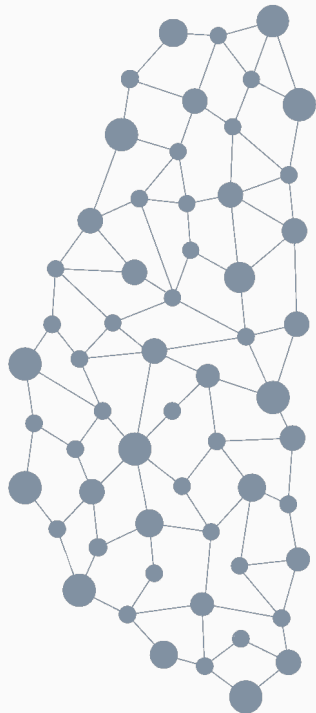# Supporting the treatment of Alzheimer's patients with explainable artificial intelligence
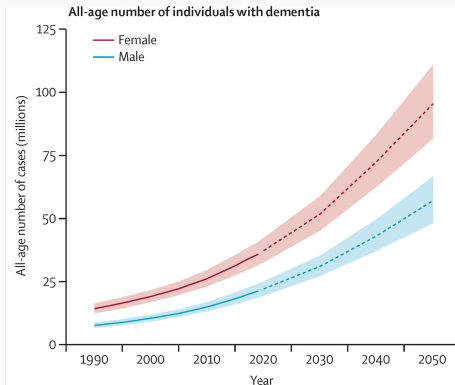
Esten H. Leonardsen

Chief Scientific Officer, baba.vision

Post-doc at the Department of Psychology, University of Oslo

baba.vision

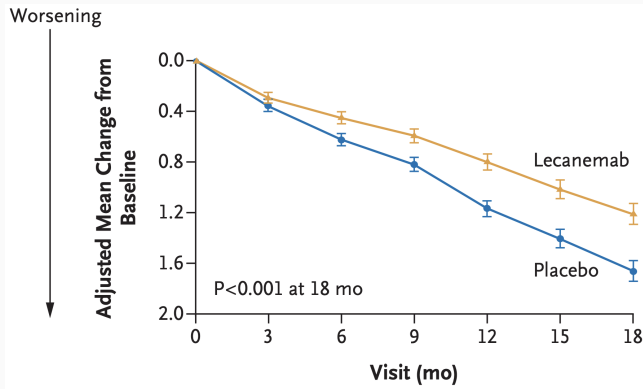**All-age number of individuals with dementia**

Global Burden of Disease Dementia Forecasting Collaborators (2022). Estimation of the global prevalence of dementia in 2019 and forecasted prevalence in 2050: an analysis for the Global Burden of Disease Study 2019. *The Lancet Public Health*.

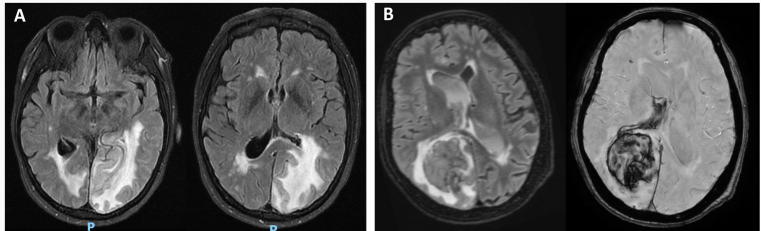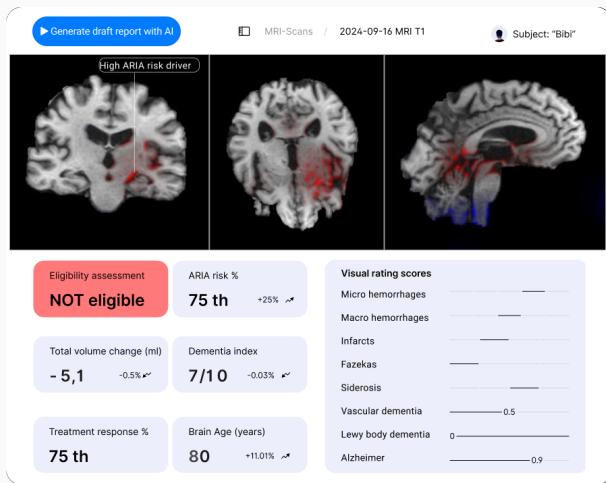European Medicines Agency reviews and revises its opinion on Lecanemab

