Our 1992 volume was a unique opportunity: defining the field of critical ultrasound. Fusing together the idea of Dénier, the father of ultrasound [1], with that of François Jardin, to enrich his ICU with an ultrasound unit [2], we were in a privileged place for achieving this task. At the time it was initiated (1989), this music sounded strange to most ears. Ultrasound was a sophisticated technique reserved for an elite group, for focused fields (gallbladder gallstones at one side, echocardiography at another: two worlds). Our volume aimed at making ultrasound a clinical tool, including classical emergency applications (aortic aneurism, venous thrombosis, free blood) specific applications (venous catheterization, simple cardiac sonography), and new applications (inferior vena cava, optic nerve...) for an adapted use to the critically ill. At this basic point and without including basic applications that were not supposed to exist (the lung), the field was so substantial that an on-site role with urgent transfer of competence was imaginable. When we saw the unlimited whole-body potential of such a unit, and searched in vain for a devoted textbook, we wrote our own. This lack in the literature was explained probably because two distant worlds (critical care and imaging) had too distinct traditions and philosophies. The 1992, 2002, and 2005 editions of our book reflect an experience born from a synthesis between these two disciplines.

Many years were lost because not only the concept of critical ultrasound (by a nonexpert physician) initially intrigued the community but also, above all, because the lung was advocated as the priority target. Fortunately, the author began as a student—a good idea when you propose something different to the community. Like all new concepts, it needed the usual gestation time before being accepted in people's minds. It is a pleasure to see that, now, these obscure times are behind us. Some doctors believe that critical ultrasound was created by the laptop revolution in the 2000s, but basic chapters will quietly show that the real revolution was fully possible long before.

For Whom Is This Book Intended?

Neither the earlier editions nor the present one designed a specialist for holding the probe (intensivist or radiologist), but rather what could be possible with this probe (lungs, etc.). There was a space for the radiologist, who had the expertise for disseminating the technique immediately. With distance, this space is still available, but we can consider that they let the opportunity escape. Critical ultrasound is now the tool of the intensivist, who has a 24/7 (24 h a day, 7 days a week) need, in a space where speed is life, with no possibility to wait for a specialist.
Suggesting to confine ultrasound to the hands of “nonexperts” was a challenge. Providentially, critical ultrasound is a simple discipline. The following pages aim at demonstrating that simple signs based on a simple technique, simple equipment and simple philosophy make it such a method. The most simple signs are present at most priority targets: lung, deep veins... Even the heart benefits from an emergency sonography based on simplicity. We ask the readers to admit that simple machines (present since 1982, perfect since 1992) and a different distribution of the priorities allow us to benefit, not from a passive competence transfer for studying biliary tract anomalies or complex cardiac Doppler flows, but really from a new discipline.

New Points in This Edition

All chapters of this book have been completely rewritten in order to gain clarity, simplicity, and compactness. The rarest situations have been sacrificed again to concentrate on the more common daily ones. The candid questions of the attendees of ICU bedside sessions in France through CEURF, and around the world through countless workshops in many initiatives like WINFOCUS, have all received answers. They are integrated in this book, contributing to making it more comprehensive – but not more complicated. We suppressed old propaganda comments, since now the question is no longer why, but rather how (i.e., how to practice critical ultrasound).

The user will begin with the abdomen (a traditional field, with adapted use however), slightly leave it with the aorta, then go into the deep matter. A venous approach will initiate the BLUE protocol. Eleven chapters are now devoted to the lung and the BLUE protocol. Chapter 20 assesses acute respiratory failure. Chapter 21 deals with the lung in the neonate. A simple approach for the heart and hemodynamic management, in light of the lung approach, will then be proposed. Chapter 23 gives clues with direct data for hemodynamic assessment of acute circulatory failure.

The new title indicates more specifically its holistic content. We could use the title of the Korean translation of our 2005 edition: “The 1,001 reasons to develop ultrasound in the critically ill patient,” but the current title indicates that the heart is included in our approach – since 1992.

Intensive care medicine is a complex area. Did we succeed in pushing back the “twilight zone”? In all areas where there is a “gold standard” (such as CT), the reader will find solid ultrasound elements, especially at the respiratory area. In areas where the gold standard is weak, mainly hemodynamic assessment, our progression is slower and our conclusions still cautious, but we humbly propose new references.

