Optical measurement on membrane roughness of neuroblastoma cells influenced by amyloid-beta 42 and gold nanoparticles

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We measured the membrane roughness of neuroblastoma cell Neuro-2a (N2a) by using non-interferometric wide-field optical profilometry (NIWOP). The NIWOP technique is based on differential confocal microscopy (DCM) and wide-field optical sectioning microscopy. It has been used to measure the dynamical membrane waves on live cells [1,2]. Recently, it is proposed that blocking the formation of amyloid beta (Aβ) fibrils on cell membranes may be a potential approach to treat Alzheimier’s disease. A previous study indicated that gold nanoparticles (AuNPs) can inhibit Aβ fibrilization [3]. In the present work, N2a cells were incubated with 0.5 nM AuNPs (dia. 30 nm) and 5 μM Aβ42 fibrils. The result showed that Aβ42 fibrils decreased membrane roughness, but AuNP-treated Aβ42 reversed this trend (see Fig. 1). Therefore we suggest that membrane roughness could be used as a parameter to measure the efficacy of Aβ on cells under various treatments. We will further investigate the combined effect of AuNPs and electrical stimulations [4] on cells treated by Aβ.

![Figure 1](image1.png)

\textbf{Figure 1.} (a) The topography of N2a cells under various treatments measured by NIWOP. (b) Membrane roughness of N2a cells under various treatments. For each condition, more than 10 cells were measured. Data show the mean ± standard error of the mean for each condition which had been normalized to the roughness measured before the treatment.

References