

# Approaches to the validation of manipulation therapy

*Edited by*

**A. A. BUERGER**

**JEROME S. TOBIS**

This volume is an up-to-date summary of knowledge on the efficacy of manipulation as a treatment for back pain. The contributors consist of scientists who have studied the effectiveness of manipulation and experts on the pathophysiology of the back.

The text recognizes that many physicians continue to reject manipulation on the grounds that it has no therapeutic value, but suggests that this is due to the dearth, thus far, of controlled clinical and experimental evidence. Through these discussions the editors and contributors recommend methods which will establish the effect of manipulation as well as the mechanism which might underlie its therapeutic use.

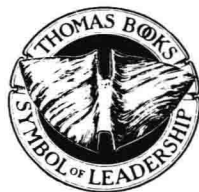
CHARLES C THOMAS • PUBLISHER • SPRINGFIELD • ILLINOIS

# Approaches to the validation of manipulation therapy

*Edited by*

**A. A. BUERGER and  
JEROME S. TOBIS**

**CHARLES C THOMAS • PUBLISHER**  
*Springfield • Illinois • U.S.A.*



*Published and Distributed Throughout the World by*  
CHARLES C. THOMAS • PUBLISHER  
Bannerstone House  
301-327 East Lawrence Avenue, Springfield, Illinois, U.S.A.

This book is protected by copyright. No part of it  
may be reproduced in any manner without written  
permission from the publisher.

© 1977, by CHARLES C. THOMAS • PUBLISHER

ISBN 0-398-03565-2

Library of Congress Catalog Card Number: 76-7019

*With THOMAS BOOKS careful attention is given to all details of  
manufacturing and design. It is the Publisher's desire to present books that are  
satisfactory as to their physical qualities and artistic possibilities and  
appropriate for their particular use. THOMAS BOOKS will be true to those  
laws of quality that assure a good name and good will.*

*Printed in the United States of America*  
R-1

*Library of Congress Cataloging in Publication Data*

Main entry under title:

Approaches to the validation of manipulation therapy.

Bibliography: p.

Includes index.

1. Backache--Congresses. 2. Manipulation (Thera-  
peutics)--Congresses. I. Buerger, A. A. II. Tobis,  
Jerome S.

RD768.A66

617'.5

76-7019

ISBN 0-398-03565-2

## CONTRIBUTORS

**Kenneth Baldwin, Ph.D.:** Assistant Professor, Department of Physiology, California College of Medicine, University of California, Irvine, Irvine, California.

**Alfred A. Buerger, Ph.D.:** Assistant Professor, Departments of Physical Medicine & Rehabilitation and Physiology, California College of Medicine, University of California, Irvine, Irvine, California.

**Rene Cailliet, M.D.:** Professor and Chairman, Department of Rehabilitation Medicine, School of Medicine, University of Southern California, Los Angeles, California.

**H. F. Farfan, M.D.:** St. Mary's Memorial Hospital, Montreal, Quebec, Canada.

**Bertram Feinstein, M.D.:** Department of Neurosciences, Mt. Zion Hospital, San Francisco, California.

**Bernard Finneson, M.D., F.A.C.S.:** Director, Low Back Pain Clinic, Crozer-Chester Medical Center, Upland Chester, Pennsylvania.

**James W. Fisk, M.B., Ch.B., D.C.H.:** General Practitioner, Cambridge, New Zealand.

**John R. Glover, M.A., M.B., Cantab. D.I.H.:** Department of Social and Occupational Medicine, Welsh National School of Medicine, Heath Park, Cardiff, Wales.

**Edward E. Gordon, M.D.:** Director, Department of Rehabilitation Medicine, Alexian Brothers Medical Center, Elk Grove Village, Illinois.

**Scott Haldeman, D.C., M.Sc., Ph.D. M.D.:** Fourth Year Medical Student, School of Medicine, University of British Columbia, Vancouver, British Columbia.

**Robert L. Kane, M.D.:** Department of Family and Community Medicine, University of Utah, Salt Lake City, Utah.

**T. Khosla:** Department of Social and Occupational Medicine, Welsh National School of Medicine, Heath Park, Cardiff, Wales.

**J. Stovall King, M.D.:** Department of Physiology, School of Medicine, University of North Carolina, Chapel Hill, North Carolina.

**C. Lam, B. Eng.:** St. Mary's Memorial Hospital, Montreal, Quebec, Canada.

**Elizabeth Lomax, M.D., Ph.D.:** Department of Anatomy, Medical Historian and Science Writer, Mental Retardation Research Center, Neuropsychiatric Institute, University of California, Los Angeles, Los Angeles, California.

**Jean G. Morris:** Department of Social and Occupational Medicine, Welsh National School of Medicine, Heath Park, Cardiff, Wales.

**Alf L. Nachemson, M.D., Ph.D.:** Professor and Head, Department of Orthopaedic Surgery I, University of Goteborg, Goteborg, Sweden.

