



Diploma Work Proposal

Distributed Biosensors for Non-invasive Tear Diagnostics

Background

Tear fluid is an extracellular fluid excreted from the tear gland. There is a dense network of blood capillaries infiltrate the tear gland, facilitating the transportation and exchange of molecules from serum to the tear gland. This realization enables scientist to build a bridge between tear fluid research and systemic disease diagnostic for the development of non-invasive diagnostic tests. ith the recent advance of proteomic technology, several important biomarkers from ocular fluid have been identified having significant clinical diagnostic value for diseases such as breast cancer and lysosomal storage diseases [1,2]. The use of tears for diagnostics has been proposed to verify eye infections, dry eye syndrome, glaucoma and hyperglycemia. However, most of the diagnostic tests for tear fluid required tedious handling procedures such as enzyme-linked immunosorbent assay (ELISA) and expensive instrumentation due to the small volume of tear fluid and low analyte concentration.

Project Description

In this project, you are going to develop distributed biosensors for detection of tear biomarkers; design of the sensing platform; investigate the diagnostic sensitivity and selectivity of the sensors; optimize the assay conditions and to preform literature review on sensing technique for tear diagnostics. The student can gain hand-on experience on surface chemistry, immobilization and integration of biomolecules on sensing platform, labeling techniques for sensing, and characterization techniques for protein functions.

Project Duration

20 weeks (30 points)

Contact

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- 1) Lebrecht A, et al., Cancer Genomics Proteomics 6(3), 177-182, 2009.
- 2) Haeckel R., et al., Ann. Bio. Clin. 51, 903-910, 1993.