Dentistry for Kids
Rethinking Your Daily Practice

Dedication

I would like to dedicate this book to Dr Christiane Gleissner. She was the first and only one who read the complete and raw manuscript, dedicating many hours while contributing some important suggestions from the viewpoint of a general dentist. She always motivated me and dispelled doubts. She will forever be an inspiration for me. May she rest in peace.

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DENTISTRY FOR KIDS

Rethinking Your Daily Practice

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Ulrike Uhlmann studied dentistry at Leipzig University from 2005 to 2010. Even during her studies she showed a keen interest in children's dentistry. After her examinations in 2010, she worked in Halle/Saale for 4 years, during which time she learned about and came to love the whole gamut of pediatric dentistry. Interdisciplinary work with midwives, pediatricians, and speech therapists was and is a cornerstone of her professional ethos. At present she works on the staff of a family dental practice in Leipzig. As a speaker, she is also involved in the continuing professional development of midwives, speech therapists, educators, and other related professional groups in the field of pediatric dentistry. Together with a Leipzig midwives practice, she has also launched a parents workshop where relevant topics concerning children's oral health are explained to pregnant women and parents, raising their awareness. She is married and has four children.

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FOREWORD

So it's 8 am on a Monday morning, and you get into work early to help the staff prepare for the day and to review the schedule. All good so far. Then you see at 10 am you have a new patient who is 2 years old, the child of a great patient of yours. You digest this and then start to sweat and get a bit stressed. You are not great with children, and the back door is blocked—you cannot escape! You would love to have a drink, but that is an after-work thing. You take a deep breath and call in your head assistant to help you with prep. She is amazing, as is the rest of the staff, because you trained her. Your procedures are all set up, so now what?

The child comes in and is a bit nervous, as are you. Well, fortunately you read this book and so did your staff, and you are ready to go ahead with the appointment. You smile and bend down to greet the child and hand him a sticker and ask for a hi-five. You get one in return and you now calm down—you've got this, and you will be great! Now you can take the time to enjoy the whole experience.

Working with children should not be an ordeal but a fun, rewarding experience for you and your team. Play kid music, make a balloon, and be silly like you are with your own kids. Remember that sometimes it is a slow process and you may need one or two appointments to get things done. That is fine. Also, remember that if you are good with this little one, your favorite patient will now be an even better referrer and will extol your virtues as the best dentist in town. Oftentimes, too, parents will test the waters of your office with their children, and if they do well you now have two parents as patients for life. It's helpful to appoint someone in your office to be the children coordinator. This person's job is to be the direct point of contact and help the parents and the child to have a great time and prepare them for their visit. This is the person who calms you and the patient down and is the one in charge of the fun!

This book will help prepare you for all the potential challenges and energize you for all the fun of pediatric dentistry. Remember: You would rather have a child make some noise and have no decay than have a mouth full of decay that could have been avoided. Read the book, and it's that easy. With every child you can handle, there are parents who will become your raving fans. Ulrike Uhlmann is a dear friend and colleague, and her pediatric skills and knowledge are beyond reproach. She has spent many hours creating this book to help inspire you, reward you, and help you have some fun at the same time. Take your time reading it, and make notes or highlight it when and where you can. Let your staff read this as well, as this is a great resource for them. I had a staff meeting in my practice to review it, and the response was a unanimous GREAT!

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PREFACE

I was more or less pushed into pediatric dentistry in 2010, shortly after starting to work as a general dentist. The early stages were fraught with a succession of small challenges. Of course we had learned how a pulpotomy works in our studies, but hardly any of us really had the opportunity to treat young patients ourselves.

A lot of questions do not come to light until the little kid is sitting there right in front of you. As an inexperienced dental practitioner, you constantly face situations that take you well outside your comfort zone. Children, in particular, have a keen sense of the person facing them, and you very quickly notice as a practitioner that the more confidently and purposefully you conduct yourself, the more likely you are to be successful. Back then, I benefited first and foremost from colleagues who shared their many years of experience through observation sessions and continuing education.

