

Wednesday-0431 Performance of plasma amyloid β assay using a benchtop MALDI-TOF mass spectrometer

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1. Background

Mass spectrometry (MS)-based assays have shown utility for blood-based biomarkers[1,2]. We are working to improve the usability of MS-based assays by downsizing the instrument and increasing throughput. A benchtop MALDI-TOF MS offers a smaller footprint and faster analysis than the conventional floor-standing model. In the previous conference, we have reported that the benchtop MALDI-TOF MS improves the analytical performance of the plasma amyloid β (A β) assay. Here, we compare the performance of plasma A β ratios for predicting amyloid PET status between the benchtop and conventional floor-standing MS models.

2. Methods

Anti-A β antibody: clone 6E10

Magnetic beads: Dynabeads Epoxy, 2.8 μ m

MALDI-TOF MS:

1) Benchtop model: MALDI-8020

2) Conventional model: AXIMA Performance™

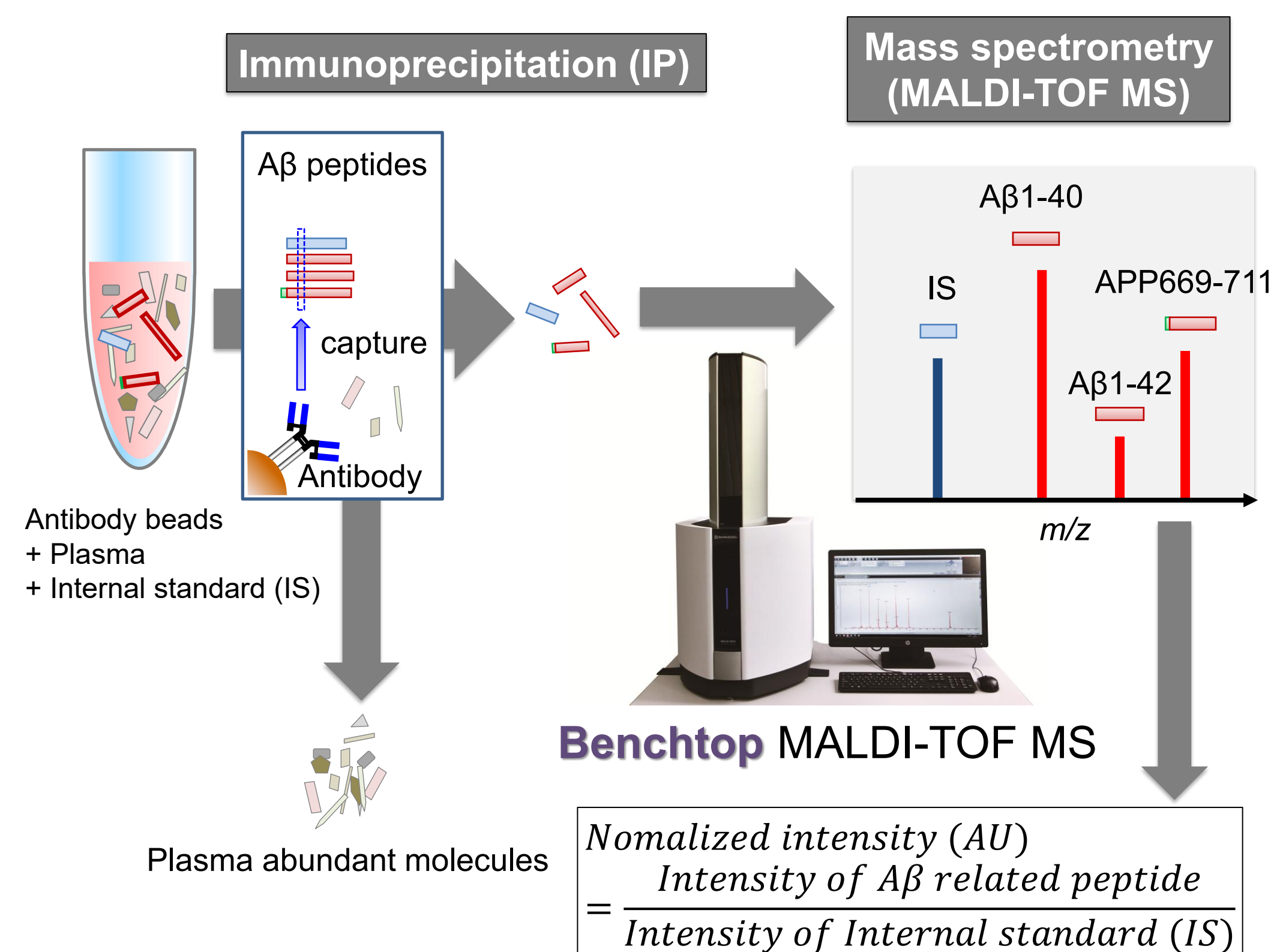


Figure 1. IP-MS methodology for A β peptides

Table 1. Participant demographics

	Overall	Amyloid PET		P-value
		negative	positive	
n	120	66	54	
Category (%)				0.027
Cognitive normal	95 (79.2)	58 (87.9)	37 (68.5)	
MCI	13 (10.8)	5 (7.6)	8 (14.8)	
Dementia	12 (10.0)	3 (4.5)	9 (16.7)	

3. Results

3-1. Precision of A β ratios analyzed by the benchtop mass spectrometer

The coefficients of variation for the benchtop model were 5.9% and 6.2% for the A β 1-40/A β 1-42 and APP669-711/A β 1-42 ratios, respectively, compared with 12.4% and 13.2% for the conventional model.

