When a PET signal changes, what can we conclude?

FICTIONAL SCENARIO | No client, patient data or previous project is represented.

01 THE SCIENTIFIC QUESTION

A fictional CNS team proposes baseline and follow-up amyloid PET in a small, single-arm study. It plans to interpret lower cortical standardized uptake value ratio (SUVR) as treatment-related amyloid reduction. **What evidence would distinguish biological change from measurement change, and support attribution to treatment?**

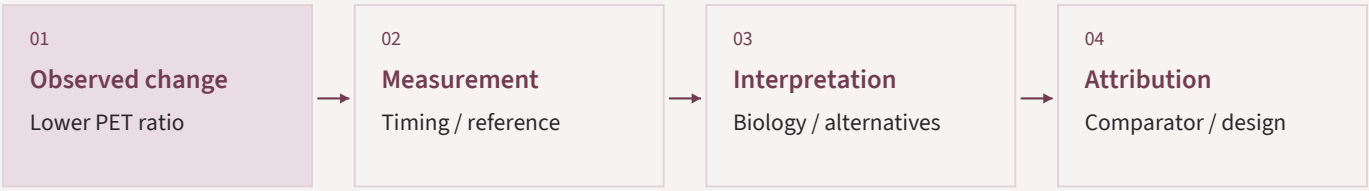


Figure 1. A review workflow, not a causal model or observed result.

02 ASSUMPTIONS TO EXAMINE

Reference stability. A ratio can fall when its denominator rises. Review the reference region and the tracer's assumptions.
Comparable acquisition. Check uptake timing, motion, scanner and reconstruction consistency; tracer delivery and blood flow can influence SUVR. [1]
Anatomy and processing. Atrophy, registration and segmentation may affect estimates. Partial-volume correction introduces its own assumptions and variability. [2]
Meaningful change. Compare the expected effect with repeatability and examine natural change and other explanations.

03 IMPLICATIONS FOR INTERPRETATION

A lower SUVR establishes a change in the measured ratio. On its own, it does not establish reduced amyloid pathology, a treatment effect or clinical benefit. In this fictional design, qualify the biological interpretation and retain the endpoint as exploratory while its assumptions are examined.

04 RECOMMENDED NEXT STEPS

1. Specify the tracer, endpoint, time window and decision.
2. Review reference behaviour, acquisition and MRI processing; prespecify justified sensitivity analyses.
3. Assess repeatability and whether a comparator or dynamic PET substudy would discriminate between explanations.

Match the strength of the conclusion to the evidence the design can support.

SELECTED EVIDENCE | Sources support principles, not the fictional scenarios.

[1] Blood-flow effects on amyloid PET SUVR (2017)
[2] Partial-volume correction in serial amyloid PET (2019)