A Mathematical Modelling of Signal Transduction System via Insulin Medication

Kyung-Kuk Lim, Kwang-Ik Kim, Hyun-Ju Lee and Sung-Ho Ryu

1) Department of Mathematics, Pohang University of Science and Technology, Pohang, Republic of Korea
2) Department of Life Science, Pohang University of Science and Technology, Pohang, Republic of Korea

Corresponding Author: Kwang-Ik Kim, kimki@postech.ac.kr
Sung-Ho Ryu, sungho@postech.ac.kr

ABSTRACT
When insulin is injected to a cell, various signal transductions occur as an reaction. There are various molecular transducers such as Insulin Receptor (IR), Insulin Receptor Substrate (IRS), Protein Kinase B (PKB, also known as Akt), and Extracellular Signal-Regulated Kinase (ERK), etc., in a cell. These transducers are phosphorylated under some stimulation and then deliver information to other transducers. In this paper, we formulate a mathematical model for these physiological signal transduction phenomena via insulin medication and analyze this insulin signal kinetics using the phosphatized transducers measured from the laboratorial experiments. It turns out that transfer rate from one transduction compartment to another depends on the quantity of the medicated insulin. Further, there is no reverse transfer action from the phosphatized ERK to the regular ERK. Through this novel signal transduction model, it is possible to predict the reaction quantity of each transducer once the amount of the medicated insulin is known, which is very important to regulate the pharmaceutical uptake.

REFERENCES

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