Skeletal Muscle Structure, Function and E.M.G.

Master

Degree In Orthopaedic Surgery

By

Gamal Morsy Mohamed El-Shoubary

(M.B.CH)

Supervisors

Prof. Dr. Hassan El-Zaher

Professor of Orthopaedic Surgery

Chairman of Orthopaedic Surgery Department

Ain Shams University

Dr. Hany Mamdouh Hefny

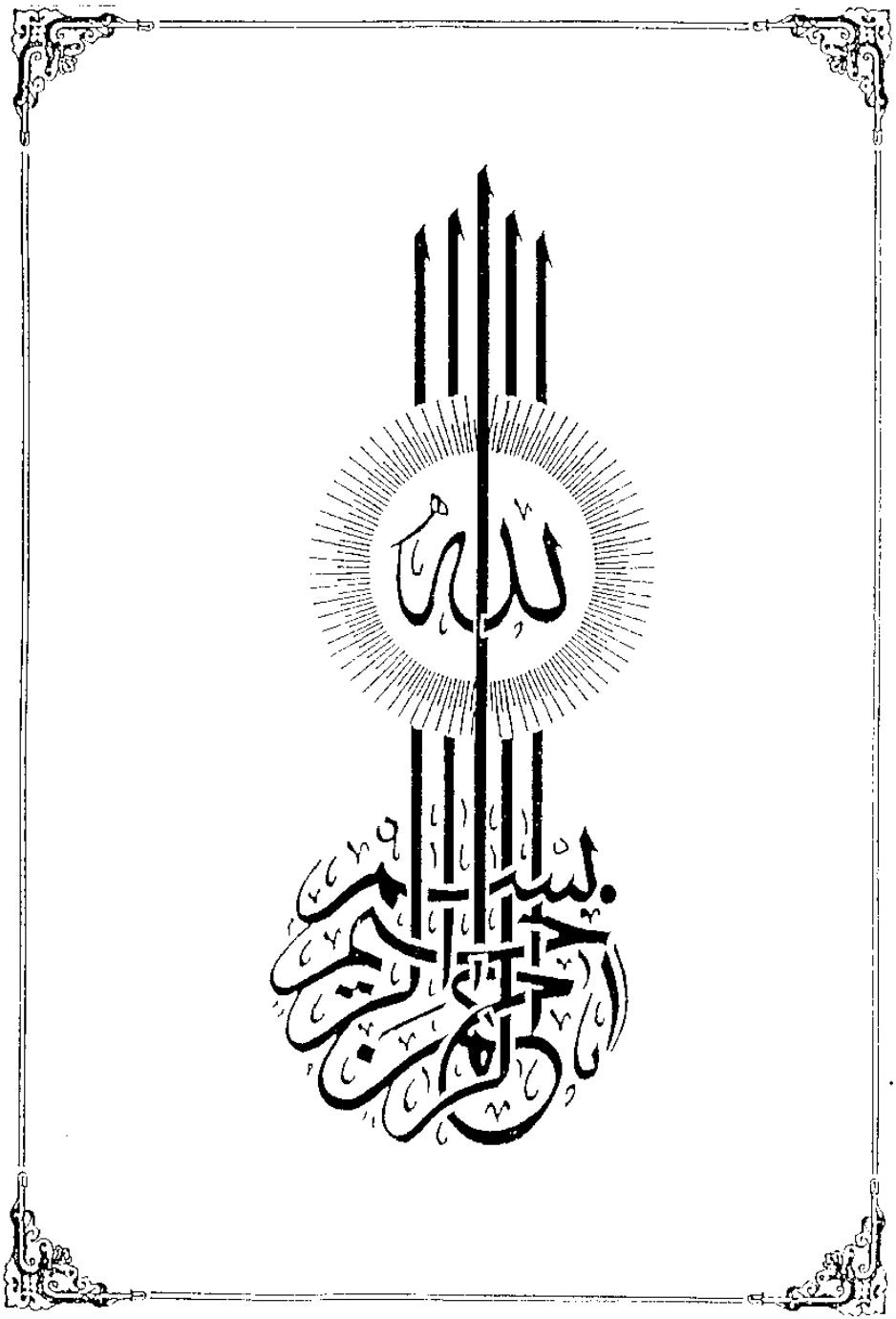
Lecturer Of Orthopaedic Surgery

Ain Shams University

Faculty Of Medicine

Ain Shams University

(1995)



ACKNOWLEDGEMENT

I would like to express my own gratitude to professor doctor Hassan El- Zaher for his help and advice.

I am also indebted to doctor Hany Hefny whose detailed comments have contributed greatly to help the essay appear in its present form.

Also, I would like to thank all my colleagues for their great help.

Gamal El - Shobary

CONTENTS

List of Figures

Chapter (I)

Introduction

Introduction

Many cells have the ability to change shape and /or move about. However, for some cells, the ability to change shape is developed to a high degree. These cells are arranged such that their contractions result in movement of the attached structures (e.g. Skeleton). These cells are (muscle) cells and in human such cells make up 50% to 70% of the lean body weight ***(Johnson, 1992).***

Muscle is the major biochemical transducer (machine) that converts potential (chemical) energy into kinetic (mechanical energy). An effective chemical mechanical transducer must meet several requirements. First there must exist a constant supply of chemical energy. In vertebrate muscle, ATP and creatine phosphate supply chemical energy. Second, there must be a means of regulating the mechanical activity (-i.e speed, duration and force of contraction in the case of muscle). The machine must be connected to an operator, a requirement met in biologic systems by the nervous system. Morever, there must be a

way of returning the machine to its original state *(Murray, 1991).*

Muscle tissue which constitutes the various kinds of muscles is a composite of two histological distinct components, the muscle cells themselves and connective tissue. The muscle cells produce contractions and the connective tissue component harness their pull and convey the necessary nerve fibers, blood vessels and lymphatics *(Cormack, 1993).*

Muscle is pulling, not a pushing machine. Therefore, a certain muscle must be antagonised by another group of muscles or another force such as gravity or elastic recoil *(Murray, 1991).*

Several types of muscle cells can be classified on the basis of structure, location, and function. All muscle cells can be divided into two groups-striated and smooth- based on their microscopic structure. On the basis of location, striated muscles can be divided into three subgroups - skeletal, cardic and visceral. Functional classification of muscle are based on contractile behaviour e.g. fast twitch or