Modeling of Insulin Receptor Binding & Recycling Subsystem

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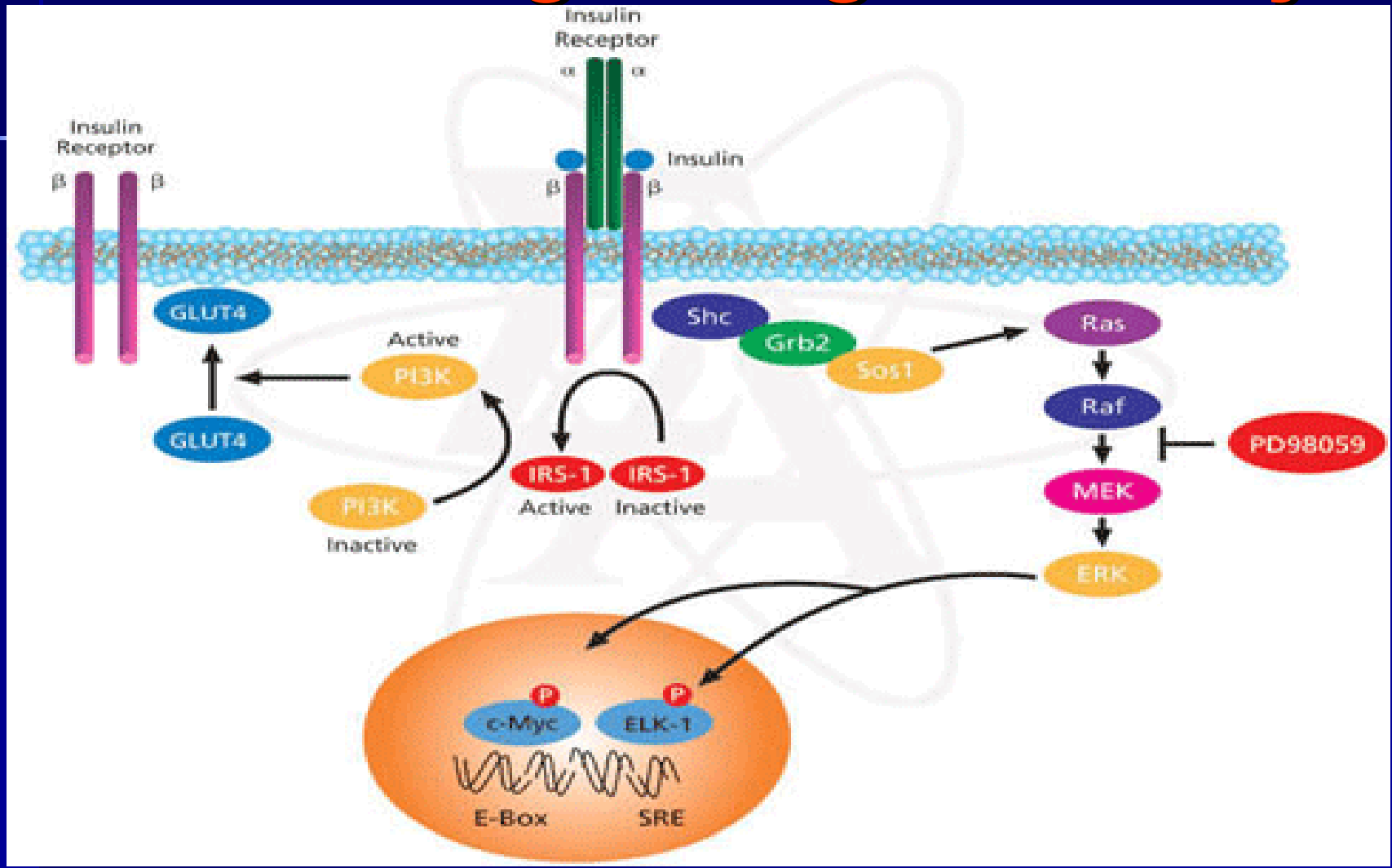
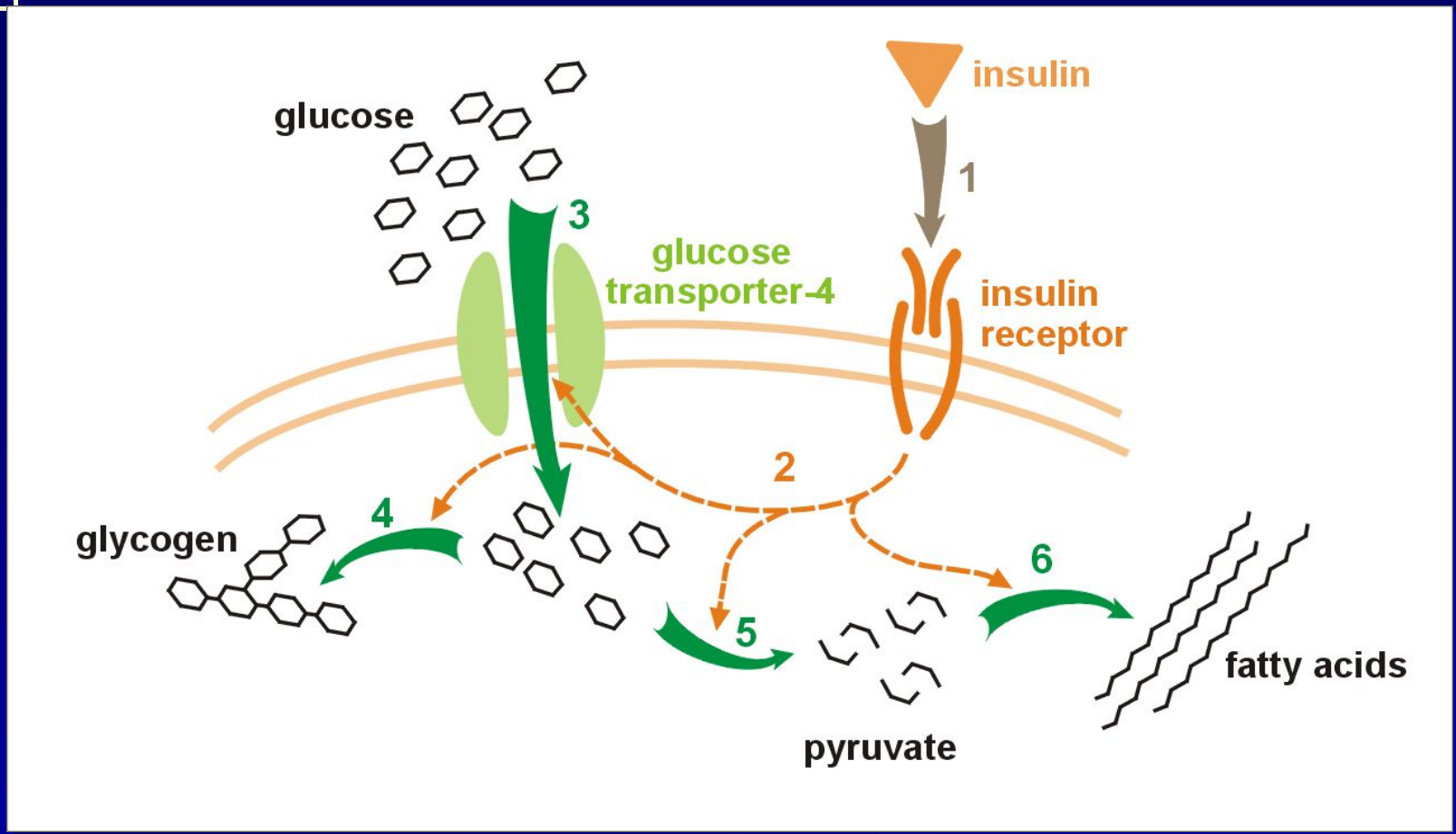
Background…

