

Ronaldo Hirata DDS, MS, PhD

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Recipes

for **composite restorations**





Recipes for composite restorations

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Recipes

for composite restorations



Ronaldo Hirata, DDS, MS, PhD

Clinical Assistant Professor
Department of Biomaterials
New York University College of Dentistry
New York, New York

Private Practice Limited to Esthetic Dentistry
Curitiba, Brazil

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DEDICATION

To all victims of the pandemic in 2020/2021

I began working on this book in March 2020, when the effects of COVID-19 had just started spreading globally. I had finished the book by July 2021, as we were hopefully facing an end to this pandemic. Somehow, I feel that I have to pay tribute to all the victims whose lives have been lost and to all their families. God bless us all.





Photos by: Jeff Chu, Arthur Di Braschi, Denny's Cezar Lopes



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Ronaldo Hirata finished his 4-year DDS course at the Federal University of Parana in Curitiba, Brazil, in 1995. After completing his degree, he undertook a 2-year operative dentistry specialty at the same university and began lecturing internationally, with a focus on esthetic dentistry. Dr Hirata has now lectured in more than 40 countries and maintains a private practice limited to esthetic dentistry in Curitiba.

To improve his scientific knowledge, Dr Hirata finished a master's degree in dental materials in 2003 at the Catholic University of Rio Grande do Sul, with a research thesis working with glass and polyethylene fibers to improve mechanical properties of composites. His PhD in restorative dentistry at the State University of Rio de Janeiro was completed in 2009, with research focusing on the transmittance, reflectance, and fluorescence of composite resins.

In 2012, Dr Hirata undertook a postdoctorate at New York University (NYU) working with plasma application on dentin surfaces and bonding strength analysis. Now, he is

Assistant Professor in the Department of Biomaterials at NYU with a secondary appointment in the Department of Cariology. Dr Hirata has published more than 100 papers in English, Portuguese, and Spanish, and his previous books (*TIPS*, Artes Medicas, 2014; *Shortcuts*, Quintessence, 2017) were both published in three languages.

Besides his passion for dentistry, Dr Hirata has fronted an amateur rock band and recorded one album. Now he more often plays acoustic guitar for gospel services and for some presentations at dental meetings. Dr Hirata is also a black belt of Shotokan Karate, having competed in tournaments and won one Brazilian championship. He has also been practicing Brazilian Jiu-Jitsu for 10 years, getting his black belt under the legendary Prof Paulo Miyao. Dr Hirata still competes in International Brazilian Jiu-Jitsu Federation (IBJJF) tournaments and last took silver medals at the 2020 Pan American IBJJF Championship and 2020 World Masters IBJJF Championship. He has also competed in amateur boxing.

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At-Home Bleaching

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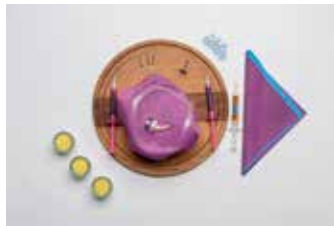
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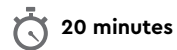
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Injectable Flowable
Composite Technique



The clock symbol is included to indicate the perfect timing for each step of a procedure. Please note that this reference can help you determine if a delay is happening in any step of the restorative sequence.

Example:



In this example, you should ideally be in the step shown when 20 minutes has passed since the beginning of the clinical procedure.



Every time you see a pepper symbol, it indicates an important clinical tip. These pepper tips are included throughout the book to provide insight into the best techniques.

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FOREWORD BY VALENTIN DEVIGUS

"A recipe has no soul. You, as the cook, must bring soul to the recipe." — Thomas Keller

recipe (noun)

In the 16th century, the term was used to mean "medical prescription," from the French word *récipé*, taken from the imperative of the Latin verb *recipere*, "to take" or "to receive." In the mid 18th century, the word began being used to mean "instructions for preparing food." Today, the common pharmacist's abbreviation "Rx" is a reminder of the original usage.

