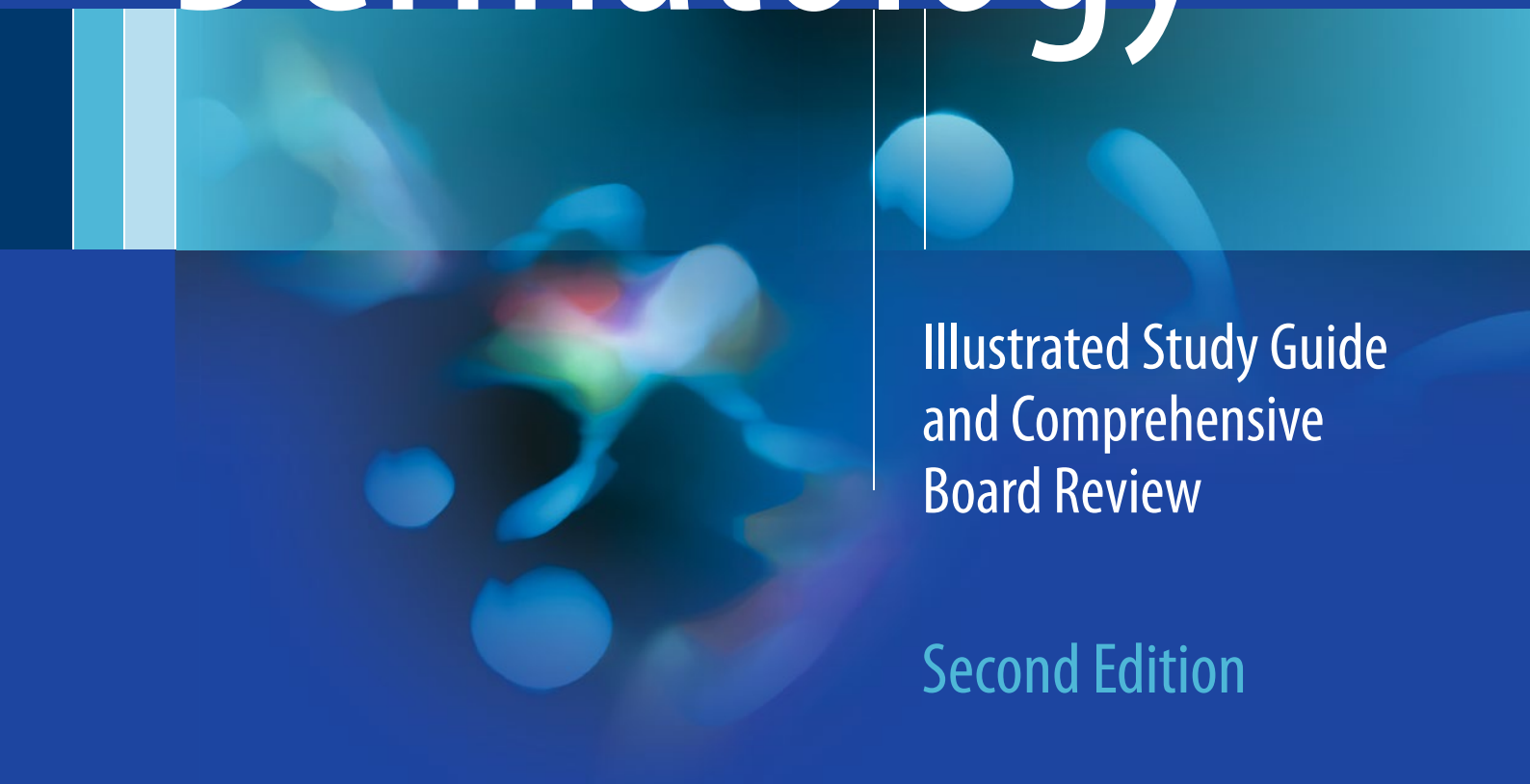
Sima Jain

Dermatology



Illustrated Study Guide and Comprehensive Board Review

Second Edition

Springer

Dermatology

Sima Jain
Author and Editor

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ISBN 978-3-319-47393-2 ISBN 978-3-319-47395-6 (eBook)
DOI 10.1007/978-3-319-47395-6

Library of Congress Control Number: 2017931060

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

To my parents, Manohar and Usha, to whom I owe so much. Thank you for teaching me the importance of hard work, for giving me strength during times of adversity and for your unconditional love and support.

To my incredible husband, Milind, for your love, patience, humor and ability to always keep me balanced. You are my everything and thank you for always believing in me.

To my beautiful children, Sahana, Sahil and Alina. You are the light of my life… my sunshine, my strength, and my treasure. I love you with all of my heart.

Foreword

I've known Dr. Sima Jain since 2003, when she visited the dermatology program at the University of Illinois at Chicago for an away elective as a medical student. Although our time together was relatively brief, Sima and I developed a connection around teaching, something which continues to drive our professional interests and contributions to the specialty. I appreciated Sima to have an indelible enthusiasm for sharing knowledge, and it seemed inevitable to me that she would create a ragingly popular review book to help residents and students learn dermatology.

