



# **Preventive Biomechanics: Optimizing Support Systems for the Human Body in the Lying and Sitting Position**

*Gerhard Silber, Christophe Then*

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How can we optimize a bedridden patient's mattress? How can we make a passenger seat on a long distance flight or ride more comfortable? What qualities should a runner's shoes have? To objectively address such questions using engineering and scientific methods, adequate virtual human body models for use in computer simulation of loading scenarios are required. The authors have developed a novel method incorporating subject studies, magnetic resonance imaging, 3D-CAD-reconstruction, continuum mechanics, material theory and the finite element method. The focus is laid upon the mechanical *in vivo*-characterization of human soft tissue, which is indispensable for simulating its mechanical interaction with, for example, medical bedding or automotive and airplane seating systems. Using the examples of arbitrary body support systems, the presented approach provides visual insight into simulated internal mechanical body tissue stress and strain, with the goal of biomechanical optimization of body support systems. This book is intended for engineers, manufacturers and physicians and also provides students with guidance in solving problems related to support system optimization.

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