

Přírodovědecká fakulta

Optické sledování hladiny glukosy

Bakalářská práce

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Ústav biochemie

Program Biochemie

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# Introduction

Glucose is an essential part of our body’s metabolism. It’s a source of energy thanks to which we can handle our day-to-day business.

Since our bodies extract glucose from the food we eat, there needs to be a mechanism which ensures that the amount of glucose in our bloodstream is balanced. Having too little(hypoglycemia) or too much(hyperglycemia) can cause health problems.

For most of us, this balancing is happening seamlessly. But there are some people, for whom this mechanism has been disrupted. Such condition is called diabetes and people affected by it need to regularly monitor their blood glucose levels.

The most reliable tool for glucose monitoring has, for many years, been an electrochemical sensor that requires a drop of blood to work. The drop is gained by pricking a finger or using an implanted thin lancelet. Both means are painful and cause a risk of infection. For such reasons it’s categorized as an invasive method.

One of the main goals in biosensor research is to devise a non-invasive method for glucose monitoring. This would lead to more comfortable lives for people with diabetes. There are several potential methods being researched.

For this thesis we are going to use an optical sensor which measures intensity of light in ultraviolet, visible, and near-infrared range. It also has a build-in LED diodes of the same wavelengths. We’ll be illuminating the skin and analyzing the reflected/backscattered light waves.

First, we’ll do multiple skin tissue measurements when subject is fasted and satiated. The data will be analyzed for qualitative difference.

Second, we’ll do measurements in a lab on glucose solutions of different concentrations. The data will be analyzed for correlations.

Third, we’ll do another set of lab measurements but using a barrier between the sensor and a beaker. The barrier will simulate skin layer. The data will be analyzed for correlations.

Lastly, we’ll create a dataset by measuring multiple subjects and labeling the samples by glucose concentration values using the electrochemical sensor. This dataset will be used to train machine learning models for glucose concentration prediction.

# [Chapter title (use style Heading 1 or Nadpis 1 for chapters)]

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# Conclusion

Bibliography

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