

# Preventive Biomechanics

Optimizing Support Systems for the Human Body in the Lying and Sitting Position

Bearbeitet von  
Gerhard Silber, Christophe Then

1. Auflage 2012. Buch. xii, 372 S. Hardcover  
ISBN 978 3 642 29002 2  
Format (B x L): 15,5 x 23,5 cm  
Gewicht: 736 g

[Weitere Fachgebiete > Medizin > Human-Medizin, Gesundheitswesen > Medizintechnik, Medizinische Werkstoffe](#)

schnell und portofrei erhältlich bei

  
DIE FACHBUCHHANDLUNG

Die Online-Fachbuchhandlung beek-shop.de ist spezialisiert auf Fachbücher, insbesondere Recht, Steuern und Wirtschaft. Im Sortiment finden Sie alle Medien (Bücher, Zeitschriften, CDs, eBooks, etc.) aller Verlage. Ergänzt wird das Programm durch Services wie Neuerscheinungsdienst oder Zusammenstellungen von Büchern zu Sonderpreisen. Der Shop führt mehr als 8 Millionen Produkte.

# Preface

This volume could not have been written without access to a network of physicians, healthcare professionals and biologists. It certainly could not have been written without the help of those committed personalities who established the Center of BioMedical Engineering (CBME) in 2005. Funding has been provided by the Ministry of Higher Education, Research and the Arts (HwK) through the federal state government program “Landes-Offensive zur Entwicklung Wissenschaftlich-ökonomischer Exzellenz” (LOEWE) in the state of Hesse (Germany) for a 3-year time period. In 2010, the research program “PRÄVENTIVE BIOMECHANIK (PRÄBIONIK)” was established, imparting powerful impetus to the development of this book. We thus wish to express our grateful thanks to the HMWK (Hessisches Ministerium für Wissenschaft und Kunst). We would also like to thank the Bundesministerium für Bildung und Forschung (BMBF) for funding the research project “Mechanical Characterization of Human Soft Tissue (MECHUM)” in the years 2005–2008, which constituted the basis for all following projects.

We are grateful to Prof. Dr. T. J. Vogl, Director of the Department of Diagnostic and Interventional Radiology at the Goethe-University in Frankfurt/Main for his reliability and permanent readiness to have all in vivo MR scanings performed. They built the entire basis for FE-model generation of the human models.

Also, we would like to thank the former senior physician and current chief physician of the Department of Radiology at the Catholic Hospital in Mainz, Priv.-Doz. Dr. med. habil. Jörn O. Balzer as well as Dr. med. Christina Larson and Dipl.-Ing. Frank Hübner for their dedicated contribution to MRI scanning (even in the early hours...).

We would like to thank Dr. Niggemann, former assistant at Upright-MR Scanning in Köln-Rodenkirchen, and currently specialist in the Department of Radiology/Neurology at the University Hospital in Bonn, for his unbureaucratic willingness to help with the MR imaging of a seated subject.

We would also like to thank Dr. Sebastian Wolf, Head of the Gait and Movement Laboratory at the Foundation of the Orthopaedic University Hospital at the University Hospital in Heidelberg and Dr. Peter Wolf, formerly at Sports

Engineering at the Swiss Federal Institute of Technology in Zurich, for executing gait analysis. This provided the basic input for the Boss-Model used for walking and running analysis.

Furthermore, we would like to thank the following members of the Institute for Materials Science: Dipl.-Ing. A. Asmus for the generation of various Boss-Models in the recumbent posture and for crash applications and for his contribution to [Sect. 7.1](#), Dipl.-Ing. A. Schmidt for the generation of various Boss-Models in the seated posture and his contributions regarding body-car seat-system interaction outlined in [Sect. 6.3.4.1](#), M.Eng. Dipl.-Ing. M. Kardeh for the generation of the Boss-Model for walking and running, B.Eng. H. M. Le for his contributions regarding body-airplane seat-systems interaction simulations in [Sect. 6.3.4.2](#) and for the analysis of aircraft seats outlined in [Sect. 7.2](#) and Dipl.-Ing. J. Menger for his constant attention to experiments, measurement engineering and software management.

The permanent volunteers, A. Asmus and his sister Mrs. T. Lorenz, deserve special thanks for their willingness to participate in numerous subject studies.

The various investigations and results of all materials regarding bedding and seat systems as well as the generation of some BOSS-Models in the seated posture could not have been accomplished without the help of the following companies: we thus thank THOMASHILFEN FÜR KÖRPERBEHINDERTE GmbH & CO. MEDICO KG (Bremervörde) and in particular the general manager Dr.-Ing. K. Jansen for numerous inspiring discussions on the “adequate” design of anti-decubitus systems and for supplying material samples, Dr. Wohlfarth of DUNLOPILLO GmbH (Hanau), H. WULFF OF WULFF MED TEC GmbH (Fedderingen), Dr. H. D. Lutter and Dr. M. Rüllmann of ELASTOGRAN BASF GROUP (Lemförde) and Dr. S. Ruzzini of FOAMPARTNER FRITZ NAUER AG (Wolfhausen, Switzerland) for supplying soft foam material samples for compression testing, DAIMLER AG (Sindelfingen) for supplying a car seat of the Mercedes E-Class and respective material samples and in particular Dr. Thomas Fölster (head of the department MERCEDES-BENZ Car Seat development—Comfort Systems/Innovations) as well as the assistants of the same department, Mrs. Dipl.-Ing. M. Rothfuß and Dipl.-Ing. U. Wörner for their willingness to participate in a subject study including MR scanning and in vivo tissue characterisation, RECARO Aircraft Seating GmbH & Co. KG (Schwäbisch Hall) and in particular O. Forgatsch (Head of Ergonomics) and Dr. O. Sabbah (Ergonomic Design Engineer) for their approval of the text and images depicted in [Sect. 6.3](#), H. Gschwender Managing Director of BIODYN GmbH & Co. KG (Münchweiler) and Dr. med. T. Laser, specialist physician for orthopaedics and physical and rehabilitation medicine (Bad Griesbach) for their excellent cooperation in developing the new bedding system presented in [Sect. 7.1](#).

Special thanks goes to Dr. M. Küssner, at that time Managing Director of Abaqus Germany GmbH (Aachen), for his expert knowledge and generous support and in particular for his review of [Sect. 3.3](#).

Numerous scientists involved in the LOEWE-PRÄBIONIK program contributed, if not directly, then indirectly, in the form of numerous stimulating discussions within the framework of the LOEWE meetings, in particular Prof. Dr. Thomas

Schmitz-Rixen (CBME), Head of the Department of Vascular and Endovascular Surgery, Department of Medicine of the Goethe-University in Frankfurt/ Main, and Prof. Dr. Rainer Moosdorf (CBME), Head of the Department of Cardiovascular Surgery, Department of Medicine of the Philipps-University in Marburg.

Last, but not least, the authors wish to thank Karen Nelson for reviewing and proofreading the English manuscript, cand.-Ing. C. Clemen for his contributions regarding word and graphic image processing and Dr. B. Gebhardt, Engineering Editor, Mr. T. Lehnert, Senior Editor Engineering, as well as Mrs. S. Cuneus and Mrs. G. Kem for Project Coordination from Springer-Verlag for their excellent service and support.

Frankfurt am Main, Germany, October 2011

Gerhard Silber  
Christophe Then