In this second edition of *Dermatology: Illustrated Study Guide and Comprehensive Board Review*, Dr. Jain offers significant enhancements that will augment the dermatology resident's learning experience. The book is replete with high yield text and well-formatted tables that now also includes over 800 clinical and histological images. This is as comprehensive and accurate of a study guide as I have come across over the years, including those available to me during my own training. The chapters on Pediatric Dermatology and Pathology deserve special mention in this regard.

Dr. Jain has left no stone unturned in her effort to provide dermatology residents a high yield resource to help condense a seemingly endless amount of information. The second edition will no doubt have a permanent position in resident book bags with easy retrieval for individual study and for group fodder sessions. In my role as a program director and an educator, my interest is in helping residents apply book knowledge to routine practice, with the goal of achieving competence in dermatology and providing high quality care to patients. I believe the residents who will get the most out of Dr. Jain's book will engage in regular and intensive reading of textbooks and journal articles in dermatology, and will supplement their study with this high yield summary to effectively refresh and reinforce knowledge.

My hat goes off to Dr. Jain for supporting the training of numerous resident cohorts, both past and for years to come through providing an excellent review resource.

Respectfully,
Amit Garg, MD
Professor and Founding Chair
Department of Dermatology
Hofstra Northwell School of Medicine

Preface

I am flattered and humbled that the first edition of the book has been so well received and it is with this in mind that I have tried to make this new edition even more helpful and practical than the first edition. In this updated version I have added more than 300 images and I have tried to include any omissions, correct any errors and include any new treatments since the first edition was released.

As I wrote in the previous preface, the idea of writing this book arose when I was studying for my dermatology board examination. At the time, I was unable to find a comprehensive study guide containing both high yield text and corresponding clinical images. I ended up using multiple textbooks, atlases, and study guides to review for the exam, which proved to be quite challenging and time consuming. My goal was to create a practical review book with concise yet thorough text along with high-yield corresponding clinical images. Important concepts throughout the book are either underlined or highlighted in the text and tables are placed in as many chapters as possible for easy reading.

Another unique aspect of this book is the discussion of life after the dermatology board exam. Medical training, as it exists today, does not emphasize important post-residency concepts such as understanding the elements of a physician employment contract, proper coding and documentation, and choosing between different types of malpractice insurance. Most of us have had to learn this on our own without a specific resource to guide us, which is why I have included this information in the last chapter.

Ultimately, this book is intended as a board preparatory guide for dermatologists who are preparing for initial certification or recertification. Moreover, the topics addressed in this book are highly relevant to daily practice and may serve as an excellent reference for physicians in both dermatology and primary care. In summary, it is hoped that this will fill a real need for all dermatologists as an essential board review book and provide an indispensable resource for all physicians.

Acknowledgements

I would like to extend my sincerest thanks and appreciation to my developmental editor, Michael D. Sova, for being immensely patient with me throughout this process and for his tireless efforts to perfect this second edition into what I had envisioned, no matter how much work that entailed or how many hours we had to talk over the phone. Thank you for your constant attention to detail and your perseverance. And thank you to my wonderful editor, Rebekah Amos, for your unwavering support and guidance. You both have been incredible to work with.

I would also like to thank Dr. Paul Getz for his generous contribution of numerous photographs to this book and the first edition.

Lastly, I want to thank the dermatology residents who have helped update this book with their comments and suggestions, namely Euphemia Mu, Alex Maley, Vikas Patel, Aly Barland, Ryan Fischer and Anand Rajpara.

Author and Editor

Sima Jain is a board-certified dermatologist who currently practices in Orlando, Florida. She completed her undergraduate studies at Johns Hopkins University in Baltimore, Maryland and received her medical degree at the University of Florida in Gainesville, Florida. She then moved to Chicago, Illinois where she completed her dermatology residency at the University of Illinois at Chicago Medical Center, where she was chosen to be chief resident during her final year. During her last year she was awarded the annual Resident Teaching Award by the prestigious medical honor society, Alpha Omega Alpha, for providing excellent clinical teaching to residents and medical students. Since completing her training, she has continued to receive awards for excellence in patient care and has stayed involved in medical education. She is currently an Assistant Clinical Professor of Dermatology at the University of Florida, has authored multiple articles in peer-reviewed journals, and is the sole author of the first edition of the book, *Dermatology: Illustrated Study Guide and Comprehensive Board Review*, which was published in 2012 and quickly became the best-selling dermatology board review book in the country. In her free time, she enjoys teaching, reading, and spending time with her husband and three beautiful children.

