

THESIS TITLE

by

Name Surname

B.S., Program Name, Boğaziçi University, 200000

M.S., Program Name, Boğaziçi University, 2013

Submitted to the Institute for Graduate Studies in
Science and Engineering in partial fulfillment of
the requirements for the degree of
Master of Science

Graduate Program in Your Program
Boğaziçi University

2016

TABLE OF CONTENTS

1. INTRODUCTION	1
2. FLUX BALANCE ANALYSIS	2
2.1. Introduction	2
2.1.1. Understanding control in metabolic models	2
REFERENCES	3

1. INTRODUCTION

Now, let us cite some studies: one source as [1], they are cited.

2. FLUX BALANCE ANALYSIS

2.1. Introduction

2.1.1. Understanding control in metabolic models

Early enzymology assumed the existence of rate limiting steps in biological pathways. The intuition was that the overall rate of a pathway is constrained by the rate of the slowest step. As the slowest reaction rate increases the whole pathway rate increases in proportion until another step becomes limiting. Niederberger *et. al* tested this assumption and found in contrast that individual up or down regulation of enzyme quantities at specific reaction steps had only marginal effect on overall tryptophan biosynthesis pathway in *Saccharomyces cerevisiae*. The rate of the pathway was instead accelerated by increasing the quantity of five related enzymes in tandem. This research demonstrated control in a biological system is distributed over the system as a whole rather than concentrated at individual reactions.

The theory of metabolic control analysis (MCA) states that there is no rate limiting step in a pathway, but instead each reaction shares a measure of overall control. The control the rate of reaction

REFERENCES

1. Aran, O., I. Ari, A. Benoit, A. Carrillo, F. Fanard, P. Campr, L. Akarun, A. Caplier, M. Rombaut and B. Sankur, “Sign Language Tutoring Tool”, *Proceedings of eNTERFACE 2007, The Summer Workshop on Multimodal Interfaces*, Vol. 21, 2007.