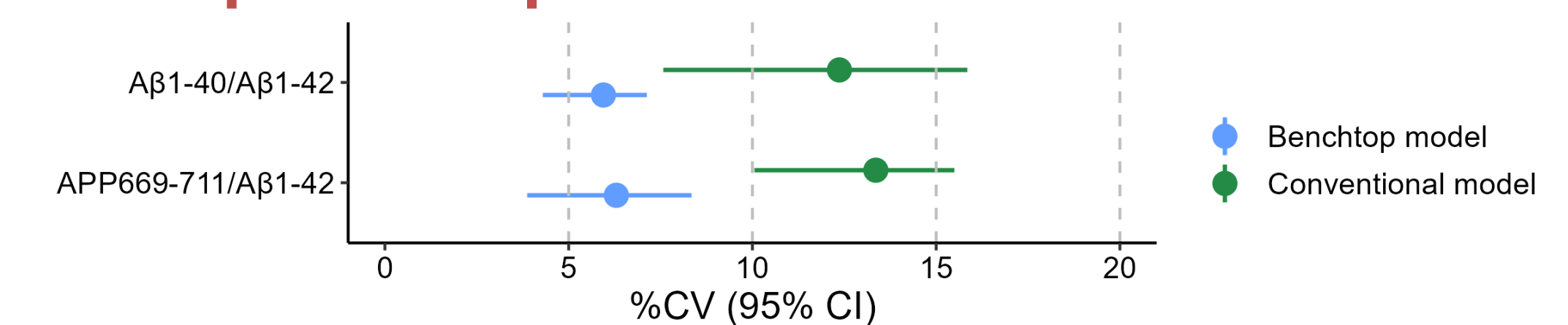


Figure 2. CV values of A β ratios in a control plasma sample

3-2. Correlation of A β biomarkers between the conventional and benchtop MS models

The two ratios and the composite biomarker showed high correlation coefficients ($r = 0.890$ – 0.895) between the benchtop and conventional models.

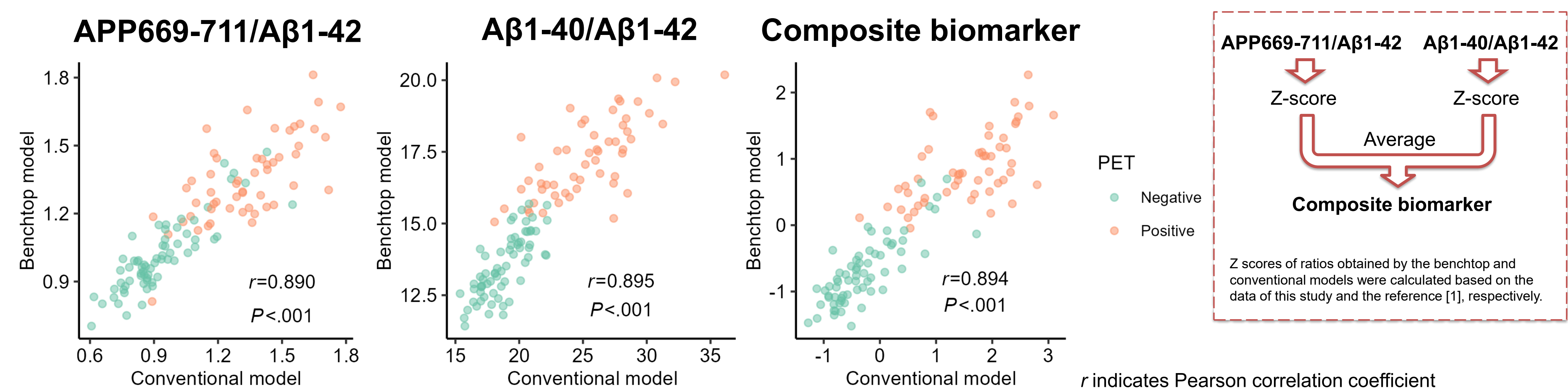


Figure 3. The correlation of plasma biomarkers between the conventional and benchtop MS models

3-3. Performance of plasma A β biomarkers using two instruments

The benchtop model yielded AUCs equivalent to or higher than those of the conventional model for predicting amyloid PET status.