This book is intended as an introduction to one of the most fulfilling areas of activity in dentistry. It cannot and should not replace continuing professional development but aims to offer insight into this highly varied field. I hope I have managed to bring together fundamental knowledge that will make it easier for people taking their first steps into the field of pediatric dentistry. The structure of the book is based chronologically on a treatment session. The outcome of any treatment stands or falls by proper communication, and parents HAVE to be educated as to their vital role on the team. Examination and diagnosis then take place, followed by various treatments.

Child patients are something of a *bête noire* for many colleagues, whether they are recently qualified or have had many years on the job. Recent years have seen more focus shift to our youngest patients, with the American Academy of Pediatric Dentistry recommending a "dental home" by the time a child reaches their first birthday (see page 2). This group of patients, which is new to some dentists, raises a few questions: How do you examine a 6-month-old baby? What issues do you address with the parents? What's the appropriate fluoride prophylaxis? From what age is it reasonable to take radiographs? How do I deal with difficult children? The parents also bombard the practitioner with a host of questions—from when teeth will erupt to teething pains and advice on pacifiers to tips and tricks for daily oral hygiene in the different age groups.

Pediatric dentistry brings together a wide variety of topics encompassing all facets of dentistry, orthodontics, nutritional sciences, and, last but not least, psychology. It involves opportunity, challenge, and responsibility all at the same time. We as clinicians must ensure that even our tiniest patients get the ideal start to enable them to live with the healthiest possible oral cavity. The special challenge, of course, is not just children's compliance but primarily the fact that children can't be the ones responsible for their (oral) health. It is therefore our task to educate and motivate parents and guardians and make them our allies. A good relationship with the parents not only guarantees

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long-term loyalty from patients beyond their childhood years, but it is also absolutely crucial to children's good oral health. It is only when dentists manage to treat young patients properly and educate their parents that they will succeed in making a long-term contribution to children's oral health. This book therefore offers professional and practical tips on communicating with parents and sets out to illustrate the responsibility involved in treating children. Above all, it aims to garner enthusiasm in readers for this diverse field of dentistry.

Acknowledgments

Many people have played a part in the creation of this book. A big heartfelt thank you must go to Dr Lee Weinstein. He has sacrificed many hours in order to adapt the content to American guidelines and recommendations. Besides that, he contributed so many thoughts and ideas. I appreciate his work on this book very much because he is such an experienced pediatric dentist. His compassion is absolutely inspiring. Also a big thank you to Leah Huffman, Samantha Smith, and Sarah Minor, who did not become tired in view of my comments and suggestions. Thank you for putting this together. I would also like to thank Sue Holmes, who did flawless work translating the book while keeping the narrative character. Huge thanks to Anita Hattenbach and Dr Viola Lewandowski for the editing of the German version, for constantly being accessible, and for always lending a sympathetic ear to questions or ideas.

My thanks also go to those colleagues who provided numerous images from their daily practice and were thus an immense support in the production of this book. These include Dr Gabriele Viergutz (Dresden), who contributed not only several illustrations but also some important suggestions, as well as Dr Richard Steffen (Zurich), who kindly supplied photographic material from his online atlas without hesitation. My thanks also to Dr Jorge Casián Adem (Poza Rica de Hidalgo), whose high-quality photographs provided excellent documentary records. In addition, heartfelt thanks to Dr Nicola Meissner (Salzburg) for her series of photographs and her contribution. Thank you to Prof Dr Katrin Bekes (Vienna), Claudia Lippold (Halle), Dr Juliane von Hoyningen-Huene (Berlin), dental technician Peter Schaller (Munich), Dr Bobby Ghaheri (Oregon), Dr Matthias Nitsche (Leipzig), and Prof Dr Roswitha Heinrich-Weltzien (Jena) for their photographs. An enormous thank you to Sabine Fuhlbrück (Leipzig) for providing illustrations and for her tireless work on myofunctional therapy. I also owe thanks to Dr Silvia Träupmann (Leipzig) who, with her passion for pediatric dentistry and her experience, was always ready to listen to young colleagues and willingly shared her knowledge. Thank you to Manuela Richter, a highly experienced dental assistant in pediatric dentistry, who guided and supported me so much in my first cautious steps in the field. Warmest thanks to Birgit Wolff for motivating words whenever they were needed.