Insulin Signaling Pathway



Biocarta Website

The Actions of Insulin



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Problem Statement…

- The entire insulin signaling pathway is complicated.
- It is believed that certain **breakdowns** in insulin metabolic pathway **contribute** to **Diabetes type II.**
- This problem is not well characterized due to the complexities of the system.

Objective..

- To build a metabolite **correlation model** for insulin receptor binding and recycling pathways using artificial neural network.

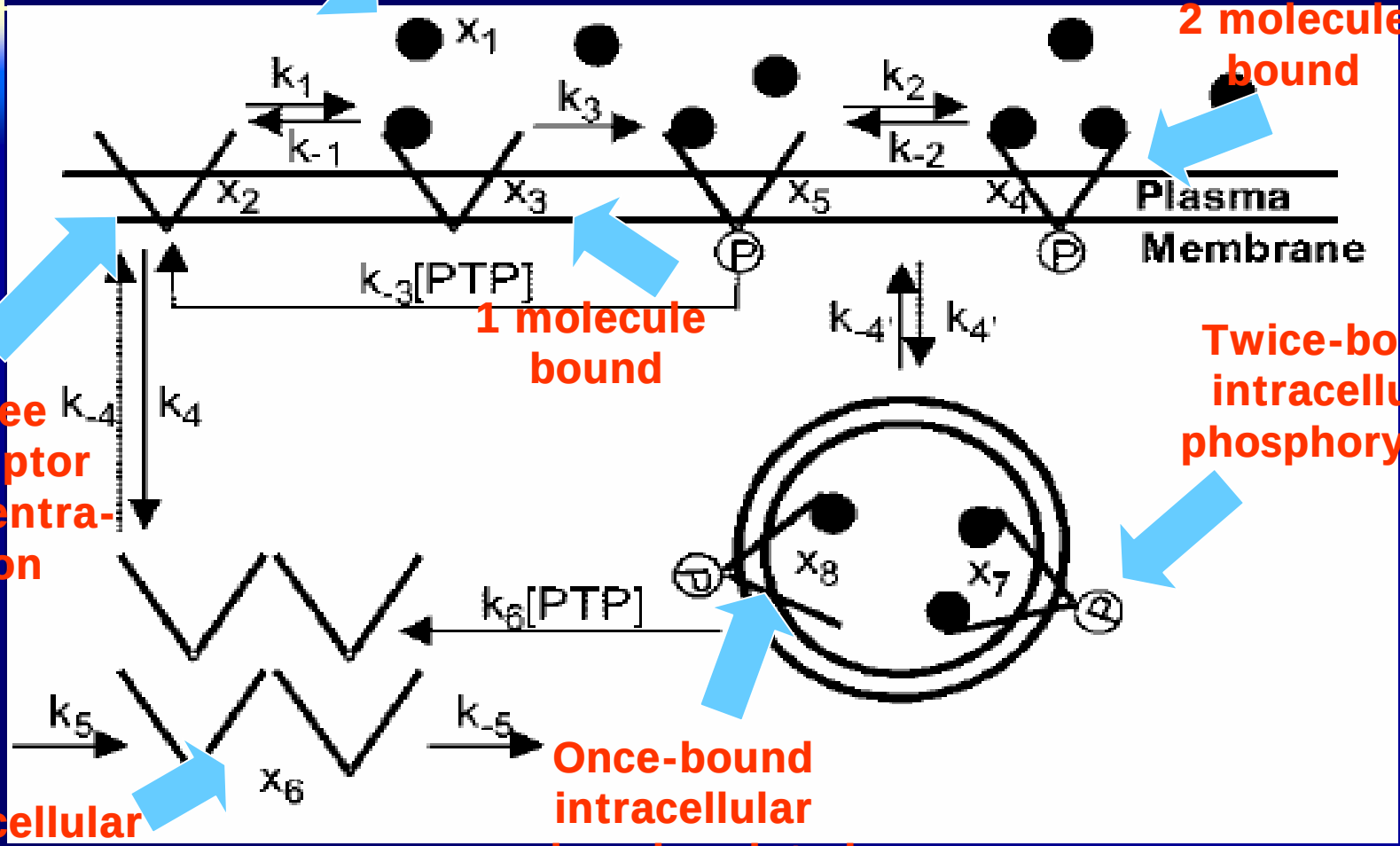
Scopes..

