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**Microfluidic Chip Platforms for Analysis of Neuro-degenerative Diseases**

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 Recent advancements in microfluidic device systems have offered new opportunities to research and monitor neuro-degenerative diseases through benefits such as precise control, reduced sample requirements and reagent consumption, cost efficiency, and high-throughput screening. This has been diversely applied to clarify complex circuits of the brain and disease-related mechanisms, in combination with biosensors or bio-chemical analysis. In this study, we introduce a technology that consistently generates amyloid clusters, which are significantly corelated with neuro-degenerative disease by adopting microfluidic chip technology. This technology can provide a deeper understanding of the reassembly of amyloid clusters, a pervasive problem in traditional drug screening that induces false positives and hinders the discovery of treatments for amyloidosis. Moreover, we introduce the versatile applications of the microfluidics-based microdialysis (MD) method, a prevalent technique in chemical profiling of biological tissues within neuroscience research. This method is instrumental in quantifying neurotransmitters, neuropeptides, metabolites, biomarkers, and drugs. The refined, miniaturized ND probe developed enables the execution of minimally invasive and highly localized sampling and chemical profiling in living biological tissues, achieving unparalleled spatiotemporal resolution. These developments hold transformative potential across clinical, biomedical, and pharmaceutical disciplines, augmenting our ability to comprehend and address neurodegenerative conditions effectively.