During the development of this book I was in contact with many inspiring colleagues, and, as a result, I was able to expand my horizons constantly and learn a lot—for which I am extremely grateful.

Last but not least, thank you to my husband who supported this project from the outset, who motivates me continually, and lightens the burden for me time and time again. Without him this book and many other accomplishments would never have been possible. Thank you.

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RESOURCES

Because this book was originally published in German, much of the literature cited comes from German sources. Therefore, included below is a list of helpful resources in English for navigating the waters of pediatric dentistry.

American Academy of Pediatric Dentistry: www.aapd.org

The AAPD has many resources available on its website from scientific research on specific topics to medical history forms that can be downloaded and adapted for clinical use.

ADA MouthHealthy: www.mouthhealthy.org

This website sponsored by the American Dental Association offers practical information and resources for clinicians and parents, including free posters and activity sheets. Tips for healthy habits and a baby eruption teething chart are available at www.mouthhealthy.org/en/babies-and-kids/healthy-habits.

FDI World Dental Federation: www.fdiworlddental.org

The FDI World Dental Federation represents more than a million dentists worldwide and develops health policy and continuing education programs to promote global oral health.

American Academy of Pediatrics: www.aap.org

Dedicated to the health of all children, the AAP is a great source for new policies and guidelines for pediatric care.

US Department of Health and Human Services: www.hhs.gov

While each state has its own health and human services department, this federal branch is a good resource for information regarding social services, child or domestic abuse, and mental health.

US National Library of Medicine: www.nlm.nih.gov

Under the umbrella of the US Department of Health and Human Services, the US National Library of Medicine includes MedlinePlus, ClinicalTrials.gov, and PubMed, among other databases, all of which provide access to the latest research in all fields of medicine.

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1

INTRODUCTION AND BASICS

> "Only those who attempt the absurd can achieve the impossible."
>
> ALBERT EINSTEIN

No matter the age, children can be at times challenging, enriching, a reason to smile, as well as the cause of the odd bead of sweat on a dentist's brow! In dental prophylaxis and treatment, it is essential to adapt to these young patients in order to achieve the best treatment outcomes, guarantee long-term patient loyalty, and, perhaps most importantly, ensure that these patients of tomorrow do not grow up anxious under our care. According to estimates, around two-thirds of anxious adult patients link their anxiety to a traumatic experience with a dentist in their childhood.[1]

In dental school, we are faced with a lot of theory, but there is virtually no discussion of the practical aspects of treating children. Because it is sometimes impossible to reconcile theory and practice without a degree of compromise, especially in pediatric dentistry, the treatment of young patients often poses a challenge in everyday practice. In many practices, seasoned dentists prefer that treatment of children is performed by the newest hire just out of dental school or with the most junior status; however, they often do not have the necessary communication skills to improve or maintain compliance from young patients. Nonetheless, provided the diagnostic steps run smoothly and none or only minor findings become apparent, no one involved has to leave their comfort zone. But what if measures become necessary that demand more from the patient and practitioner than their individual comfort zones will allow?

Children are incredibly receptive and attuned to the people interacting with them. Uncertainties are easily transmitted to young patients, which commonly results in stress and refusal. Specialized pediatric dentists are often called in too late and then laboriously have to regain the child's trust. But it can be different! With a few tricks in organization, communication, and treatment; proper diagnostic testing; and realistic recognition of one's own capabilities and limitations, treatment of children can become established as a successful element of a practice concept.