Simulation of:-

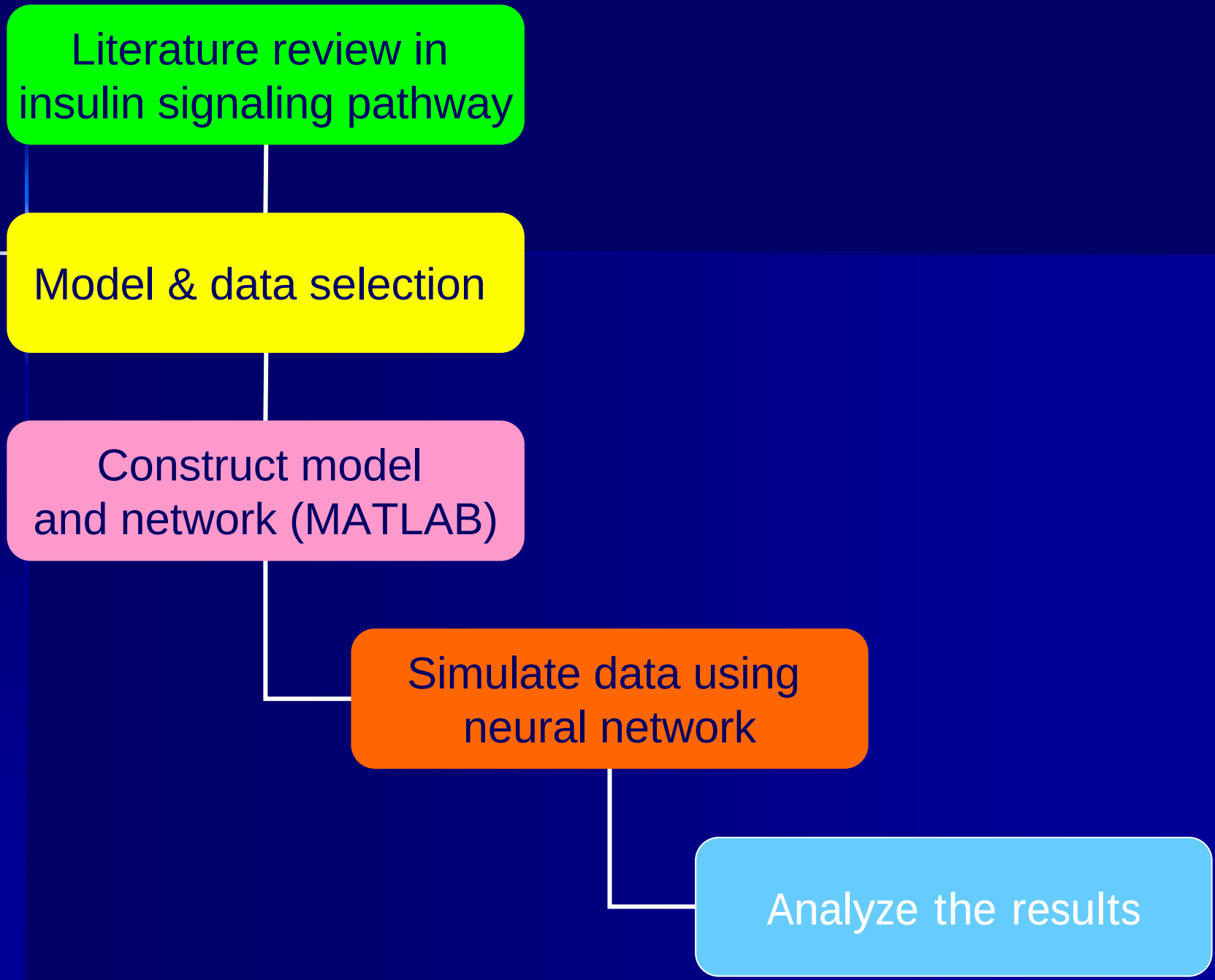
- insulin receptor binding subsystem
- insulin receptor recycling subsystem.

