## Abstract

Pancreas is known to be an organ producing a variety of exocrine and endocrine substances, where also insulin belongs. This hormone is produced in the body almost solely by specialized β-cells of the Langerhans islets and is stored here in secretory granules. As the β-cells contain large number of these vesicles, an organism can quickly respond to the glucose stimulation. Completely processed insulin is formed in the secretory granules probably as a hexamer, where six insulin molecules are coordinated along two zinc bivalent cations. Appropriate β-cell response to higher glucose level and following insulin secretion is one of the key processes that regulate metabolism in the body. In order to study insulin production, its effects or secretion, permanent pancreatic cell lines are often used as biological models, out of primary cells from islets of Langerhans.

This diploma thesis is focused on two permanent cell lines INS-1E and BRIN-BD11. We searched for the ability of the cells to produce insulin, if the hormone is fully processed, as well as zinc content, which could have a great influence on insulin's processing. Using different methods we compared these two cell lines with cells from the Langerhans islets. We succeeded in isolation of secretory granules from all three cell types and we plan to use these granule fractions in further studies. According to our findings from the study of secretory granules we came to the conclusion that the cell line INS-1E is a better and more eligible model of the pancreatic β-cell then the cell line BRIN-BD11 in all studied aspects. INS-1E cells produce more insulin, have higher zinc content and are able of glucose stimulated insulin secretion. In spite of that, these INS-1E cells' features can be hardly compared to β-cells, which were obtained directly from an organism. It shows us that using cell lines as a model for the research brings advantages like reproducibility of outcomes, scientists do not have to waste animal material, but on the other hand possibility of varied or insufficient features according to original cells.



Key words: insulin, secretory granules, protein isolation, beta-cells, zinc