The concept of a family dental practice yields benefits for all those involved: Parents can combine their preventive care appointments with their children's to save time, while dentists can gain a whole new patient base and duplicate their range of treatments and that of their team. Treating children also provides dentists with more variety in everyday work, opens up new prospects, and creates trust. Parents who know their children are in good hands with a dentist will be happy to become or remain patients themselves.

The great challenge in pediatric dentistry is determining which treatment approach and technique is most appropriate for each individual patient. Not every young patient is suitable for classic filling therapy, and the wait-and-see approach after fluoride application is not appropriate for many children. However, it should still be our main goal to provide even our youngest patients with optimal, state-of-the-art treatment.

In addition, we must not forget that pediatric dentistry in particular is much more than just drill and fill. Our actual core task and daily challenge is prophylaxis and the prevention of caries. Unlike adult patients, children are not able to take responsibility for their own oral health. There is no reason for caries to develop in primary teeth, and yet, on a daily basis, we see that the reality is quite different. This is why we need to partner with parents and make them understand that they are the key to their children's oral health. Sometimes this can be a considerable challenge.

The objective of the first dental examination is to fully inform parents about the relevant topics (fluoride, oral hygiene, diet, drinking), dispel any fears (eg, premature or delayed eruption of teeth, grinding teeth, teething troubles), and detect or prevent early childhood caries (ECC). This visit also serves to familiarize children with dental treatment in a positive way so that they are less anxious for future visits that may be required for trauma or caries. Most importantly, the purpose of these early visits is to establish a "dental home" for the child and their parents.

DENTAL HOME

The American Academy of Pediatric Dentistry (AAPD) defines a dental home as the "ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated, and family-centered way. The dental home should be established no later than 12 months of age to help children and their families institute a lifetime of good oral health. A dental home addresses anticipatory guidance and preventive, acute, and comprehensive oral health care and includes referral to dental specialists when appropriate" (AAPD, 2018). Our care should always be centered around the child, meaning that if we can't offer proper treatment, we refer to someone who we think can; the referral of a patient does not mean we failed doing our job but rather that we care for our patients more than for our ego. For this we will not lose any patients but gain trust and thankfulness.

This introductory chapter briefly addresses the most important anatomical, physiologic, and morphologic basics of primary teeth that have practical relevance. This chapter may also be used as a source for mineralization and eruption times as well as the multifactorial etiology of caries. The teething charts can also be copied and handed out to parents.

STRUCTURE OF PRIMARY TEETH

The structure of primary teeth differs significantly from that of permanent teeth, and this factor has a direct influence on treatment. First, a few particular features must be kept in mind during adhesive cementation of fillings because of the morphologic characteristics of primary teeth (Box 1-1). Second, caries in primary teeth invades the dentin more quickly and endodontic treatments are required far earlier than with permanent teeth because of the macromorphology of primary teeth (Fig 1-1).

The micromorphology is characterized by an aprismatic and irregular enamel structure (Fig 1-2). The proportion of organic constituents is higher than in permanent teeth, which explains poorer conditioning by the acid etch technique. The dentin structure also differs from that of permanent teeth (Fig 1-3): The mineral content is reduced, the distribution of dentinal tubules is more irregular, and the tubules are larger. This explains the faster progression of caries and the lower dentin adhesive values.[3]

BOX 1-1 Morphologic characteristics of primary teeth[2]

Macromorphology

- The enamel mantle is not thicker than 1 mm in any location.
- The pulp chamber of the primary teeth is relatively larger, and the pulp horns are relatively more exposed compared with permanent teeth.
- The occlusal surfaces of the primary teeth are narrower in comparison to permanent teeth, and their buccal and lingual facets diverge toward a strongly developed cervical or basal enamel bulge.
- Primary molars have a broader and flatter interproximal contact than permanent molars.

