

Renal Physiology Education via Podcast: Channel Your Enthusiasm



Melanie P. Hoenig, Anna R. Gaddy, Priti Meena, Roger A. Rodby, Leticia Rolón, Juan Carlos Q. Velez, Joshua Waitzman, Amy A. Yau, and Joel M. Topf

Renal physiology is considered one of the most challenging medical disciplines to understand and to teach. Eight academic nephrologists have come together to produce a podcast devoted to helping learners at any level improve their understanding of this difficult topic. Using Dr Burton D. Rose's classic textbook: *Clinical Physiology of Acid-Base and Electrolyte Disorders*, the podcast faculty systematically attack each chapter of the book in a didactic yet fun-flowing interactive discussion. This education model is unique and helps demystify complex topics.

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Complete author and article information provided before references.

Correspondence to
M.P. Hoenig (mhoenig@bidmc.harvard.edu)

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“Renal physiology, a complex, yet logical and internally consistent system that maintains our precious bodily fluids. You are listening to an accounting of our ongoing mission to explore and develop a functional mental model of the workings of the kidney and its associated functions. To understand completely how the kidney accomplishes its primary mission of establishing and maintaining homeostasis.

This is Channel Your Enthusiasm, the Burton Rose Cocktail Club and Variety Hour.”

And so begins each episode of “Channel Your Enthusiasm,” the podcast dedicated to *Clinical Physiology of Acid-Base and Electrolyte Disorders*, Rose's¹ classic textbook on renal physiology.

Renal physiology is one of the more difficult disciplines for students of medicine at all levels. Most begin learning about the kidney in secondary school and university followed by a more in depth, albeit compressed, exploration in a preclinical curriculum in medical school. In the clinical arena, ideally lessons are reinforced by patient care. However, ironically, most patients referred to a nephrology service experience either acute or chronic kidney failure and hence are poor examples of normal renal physiology. In addition, the large number of patients seen and the often frenetic pace of the nephrology service limit time available for in-depth discussions. These factors conspire to make clinical medicine a poor classroom for learning the intricacies of kidney physiology. Trainees who choose to pursue nephrology engage in graduate medical education in nephrology at their institutions. Programs may include basic physiology, but curricular content is not consistent and is not specified by the Accreditation Council for Graduate Medical Education,² so comprehensive exploration of physiology may be lacking.³

Many seasoned nephrologists fell in love with nephrology because of the writings of Dr Burton Rose, who later created UpToDate. Reading Rose's¹ text, *The Clinical Physiology of Acid-Base and Electrolyte Disorders*, now in its

fifth edition, although last published more than 2 decades ago, was considered a rite of passage for foundational learning of the nephron.⁴ Exploration of a basic physiology text is typically completed by learners working alone, but this content is also suited for a more modern, collaborative approach. Although medical podcasts usually address contemporary topics without a particular order, a freely available podcast series that thoughtfully and methodically explores renal physiology has the potential to support learners in a new way. We created a podcast to serve as a companion to the well-loved textbook and to try to capture Rose's magic—the Channel Your Enthusiasm Podcast: the Burton Rose Book Club <https://www.rosebook.club>.

FREE OPEN-ACCESS MEDICAL EDUCATION

The use of a single textbook as an anchor for exploring renal physiology is not a new concept but its use in a podcast is unique. Over the past decade, the number of medical podcasts and the consumption of this modality have burgeoned along with a range of other forms of free open-access medical education.⁵ There are podcasts on medical history, medical mystery, primary care, as well as content across the spectrum of medical interests. Podcasts abound in every specialty, recorded by medical societies, journals, industry, and individual physicians and patients. Podcasts target medical students, house staff, and a general audience. In nephrology, there are podcasts for trainees, nurses, dialysis technicians, practicing physicians, and a general audience.⁶ Despite this, to our knowledge, the Channel Your Enthusiasm Podcast is one of a very small number of medical textbook podcasts and certainly the only nephrology book club podcast. Analysis of podcasts pedagogy identifies a range of formats and the potential to harness higher level cognitive skills in Bloom's taxonomy of learning with “integrating and applying concepts as well as deconstructing clinical biases.”⁷ Podcast pedagogy may take the form of a lecture, with a goal of simply transferring knowledge. Alternatively, podcasts can provide a

