Giants in Obstetrics and Gynecology Series: A profile of John C. Hobbins, MD

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John C. Hobbins, MD, Distinguished Professor at the University of Colorado, and former Professor and Chief of Obstetrics at Yale University and at the University of Colorado, is an undisputed giant in our specialty. John has been a pioneer of ultrasound imaging in obstetrics and gynecology; even more so, it is the inspirational vitality of such an extraordinary man whose influence on the evolution of modern obstetrical practice is perhaps best reflected in the legions of residents and fellows he trained. They, in turn, have taught others, building on what they learned from John to become academic leaders in our specialty and changing the practice of obstetrics through their work.

John wrote the first book on obstetrical ultrasound imaging, *Ultrasoundography in Obstetrics and Gynecology*, with Fred Winsberg (Figure 1); he is a recipient of the Joseph Bolivar DeLee Humanitarian Award from the University of Chicago, and he is the first among his peers in the United States to have received the 1995 Ian Donald Gold Medal in recognition of his work as a scientist, teacher, leader, and humanitarian in the field of ultrasound imaging in obstetrics and gynecology.

A New Yorker at heart

John’s roots are European. His grandparents were immigrants: maternal, from Switzerland and France; paternal, from England and Scotland. John’s mother grew up dirt poor and fatherless in a small French enclave in Louisville, Ohio. His father, born in Niles, Ohio, was a commercial artist who served on the front line during World War I, where he sketched soldiers in battle, many of which John has kept. On his return from the war, John’s father moved to New York City, where he attended the Art Students League in Manhattan, was hired by an advertising agency, and became an art director at the Anaconda Cooper Company.

John, a New Yorker through and through, went to school in Port Washington on the North Shore of Long Island and attended Hamilton College in upstate New York and medical school at New York Medical College.

Internship, tour of duty, residency, and faculty positions at Yale

At the end of his internship, John interviewed with Lee Buxton, Chairman of Obstetrics and Gynecology at Yale University. The two hit it off, and John became one among the “galaxy of superstars” to train in the obstetrics and gynecology residency program. Leon Speroff was a senior resident when John was a junior resident. John says that Leon was a brilliant teacher who inspired him to pursue an academic career, and the pair went on to become best friends to the present day. After residency, John joined the United States Air Force on the “Berry Plan” (which allowed deferment of those completing a residency) and got lucky—he was assigned to the Otis Air Force Base on Cape Cod instead of Vietnam and spent two idyllic years commuting back and forth to the hospital on a scooter. Edward “Ted” Quilligan, during his term as Chair, was a mentor to John during his residency, and Nathan Kase was Chair when John returned to Yale as an instructor. John never looked back.

The beginning of ultrasound imaging in the United States

John first encountered ultrasound imaging as a resident at Yale. Ernest Kohorn, who had worked with Ian Donald, brought the technology to Yale. Ernest and John wrote about biparietal diameter measurements using A-mode ultrasound imaging (“A” refers to amplitude). John recalled that Dr Kohorn received funds from a grateful patient to purchase the next generation of scanners, known as a B-scanner (“B” refers to brightness). The machine sat in a dusty corner of the Department of Radiology; when John found it, he wheeled it over to the Department of Obstetrics where he began to scan his patients and teach himself about its physics and principles—really, inventing a new field. John said that he almost immediately realized the tremendous clinical potential of the technology. At the time, ultrasound imaging generated static pictures of limited quality; it took a lot of imagination
and knowledge of anatomy to figure out what the black and white lines represented.

John initially worked with a Picker ultrasound system manufactured in the United States (Picker Corporation, New York NY). He used the multi-joint compound contact scanner (Figure 2) from which the transducer could be positioned and moved over the scanning area by an operator. By mastering the equipment, John then built the first US biparietal diameter chart according to gestational age. He was also able to measure the abdominal circumference and develop a means of calculating estimated fetal weight by combining biparietal diameter and abdominal circumference. This innovation became the thesis topic of a Yale medical student, Steven Warsof, who is now a renowned maternal-fetal medicine academician at Eastern Virginia Medical School and who shared authorship with Parviz Gohari and Richard Berkowitz. This influential paper was published in the American Journal of Obstetrics & Gynecology and became the standard method to estimate fetal weight for many years.4

The static scanner allowed imaging of the entire uterine cavity, placenta, amniotic fluid, and fetus. Given that fetal growth restriction was associated with low fetal weight, oligohydramnios, and a smaller placenta, John thought that one of the ways forward to detect fetal growth restriction was to estimate the total intrauterine volume. Parviz Gohari became the first author of a paper also published in the American Journal of Obstetrics & Gynecology.5

