

"Type grouping" in skeletal muscles after experimental reinnervation

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APPLICATION OF histochemical techniques to the study of human muscle biopsies has helped to elucidate a number of pathologic reactions of skeletal muscle that are not evident in routinely stained paraffin-embedded tissue.¹⁻⁴ One of these abnormalities has been termed "type grouping" and defined as "groups of fibers of the same histochemical type much larger than usual . . . consisting of 50-100 fibers or more."² Normally, in histochemically mixed muscles, the two basic histochemical fiber types (types 1 and 2) are intermingled in a mosaic pattern when viewed in cross section. In normal human muscle the number of fibers of similar histochemical type in tight contiguity does not exceed 50 and is usually less than 15. Type grouping is commonly observed in muscle biopsies of patients with chronic peripheral neuropathies (Fig. 1) and somewhat less often in the advanced stage of motor neuron disease. It has been postulated to be a sign of reinnervation by "collateral sprouting."²

In this paper we present an experimental model in which typical type grouping was produced in histochemically mixed muscles of the guinea pig by experimental reinnervation. The results support the suggestion that collateral sprouting is at least one pathogenic mechanism which may be responsible for type grouping in disease in human beings.

MATERIALS AND METHODS

In adult (3-month-old), male albino guinea pigs, experimental reinnervation of the gastrocnemius and plantaris muscles was produced on one side of each animal. All experimental procedures were done on animals under intraperitoneal pentobarbital sodium anesthesia (25 mg. per kilogram). The three methods used for experimental reinnervation are shown

in Figure 2. In group A (12 animals) the lower one-third of one sciatic nerve was exposed from a posterior thigh approach by blunt dissection of the hamstring muscles and the exposed nerve was crushed with uniform force for ten seconds. The crushing instrument was a mosquito forceps on which the serrated jaws were enveloped in polyethylene tubing. At ten and twelve weeks after the procedure, these animals were sacrificed with an overdose of barbiturate. In group B (6 animals) one sciatic or posterior tibial nerve was exposed at the region of the sciatic nerve bifurcation as described above and with the tip of a fine jeweler's forceps the nerve was crushed vigorously at three separate places about 2 mm. apart. Ten days later the same procedure was repeated on the same nerves at a slightly more distal portion of the nerve. These animals were sacrificed six months after the second procedure. In group C (6 animals) the sciatic nerve bifurcation was exposed in the popliteal fossa and the sciatic or posterior tibial nerve was completely severed just above or below the bifurcation. The severed ends were carefully approximated by suturing of the nerve sheath with two 7-0 silk sutures. These animals were sacrificed at four to six months after the operation.

Two types of controls were used: [1] the contralateral unoperated or sham-operated side of the experimental animals and [2] completely normal adult male guinea pigs.

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Understanding Nursing Research Susan K. Grove,Jennifer R. Gray, PhD, RN, FAAN,Nancy Burns,2014-09-22 As the bestselling nursing research text Understanding Nursing Research Building an Evidence Based Practice 6th Edition offers unique insights into understanding appraising and applying published research to evidence based practice It is known for its authoritative content time tested systematic approach and unique research example format newly redesigned for the sixth edition to better demonstrate how

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Crafting Bone International Council for Archaeozoology. Worked Bone Research Group. Meeting, 2001 Thirty six papers from the 2nd meeting of the ICAZ worked Bone Research Group held in Budapest in 1999 written by archaeologists and archaeozoologists report on material from North and Central America Europe and South West Asia

Biological Anthropology of the Human Skeleton M. Anne Katzenberg, Shelley R. Saunders, 2011-09-23 This book is virtually required reading for biological anthropologists and will be a useful up to date primer on osteological analyses for a wider audience The Quarterly Review of Biology March 2009 a comprehensive guide to the ever changing discipline of physical anthropology provides an in depth introduction to human skeletal biology The structure of the book makes it easy for the reader to follow the progression of the field of human skeletal biology

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Bone and Joint Infections Werner Zimmerli, 2021-03-16 BONE AND JOINT INFECTIONS Explore this comprehensive presentation of bone and joint infections including non implant and implant associated orthopedic infections In the newly revised Second Edition of Bone and Joint Infections From Microbiology to Diagnostics and Treatment accomplished researcher and author Werner Zimmerli delivers a comprehensive overview of the most recent developments in the subject of bone and joint infection Covering much of the new information appearing over the last five years the book includes four new chapters presenting the diagnostic approach in bone and joint infections discussing the identification of pathogens by non culture techniques management of multi resistant bacteria in bone and joint infections by bacteriophages and unusual microorganisms in periprosthetic joint infections Many of the chapters are also updated to include new information on topics like eubacterial PCR multiplex PCR and the shotgun metagenomics approach These subjects are of increased applicability and interest to increase the fraction of cases with identified pathogens The book also helps clinicians to understand MRI based images and rapidly interpret and plan for comprehensive therapy Readers will also benefit from the inclusion of A thorough introduction to the pharmacokinetics and pharmacodynamics of antibiotics in bone and preclinical models of infection in bone and joint surgery An exploration of native joint arthritis in children and adults as well as an overview of septic arthritis of axial joints A practical discussion of the general aspects of periprosthetic joint infection as well as specific aspects of periprosthetic joint infection after total hip and knee shoulder elbow and ankle

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Bones John D. Currey,2013-10-31 This is a comprehensive and accessible overview of what is known about the structure and mechanics of bone bones and teeth In it John Currey incorporates critical new concepts and findings from the two decades of research since the publication of his highly regarded *The Mechanical Adaptations of Bones* Crucially Currey shows how bone structure and bone s mechanical properties are intimately bound up with each other and how the mechanical properties of the material interact with the structure of whole bones to produce an adapted structure For bone tissue the book discusses stiffness strength viscoelasticity fatigue and fracture mechanics properties For whole bones subjects dealt with include buckling the optimum hollowness of long bones impact fracture and properties of cancellous bone The effects of mineralization on stiffness and toughness and the role of microcracking in the fracture process receive particular attention As a zoologist Currey views bone and bones as solutions to the design problems that vertebrates have faced during their evolution and throughout the book considers what bones have been adapted to do He covers the full range of bones and bony tissues as well as dentin and enamel and uses both human and non human examples Copiously illustrated engagingly written and assuming little in the way of prior knowledge or mathematical background *Bones* is both an ideal introduction to the field and also a reference sure to be frequently consulted by practicing researchers

Finite Element Analysis David Moratal,2010-08-17 Finite element analysis is an engineering method for the numerical analysis of complex structures This book provides a bird s eye view on this very broad matter through 27 original and innovative research studies exhibiting various investigation directions Through its chapters the reader will have access to works related to Biomedical Engineering Materials Engineering Process Analysis and Civil Engineering The text is addressed not only to researchers but also to professional engineers engineering lecturers and students seeking to gain a better understanding of where Finite Element Analysis stands today

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Segmentation of Hand Bone for Bone Age Assessment Yan Chai Hum, 2013-05-25 The objective of this Brief is to provide a solution to the unsolved technical problem in segmentation for the automated bone age assessment system The task is accomplished by first applying the modified histogram equalized module then applying the proposed automated anisotropic diffusion technique It is followed by a novel fuzzy quadruple division scheme to optimize the central segmentation algorithm and then an additional quality assurance scheme The designed segmentation framework works without demanding scarce resources such as training sets and skillful operators The results have shown that the designed framework is capable of separating the soft tissue and background from the hand bone with high accuracy This Brief should be especially useful for students and professional researchers in the Biomedical and image processing fields

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