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Basic Science and Immunology

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DOI 10.1007/978-3-319-47395-6_1, © Springer International Publishing AG 2017

1.1 EMBRYOLOGY

Table 1-1: Development of Cutaneous Structures

	Gestational Age (Estimated)	Epidermal Development	Hair, Nail and Gland Development	Dermal/Subcutaneous Development
1st trimester	~3–4 weeks	Single layer of ectoderm		
	~6 weeks	Outer flattened periderm and inner, cuboidal germinal (basal) layer ← Germinal layer produces entire epidermis		Germinal layer in contact w/ underlying mesenchyme
	~7 weeks	Fetal **basement membrane**	Tooth primordia	
	~8–12 weeks	Epidermal stratification begins ~8 weeks ← Completed by 2nd trimester Appearance of → **Melanocytes** → **Langerhans cells** → **Merkel cells**		Dermal-subcutaneous boundary distinct
	~9–12 weeks	Appearance of anchoring filaments/hemidesmosomes	Hair follicle and nail primordia seen	
2nd trimester	~12 weeks	**Formation of dermo-epidermal junction** (DEJ)	**Nail bed starts to keratinize, proximal nail fold forms**	Type III collagen appears
	~12–14 weeks	Parallel ectodermal ridges (fingerprints)	Eccrine and sebaceous gland primordia seen	Fibroblasts actively synthesizing collagen and elastin in dermis
	~12–24 weeks	Melanin production (12–16 wks), melanosome transfer (20 wks)	Hair follicles differentiate during 2nd trimester (7 concentric layers present)	
	~15–20 weeks	Periderm is shed (periderm is part of vernix caseosa) [20–21 weeks]	Follicular keratinization, **nail plate completely covers nail bed**	Papillary/reticular boundary distinct, dermal ridges appear
	~22 weeks		Trunk eccrine gland primordia	Elastic fiber seen
	~22–24 weeks	**Mature epidermis complete** (w/ interfollicular **keratinization**)		Adipocytes appear under dermis

1.2 EPIDERMIS

- Functions as a mechanical and antimicrobial barrier; protects against water loss and provides immunological protection; thickness varies from 0.04 mm (eyelid skin) to 1.5 mm (palmoplantar skin)
- Divided into four layers (each with characteristic cell shape and intracellular proteins): stratum corneum, stratum granulosum, stratum spinosum, and stratum basale (germinativum); of note, stratum lucidum is additional layer in palmoplantar skin

Keratinocytes

- **Ectodermal derivation**; keratinocytes comprise approximately 80–85% of epidermal cells
- Total epidermal turnover time: average 45–60 days (30–50 days from stratum basale to stratum corneum and approximately 14 days from stratum corneum to desquamation)
- Epidermal self-renewal maintained via stem cells in basal layer of interfollicular epithelium and the bulge region of hair follicles (latter location only activated with epidermal injury)
- Keratinocytes produce keratin filaments (syn: intermediate filaments or tonofilaments), which form the cell's cytoskeletal network; this provides resilience, structural integrity, along with serving as a marker for differentiation (ie. basal layer: K5/14)
  - Six different types of keratin filaments: type I/II are epithelial/hair keratins, type III-VI include desmin, vimentin, neurofilaments, nuclear lamins, and nestin
  - >50 different epithelial/hair keratins, expressed as either type I (acidic) or type II (basic), and type I/II coexpressed together as a heterodimer (i.e., K5/14)
    - Type I (acidic) epithelial keratins: K9–28, chromosome 17
    - Type I (acidic) hair keratins: K31–40 *(old nomenclature: hHa1–hHa8, Ka35, Ka36)*
    - Type II (basic) epithelial keratins: K1–8 and K71–80, chromosome 12
    - Type II (basic) hair keratins: K81–86 (*old nomenclature: hHb1–hHb6*)

Of note, second cytoskeletal network formed by actin filaments

Table 1-2: Keratin Filament Expression Pattern

Type II	Type I	Location of expression	Associated diseases
1	10	Suprabasal keratinocytes	Epidermolytic hyperkeratosis, Unna-Thost PPK
1	9	**Palmoplantar** suprabasal keratinocytes	Vorner PPK
2 *(2e)*	10	Granular and upper spinous layer	Ichthyosis bullosa of Siemens
3	12	Cornea	Meesman corneal dystrophy
4	13	Mucosal epithelium	White sponge nevus
5	14	**Basal keratinocytes**	Dowling-Degos disease, EBS
6a	16	Outer root sheath	Pachyonychia congenita I
6b	17	**Nail bed**	Pachyonychia congenita II
8	18	Simple epithelium	Cryptogenic cirrhosis
K81 K86		Hair	Monilethrix
	19	Stem cells	

Do not confuse Dowling-Degos with Degos disease:
Dowling-Degos: AD, reticulated pigmentation over skin folds
Degos (malignant atrophic papulosis): occlusion + tissue infarction

Stratum Basale (Germinativum)

- Basal layer just above basement membrane; contains keratinocytes, melanocytes, merkel cells and Langerhans cells (latter mainly in stratum spinosum)
- 10% of cells in basal layer are stem cells
- Expression of ornithine decarboxylase (ODC), which is a marker for proliferative activity
- (ODC stimulated by UVB and partially blocked by retinoic acid/corticosteroid/vitamin D_3)
- De novo expression of K5/14 occurs, forming keratin filaments which insert into both desmosomes and hemidesmosomes and form keratinocyte cytoskeleton
- Hemidesmosomes allow attachment of basal keratinocyte to basement membrane