

National University of Science and Technology

Think in Other Terms



SPECIAL COLLECTION
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FACULTY: *APPLIED SCIENCES*

DEPARTMENT: *APPLIED MATHEMATICS*

PROJECT TITLE: *MODELLING TYPE ONE DIABETES AND POSSIBLE TREATMENT STRATEGY.*

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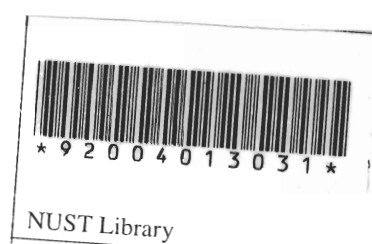
STUDENT NUMBER: *N005 649B*

SUPERVISOR: *MR. G. MAGOMBEDZE*

*In partial fulfillment of the requirements for the Bachelor of Science (Honors)
Degree in Applied Mathematics*

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Abstract

The cells in the body rely primarily on glucose as their chief energy supply. Glucose is not able to enter most cells directly-insulin is required for the cells to uptake glucose. Insulin is produced by the beta cells in the islets of the Langerhans. When the body fails to produce enough insulin to regulate the blood glucose level, it constitutes type 1 diabetes mellitus. Existing mathematical models are on the dynamics of the destruction of beta cells only. Through the use of mathematical modeling and simulation, and well defined assumptions, the nature of interactions between the cells in the pancreas can be quantified and better understood. We thus develop a model which looks at the beta cells destruction and the glucose, insulin dynamics. The model will also be modified to include the effect of having external artificial insulin in the system and to see its effect on the stability of the system. From our model analysis we find that the onset of type 1 diabetes is due to a collective dynamic instability. A possible treatment strategy may be the administration of insulin to down regulate the beta cells.