Micromorphology

- The enamel surface is characterized by a largely aprismatic enamel surface (layer thickness 30–100 µm).
- The enamel prisms in the cervical area increase from the dentinoenamel junction toward the occlusal surface.
- The mineral content of the primary tooth enamel is lower than in the permanent dentition.
- In primary teeth the enamel formed postnatally is far less densely mineralized than the prenatal enamel mantle.
- The structure of primary tooth dentin is different than permanent tooth dentin: The dentinal tubules are larger, the peritubular dentin is more highly developed, and the mineral content of the intertubular dentin is lower than in the permanent dentition.

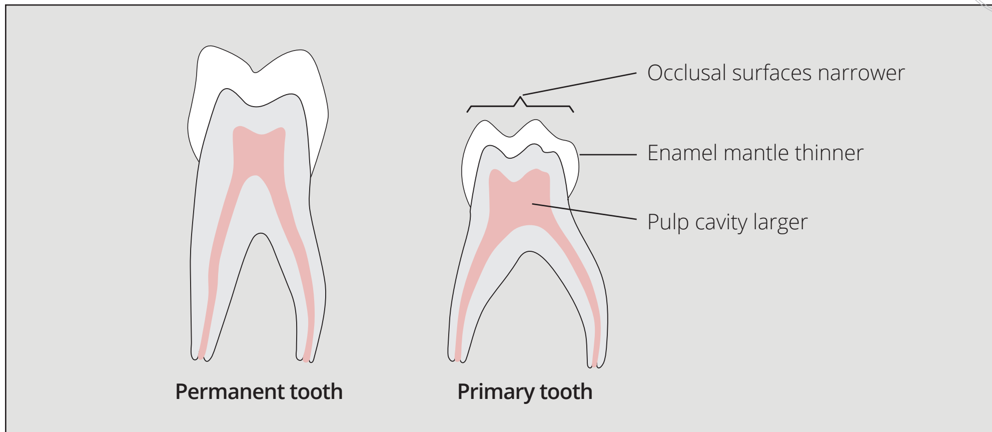

Fig 1-1 Morphologic differences between primary and permanent teeth.

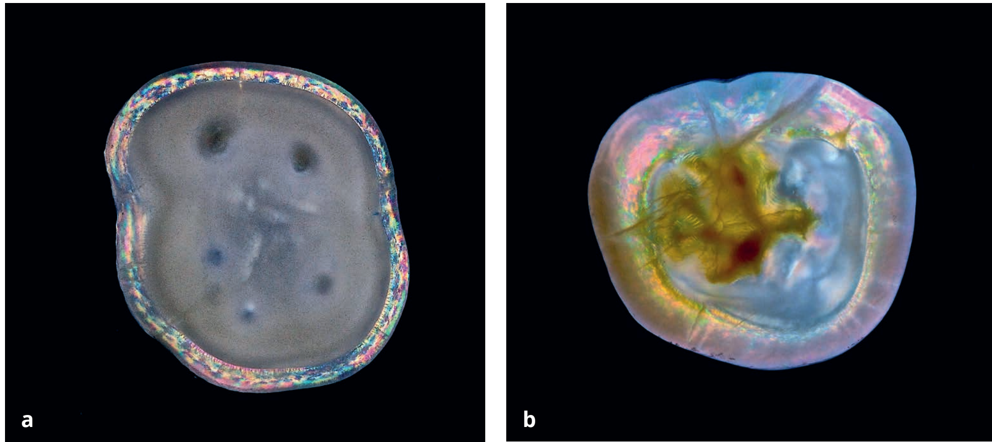

Fig 1-2 Cross section of a primary *(a)* versus a permanent *(b)* tooth revealing enamel layer thickness. In the primary tooth, the enamel layer is very thin compared with the permanent tooth. (Photographs courtesy of Peter Schaller.)