Thus far, everything in ultrasound imaging was based on static images. The real quantum leap, John said, occurred with the development of real-time ultrasound imaging. John vividly remembered when a representative from ADR (Advanced Diagnostic Research, Tempe, AZ), Jim Binns, visited his office in New Haven to show him what looked like a suitcase. John recalled thinking that this would be a gimmick; however, as soon as he turned the machine on and saw the fetus moving, he exclaimed, “My God, I have to have that damn thing yesterday!” John went straight to a young administrator at Yale New Haven Hospital, Vince Conti, to tell him that he had seen the future and that he needed to have this piece of equipment. Vince asked John, “Do you REALLY think you need it?” After no more than a handshake, the machine was purchased; at the time, the cost was just $20,000 (Figures 3 and 4).

In John’s hands, numerous applications for ultrasound examination quickly followed: for the diagnoses of congenital anomalies and placenta previa, to guide the insertion of a needle into the fetal abdomen for intrauterine transfusion in cases of Rhesus sensitization, to perform an amniocentesis, among many others.

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Perhaps one of his less well-known contributions is that, before he went home every night, he rolled his precious ADR ultrasound system to Labor and Delivery just in case someone had a question. John’s openness is how residents, private attendings, and faculty members learned to use ultrasound imaging. Rather than locking the ultrasound unit in his laboratory, John encouraged its usage and assumed the risk for the transducer’s breakdown from time to time. This single decision, reflective of John’s generosity, is perhaps responsible for the rapid adoption of ultrasound imaging as a clinical tool by the obstetrics faculty and trainees at Yale. We all learned by doing; there were no books or courses at the time. However, John recognized the importance of teaching ultrasound imaging and organized the first courses of obstetric and gynecologic ultrasound imaging at Yale for both academic physicians and private practitioners. He arranged the courses to have a theoretic component in the morning and a practical hands-on session in the afternoon.

Ultrasound imaging for the diagnosis of fetal congenital anomalies
John saw that ultrasound imaging offered a detailed examination of fetal anatomy, thus the visualization and measurement of congenital anomalies. Previously, the inability to obtain a biparietal diameter resulted in only a hint to the presence of anencephaly, reported by Campbell et al in the United Kingdom. John and his coauthors reported the proficiency of ultrasound imaging for the diagnosis of several congenital anomalies. Over the course of a little more than two years, 2548 ultrasound examinations of high-risk patients were performed in John’s unit. Of those patients at risk because of a previous anomaly, 10 of 122 had a recurrent anomaly. His team concluded that ultrasound-derived information could be used to assess the risk of a recurrent anomaly and optimize the care of pregnant women who are diagnosed with congenital anomaly. This concept is the basis for the current practice of offering a midtrimester ultrasound scan to screen for congenital anomalies. Figure 5 shows a congenital diaphragmatic hernia that was diagnosed with the contact scanner and published in that seminal paper.

A flurry of activity followed, because ultrasound imaging was used to identify anomalies in virtually every organ system. For example, patients at risk for fetal skeletal dysplasias were referred to the unit for prenatal imaging. Supporting this preliminary work conducted by John and his key coinvestigator M. Jeremiah Mahoney was Edmund Crelin, Professor and Chair of Anatomy at Yale. “Ed, who was interested in short-limb dysplasias, gave Jeremiah and me permission to go off hours into his scary, poorly lit, morgue-ish lab deep in the bowels of the medical school with a fish tank and a portable (the ADR) ultrasound unit,” John said. “I remember scanning his fetal cadaver long bones under very creepy circumstances. I asked an engineer from the company what would happen if I, inadvertently, let the transducer fall into the water in the tank. He used one word — electrocution. I didn’t know whether he was joking....”
John further explained: “We went to the Anatomy Department to be sure that the hyperechogenic lines actually corresponded to fetal bones. Those who use ultrasound imaging today and are able to recognize the complexity of the fetal heart, thyroid, or the intraocular structures may not realize that there was a time when we were not sure if we were actually seeing fetal long bones reliably or knew how to standardize the measurement.” Soon, the diagnosis of osteogenesis imperfecta, thanatophoric dysplasia, and chondrodactyldermal dysplasia were reported from John’s unit. Some diagnoses (ie, Ellis van Creveld syndrome) rested on sonographic and fetoscopic findings: fetoscopy identified the ectodermal findings and polydactyly, because the latter could not be diagnosed with ultrasound imaging at that time.