- **Construct and validate** insulin receptor binding and recycling subsystem **model** using **Artificial Neural Network** (MATLAB)

Insulin receptor binding & recycling subsystem

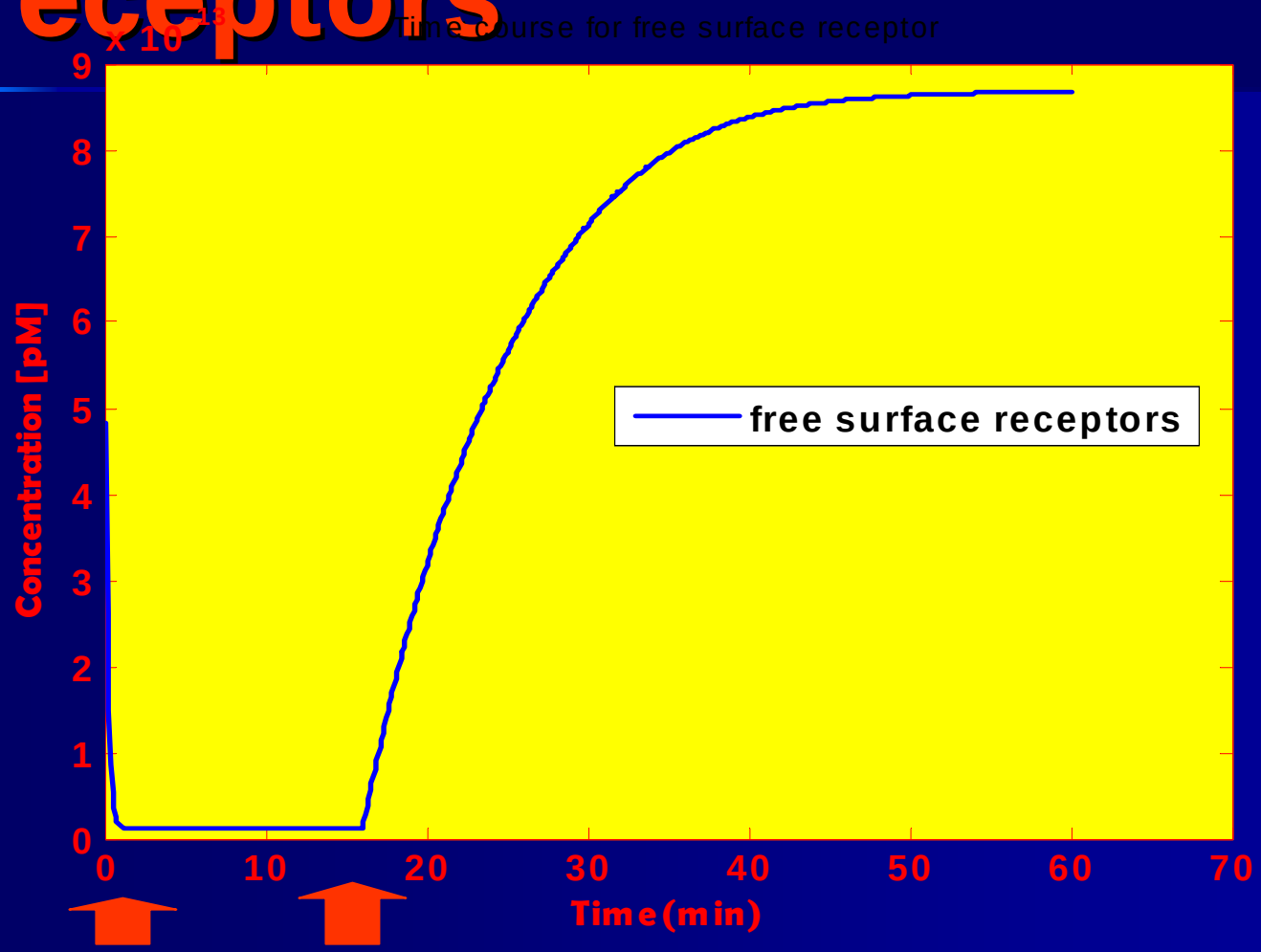


Approach..

