Modularity of Orthopedic Implants

Donald E. Marlowe, Jack E. Pala, and Michael B. Mayor, Editors

STP 1301

ASTM
Modularity of Orthopedic Implants

Donald E. Marlowe, Jack E. Parr, and Michael B. Mayor, Editors

ASTM Publication Code Number (PCN):
04-013010-54

ASTM
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959

Printed in the U.S.A.
Foreword

This publication, *Modularity of Orthopedic Implants*, contains papers presented at the Symposium on Modularity of Orthopedic Implants held 8 November 1995 in Norfolk, VA. The symposium was sponsored by ASTM Committee F4 on Medical and Surgical Materials and Devices. Donald E. Marlowe, of the FDA Center for Devices and Radiological Health in Rockville, MD; Jack E. Parr, with Wright Medical Technologies in Memphis, TN; and Michael B. Mayor, with the Dartmouth Hitchcock Medical Center in Lebanon, NH, presided as symposium chairmen and are editors of the resulting publication.
Contents

Overview 1

CLINICAL RELEVANCE

A Review of the Use of Modularity in Total Shoulder Arthroplasty — JOSEPH D. ZUCKERMAN, RUSSELL J. CAVALLO, AND FREDERICK J. KUMMER 5

ISSUES OF CONCERN

The Fibrous Tissue Interface Surrounding Well-Fixed, Revised, Cementless Acetabular Components for Hip Replacement — STUART B. GOODMAN, PHIL HUIE, YONG SONG, MIKE O'CONNOR, STEVEN T. WOOLSON, WILLIAM J. MALONEY, DAVID J. SCHURMAN, AND RICHARD SIBLEY 21


The Mechanical and Electrochemical Processes Associated with Taper Fretting Crevice Corrosion: A Review — JEREMY L. GILBERT AND JOSHUA J. JACOBS 45

Wear of Non-Articulating Surfaces in Modular Acetabular Cups — JEFFREY J. SHEA, RICHARD D. LAMBERT, AND TERRY W. McLEAN 60

Marking of Ceramic Femoral Heads — BERNARD J. CALÈS 69

STATE OF THE ART IN PROPERTIES TESTING I

Test Method for Fatigue of a Modular Posterior-Stabilized Tibial Component — MARY E. ANTHONY, MICHAEL B. COOPER, AND JEFFREY A. HOLBROOK 85

Test Method for Evaluating Motion Between the Polymeric Articulating Surface and the Tibial Tray of Modular Total Knee Systems — LYNN A. KIRKPATRICK 94

Test Method for the Assessment of Fretting at the Femoral Head and Neck Taper Interface — TERRY W. McLEAN AND RICHARD D. LAMBERT 104

Influence of the Ball/Stem-Interface on the Load Bearing Capability of Modular Total Hip Endoprostheses — HERBERT G. RICHTER, GERD WILLMAN, MARTIN WIMMER, AND FRANK G. OSTHUES

STATE OF THE ART IN PROPERTIES TESTING II

Fatigue Integrity Test of a Modular Tibial Stem Extension — MICHAEL B. COOPER, MARY E. ANTHONY, ABRAHAM B. SALEHI, AND JEFF A. HOLBROOK

Fretting Corrosion Fatigue Study of Modular Joints in Total Hip Replacements by Accelerated In Vitro Testing — SUSHIL K. BHAMBRI AND LESLIE N. GILBERTSON

Corrosion Testing of Modular Hip Implants — JAY R. GOLDBERG, CHRISTINE A. BUCKLEY, JOSHUA J. JACOBS, AND JEREMY L. GILBERT

Test Method Comparing Torsional Fatigue of Modular Acetabular Components — RICHARD D. LAMBERT AND TERRY W. MCLEAN

Effects of Neck Extension, Coverage, and Frequency on the Fretting Corrosion of Modular THR Bore and Cone Interface — STANLEY A. BROWN, ALULA ABERA, MARK D'ONOFRIO, AND CURT FLEMMING

The Importance of Fatigue Loading When Assessing Liner/Shell Distraction Resistance and Congruency for Modular Acetabular Components — DOMINIC R. FOSCO AND DENNIS J. BUCHANAN

Fretting Corrosion Mechanisms at Modular Implant Interfaces — SHILESH C. JANI, WILLARD L. SAUER, TERRY W. MCLEAN, RICHARD D. LAMBERT, AND PAUL KOVACS

Femoral Stem Fatigue Characteristics of Modular Hip Designs — CHRISTINE S. HEIM, PAUL D. POSTAK, AND A. SETH GREENWALD

Author Index

Subject Index