

Label-Free Optical Monitoring Of The Adhesion And Spreading Of Human Cells: High Throughput Analysis With Superior Sensitivity And Time Resolution

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Abstract— Here, we briefly discuss the past, present, and possible future of label-free optical biosensors in cell adhesion research. Currently available optical biosensors possess outstanding potentials still not rightfully recognized and still waiting to be fully exploited in the field. Thus, during the description we give special emphasis to the advantages the state-of-the-art optical cell-based biosensors possess as compared to microscope- or force- measurement based techniques that are currently much more generally used to characterize cell adhesion. To name here only a few, they enable label-free detection close to a planar sensor surface, have high sensitivity, and generate superior quality kinetic data. Such information-rich kinetic data, in turn, can be subjected to in-depth comparative and kinetic analysis. To exemplify the importance of in-depth kinetic analysis, we review a recent study, in which the Epic BenchTop high-throughput optical biosensor was used to measure the dependence of adhesion kinetics on the surface density of integrin ligands. Based on the kinetically analyzed data, a model enabling the label-free determination of the dissociation constant for the interaction between adhesion ligands and their native cell membrane receptors has been constructed.