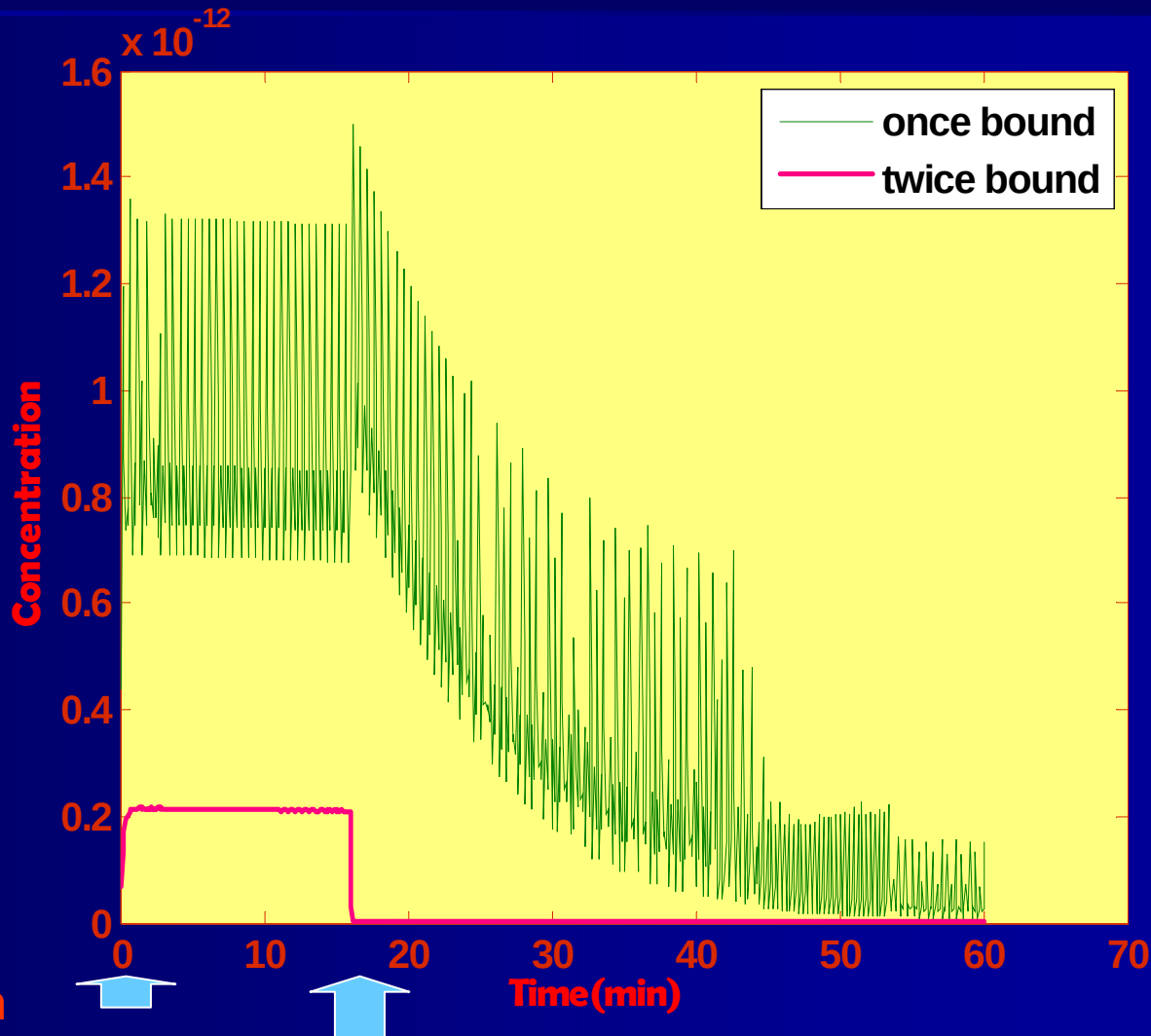

Literature review in insulin signaling pathway
Model & data selection
Construct model and network (MATLAB)
Simulate data using neural network
Analyze the results

Results...