A recipe is a set of instructions used for preparing and producing a certain food, dish, or drink. The purpose of a recipe is to have a precise record of the ingredients used, the amounts needed, and the way they are combined.

A good recipe delivers clear instructions and compositions. A chef who keeps all of his recipes in his head must do all the cooking himself in order to make the recipes correctly. He will not be able to get consistency from other employees, unless he puts everything into a written recipe to give to his staff.

Ultimately a recipe is a template by which a chef educates his staff to meet his criteria for flavor and technique on any given dish. The goal is that the staff would be able

to replicate the taste, texture, and presentation without the chef's help. In practice this means that the cook will be able to recognize if the ingredient flavor profile has changed and then make the correct adjustments on the recipe to still meet the chef's expectation regarding flavor and texture.

Recipes also ensure standardization. Of course, a recipe is not perfect, and the kitchen crew still needs to learn how to make final adjustments on seasoning and consistency in order to match the chef's palate. In this sense a recipe is a guideline, a way for the chef to point his crew in the proper direction. But in the end, cooks need to know the palate and expectations of the chef to reproduce the recipe to his standards.

This is what a good recipe can do for you:

- Increase or maintain food quality
- Improve food consistency
- Motivate the trying of something new



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Cooking and dentistry have many things in common. To get the best and most consistent results, it is mandatory to work carefully and clean, following standards and guidelines. Always try to use fresh ingredients—watch out for the expiration dates of the products you are using. Work to improve your skills every single day, not just to reproduce a single recipe at the highest level. BUT it is also important to improvise; only then can you achieve something out of the ordinary and lift your results closer to perfection.

Buon appetito reading!

Valentin Devigus

Instagram: @vdevigus

About Valentin Devigus

The first 21 years of my life were marked by my passion for ice hockey, which is a popular sport in Switzerland. Just before the start of a professional hockey career, I decided to pursue my real passion of cooking.

I completed an apprenticeship as a cook and began to devote myself more intensely to my career. After almost 2 years in a 1-star restaurant (Restaurant Mesa, Zürich), I broadened my horizons by applying for and getting a job with my idol, Sergio Hermann. In May 2018, I started at Air Republica on the North Sea in the Netherlands. After 2 years, I got the chance to move to Le Pristine in Antwerp, which is Sergio Hermann's newest project.

Even during a time of global crisis, I was able to improve my skills. Push yourself to the highest level. Let's rock it and stay positive for the future!!

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Photos by: Denny Cezar Lopes

FOREWORD BY ANDRÉ V. RITTER

I have always been interested in cooking. The act of processing ingredients from various sources into food that nourishes the body transcends time, cultures, and history. At an elemental level, it is what provides us with the energy we need to live, grow, and thrive. But the process of assembling ingredients, putting them together, cooking them over fire (or not), and then consuming them also has a spiritual meaning, as I believe that when we have a great meal we are not only nourishing our bodies, but also our soul.

To have access to raw ingredients and the means to cook and bake them into something edible—although sometimes eating them raw is also quite good!—is an incredible privilege. However, in addition to ingredients and means, to have access to a list of ingredients and their measures, and preparation instructions for any specific dish, is a ticket to paradise! Even the most resourceful chefs need a plan, a recipe.

Ronaldo Hirata's book ***Recipes for Composite Restorations*** is for dentistry what the books of Grant Achatz and Alex Atala are for the culinary arts—an exceptional cookbook that helps us break down processes into achievable steps toward extraordinary results. At the same time, each of

these books is a wonderful work of art in a broad sense, art that nourishes our souls.

This book is a pleasure to read, visually, technically, didactically, and intellectually. The idea of presenting very familiar clinical techniques as recipes, with a list of ingredients and step-by-step instructions on how to apply them for optimal results, is a welcome breath of fresh air, and in doing so Hirata has elevated the game to a whole new level. As I would say in Portuguese, this was a "grande sacada" (great insight) and a perfect illustration of his creative genius.

