Nanomembrane system could help diagnose diseases by isolating biomarkers in tears
20 July 2022

Fei Liu and colleagues wondered if a nanomembrane system, which they originally developed for isolating exosomes from urine and plasma, could allow them to quickly obtain these vesicles from tears and then analyze them for disease biomarkers.

The team modified their original system to handle the low volume of tears. The new system, called "Incorporated Tear Exosomes Analysis via Rapid-isolation System" (iTEARS), separated out exosomes in just 5 minutes by filtering tear solutions over nanoporous membranes with an oscillating pressure flow to reduce clogging. Proteins from the exosomes could be tagged with fluorescent probes while they were still on the device and then transferred to other instruments for further analysis. Nucleic acids were also extracted from the exosomes and analyzed.

The researchers successfully distinguished between healthy controls and patients with various types of dry eye disease based on a proteomic assessment of extracted proteins. Similarly, iTEARS enabled researchers to observe differences in microRNAs between patients with diabetic retinopathy and those that didn't have the eye condition, suggesting that the system could help track disease progression. The team says that this work could lead to a more sensitive, faster and less invasive molecular diagnosis of various diseases—using only tears.


Provided by American Chemical Society

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