Degradation of Dental Polymers

Jean-François Roulet

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183 figures, 20 tables, 1987

Karger
Basel • München • Paris • London • New York • New Delhi • Singapore • Tokyo • Sydney

National Library of Medicine, Cataloging in Publication

Roulet, Jean-François
Includes bibliographies and index.
WU 190R859d
ISBN 3-8055-4320-4

Drug Dosage
The author and the publisher have exerted every effort to ensure that drug selection and dosage set forth in this text are in accord with current recommendations and practice at the time of publication. However, in view of ongoing research, changes in government regulations, and the constant flow of information relating to drug therapy and drug reactions, the reader is urged to check the package insert for each drug for any change in indications and dosage and for added warnings and precautions. This is particularly important when the recommended agent is a new and/or infrequently employed drug.

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Printed in Switzerland by Thür AG Offsetdruck, Prattein
ISBN 3-8055-4320-4

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The motivation for writing this book came from my doctorate thesis. In an early phase of the study it became apparent that a comprehensive review on the composition, structure and mechanisms of wear of composite resins was necessary. The review, which is based on the literature available until 1984, provided the material for the first part of this book. Chapters 1-3 cover, in detail, polymer constructions, polymerization mechanisms and wear. Experiments done to help better understand the behaviour of posterior composite materials are described in the second part of the book (chapters 5-8). Clinical data on restorative materials are always more predictive of clinical success than in vitro results. Therefore, clinical experiments were designed to answer questions on wear and marginal behaviour of composite resins. Due to the nature of the clinical experiments, the
results must be comprehensive. To answer very specific questions, it is often advantageous to carry out in vitro experiments. However, predicting the clinical behaviour of dental restorative materials, especially composite materials, based on the classical in vitro data, is presently impossible. This is why the in vitro experiments simulate clinical situations as closely as possible. The chart shows the relationship between the individual experiments. I hoped that the in vivo and in vitro data for the same material would allow us to better understand the in vivo behaviour of the material. A list of references is at the end of each chapter even though some works are, therefore, cited several times. The magnification factor given with SEM photographs corresponds to the original magnification as set on the SEM and not to the true magnification on the printed photograph. This was done because the set magnification is relevant for detail reproduction. However, every SEM photograph has a reference bar to give the reader the correlation to the true dimension. Furthermore, I took great efforts to describe all methods in detail and to mention the source of all materials used. This will hopefully give others the courage to try methods that have been proven to work.

Preface XII

The road to perfect restorative materials is still long. However, the goal can be attained, and I hope that this book has shortened this road a little.

Berlin, September 1986 Jean-François Roulet

Acknowledgements

The realization of the following book was only possible with the direct and indirect help of many teachers, collaborators and friends. I want to express my deep gratitude to all who have given advice, patience, labor, and also to all who were interested discussion partners in creating an innovative environment.

Prof Dr. H.R. Mühlemann, University of Zürich, Dental Institute, Department of Cariology, Periodontology and Preventive Dentistry, gave me the opportunity to work with an outstanding research group and also the liberty to be creative. He demanded performance and stimulated the search for improvements in quality.

My greatest thanks go to my close collaborators in the research laboratory: H. Bolli-Besançon, T. Reich and W. Keil. Their technical knowledge, competence and engagement in the project was a major contribution. In the clinical experimental part, I wish to thank Dr. C. Ameye, Dr. U. Jaeger,
Dr. R. Marolf and Dr. C. Wälti for their help and substantial contributions. Dr. L. Molinari, Abteilung für Statistik, Zürich, helped to calculate all the statistical analyses, for which I am very grateful. The graphics and photographs were produced in collaboration with the photographic department of the dental school in Zürich. Thanks to Mrs. L. Brandenberger for the competent photographic work and Mrs. E. Roth for part of the graphics. I also wish to thank Mr. S. Eckert and Mr. T. Lorenz, Free University Berlin, Dental Clinic North, Art Department, for their help in presenting the chemical formulas and performing minor corrections in the figures.

I also want to thank Dr. R. Janda, Kulzer & Co. GmbH, for proofreading the manuscript from the technical/chemical aspect and I am very grateful to my wife, Trudy, who was patient enough to proofread the final manuscript. Last but not least, I thank Mrs. G.C. Fischer for typing the manuscript. Only through the financial and technical support of Bayer, Espe, Ivoclar and Sybron-Kerr, could the complex and costly experiments be accomplished.

Abbreviations

ADA American Dental Association
AM Amalgam
AMC Agglomerated microfiller complex
ANOVA Analysis of variance
BDMA Buthylene dimethacrylate
BET Brunauer-Emmett-Teller nitrogen adsorption method
BIS-DMA Bisphenol dimethylacrylate
BIS-GMA Bisphenol glycidylmethacrylate
BPO Benzoyl peroxide
CFA Contact-free area
3-DS Three-dimensional scanner
EGDMA Ethylene glycol dimethacrylate
EM Excellent margin
EMA Ethylmethacrylate
HC Hybrid composite
HMC Homogeneous microfilled composite
IMC Inhomogeneous microfilled composite
IPN Interpenetrating network
ISOBIS-GMA Isobisphenol glycidylmethacrylate
4-META 4-Methacryloxyethyl trimethylc anhydride
MF Microfiller
MFC Microfilled composite
MMA Methylmethacrylate
MO Marginal opening
MRF Marginal restoration fracture
MTF Marginal tooth fracture
OCA Occlusal contact area
OH Overhang
PL Positive ledge
PMMA Polymethylmethacrylate
SEM Scanning electron microscope
SphPB Spherical polymer-based microfilled complex
SphPP Spherical prepolymerized particles
SPP Splintered prepolymerized particles
SPSS Statistical Package for the Social Sciences
TC Traditional composite
TEGDMA Triethylene glycol dimethacrylate
UDMA Urethane dimethacrylate
UF Underfilled
USPHS United States Public Health Service