



空军军医大学(第四军医大学)  
口腔医学院



# Study On Serum-Based Biomarkers of Alzheimer's Disease

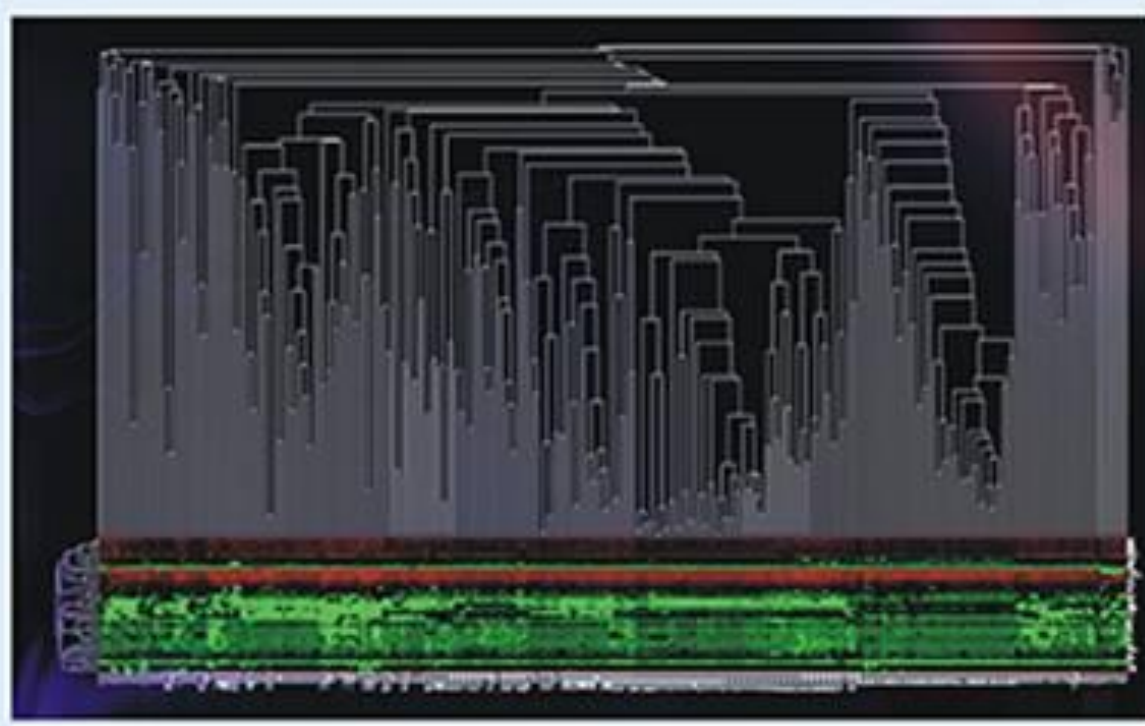
Shu Yu, Lu Zhang, Juanling Gu, Jing Yang, Wei Zhang, Ding Wu, Genghong Wan, Jucai Yang,, Ping Huang and Yindong An

State Key Laboratory of Military Stomatology and National Clinical Research Center for Oral Disease and Shaanxi Clinical Research Center for Oral Disease, Department of Laboratory Medicine, School of Stomatology, Forth Military Medical University, Xi'an, Shaanxi Province, 710000, China