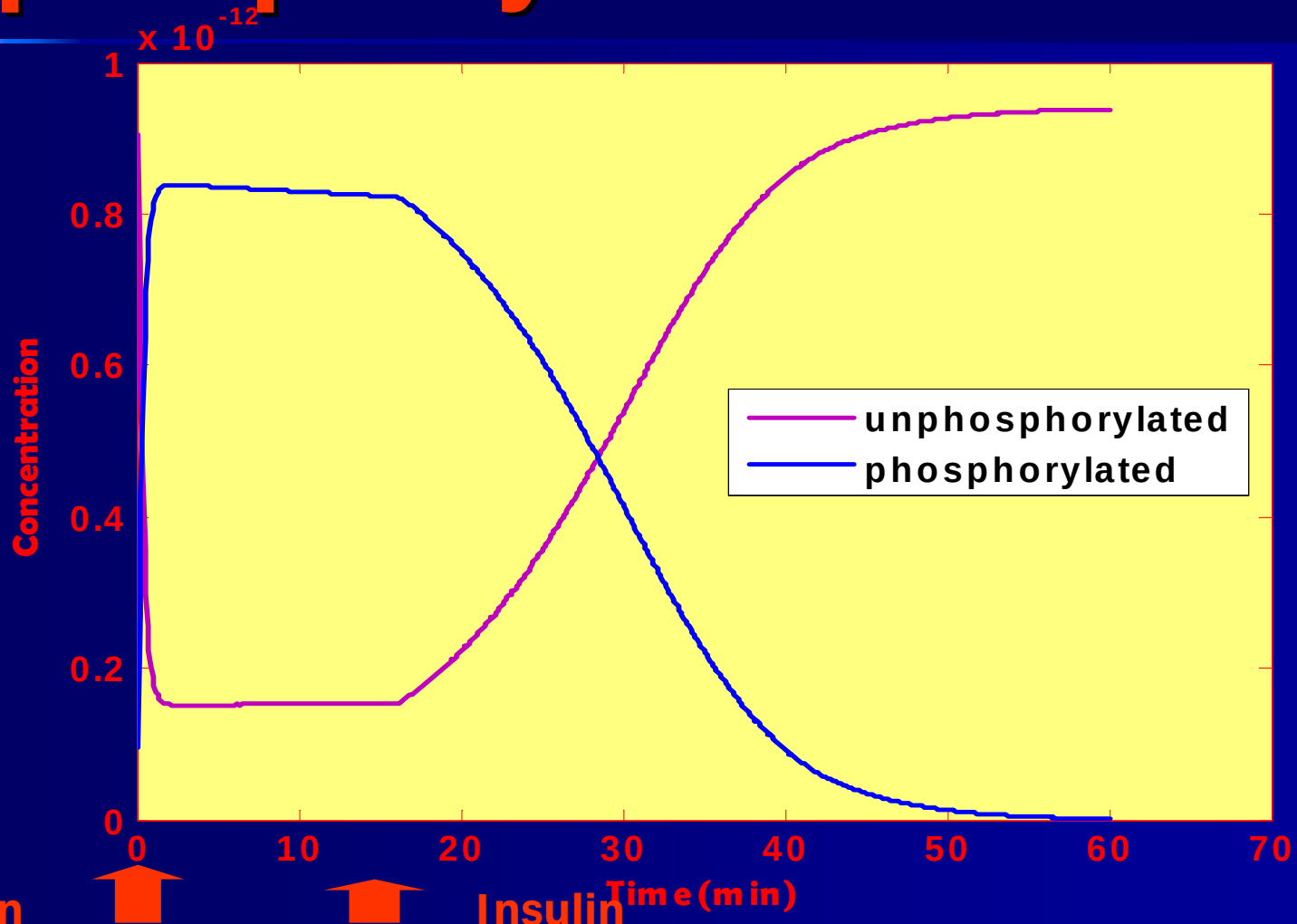
Time courses for unbound receptors



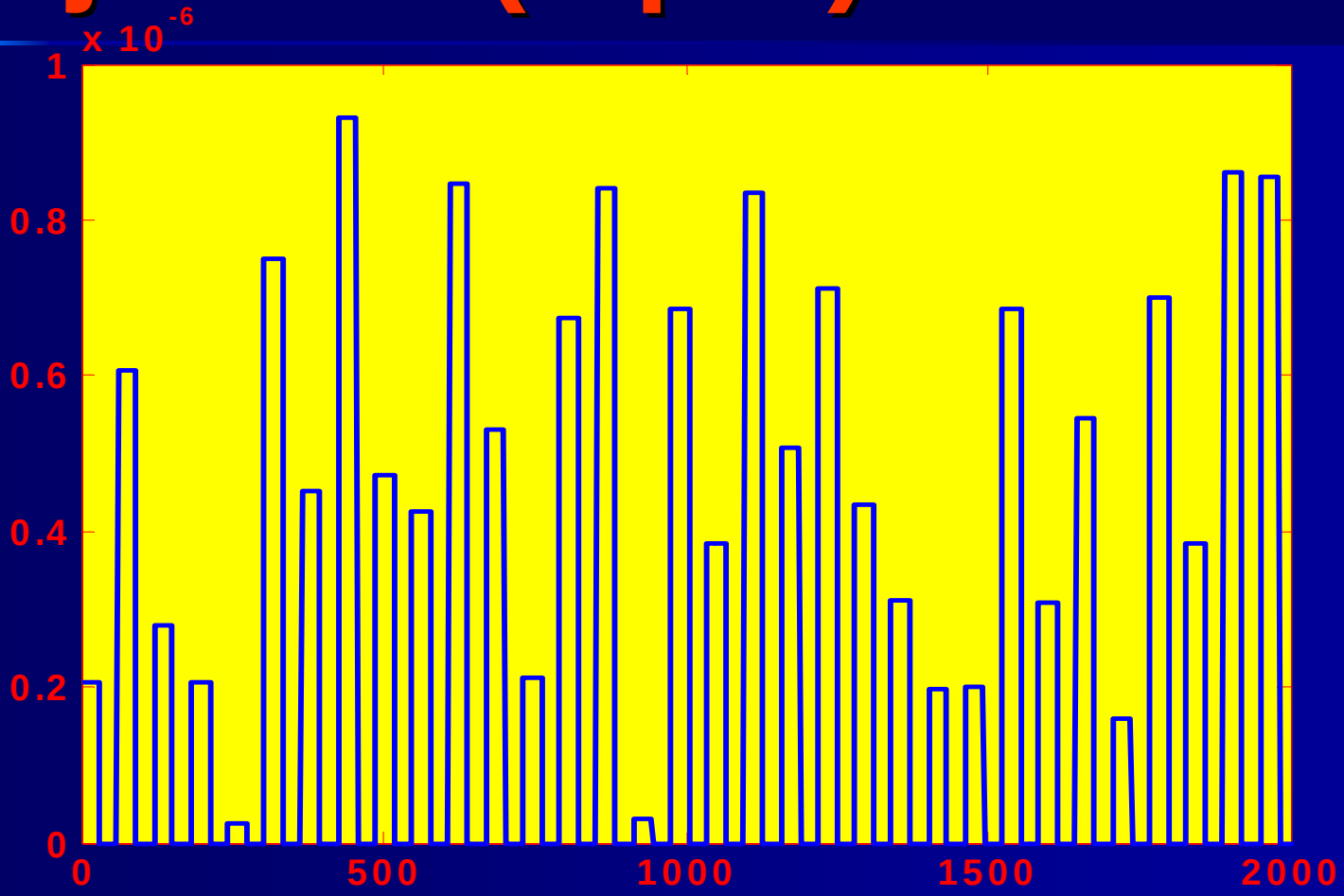
Once- & twice-bound phosphorylated surface receptors