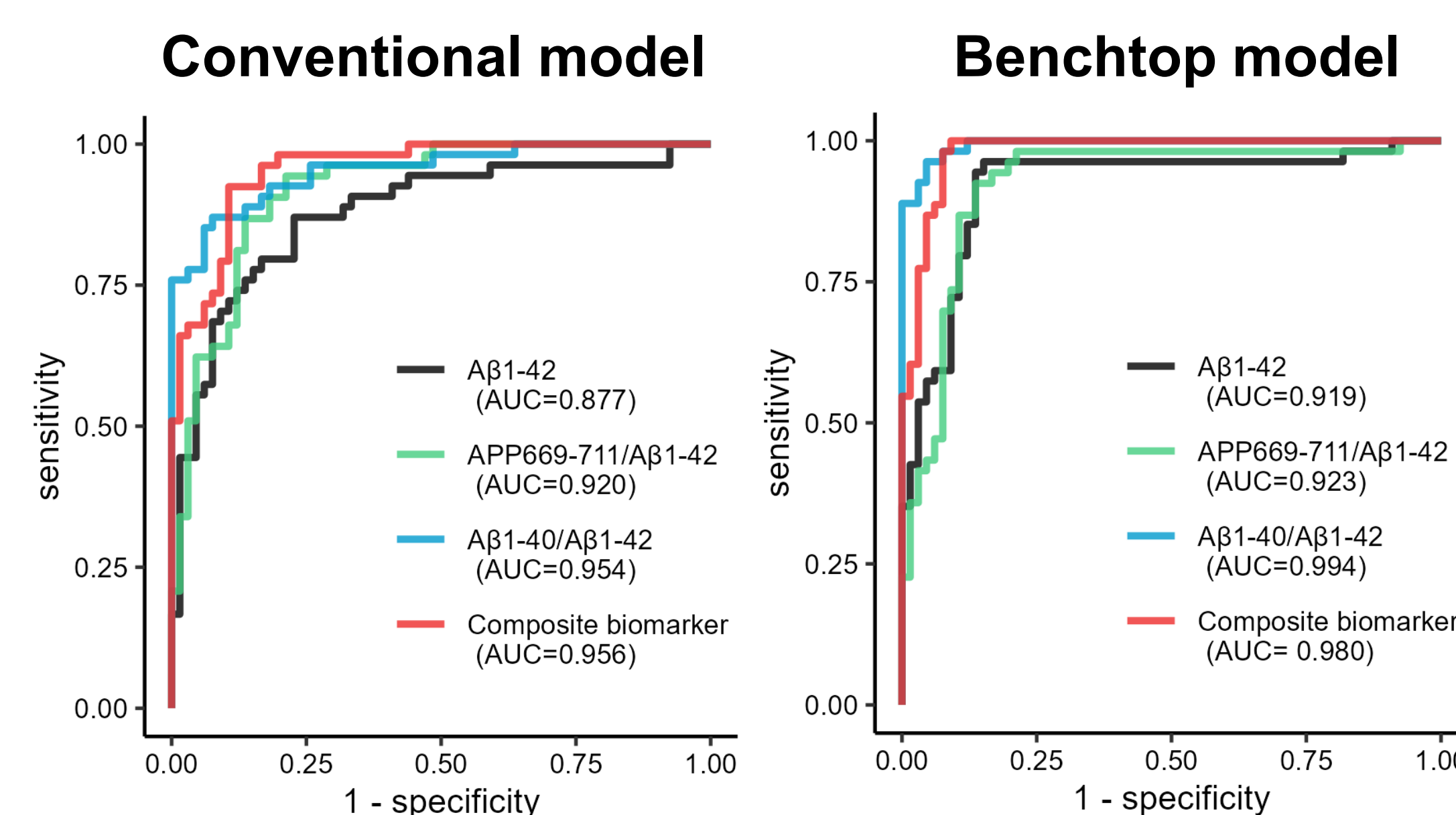


Figure 4. ROC curves distinguishing Amyloid PET positive vs negative

Table 2. Performance of A β biomarkers measured by the benchtop mass spectrometer

Name	cutoff	specificity	sensitivity	accuracy
A β 1-42	0.39	0.85	0.96	0.90
APP669-711/A β 1-42	1.15	0.86	0.92	0.89
A β 1-40/A β 1-42	15.30	0.95	0.96	0.96
Composite biomarker	-0.03	0.91	0.96	0.93

4. Conclusions

These results suggest that the benchtop MALDI-TOF mass spectrometer can provide lower variation in A β ratios and AUC values equivalent or superior to the conventional instrument. Further studies are needed to validate its utility.

5. References

- [1] Nakamura, A. et al. *Nature* 554, 249-254 (2018).
- [2] Ataka T, et al. *Alzheimer's Dement* (N Y). 10, e70008 (2024).

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