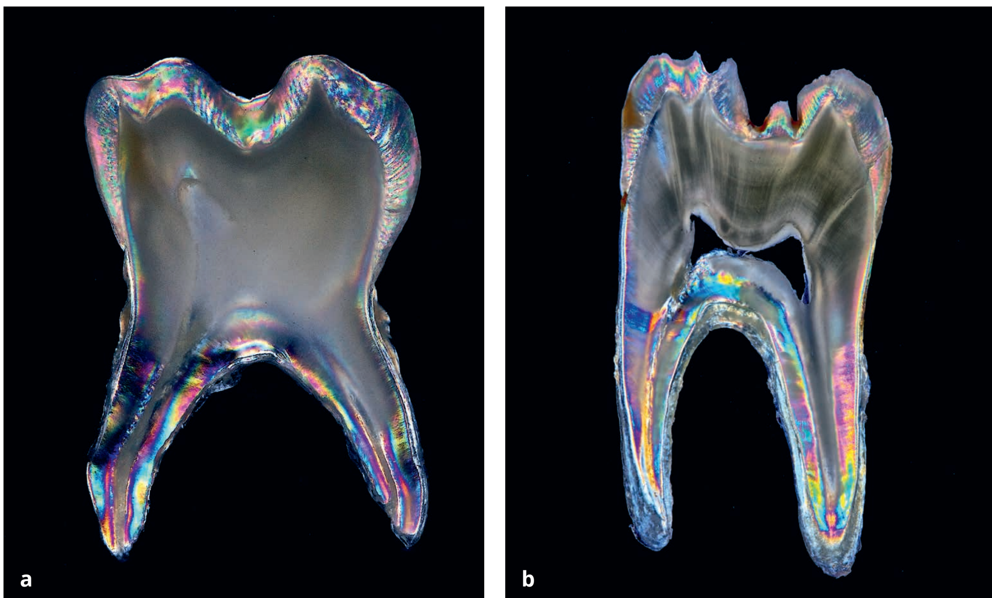

Fig 1-3 Longitudinal section of a primary *(a)* versus a permanent *(b)* tooth. The size of the pulp cavity is much larger in the primary tooth, whereas the dentin layer between the enamel and the pulp is much thicker in the permanent tooth. (Photographs courtesy of Peter Schaller.)

TABLE 1-1 Mineralization times of the primary teeth[4]

Tooth	Start of mineralization	End of mineralization	Root fully developed
Incisors	3–5 months in utero	4–5 months post-natal	1.5–2 years
Canines	5 months in utero	9 months postnatal	2.5–3 years
Primary first molar	5 months in utero	6 months postnatal	2–2.75 years
Primary second molar	6–7 months in utero	10–12 months postnatal	3 years

TABLE 1-2 Mineralization times of the permanent teeth[4]

Tooth	Start of mineralization	Crown fully developed	Root fully developed
Maxilla			
Central incisor	3–4 months	4–5 years	10 years
Lateral incisor	Up to 1 year	4–5 years	11 years
Canine	4–5 months	6–7 years	13–15 years
First premolar	1.5–1.75 years	5–6 years	13–15 years
Second premolar	2–2.25 years	6–7 years	12–14 years
First molar	At birth	2.5–3 years	9–10 years
Second molar	2.5–3 years	7–8 years	14–16 years
Third molar	7–9 years	12–16 years	18–25 years
Mandible			
Central incisor	3–4 months	4–5 years	9 years
Lateral incisor	3–4 months	4–5 years	10 years
Canine	4–5 months	6–7 years	12–14 years
First premolar	1.75–2 years	5–6 years	13 years
Second premolar	2.25–2.5 years	6–7 years	13–14 years
First molar	At birth	2.5–3 years	9–10 years
Second molar	2.5–3 years	7–8 years	14–15 years
Third molar	8–10 years	12–16 years	18–25 years