Fetoscopy, fetal blood sampling, and prenatal diagnosis with fetal blood, a partnership with M. Jeremiah Mahoney

Further development of fetoscopy by John and Jeremiah, a pediatrician and Vice Chairman of the Department of Human Genetics at Yale, led to fetal blood sampling in utero for the prenatal diagnosis of hemoglobinopathies and other conditions, which included congenital infections, hemophilia, and other disorders. New Haven had become a destination for people from all over the world to observe John perform fetoscopy and fetal blood sampling. Among those who benefited from John’s generosity was Aris Antsaklis, who subsequently addressed the problem of thalassemia in Greece, as well as many others who are known to have founded centers of their own. The famous “Fetoscopy Group” continues to meet yearly to discuss issues in prenatal diagnosis.

John’s trainees

John held the position as the division director of Maternal-Fetal Medicine at Yale from 1976–1991. A prominent group of clinical fellows graduated from the program. Frank Chervenak, Professor and Chair at Cornell, hosted a special event at the Cornell Club to celebrate John’s accomplishments on the occasion of the Annual Congress of the International Society of Ultrasound in Obstetrics and Gynecology (Figure 6).

Gianluigi Pilu was a visitor/trainee who has become one of the most productive people in the field of ultrasound imaging. “When our family traveled to Bologna in 1982, he was the very young guy assigned to make our family comfortable on our sabbatical,” John said. “We could tell immediately that he was something special.”

Beyond the formal maternal-fetal medicine fellowship training, there was an extraordinary group of individuals who trained in ultrasound imaging in John’s unit: Philippe Jeanty, Gianluigi Pilu, Moshe Mazor, Albert Reece, Frank Chervenak, Charly Lockwood, Hung Winn, Khalil Tabsh, Sigi Rotmensch, Enrique Oyarzun, Mohammed Emamian, Jorge Andres Robert, Angela Scioscia, Alfred Abuhamad, Ray Bahado-Singh, Zion Hagay, Mary D’Alton, Antonella Perolo, Macor Wan, and Bo Hyun Yoon. John’s trainees have gone on to become leaders in obstetrics and gynecology, and in medicine, occupying such positions as Deans of Schools of Medicine, Associate Deans, Chairs of Departments in the United States and abroad, leaders at the National Institutes of Health, and Division Heads of Maternal-Fetal Medicine, among others, and have been recognized as outstanding leaders in their own right.

“Larry Platt and I have happily worked together on various projects over the years,” John also recalled. “Larry, Jim Binns, and I established the Gottesfeld-Hohler Memorial Foundation (GoHo) many years ago to provide fora for ultrasound imaging education. One of GoHo’s (Larry, John, and Josh Copel) biggest triumphs was to recently organize an international think tank in June for discussion about how to deal with Zika and its effect on the fetal central nervous system. We’ve just submitted the summary for publication.”

Importance of ultrasound imaging in labor

An early pioneer of ultrasound imaging in labor, John’s tutelage of one of his fellows, Phillippe Jeanty, led to the development of perineal ultrasound imaging to exclude placenta previa, its use progressed from there to measuring the station of the head in labor, detecting molding, and assessing the angle of progression as a prognostic factor for vaginal delivery. The latter work was done with Antonio Barbera and was first published as an American College of Obstetricians and Gynecologists video. Intrapartum sonography is an emerging field, because it is becoming increasingly clear that ultrasound imaging can help identify the patient who would have a difficult operative vaginal delivery.

Transvaginal ultrasound imaging

E. Albert Reece had the original idea to develop transvaginal ultrasound imaging. Al and John worked with ATL
Ultrasound Inc. (Bothell WA), a US manufacturer of ultrasound diagnostics systems, to develop a vaginal probe prototype; however, the company used a 2.5 MHz transducer, and visualization was not adequate. Then, Ilan Timor-Tritsch, working with the Elcin Company in Israel, used a high-frequency transducer that established vaginal ultrasound imaging as a standard tool in obstetrics and gynecology.

Fetal echocardiography
John published one of the first articles on fetal echocardiography in partnership with Charlie Kleinman, a leading pediatric cardiologist and fellow recipient of the Ian Donald Gold Medal for his major contributions to the study of the fetal heart using ultrasound imaging. From this work emerged the contributions of Greggory DeVore and Joshua Copel, prominent investigators and leaders in fetal echocardiography. The team studied fetal cardiac anatomy, function, and the diagnosis/management of fetal arrhythmias.

Books
John and Fred Winsberg’s first book, which was devoted exclusively to obstetric and gynecologic ultrasound imaging, went into a second edition with Richard Berkowitz. John was subsequently an author of Prenatal Diagnosis of Congenital Anomalies (known the “red book,” Figure 7). With Al Reece, John edited the book Medicine of the Fetus and Mother, a comprehensive treatise of maternal-fetal medicine that has been very successful and is on its way to a third edition (Figure 8).

