT181, and $A\beta_{42}$ using Roche Elecsys® on a Roche Cobas Core e801 autoanalyzer. The SBS Biomarker Laboratory participates in the Alzheimer's Association EQA Scheme (European). Total tau is not required but available and optional for additional cost – this may be requested by the clinical biochemist in ambiguous cases

- **Additional Tests:** To request an additional test, email the laboratory at labenquiries@brainsciences.scot with the following information:

    - Patient Name
    - Second patient identifier (eg CHI number, date of birth)
    - Date of sample collection
    - Additional Test requested

  Additional tests can only be fulfilled if received within time limits listed below, and if there is sufficient sample volume.
    1. Within 5 days of sample collection if sent to lab at room temperature.
    2. Within 14 days of sample collection if sent to lab at 2°C-8°C.
    3. Within 8 weeks of sample collection of sent to lab at -20°C/-80°C.

- **Price:** Please contact labenquiries@brainsciences.scot for further information.

Result Interpretation

The combination of **low $A\beta_{42}$ and high pT181/ttau** is consistent with Alzheimer's disease pathology.

Primarily, pT181/Aβ42 will be used to determined amyloid pathology that is consistent with Alzheimer's disease. Total tau is not necessary but available and optional for additional cost – this may be requested by the clinical biochemist in ambiguous cases

Biomarker	**Result**	**Interpretation**
↓ $A\beta_{42}$	Abnormal	Amyloid plaque pathology
↑ pT181	Abnormal	Tau hyperphosphorylation
↑ ttau	Abnormal	Neuronal injury/degeneration
pT181/ $A\beta_{42}$	>0.023	Consistent with AD
Ttau/ $A\beta_{42}$	>0.28	Consistent with AD

Each result report will have an interpretative comment and further information regarding the interpretation of these results can be provided by contacting Dr Alison Green, Clinical Biochemist (a.green@brainsciences.scot), Dr Meher Lad, Academic Cognitive Neurologist (m.lad@brainsciences.scot) or Prof Craig Ritchie, Professor of Psychiatry (C.Ritchie@brainsciences.scot).

Expression of Dissatisfaction: If you wish to express dissatisfaction with any of the services provided, you can do so by completing with form found on the Scottish Brain Sciences Website under Laboratory Services.