**David J. Newell, M.A., Ph.D.:** Professor of Medical Statistics and Director of Unit, Medical Care Research Unit, Medical School, University of Newcastle upon Tyne, Newcastle upon Tyne, England.

**Jerome S. Tobis, M.D.:** Professor and Chairman, Department of Physical Medicine and Rehabilitation, California College of Medicine, University of California, Irvine, Irvine, California.

**Adrian R.M. Upton, M.B., B. Chir., F.R.C.P.(C):** Associate Professor of Medicine (Neurology), McMaster University School of Medicine, Hamilton, Ontario, Canada.

**F. Ross Woolley, Ph.D.:** Assistant Professor, Department of Family & Community Medicine, College of Medicine, University of Utah, Salt Lake City, Utah.

## INTRODUCTION

**M**ANIPULATION was used for the treatment of para-vertebral pain over one thousand years ago, and it is still widely used today. However, no method for the appraisal of the therapeutic effect of manipulation has been widely accepted by a majority of the interested basic and clinical scientists. Furthermore, with some noteworthy exceptions, relatively few carefully organized attempts have been made to use the available methods. In addition, the mechanisms which might be responsible for the continuing use of manipulation are unclear.

At the conference which resulted in this volume, we gathered many of the scientists who have studied the effectiveness of manipulation together with experts on the pathophysiology of the back. We hope that this volume will yield a clearer understanding of the methods required to establish the effect of manipulation, as well as of the mechanisms which might underlie manipulation's therapeutic use.\*

Alfred A. Buerger, Ph.D.  
Jerome S. Tobis, M.D.

---

\*Note added in proof: A monograph edited by Murray Goldstein, D.O., M.P.H. and entitled, "The Research Status of Spinal Manipulative Therapy" has recently been published by the Department of Health, Education, and Welfare. It is an excellent complement to this book. It is available from:

Office of Scientific and Health Reports  
National Institute of Neurological and Communicative  
Disorders and Stroke  
Room 8A16, Building 31  
National Institutes of Health  
Bethesda, Maryland 20014

## ACKNOWLEDGMENTS

THE list of people who were essential to the success of the conference and of the volume which followed it is too lengthy to enumerate. We wish to specifically thank Dr. Murray Goldstein of the National Institute of Neurological and Communicative Disorders and Stroke for his interesting after-dinner talk. We also thank the Social and Rehabilitation Service for supplementing part of the budget for the conference, the American Academy of Physical Medicine and Rehabilitation for cosponsoring the conference, and University Extension at University of California - Irvine, and the Office of Continuing Education and the Center for Health Education of this medical school, as well as the Forty-first Medical Trust, for their aid. We particularly thank Mary Jane Bromley, Arthur Carroll, Margaret Frederick and Margaret Ross. We also greatly appreciate Jacque Bertolina, Char Bell, Ann de Peyster and the other members of the secretarial and administrative staff of the Department of Physical Medicine and Rehabilitation who attended to the multitude of details essential to the success of the project; Sharon Jonker, Amer Holmes and especially Rosemary Pfuhl and Peggy Glenn deserve specific mention for devoted help with the editorial work. We would also like to thank our wives for tolerating us during the completion of this project.

A.A.B.  
J.S.T.

# CONTENTS

	<i>Page</i>
<i>Introduction</i> — A. A. Buerger and J. S. Tobis .....	vii
<i>Acknowledgments</i> .....	ix

## SECTION I

### BACK PAIN: AN INTRODUCTION

#### *Chapter*

1. A MATHEMATICAL MODEL OF THE SOFT TISSUE MECHANISMS OF THE LUMBAR SPINE — <i>H. F. Farfan and C. Lamy</i> .....	5
2. PATHOPHYSIOLOGY AND TREATMENT OF BACK PAIN: — A CRITICAL LOOK AT THE DIFFERENT TYPES OF TREATMENT — <i>A. L. Nachemson</i> .....	42
3. A SUMMARY OF THE CLINICAL APPROACHES TO BACK PAIN — <i>B. F. Finneson</i> .....	58
4. RANDOMIZED TRIAL OF THE REES AND SHEALY METHODS FOR THE TREATMENT OF LOW BACK PAIN — <i>J. S. King</i> ..	70
5. REHABILITATION MANAGEMENT OF THE PATIENT WITH LOW BACK PAIN — <i>R. Cailliet</i> .....	84

## SECTION II

### THE DIFFERENTIATION OF SOME TYPES OF BACK PAIN

6. LOW BACK PAIN: DIAGNOSIS BY HISTORY AND EXAMINATION — <i>R. Cailliet</i> .....	101
--	-----



<i>Chapter</i>	<i>Page</i>
7. DIFFERENTIATION BETWEEN LESIONS IN THE PRIMARY AND SECONDARY DIVISIONS OF THE NERVE ROOTS — <i>A. R. M. Upton</i> .....	112
8. REFERRED PAIN FROM PARAVERTEBRAL STRUCTURES — <i>B. Feinstein</i> .....	139
9. CHARACTERIZATION OF LOCALIZED BACK PAIN — <i>J. R. Glover</i> .....	175
10. WHY ONE CAUSE OF BACK PAIN? — <i>S. Haldeman</i> .....	187
11. BACK PAIN SYNDROMES — A CAUSE FOR CAUTION — <i>J. S. Tobis</i> .....	198