Like in the previous editions, the author heartily thanks those colleagues (acknowledged in the text where possible) who indirectly contributed to this book.

What Is Unchanged in This Edition

We kept our vision of simplicity. This precious tool was exploited to its limits without compromise for the patient’s safety, since passing years have shown that this is the winning way. Once again, the reader will search in vain for images with Doppler.
Critical ultrasound is a new discipline, with a real adaptation to the critically ill, and not a simple copy-paste of the traditional radiologic (or cardiologic) culture just performed in the emergency room (ER) instead of within the radiology department. Our books only deal with points of immediate clinical relevance for life-threatening situations (most gynecologic situations and minor surgical diseases such as appendicitis are not dealt with).

The homogeneity and coordination have been optimized. In order to have the lightest volume as possible, *essential notions are not repeated*. They are inserted at a logical site, and shortly recalled in other chapters. A maximal quantity of information fits, therefore, in a minimal volume. A single-author redaction was the key for this concept.

As usual, the author apologizes for possible errors or omissions, and will greet with major attention the suggestions of the colleagues who make the effort to open this book. The recent explosion of ultrasound in the ER has given rise to many publications. Papers willing to show the interest of ultrasound, in an evidence-based approach, are basic, but we apologize for not have space for including the numerous references which show that nonradiologists can do what radiologists can, or that nonexperts can become experts after a certain number of examinations. This was not the aim of this textbook. Wanting to keep the size of the book to a minimum, we devote only on what can be done with a probe rather than who can hold it, and after how long training.

**For Those Interested in Research**

Of the 320 pages of this textbook, the authors had time to publish a minute part (20 publications) in the peer-reviewed international literature in 19 years. With one paper published per year, they have calculated that time would be short for publishing all of them. Dozens of applications that featured in the 1992 edition are now widely in use (venous access, search for free blood in trauma, optic nerve, gastric tube, etc.). This book is an alternative for all ideas that will not be published for lack of time. The reader has just to take those from this textbook which are not yet peer-reviewed, and publish them. This is the modest gift of the lucid authors to the patients from the whole community, from sophisticated sites to sparsely resourced countries.

**The Images**

Our 1992 edition used 1982 technology images (the ADR-4000 and its mechanical sectorial 3-MHz probe). Our 2002 and 2005 editions combined technologies from 1982 and 1992 (the Hitachi EUB-405 and its electronic 5-MHz microconvex probe). In this 2010 edition, we use the same 1992 technology, because we find it of superior quality to that found in the usual small-height machines.

Some images obtained using 1982 technology have been kept, simply because the clinical information was fully relevant for saving lives. They will be recognized thanks to their dotted (centimetric) lateral borders.

Everybody will agree that the 1951 resolution was a bit weak. The figure enclosed herein, from the historical article of Howry [3], is perhaps the first ultrasound real
image (not dealing with Dussik’s images of 1942, which proved to be a mistake, taking artifacts as pathologic structures, nor Dénier’s work, since we have no image). The revolution of real time, acquired thanks to the work of Walter Henry and James Griffith in 1974, has been a nice step forward. The 1982 resolution was perfectly suitable for saving lives, decreasing X-rays and CT referrals. The 1992 resolution is even better.

**One Last Point**

In our 1992 edition, we warned the readers that our policy of trying to decrease irradiation by all available means was a critical aim. Certain uses of ultrasound may have looked excessive for some. Meanwhile, works highlighting the side effects of radiation techniques have at last been published [4–6]. Colleagues who long ago invested in ultrasound made a winning choice and are now one step ahead.

**References**


Normal gallbladder, transverse scan. This scan was obtained from the historical article of Howry and Bliss (J Lab Clin Med 40:579–592). We can understand that, from this image, ultrasound did not have the immediate success of radiography, CT or MRI... and therefore academicians forgot to acknowledge such a pacific revolution. This image suggests another comment. Even using the pantographic systems of 1970, the sound had the same speed as today, i.e., 1,540 m/s. This means that, theoretically, a scan of the thorax would have been able to display the A-lines and B-lines and even maybe the seashore sign, which are the main tools of lung ultrasound. Maybe a visit to the museum of sonography would reserve some surprises.
Whole Body Ultrasonography in the Critically Ill
Lichtenstein, D.A.
2010, XX, 326 p., Hardcover
ISBN: 978-3-642-05327-6