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# Rapid prototyping technology in medicineâ€”basics and applications

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## Abstract

Using medical models built with Rapid Prototyping (RP) technologies represents a new approach for surgical planning and simulation. These techniques allow one to reproduce anatomical objects as 3D physical models, which give the surgeon a realistic impression of complex structures before a surgical intervention. The shift from the visual to the visual-tactile representation of anatomical objects introduces a new kind of interaction called â€˜touch to comprehendâ€™. As can be seen, from the presented case studies of maxillo-cranio-facial surgery, the RP models are very well suited for use in the diagnosis and the precise preoperative simulation of skeleton modifying interventions.

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Keywords

Rapid prototyping technology; Stereolithography; Medical models; Cranio-maxillo-facial surgery; Computer-aided surgery



**Ralf Petzold** graduated form the University of Rostock, Germany, in Computer Science in 1995. He gained first experience with medical models built by Stereolithographie for surgical planning and simulation during his work at the MultiMedia Laboratory at the University of Zurich, Switzerland in 1994. Presently he works on his PhD thesis at the Institute of Medical Physics in Erlangen, Germany focusing on Computer Aided Surgery of Total Hip Replacement.

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**Willi A. Kalender** received the Master's degree and PhD in Medical Physics from the University of Wisconsin, Madison, Wisconsin, USA in 1979. In 1988 he completed all postdoctoral lecturing qualifications (Habilitation) for Medical Physics at the University of TÃ¼bingen. From 1979 to 1995 he worked in the research laboratories of Siemens Medical Systems in Erlangen, Germany, from 1988 to 1995 as the head of the department of Medical Physics. Since 1991 he has been Adjunct Associate Professor of Medical Physics at the University of Wisconsin. From 1993 to 1995 he lectured at the Technical University of Munich. In 1995 he was appointed full professor and director of the newly established Institute of Medical Physics at the Friedrich-Alexander-University Erlangenâ€“NÃ¼rnberg, Germany. His main research interests are in the area of diagnostic imaging, the development and the introduction of volumetric spiral CT was of particular focus. Other fields of research are radiation protection and the development of quantitative diagnostic procedures, e.g. for assessment of osteoporosis, lung and cardiac diseases.



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