Table 1. Podcast Features

	Value	Example	Episode; Timing ^a
Calculations	Demonstrates key points	How much substrate the proximal tubule absorbs	Chapter 3: The Proximal Tubule; 6:20
Comaraderie	Welcomes learners	Benefits of learning together	Chapter 1: Introduction to Renal Function; 0
Classic study	Reinforces basic physiologic understanding	Salt and water losses explored by RA McCance and detailed in <i>Lancet</i> 1936	Chapter 0: Regulation of Plasma Osmolality; 18:56
Clinical example	Contributes context	Tacrolimus mimics Gordon syndrome (familial hyperkalemic hypertension) by acting in the WNK pathway to activate NCC	Chapter 5: Functions of the Distal Nephron 30:48
Clinical pearl		When considering the BUN: creatinine ratio, avoid early closure and assumption that the prerenal state is present	Chapter 14: Hypovolemic States 1:34
Corrections	Corrects misconceptions and errors, reminds listeners that experienced clinicians can make errors	Sodium filtered at a low GFR	Chapter 2: Renal Circulation and Glomerular Filtration Rate timestamp 10:05
Novel mechanism	Provides scientific evidence for prior understanding	Tight junctions in the nephron from the leaky junctions to toad bladders	Chapter 1: Introduction to Renal Function; 39:00
High impact trial	Explores contemporary clinical evidence for renal physiology concepts	DIABLO study in the discussion of respiratory acidosis	Chapter 3: The Proximal Tubule; 23
Voice over	Clarifies a knowledge gap	Is an ACE inhibitor a diuretic?	Chapter 13: Meaning and Application of Urine Chemistries; 35:26

Abbreviations: ACE, angiotensin converting enzyme; BUN, blood urea nitrogen; GFR, glomerular filtration rate; NCC, sodium chloride co-transporter; WNK, with no lysine kinases.

^aTiming on the Channel Your Enthusiasm Website <https://www.rosebook.club>. The timing on other sites including Apple Podcast may differ slightly.

critical review of recent literature. Finally, medical podcasts may explore how to apply clinical knowledge to patient care.⁷ The format of the Channel Your Enthusiasm Podcast links exploration of renal physiology to recent literature and considers how to apply this knowledge to clinical care. This combined strategy promotes inquiry and invites listeners to use lessons learned in clinical practice. Podcasts as a form of medical education have enjoyed increasing appeal for nephrology trainees in recent years, particularly since the coronavirus disease 2019 pandemic. In the 2022 American Society of Nephrology fellow survey, nearly half of respondents reported listening to medical podcasts, a doubling from the prior year.^{5,8}

FEATURES

The book club podcast is modeled after the long-held tradition of a resident book club, an educational session during which trainees read a foundational textbook as a collective endeavor. Each episode explores content from a chapter and participants discuss content, exploring how the text compares to our current understanding of kidney physiology, cellular biology, and clinical care. Listeners are encouraged to read the chapter before listening to the podcast, but this is not required to enjoy and learn from the episode. Podcast “faculty,” or Channelers, represent a diverse group of educators who hail from different locales and types of practice, and have a range of clinical training, practice, and teaching experience. Our podcasters bring perspectives on original physiology experiments and

cutting-edge current research, as well as how these concepts are demonstrated and applied clinically. The Channelers enjoy analogies to the animal kingdom or finding a classic human study that illustrates a key point. Throughout, we aim to adhere to the assigned content from the chapter to explore the lessons important for understanding clinical nephrology. The dialog includes multiple learning elements that are included holistically based on content (Table 1). The recording is critically edited to provide a comprehensive look at each chapter with a balance of humor and enthusiasm. Each chapter is also accompanied by a graphic depiction (Fig 1) of key points and “show notes” that include an outline and references discussed during the podcast that can be readily accessed. Annotations that explain the relevance of the references have been added based on listener suggestions.

