Alzheimer's Disease

The four scans that anchor diagnosis and anti-amyloid therapy

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A reference guide for neurologists, geriatricians, psychiatrists and memory-clinic specialists.

1. Radiology pathways

Imaging anchors both the **diagnosis** of Alzheimer's disease and the **safe delivery of anti-amyloid therapy**. Four studies are available, used in sequence according to the clinical question:

- **Brain MRI:** in any patient with progressive cognitive decline, to exclude structural or reversible mimics and characterise the atrophy pattern (medial temporal / hippocampal in typical AD).
- **FDG-PET:** when the diagnosis remains unclear after MRI and bloods, to read the metabolic signature and separate AD from FTD and DLB.
- **Amyloid (Aß) PET:** to confirm cortical amyloid (the premortem gold standard) and establish eligibility for anti-amyloid therapy.
- **ARIA-monitoring MRI:** once therapy starts, a baseline plus a scheduled series of surveillance scans to detect amyloid-related imaging abnormalities.

A validated blood test (plasma p-tau217) is emerging as a non-invasive triage step ahead of PET, but imaging remains the confirmatory and monitoring backbone.

2. A quick reference guide

Scan	What it demonstrates	Role / when to request
MRI brain	Medial temporal / hippocampal atrophy; posterior atrophy in atypical AD. Screens for mimics (subdural, tumour, NPH, vascular burden). Baseline microhaemorrhage / siderosis via GRE/SWI.	First-line. Excludes surgical and reversible causes; sets the pre-treatment haemorrhage baseline before anti-amyloid therapy.
FDG-PET	Temporo-parietal and posterior-cingulate hypometabolism; distinct patterns in FTD (frontal) and DLB (occipital).	Problem-solving second-line when the diagnosis is inconclusive after MRI and bloods. MBS-funded for this indication.
Amyloid (Aß) PET	Cortical fibrillar amyloid burden by visual read.	Confirms AD pathology (premortem gold standard) and establishes anti-amyloid therapy eligibility. Not MBS-funded.
ARIA-monitoring MRI	ARIA-E (vasogenic oedema on FLAIR) and ARIA-H (microhaemorrhage / siderosis on GRE/SWI).	Baseline plus scheduled surveillance for every patient on anti-amyloid therapy. AJNR-standard protocol across I-MED clinics – see panel 4.

3. Anti-amyloid therapy & ARIA

Two amyloid-targeting monoclonal antibodies are now TGA-registered for **early symptomatic AD** (MCI or mild dementia) with biomarker-confirmed amyloid: **donanemab (Kisunla) and lecanemab (Leqembi)**. Neither is PBS-subsidised.

- **Eligibility:** confirmed amyloid (Aß-PET or CSF) plus, for donanemab, a low/medium–high tau stratum. **ApoE ε4 testing is required before initiation**; these agents are not indicated in ε4 homozygotes (≈ 15% of AD patients – markedly higher ARIA risk).
- **ARIA is the principal treatment risk:** ARIA-E (vasogenic oedema) and ARIA-H (microhaemorrhage / superficial siderosis). Trial rates – lecanemab: ARIA-E 12.6%, ARIA-H 17.3%; donanemab: ARIA-E ≈24%, ARIA-H ≈31%. Usually asymptomatic and caught on routine MRI, most often early (first ≈ 6 months); occasionally serious or fatal.
- **ARIA-E can mimic acute stroke** – weigh thrombolysis carefully and keep heightened vigilance when reading head CT in a patient on therapy.

→ **MRI protocol, sequences and schedule are detailed in panel 4.**

4. ARIA-monitoring MRI – protocols & scheduling

Safe anti-amyloid therapy depends on standardised serial MRI. I-MED follows the **ASNR / AJNR consensus recommendations** (no separate RANZCR standard exists yet); every I-MED MRI clinic is trained and configured to deliver the minimum ARIA sequences consistently across the network.

Referrals must state that the patient is on anti-amyloid AD treatment – this selects the correct protocol (baseline / asymptomatic interval / symptomatic) and reporting. Non-specific or unclear referrals are clarified with the treating practitioner before scanning.

Minimum sequences target subtle oedema (FLAIR) and microhaemorrhage / siderosis (GRE/SWI, with DWI), kept identical from baseline through follow-up. Scans are **non-contrast for baseline and routine monitoring**; gadolinium is added only at the reporting radiologist's discretion for symptomatic patients.

Protocol	Timing	Contrast	Key points
Baseline / enrolment	Before the 1st infusion – dedicated scan close to initiation; a scan <1 yr old may suffice if adequate.	None	Documents pre-existing microhaemorrhage, siderosis and oedema; the reference for all future comparisons. Re-baseline if the prior scan is >1 yr old or lacks GRE.
Routine interval (asymptomatic)	3–4 scans in year 1, concentrated in the first ≈ 6 months. **Donanemab**: before the 2nd, 3rd, 4th & 7th infusions. **Lecanemab**: before the 5th, 7th & 14th (plus ≈ week 52 / 26th).	None	If ARIA is detected – symptomatic or not – add monthly MRI until ARIA-E resolves and ARIA-H stabilises.
Symptom-triggered	Ad hoc / urgent whenever new neurological symptoms appear.	Gadolinium at radiologist discretion, to aid differential	ARIA-E can mimic stroke – heightened vigilance on head CT and caution with thrombolysis; MRI recommended for further evaluation.

Scheduling ultimately sits with the treating practitioner and varies by drug; the above reflects AJNR-based examples. Adapted from I-MED's ARIA monitoring protocol guidance (see references).

5. Differentials, atypical AD & red flags

Differentials, atypical AD

Consider non-AD – and the scan that helps

- **FTD** - behavioural change or aphasia; frontotemporal atrophy on MRI, frontal hypometabolism on FDG-PET.
- **DLB** - fluctuations, visual hallucinations, parkinsonism, RBD; occipital hypometabolism on FDG-PET; supportive DAT-SPECT.
- **Vascular** - strategic infarcts or confluent small-vessel disease on MRI.
- **NPH** - gait / incontinence / cognition triad; ventriculomegaly out of proportion to atrophy on MRI.
- **Prion / RPD** - rapid course; cortical / basal-ganglia DWI restriction on MRI.

Atypical AD phenotypes

- **Posterior cortical atrophy** - visuospatial failure; posterior atrophy / hypometabolism.
- **Logopedic variant PPA** - word-finding and repetition deficits.

Red flags - expedite structural MRI

Red flags - expedite MRI

- Rapid progression (weeks–months)
- Focal neurological deficit
- Early or unexplained seizures
- Prominent early gait disturbance
- Atypical age or abrupt onset
- Headache, papilledema or systemic features

Direct radiologist consultation is available before referring - contact your local I-MED radiologist for protocol selection or ambiguous cases.

6. Imaging access & Medicare funding (Australia)

- **Brain MRI:** Medicare-eligible on specialist request under the Diagnostic Imaging Services Table.
- **FDG-PET:** MBS-funded where AD remains inconclusive after clinical assessment, MRI and bloods.
- **Amyloid PET:** not currently MBS-funded – accessed via self-funding, trials or research.
- **ARIA-monitoring MRI:** repeat monitoring MRI is not currently Medicare-funded for routine AD management – factor into treatment planning and patient counselling.

Item numbers and funding are subject to MBS review – verify currency at mbsonline.gov.au before claiming.

References & sources

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