## Background

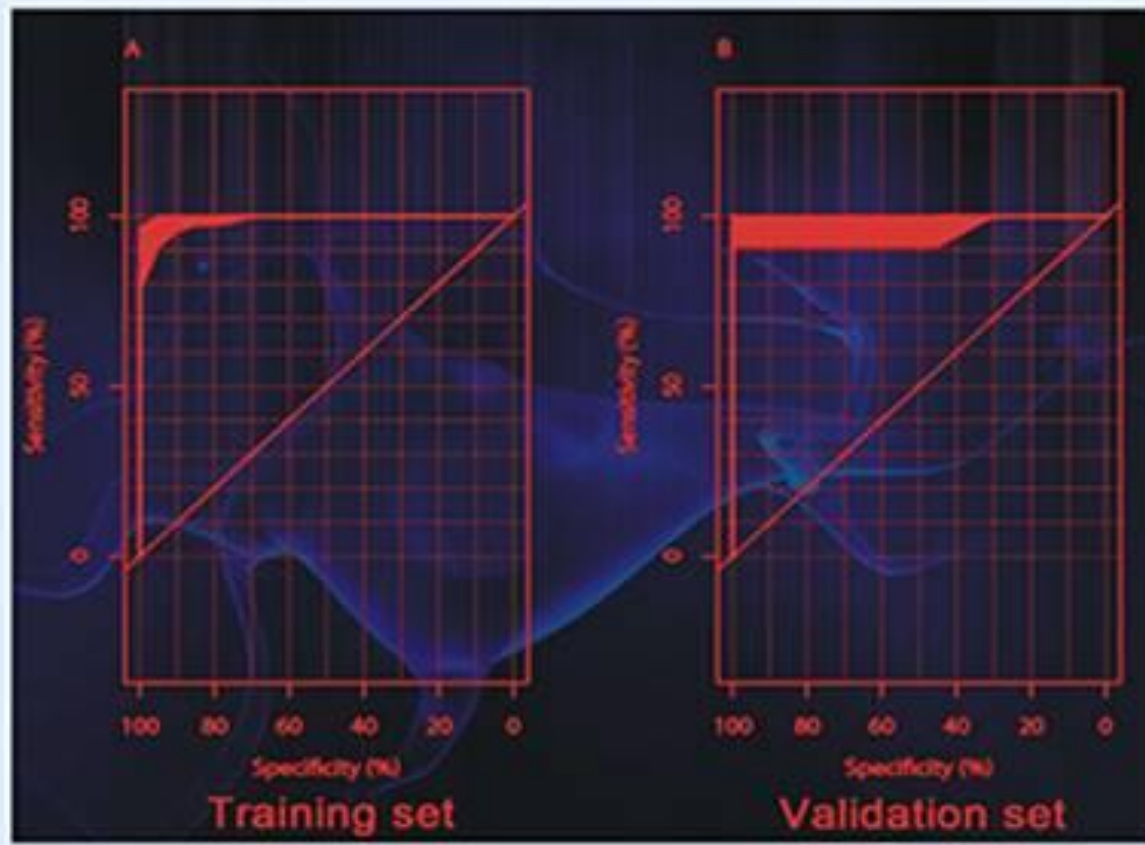
Alzheimer's disease (AD) typically affects individuals who are aged 60 or above and is quickly becoming one of the most prevalent neurodegenerative disease worldwide. Thus, a non-invasive serum-based biomarker-based diagnostic platform is eagerly awaited. The goal of this study was to identify a serum-based biomarker panel using a predictive protein-based algorithm that is able to confidently distinguish AD patients from control subjects.