NONNEPHROLOGY CURRICULUM

Importantly, the faculty of the podcast model behavior that promotes learning and community. Participants rejoice in the topics and celebrate the book’s well-crafted prose plus debate both dogma and confusing topics. There is a spirit of codiscovery. There is no hierarchy or pecking order. We appreciate that each member brings unique knowledge and experiences to the podcast. A spirited debate can occur safely among participants who respect each other, are curious and passionate about physiology and poised to think critically about the content. We also model humility and vulnerability when we share confusion regarding

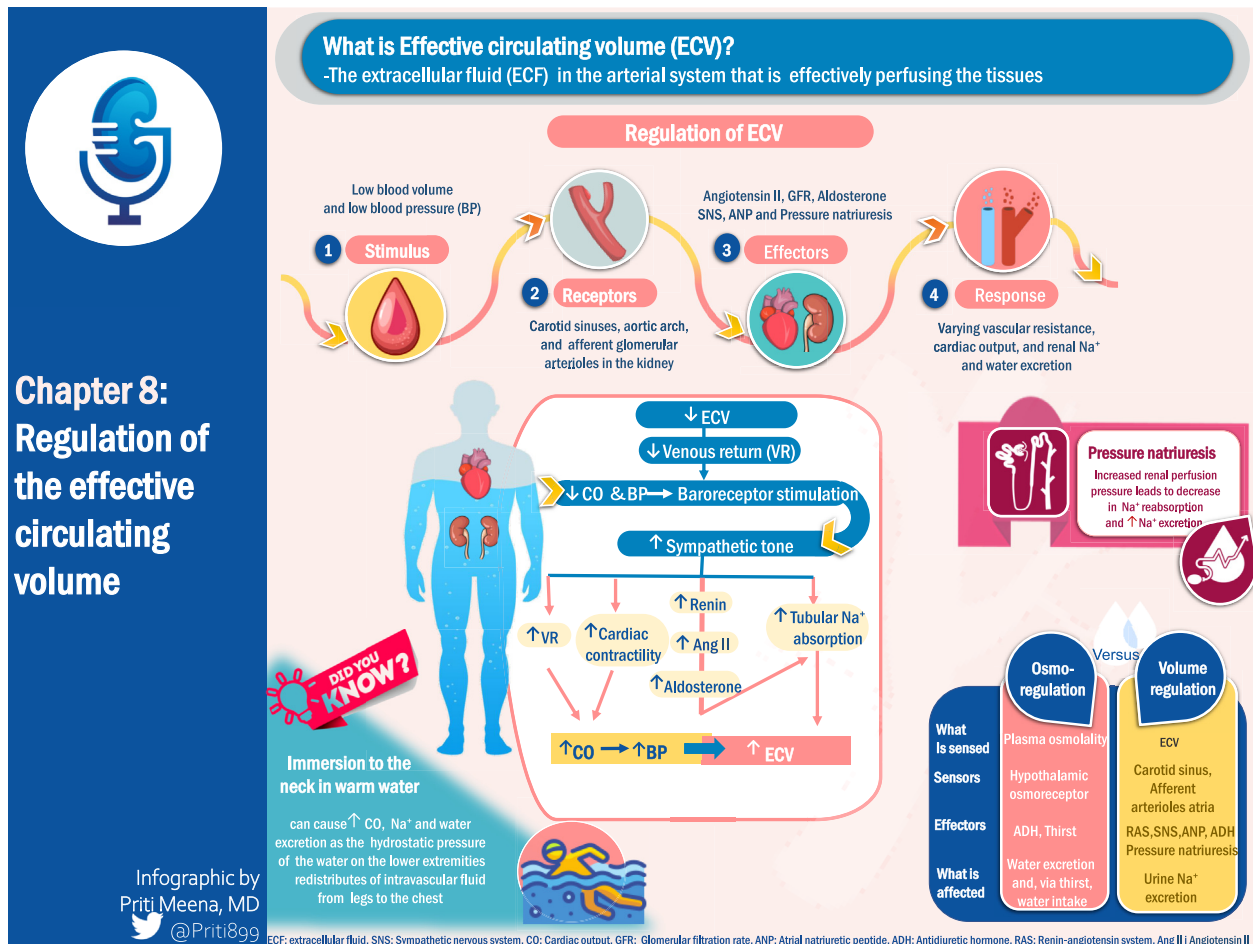


Figure 1. Chapter 8 Visual Abstract. Each episode is linked to the website and includes “show notes” with a visual abstract. The central diagram on effective volume depletion is adapted from Figure 8-5 of *Clinical Physiology of Acid-Base and Electrolyte Disorders*.¹

challenging concepts and do not hesitate to admit knowledge deficits, this humility can serve as a model for “what it means to be a self-reflective clinician.”⁹ Deficits can be remedied real-time by another participant or in follow-up with a carefully crafted “voice overs and corrections.” In an era when coronavirus disease 2019 has led to isolation, the podcast serves as an opportunity to foster community.