### SECTION III

#### APPROACHES TO THE VALIDATION OF MANIPULATION THERAPY

12. MANIPULATIVE THERAPY: AN HISTORICAL PERSPECTIVE — <i>E. Lomax</i> .....	205
13. A COMPARISON OF ALLOPATHIC AND CHIROPRACTIC CARE — <i>F. R. Woolley and R. L. Kane</i> .....	217
14. AN EVALUATION OF MANIPULATION IN THE TREATMENT OF THE ACUTE LOW BACK PAIN SYNDROME IN GENERAL PRACTICE — <i>J. W. Fisk</i> .....	236
15. BACK PAIN: A RANDOMIZED CLINICAL TRIAL OF ROTATIONAL MANIPULATION OF THE TRUNK — <i>J. R. Glover, J. G. Morris and T. Khosla</i> .....	271
16. MANIPULATION IN THE TREATMENT OF LOW BACK PAIN: A MULTICENTER STUDY — <i>D. J. Newell</i> .....	284
17. WHAT IS MEANT BY MANIPULATION? — <i>S. Haldeman</i> .....	299
18. A CRITIQUE OF THE LOW BACK PAIN PROBLEM — <i>K. M. Baldwin</i> .....	303
19. DISCUSSION — PROGRAM FOR RESEARCH FOR EFFECTIVENESS OF MANIPULATION IN LOW BACK PAIN — <i>E. E. Gordon</i> .....	308
20. CLINICAL TRIALS OF MANIPULATION THERAPY — <i>A. A. Buerger</i> .....	313

*Contents*

xiii

*Chapter*

*Page*

21. THE PROBLEM OF LOW BACK PAIN — *A. L. Nachemson* . . . 320

*Index* . . . . . 323

**Approaches  
to the  
validation of  
manipulation  
therapy**



## *SECTION I*

### **BACK PAIN: AN INTRODUCTION**

**O**UR understanding of the pathophysiology of the vertebral column is incomplete. To quote Hollinshead for example, "There has been no careful clinical or physiologic study of the individual actions of the various muscles of the vertebral column, therefore statements of their action are based merely upon observations of the anatomical dispositions of the muscles."<sup>1</sup>

We have, therefore, begun this volume with discussions by recognized experts on normal and abnormal back function.

---

<sup>1</sup>Hollinshead, W. H.: *Anatomy For Surgeons*. New York, Hoeber-Harper, 1958, vol. 3, p. 173.



# CHAPTER 1

## A MATHEMATICAL MODEL OF THE SOFT TISSUE MECHANISMS OF THE LUMBAR SPINE\*

H. F. FARFAN, M.D. AND C. LAMY, B. ENG.

THE purpose of this study is to quantify the activity of the musculature of the lumbar spine.† At present, there is no method of measuring directly *in vivo* the actual vector value of a muscle or a ligament. Nevertheless, quantitation of muscle activity would determine the relative importance of each muscle and place in perspective the functional value of ligamentous intervertebral connections including discs and ligaments.

Because the spine is a mechanical structure, it is obvious that the laws of mechanics must apply to its members. Thus, the active muscle and passive ligament allow the physician to set up a mechanical model and from this deduce with some accuracy the basic kinesiology of the spinal musculature in the performance of certain tasks.

Preliminary calculations have already demonstrated that, in the static erect posture, the anterior turning moment of the abdominals almost balanced the posterior turning moment of the extensors because of their larger area but smaller lever arm (Farfan, 1973). These calculations were recently supported by the almost identical conclusion reached by Stauffer (Stauffer et al., 1975).

Such large abdominal moments would obviously interfere with the extensor turning moment of the erectors and also produce unacceptably high compression and shear loads on the intervertebral joint.

---

\*This project was supported by Shell Canada, Ltd.

†The editors also recommend Dr. Farfan's excellent book entitled *Mechanical Disorders of the Low Back*, Philadelphia, Pennsylvania, Lea and Febiger, 1973, for a more complete treatment of this subject.

It seems obvious that some other mechanism is required to support forward moment of body weight and other external load. The author has proposed that these additional moments could be supported by the posterior ligamentous system because this ligamentous system can develop high tensions when stretched (Farfan, 1975a, b).

In addition, it was thought that it would be unlikely that all muscle groups would act with the same force per unit area.

As regards the ligamentous system, the behavior of this



Figure 1-1.



structure could be studied in the laboratory and its effects estimated *in vivo* with some degree of accuracy.

However, for the problem of determining the force per unit area of the various muscles, there is no known solution.



Figure 1-2a.