## Methods

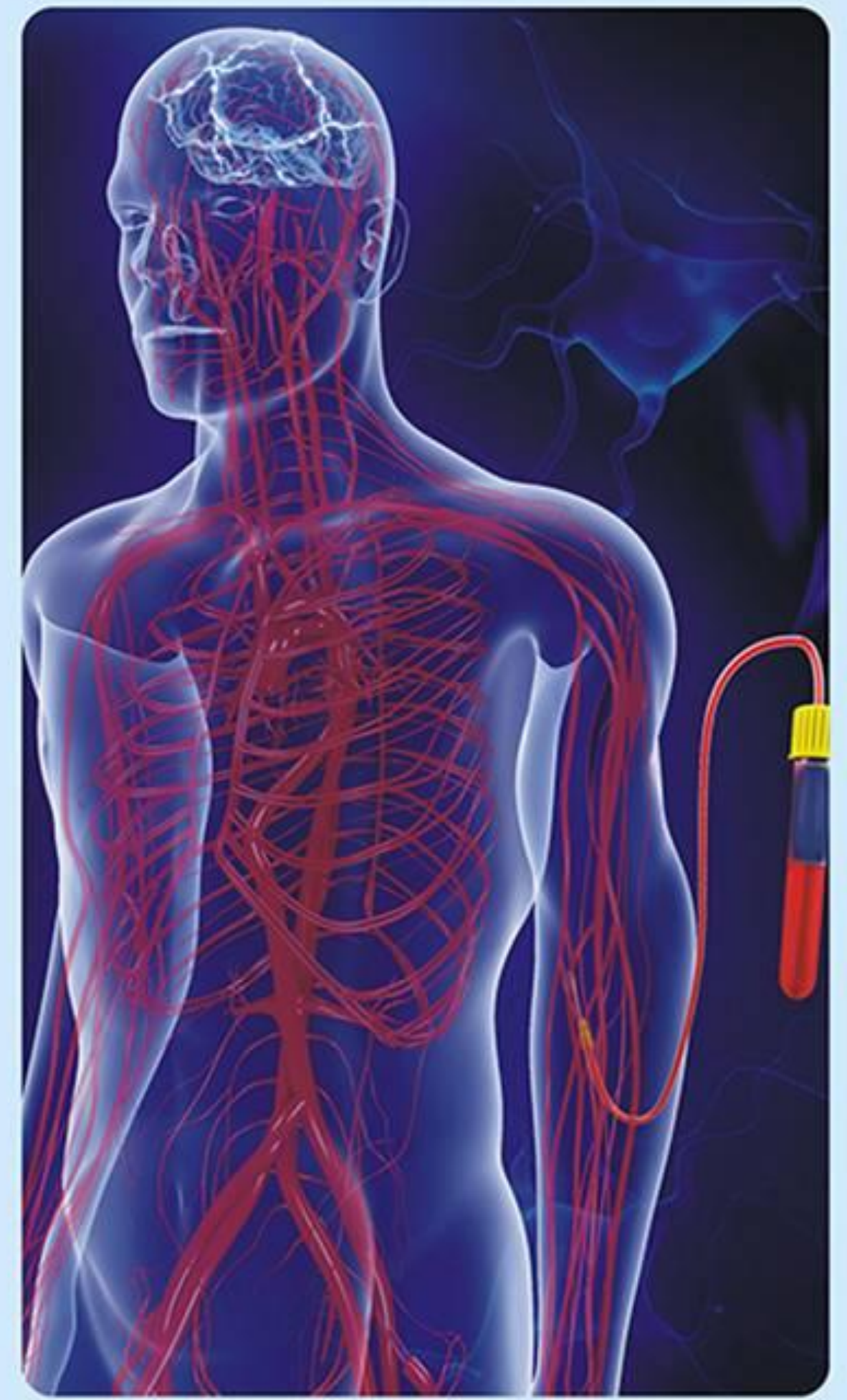


One hundred and fifty six patients with AD and the same number of gender- and age-matched control participants with standardized clinical assessments and neuroimaging measures were evaluated. Serum proteins of interest were quantified using a magnetic bead based immunofluorescent assay and a total of 33 analytes were determined. All of the subjects were then randomized into a training set and a validation set in a proportion of 70:30. Logistic regression and Random Forest analysis were then applied to develop a desirable algorithm for AD detection.

## Findings

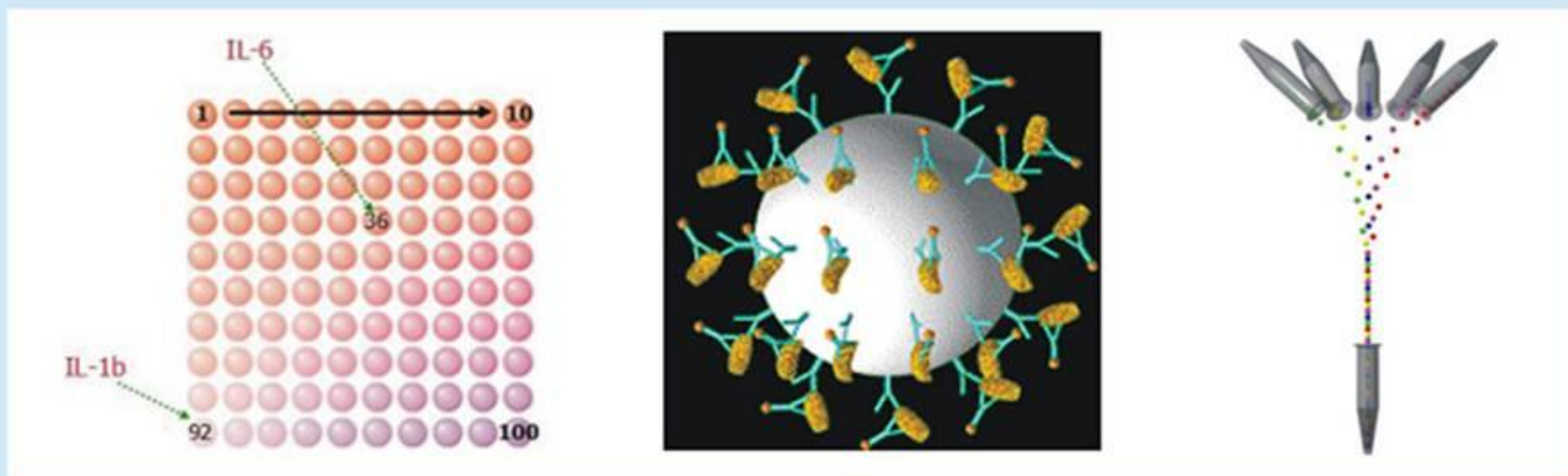


Of the 33 analytes examined, 17 were found to be significantly differentially expressed between AD and control samples. The Random Forest method was found to generate a more robust predictive model than using the logistic regression analysis. Furthermore, an 8-protein-based algorithm was found to be the most robust with a sensitivity of 97.7%, specificity of 88.6%, and AUC of 99%.



## Conclusion

This study identified a total of 17 potential serum-based AD biomarkers, with 8 of these potential biomarkers ultimately selected following the construction of a novel 8-protein-based algorithm using the Random Forest method. Furthermore, the developed 8-protein biomarker panel was shown to have desirable sensitivity and specificity, thus suggesting applicability when developing an AD diagnostic. It is hoped that these results provide further insights into the applicability of serum-based screening methods and contribute to the development of lower cost, less invasive methods for diagnosing AD and monitoring progression.



**Key word:** Alzheimer's disease, Diagnosis, serum protein-based profiles, Novel biomarkers