Recipes for Composite Restorations covers a wide range of restorative and esthetic procedures, from home bleaching (for the novice chef) to Class II restorations with bioactive resins (for the intermediate chef) to cosmetic contouring (for the advanced chef). The 26 recipes are presented as an illustrated menu, where the reader can access and follow any recipe for that particular procedure, without the need to read the entire book from cover to cover. Taken as a whole, ***Recipes for Composite Restorations*** is a comprehensive tome on esthetic and adhesive dentistry, a true must-read for anyone interested in knowing more about the state of the art and the science.



Photo by: Denny's César Lopes



Oftentimes when I see a beautiful piece or art or read a beautiful piece of poetry or hear a beautiful piece of music, I have a sense of elevation. These experiences truly elevate our spirit and give us hope in humanity. This book is one such experience. Not only is it a superb dentistry book; it is a superb book. Period.

I hope you will enjoy it as much as I did.

André V. Ritter, DDS, MS, MBA, PhD

Instagram: @ritter_nyu

About André V. Ritter

I became interested in dental education, research, writing, publishing, and working with teams when I was a 4th-year dental student in 1987. For the next 10 years, in addition to working different jobs as a dentist as well as in a private dental office, I would become a junior member of a top level operative dentistry team at the Universidade Federal de Santa Catarina in Florianopolis, Brazil. Those formative years defined my trajectory and provided the foundation on which I would then create my own path.

The next 20 years were incredibly productive, as I joined the operative dentistry department at the University of North Carolina in Chapel Hill. There I learned from another group of outstanding educators, researchers, editors, and public speakers. I started at Chapel Hill as a graduate student, and by the time I left I was the school's Executive Dean, having been Graduate Program Director and Chair of Operative Dentistry in between those bookend positions.

I am now in New York as Chair of the Department of Cariology and Comprehensive Care at New York University, which is the largest academic department of the largest dental school in the United States.

As I look back, I feel that those first 34 years were just the beginning. The best is yet to come!

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"Simplicity is the ultimate sophistication." – Leonardo da Vinci

This book came out of one of the toughest moments in recent human history—the COVID-19 pandemic. Nobody could ever have imagined it fully or how much it would change our routines and beliefs. For me as well, I felt it on many levels and experienced many stages. In one of the earliest quarantine stages, I recognized that I had to create something real out of this time of suffering and indecision, so I pushed myself to work on this book for myself. In a sense, this book is a gift or a memory that came out of what I had passed through.

I came to realize and understand fully that all of life was becoming too complex; this included dentistry itself. I had noticed in recent years that everything was becoming too fancy, too difficult, and including too many steps, too much stuff. But after the period of lockdown and much reflection, I decided that life had to be simpler, especially in our search for happiness. Restorative dentistry too should be simple, allowing us as dentists to be happy and satisfied.

Maybe I was just tired of being an "artist" doing restorations that only I have the skills to do. Maybe I was tired of creating ideas for fancy techniques using 17 shades and offering magical results. Maybe I was getting older and realizing in light of COVID-19 that dentistry is, in reality, simple. You don't have to be a rockstar clinician; all of us really can be good at it and happy in our work.

Take this book of recipes as a reminder that simplicity is totally related to happiness and should be accessible to anyone. Here are my recipes, presented simply and in a shockingly direct way. This is a reflection of how I see dentistry now. Simple.

A handwritten signature in black ink, appearing to be 'D. M. M.' with a large, stylized initial 'D'.