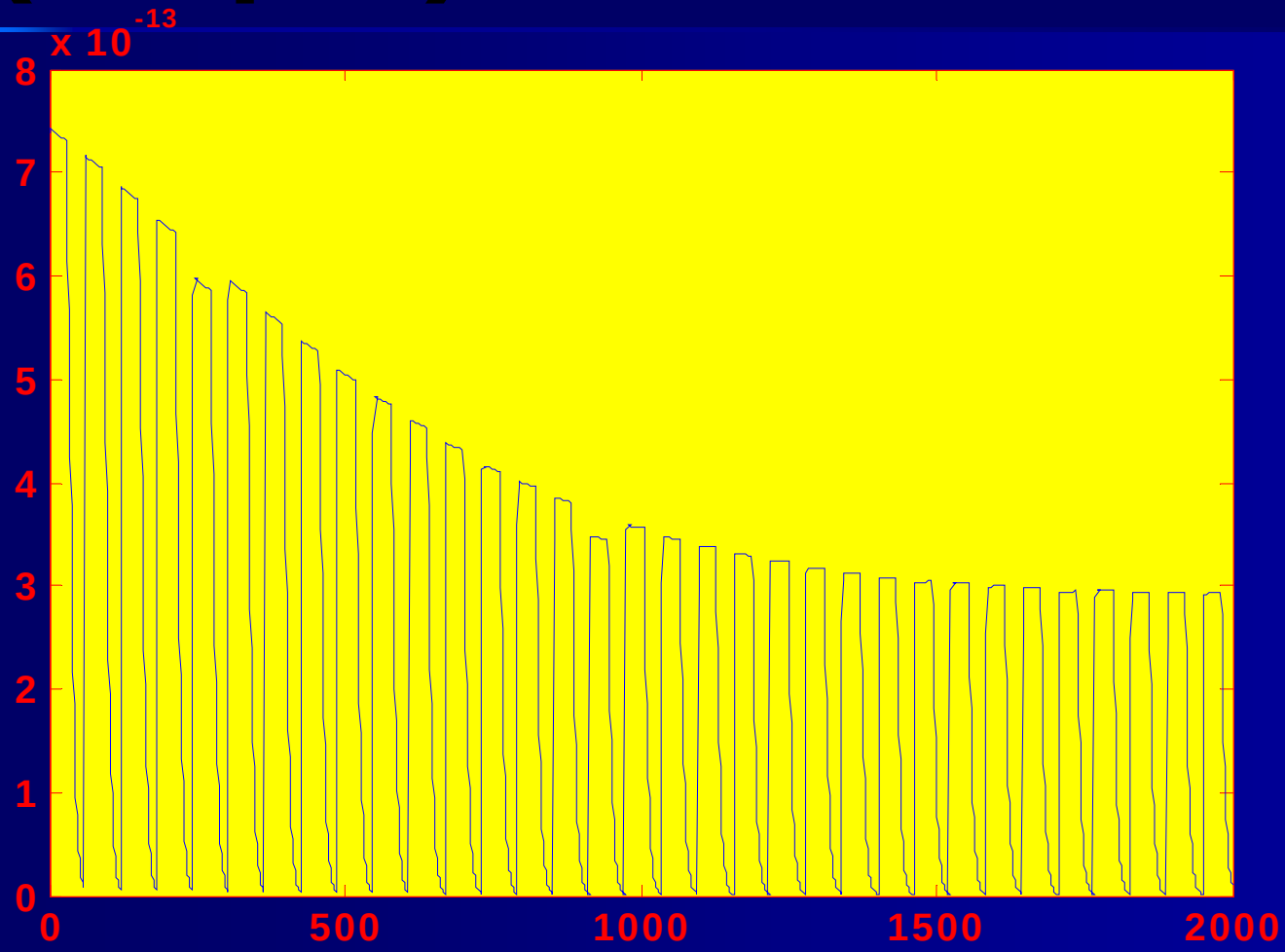
Unphosphorylated & phosphorylated IRS-1



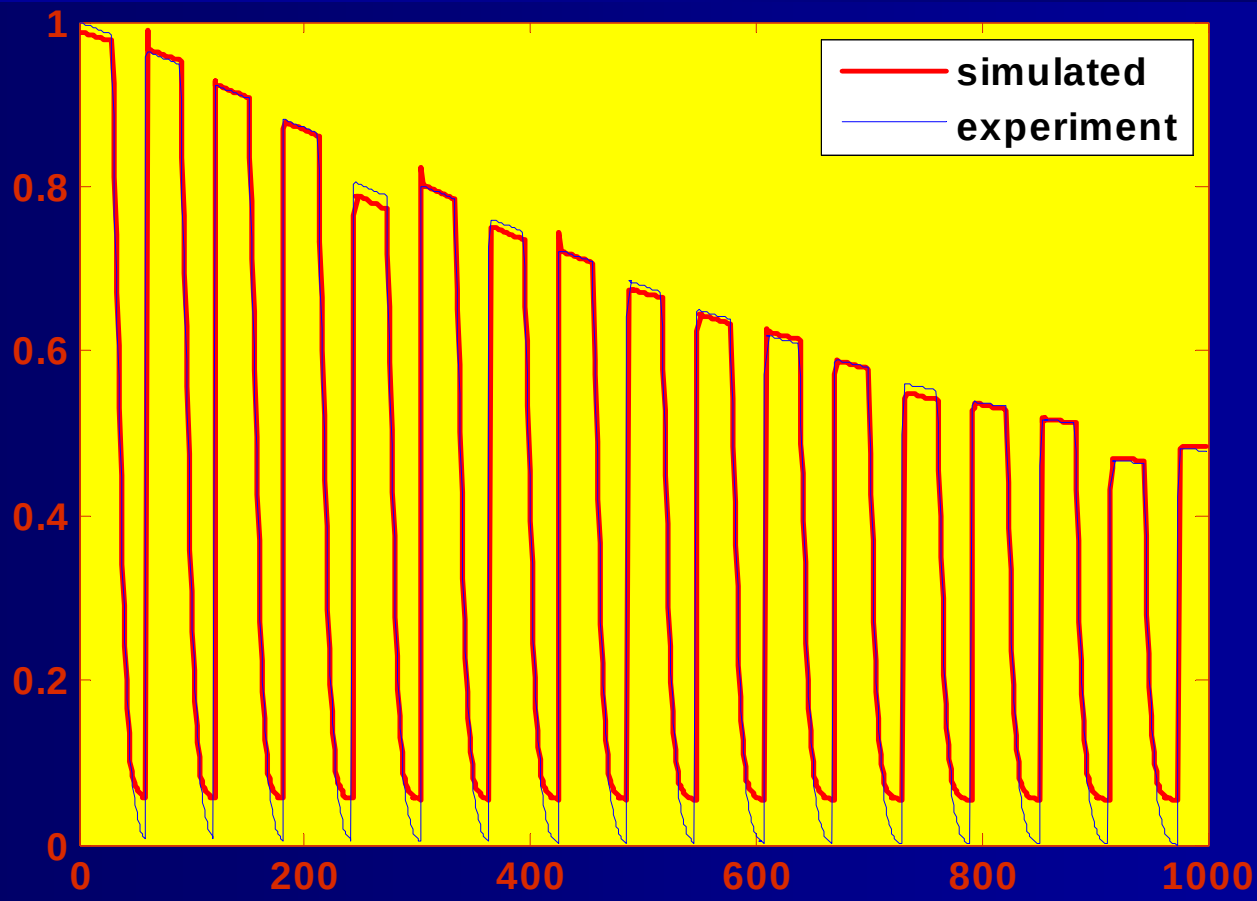
Step Change of insulin injection (input)