Worsening

Van Dyck, C. H., Swanson, C. J., Aisen, P., Bateman, R. J., Chen, C., Gee, M., ... & Iwatsubo, T. (2023). Lecanemab in early Alzheimer's disease. *New England Journal of Medicine*.
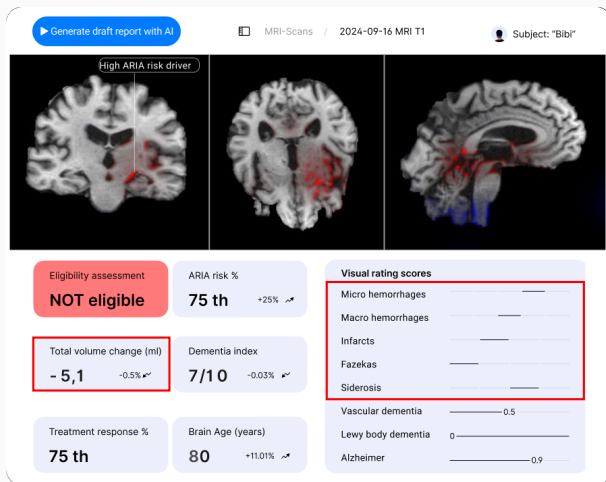
Villain, N., Planche, V., & Levy, R. (2022). High-clearance anti-amyloid immunotherapies in Alzheimer's disease. Part 1: Meta-analysis and review of efficacy and safety data, and medico-economical aspects. *Revue neurologique.*
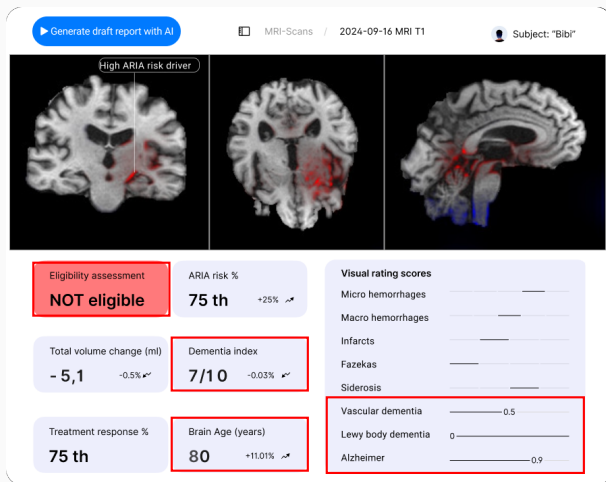
The baba.vision treatment support suite

Supporting the treatment of Alzheimer's patients with explainable artificial intelligence

The baba.vision treatment support suite

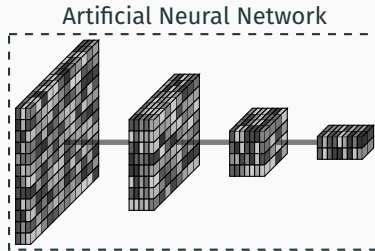Supporting the treatment of Alzheimer's patients with explainable artificial intelligence

The baba.vision treatment support suite
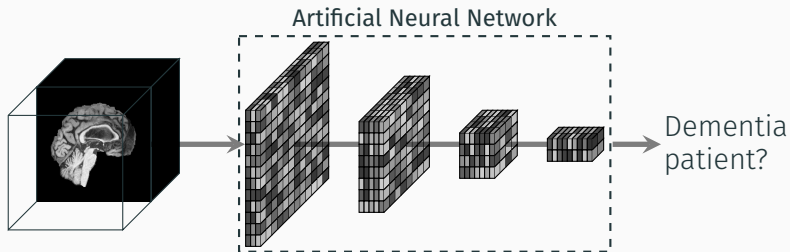

Supporting the treatment of Alzheimer's patients with explainable artificial intelligence
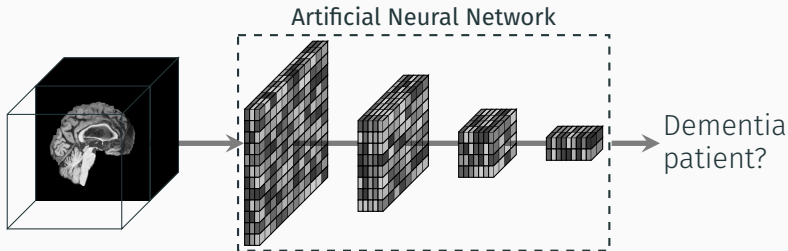
Explainable Artificial Intelligence

Artificial Neural Network

Artificial Neural Network

Dementia patient?