REACH

In keeping with the social media revolution,¹⁰ the podcast has enjoyed a warm reception. Learners can access the podcast from our website (<http://www.rosebook.club/>) or they can engage from other podcast sources including Apple Podcasts and Spotify. To date, Channel Your Enthusiasm has attracted a large number of learners; more than 3,200 listeners from 45 countries (Fig S1). Our listeners have enjoyed nearly 250,000 “plays” and more than 15,700 hours of listening. Listeners have shared comments on the Apple Podcast site: “The podcasters range

from fellows to sages. They all convey their wonder with this fantastic renal system (and Burton Rose). Their accounts of how they use their expertise to treat their patients is very engaging. Cocktail party atmosphere. I listen to these podcasts over and over again (and I have been teaching for 40 years).” “With expert guest, thought provoking discussions and impeccable production quality, it’s a must-listen for anyone interested in this field: A captivating and educational auditory experience.” “The diverse group of hosts bring their own areas of interest/expertise to help explain renal physiology. An amazing book brought to life with their enthusiasm.”¹¹ The podcast was also recognized by the American Society of Nephrology Innovation in Kidney Education Contest in 2022.

Although we believe that the podcast has many strengths, the format has limitations. Our 8 participants critically review each episode before release, but this is not the same as anonymous peer review. Further, the asynchronous nature of podcasts may lead to a “ceiling” on impact and efficacy.¹² Indeed, although we have data on downloads and positive reviews from listeners, we do not

have evidence of efficacy in improving listener knowledge, improving application of physiology at the bedside, or the ultimate goal of improving patient care. Nevertheless, we feel that we do achieve smaller goals: promoting curiosity and self-reflection as we apply basic physiology concepts to modern clinical conundrums.

In summary, the Channel Your Enthusiasm: Burton Rose Book Club Podcast is among the first in kind medical book club podcast. This educational series serves as a model of scholarship, collaboration, and innovation in education that complements the range of free open-access medical education offerings from an energized social media nephrology community that is inclusive and shares a passion with all whom embrace renal physiology.

SUPPLEMENTARY MATERIAL

Supplementary File (PDF)

Figure S1: Listeners by country or region from 2021 through 2023.

ARTICLE INFORMATION

Authors' Full Names and Academic Degrees: Melanie P. Hoenig, MD, Anna R. Gaddy, MD, Priti Meena, MD, DNB, Roger A. Rodby, MD, Leticia Rolón, MD, Juan Carlos Q. Velez, MD, Joshua Waitzman, MD, PhD, Amy A. Yau, MD, Joel M. Topf, MD

Authors' Affiliations: Department of Medicine (Hoenig, Waitzman), Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA; Division of Nephrology (Gaddy), Medical College of Wisconsin, Milwaukee, WI; Department of Nephrology (Meena), All India Institute of Medical Sciences-Bhubaneswar, Odisha, India; Division of Nephrology (Rodby), Rush University Medical Center, Chicago, IL; Department of Nephrology and Hypertension (Rolón), Mayo Clinic, Rochester, MN; Department of Nephrology (Velez), Ochsner Clinic Foundation, New Orleans, LA; Division of Nephrology (Yau), The Ohio State University Wexner Medical Center, Columbus, OH; and Department of Medicine (Topf), Oakland University William Beaumont School of Medicine, Rochester MI.

Address for Correspondence: Melanie Hoenig, MD, Department of Medicine, Beth Israel Deaconess Medical Center, 171 Pilgrim Road, Boston, MA 02215. Email: mhoenig@bidmc.harvard.edu

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