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Camila Sobral Sampaio, DDS, MSc, PhD

- DDS, MSc, and PhD in Dental Materials at State University of Campinas (UNICAMP, Brazil)
- Visiting Scholar at New York University (NYU, New York City)
- Professor of Biomaterials at Universidad de los Andes (Santiago, Chile)

Daniel Kenji Funabashi, DDS, MSc

- DDS at Federal University of Espirito Santo (UFES, Brazil)
- PG in Operative Dentistry at Brazilian Association of Dentistry (ABO-ES, Brazil)
- MSc in Dental Materials at State University of Campinas (UNICAMP, Brazil)

Rafaelly Cubas Camargo, DDS

- DDS at Federal University of Parana (UFPR, Brazil)
- Assistant in PG of Operative Dentistry at Latin American Institute of Research and Education (ILAPEO, Brazil)


Stephanie Gomes Assunção Alves, DDS

- DDS at Federal University of Parana (UFPR, Brazil)
- PG in Prosthodontics at Federal University of Parana (UFPR, Brazil)
- Assistant in PG of Operative Dentistry at Latin American Institute of Research and Education (ILAPEO, Brazil)





At-Home Bleaching

 Time for this recipe: **2 to 4 weeks**

INGREDIENTS:

1. Five portions (three for maxilla and two for mandible) of an alginate (Hydrogum 5)
2. Four syringes of a whitening gel based on carbamide peroxide (Whiteness Perfect 22%)
3. One portion of a composite polishing paste (Diamond Excel)

INSTRUMENTS, DEVICES, AND MORE:

1. Tray adhesive for alginate (TAC)
2. Maxillary and mandibular impression trays in plastic or aluminum
3. Type 3 or type 4 gypsum
4. Plates for custom dental trays (Whiteness)
5. Vacuum forming machine (Plastvac P7)
6. Scissors
7. Shade guide (VITA Classical or 3D-MASTER)
8. Felt disc (Diamond Flex)

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THE RECIPE

Tooth color is influenced by intrinsic and extrinsic pigments. The *intrinsic color* of a tooth is determined by how light is scattered and absorbed at its surface and by its structures, such as enamel and dentin, while *extrinsic color* is related to external pigments that might adhere on the tooth's surface, such as from tobacco products and some foods and beverages.^{1,2} Tooth bleaching improves overall whiteness and is a safe, quick, effective, evidence-based, and conservative treatment.

At-home bleaching procedures can be done with carbamide peroxide (CP) or hydrogen peroxide (HP) gels, which are either inserted into individual trays or come in prefilled whitening trays. Many bleaching concentrations are available in the market, with CP usually ranging from 10% to 22% (the most common being 10% to 16%) and HP from 2.5% to 14% (with 7.5% being the most common), and are indicated for periods ranging from 8 hours (CP overnight) to 2 hours (CP daily) or even 30 minutes daily (HP daily), depending on the type and concentration of the bleaching gel.³ Clinical trials show that at-home dental bleaching requires 15 to 21 days to achieve the best tooth color change.^{4,5} Thus, a follow-up of individual patients must be done in consideration of the final outcomes that they want to achieve.

Regardless of the bleaching gel used, HP is the active whitening component, and the free radicals decomposed from HP break down the chromophores in dentin into smaller molecules.³ HP-based products are very unstable and release all of their active HP in 30 to 60 minutes, leading to a fast reaction rate,⁶ which makes this product ideal for day applications of 30 minutes. On the other hand, CP breaks down into HP and urea, with the HP component being approximately a third of the original CP percentage.³ This explains why higher concentrations of CP are available compared to HP and also why the release of active HP in tray-delivered CP gels is slower (3 to 5 hours) than in HP-based products,³ which also relates to the indication of each type of gel. This slow degradation makes CP ideal for night applications.

In years past, there was a widespread idea that when patients were undergoing a bleaching treatment, they were supposed to avoid smoking or consuming food or beverages rich in dark pigments, which could jeopardize the whitening outcome. However, based on publications that studied dark beverages and smoking, it was observed that these items that are not considered part of a "whitening diet" do not negatively influence the overall color change values.⁷⁻¹⁰ However, patients who



smoke or drink dark-pigmented beverages may be more susceptible to staining in the long term.⁸ The conclusion is that heavily pigmented components do not influence the bleaching treatment efficacy itself, but they do affect the long-term stability of tooth whitening.