MINERALIZATION AND ERUPTION TIMES

To understand disorders such as hypomineralization or dental fluorosis, we need to know exactly when primary and permanent teeth are mineralized (Tables 1-1 and 1-2). Furthermore, when assessing radiographs in the mixed dentition, it can be helpful to know when the dental crowns of the permanent premolars or molars should be visible

TABLE 1-3 Eruption times of the primary and permanent teeth*

Tooth	Eruption times
Primary	
Central incisor	6–8 months
Lateral incisor	8–12 months
First molar	12–16 months
Canine	16–20 months
Second molar	20–30 months
Permanent	
First molar (6-year molar)	5–7 years
Central incisor	6–8 years
Lateral incisor	7–9 years
Canines and premolars	9–12 years
Second molar (12-year molar)	11–14 years
Third molar (wisdom tooth)	16+ years

* Relatively wide variations in these timings are possible.

so that any agenesis can be diagnosed. Table 1-3 shows the eruption times of the primary and permanent teeth. It should be noted that relatively wide variations in these timings are possible; those listed in the table should only serve as a guide.

CARIES AS A MULTIFACTORIAL DISEASE

Because caries is a multifactorial disease, it is up to the clinician to identify each patient's individual risk factors and intervene preventively and therapeutically in a targeted way. Especially in children who have no influence on their own diet and oral hygiene, it is important to identify all the etiologic factors contributing to the caries so that adjustments can be made, provided the parents are compliant and reliable, to achieve a lasting reduction of the risk of caries. Figure 1-4 represents the caries etiology model[5] according to Fejerskov and Kidd, illustrating the various key components and their interactions for the purpose of successful caries assessment.

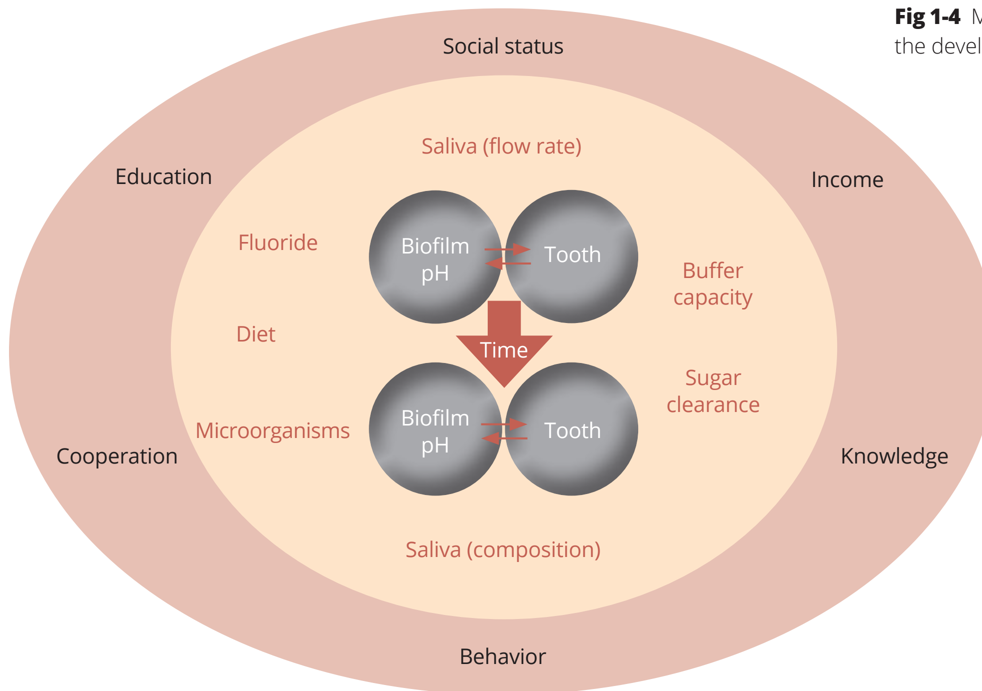

Fig 1-4 Multifactorial etiology model of the development of caries.

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