Explainable Artificial Intelligence

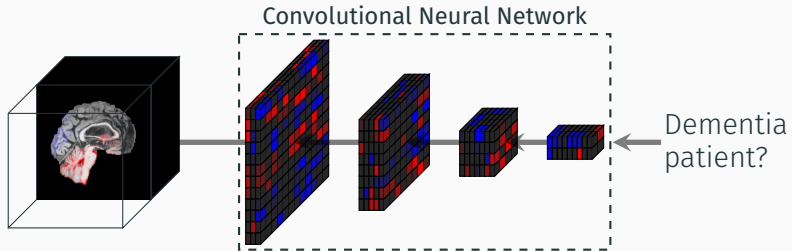|	ROC AUC	Accuracy	Modalities	Preprocessing	Model Type
Gupta et al. (2023)	–	88.6% (BA)	T1w	R	2.5D CNN
Zhang et al. (2022)	96.1%	93.2%	T1w	N(ANTs)-SS(ANTS)-R(ANT)	2.5D CNN
Cobbinah et al. (2022)	94.9%	93.1%	T1w	None	VAE,3D CNN
Lu et al. (2022)	96.3%	90.0%	T1w	SEG(DPARSF)-NR[DARTEL]	3D CNN
Wen et al. (2020)	–	89.0% (BA)	T1w	N(ANTs)-SS(ANTs)-R(ANTs)	3D ROI CNN
Lu et al. (2018)	–	84.6%	T1w, FDG-PET	SEG(FS)-NR(LDDMM)	FEAT MLP
Liu et al. (2018a)♦	95.0%	91.2%	T1w, FDG-PET	N-S (Wang et al., 2011), R(FSL)	3D ROI CNN
Liu et al. (2018b)♦	95.9%	91.1%	T1w	LMD	3D ROI CNN
Aderghal et al. (2018)♦	–	90.0%	T1w, MD	N(SPM)-R(SPM)-SS(SPM)	2.5 CNN
Bäckström et al. (2018)♦	–	90.1%	T1w	N(FS)-SS(FS)	3D CNN
Li et al. (2018)♦	92.4%	89.5%	T1w	SS-N-R(FSL)	2.5 CNN

Grødem, et al., (2024). A minimalistic approach to classifying Alzheimer's disease using simple and extremely small convolutional neural networks. *Journal of Neuroscience Methods*.
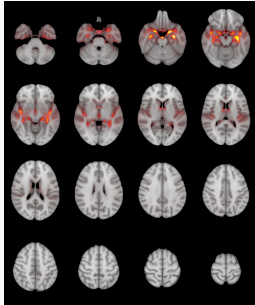
Artificial Neural Network

Dementia patient?

+ Produces very accurate predictions
- Very hard to understand

Convolutional Neural Network

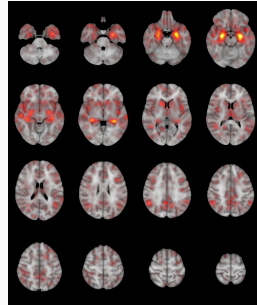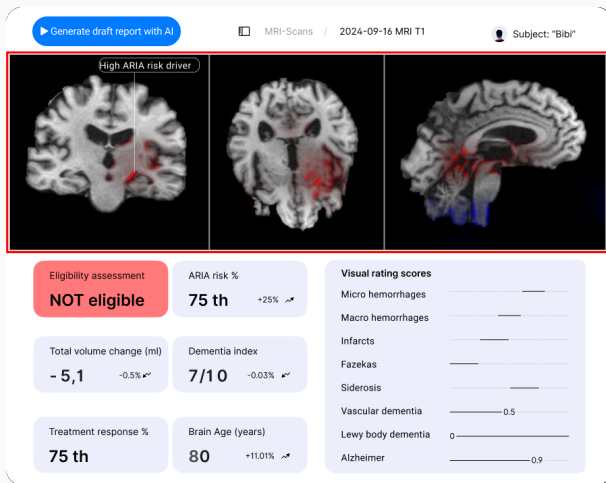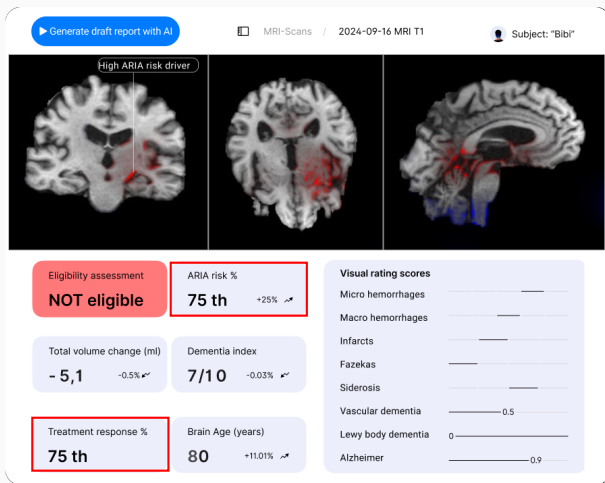Dementia patient?

Explainable AI

Human researchers

Leonardsen et al., (2024). Constructing personalized characterizations of structural brain aberrations in patients with dementia using explainable artificial intelligence, *npj Digital Medicine*

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Thank you for your attention!

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