Another adverse effect related to tooth bleaching is the reduction of bond strength of resin-based materials to enamel immediately after the bleaching procedure. When an adhesive system is applied to the enamel and dentin, an acid-base resistant zone is formed at the adhesive-tooth substrate interface.¹¹ However, bleaching agents can affect the morphology of this zone by promoting an increased thickness with an irregular shape, which occurs due to an increase in enamel porosity after

bleaching, leading to deeper penetration of the primer. The residual oxygen from the bleaching agent may hinder polymerization of the adhesive, thus causing a decrease in bond strength. Delaying bonding for at least 1 week after bleaching eliminates the effect of residual oxygen and is recommended.¹¹

The advantages of at-home bleaching include ease of application, reduced chair time and costs, and high rates of success.³ However, disadvantages include the fact that some patients might not adapt to the technique because of the need to wear individual trays. Considering these and other limitations, different bleaching procedures can be indicated and will be explained in the next recipe.





Figure 1. A photograph of the patient smiling is taken as an initial reference and used for before and after showcase.



Figure 2. A lip retractor should be placed and a shade guide (VITA Classical/3D-MASTER) should be used to register the initial tooth shade. A photograph is recommended for recording the baseline tooth shade, which also can be used as a reference for final results.



Figures 3 to 5. Initial photographs have to be taken from the frontal, left, and right views.





Figures 6 and 7. For the fabrication of the bleaching trays, impressions with alginate (Hydrogum 5) should be taken, and the casts should be done using type 3 or 4 gypsum (palate and tongue areas should be removed after plaster has set).



PEPPER TIP A scalpel should be used to cut below the gingival margins in order to create a depression, allowing vacuum forming to promote better retention for the tray.



20 minutes for clinical procedures

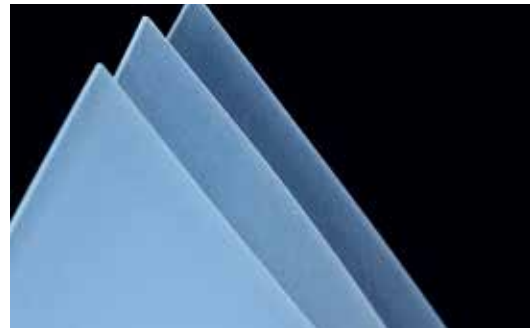


Figure 8. Silicone-based plates (Whiteness) are ideal to fabricate bleaching trays with a thickness of 1.0 mm.



Figure 9. After obtaining the casts, they must be placed in a vacuum former for the fabrication of the bleaching trays. The rough side of the tray should be positioned downward because it will create better retention for the gel from inside. After the bleaching trays are made, they should be cut 1.0 mm from the labial gingival margin and around the papilla. These reductions will minimize the contact of the gel with gingival tissues.



30 minutes for laboratory procedures

Figure 10. The patient should be instructed about the bleaching procedure. Clinicians should demonstrate how to load and clean the trays with each use.



Figure 11. Bleaching trays must be tried in to check the fit and comfort for the patient. Once the trays are confirmed to fit securely, the trays and the syringes with CP gel (Whiteness Perfect 22%) can be delivered to the patient, and the treatment can begin. Usually, after a week of treatment, the patient returns to the office for a follow-up consultation, in which the integrity of the gingival tissues is examined and the patient is questioned in relation to sensitivity. The total period of treatment with the gel is usually between 2 and 4 weeks.



 **2 to 4 weeks total**

Figure 12. One felt disc with a portion of polishing paste is used for polishing enamel surfaces (Diamond Flex with Diamond Excel).





Figure 13. Final situation after 3 weeks of treatment. Final photograph of the patient smiling is taken and compared to initial situation.



Figure 14. A photograph with the initial shade tab (VITA Classical) to observe the color contrast and the evolution of treatment.



Figure 15. Final photograph with the new shade tab (3D-MASTER) compatible with bleached teeth.

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Figure 16. Initial case.



Figures 17 to 19. Final result after 3 weeks of treatment with night applications of 22% CP (Whiteness Perfect).





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