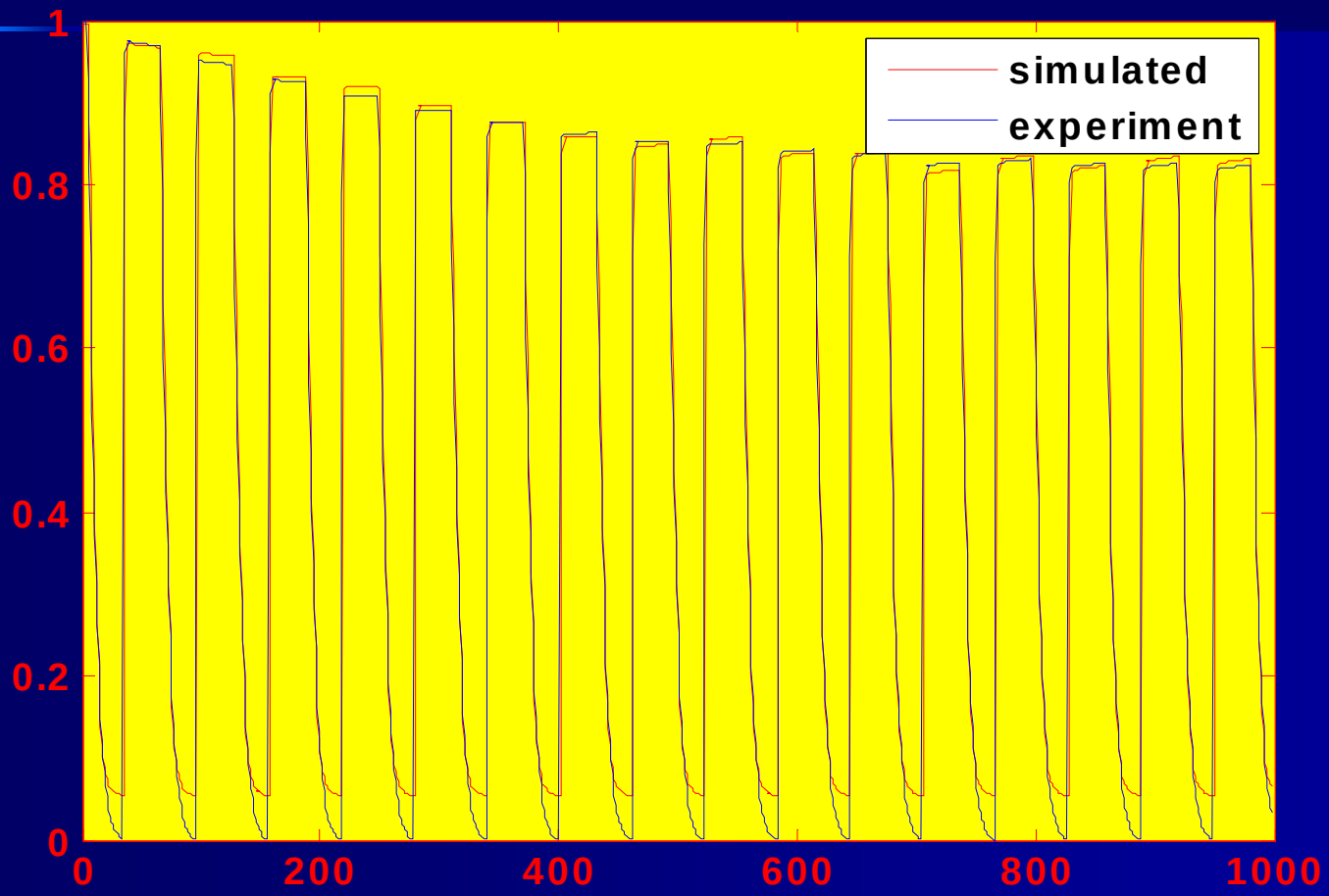
Step Change of IRS-1 (output)



Validation of input



Validation of output



Conclusion

- The numerical result obtained using MATLAB software are comparable with the result given in the literature.
- The errors obtained for the models developed are MSE 0.00557697/1e-005

Thank You…