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ULTRASTRUCTURAL STUDIES ON HORSE LIGAMENTS

A thesis presented in partial fulfilment of the requirements
for the degree of Master of Science in Biophysics at
Massey University

SACHIN PADMAKAR DAVANKAR

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DEDICATION

This thesis is dedicated to my supervisor Professor D.A.D. Parry

ABSTRACT

This thesis has been devoted to studying one of the largest structural units present in most connective tissues - the collagen fibril. Diameter distributions of collagen fibrils from horse ligaments have been investigated as a function of age. A fairly complete age-related study of collagen fibril diameter distribution was targeted during this work. The ligaments (lateral collateral ligament, medial collateral ligament, radioscaphoid ligament, lateral pisiformometacarpal ligament and scaphocapitate ligament) were sampled from horses of ages one year, two-and-half year, five year, six year and eleven year. Electron microscopy methods were employed and corresponding electron micrographs were obtained from transverse sections. These were used to calculate a mean diameter and mass-average diameter of the collagen fibrils. Individual histograms were plotted showing the frequency and mass distribution of the fibrils versus the diameter at each of the ages studied. The data obtained have been related to the mechanical properties of the ligaments and their mode of growth. The diameter distributions obtained clearly reflect the mechanical needs of the ligaments during various stages of maturation. Results from a previous study of these ligaments at one particular age (four years) have been compared and found to be compatible with the results obtained during the course of this study. The effect of training on collagen fibril diameter distribution of horse ligaments has also been discussed.

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TABLE OF CONTENTS

	Page
ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
CHAPTER 1. INTRODUCTION	1
1.1 Molecular Architecture Of The Collagen Molecule	2
1.2 The Collagen Fibril	3
1.3 Packing Of Collagen Molecules In Fibrils	6
1.4 The Mechanical Properties Of Connective Tissues	6
1.5 Role Of Glycosaminoglycans In Collagen Fibril Development	9
1.6 Diameter Distribution Of Collagen Fibrils As A Function Of Age	10
1.7 Scope And Aim Of This Thesis	11
CHAPTER 2. METHODS AND MATERIALS	12
2.1 Sampling, Fixation and Embedding Of The Tissues	12
2.2 Sectioning Methods	17
2.3 Staining Methods	17
2.4 Electron Microscopy	18
2.5 Mensuration Methods	21
CHAPTER 3. RESULTS	23
3.1 Lateral Collateral Ligament	23
3.2 Medial Collateral Ligament	28

3.3 Radioscaphoid Ligament.....	28
3.4 Lateral PISOformometacarpal Ligament.....	33
3.5 Scaphocapitate Ligament.....	33
CHAPTER 4. DISCUSSION.....	38
4.1 Discussion Of Results.....	41
4.2 Effect Of Training.....	46
SUMMARY.....	49
REFERENCES.....	51

LIST OF TABLES

	page
Table 1.1 Collagen types and their distribution.....	4
Table 2.1 Table showing the ligaments sampled.....	14
Table 2.2 Program followed by the tissue processor.....	16
Table 3.1 Mean diameter, mass-average diameter, and the standard deviation of collagen fibrils.....	24

LIST OF FIGURES

	page
Figure 2.1 Dorsopalmar and mediolateral views of the equine carpus.....	15
Figure 2.2 Detailed section of a Philips electron microscope column.....	19
Figure 2.3 Simplified ray diagram for an electron microscope.....	20
Figure 3.1 Electron micrographs of transverse section of collagen fibrils from equine lateral collateral ligament	26
Figure 3.2 Collagen fibril diameter distribution and mass-average diameter distribution from equine lateral collateral ligament.....	27
Figure 3.3 Electron micrographs of transverse section of collagen fibrils from equine medial collateral ligament.....	29
Figure 3.4 Collagen fibril diameter distribution and mass-average diameter distribution from equine medial collateral ligament.....	30
Figure 3.5 Electron micrographs of transverse section of collagen fibrils from equine radioscaphoid ligament.....	31
Figure 3.6 Collagen fibril diameter distribution and mass-average diameter distribution from equine radioscaphoid ligament.....	32
Figure 3.7 Electron micrographs of transverse section of collagen fibrils from equine lateral pisiformometacarpal ligament.....	34
Figure 3.8 Collagen fibril diameter distribution and mass-average diameter distribution from equine lateral pisiformometacarpal ligament.....	35
Figure 3.9 Electron micrographs of transverse section of collagen fibrils from equine scaphocapitate ligament.....	36
Figure 3.10 Collagen fibril diameter distribution and mass-average diameter distribution from equine scaphocapitate ligament.....	37
Figure 4.1 Ultimate tensile strengths for (a) rat skin (b) rat-tail tendon.....	39