He takes particular pride in his most recent book—Obstetric Ultrasound: Artistry in Practice—a personal view of obstetrical ultrasound imaging. The last chapter of which contains what John regards as important information not only about how to run an ultrasound unit, what to think about while performing an ultrasound imaging, and how to be a physician, but also about how to deal with people.

A move to the University of Colorado—Denver as Head of Obstetrics and Maternal-Fetal Medicine
In 1991, John took a sabbatical year in Denver at the University of Colorado while Ronald Gibbs, renowned for his contributions to the field of infectious diseases in obstetrics and gynecology, was Chair of the Department. He recruited John to join the faculty as Professor and Chief of Obstetrics. In 2003, after more than 10 years in this role, John stepped down from the day-to-day responsibilities of leadership to...
establish a University of Colorado “outpost” for ultrasound imaging. Operating on a shoestring budget, John and Wayne Persutte renovated a unit that once housed an old casket factory in the all-brick, turn-of-the-century building and launched the Platte River Perinatal Center. Located in “Lodo,” the heart of downtown Denver, they gradually expanded the facility into a boutique center for high-risk patients. “Patients love it, and I went from being very happy to exquisitely happy, especially without the administrative challenges of being Chief of Obstetrics,” John said. “We’ve received a generous grant for a fetal growth restriction study from a grateful patient via the Perelman Family Foundation. I’m ecstatic with our findings so far.”

An eclectic life: cooking, music, sports
John had always loved cooking and took an interest in earnest during his sabbatical in Bologna, Italy, where he learned about Mediterranean cuisine. Every Thursday, John cooks lunch for the Platte River team. He promised never to repeat the same recipe; after preparation of nearly 100 recipes, he wrote his cookbook, Doc’s Happy Kitchen, of which he is very proud.

After his family moved to Port Washington on Long Island when he was a child, John’s interest in music grew. He began piano lessons at age 7 with his brother Jim’s friend, a Yale School of Music graduate, who Jim had met while in art school at Yale. Playing by ear came naturally to John, but for a time, classical piano training took a back seat to football.

Although he still listens to classical music, John plays jazz, moving from Dixieland to progressive jazz to pop. He usually plays at night before going to bed. What kind of music does he like best? John said he likes all music. He loves Eric Clapton, who he describes as a genius, and some of the newer bands his son listens to—such as the Tedeschi Trucks and the Main Squeeze.

John and his wife Susan, a nurse midwife, divide their time between Denver, Colorado, and Key West, Florida, where he can put into play his love of tennis and long-distance ocean swimming. John indulges all his many interests and retains the indefatigable spirit that has inspired so many. He is a “Giant” in Obstetrics and Gynecology not only for his original contributions, but also for pioneering the implementation of ultrasound imaging in routine obstetric and gynecologic practice, as well as for having
inspired and trained generations of leaders in our discipline. His charisma and contagious enthusiasm for all that ultrasound imaging can do have made him beloved throughout the world.

REFERENCES
SUPPLEMENTARY FIGURE 1
John looking at a Polaroid picture from the contact scanner in the 1970s

SUPPLEMENTARY FIGURE 2
John at a meeting in Italy with Professor Luciano Bovicelli of the University of Bologna, where John spent a sabbatical year and initiated a long-term collaboration

SUPPLEMENTARY FIGURE 3
John in Milan, Italy, at a conference on prenatal diagnosis
SUPPLEMENTARY FIGURE 4
A picnic at Yale with members of the Perinatal Unit; rain interrupted the event, but it was all taken in stride.

SUPPLEMENTARY FIGURE 5
John using the contact scanner in the 1970s.

SUPPLEMENTARY FIGURE 6
John in his office, relaxing between procedures.

SUPPLEMENTARY FIGURE 7
Medical intelligence article in the New England Journal of Medicine that described a method for obtaining fetal blood using the fetoscope.

The hand with the syringe is that of M. Jeremiah Mahoney (Department of Human Genetics, Pediatrics, Obstetrics and Gynecology at Yale).

SUPPLEMENTARY FIGURE 8
Event at the Cornell Club in 2002

L to R: Roberto Romero, Frank Chervenak (Professor and Chair at Cornell), John Hobbins, E. Albert Reece (Dean of the School of Medicine at the University of Maryland), and M. Jeremiah Mahoney (Department of Human Genetics, Pediatrics, Obstetrics and Gynecology at Yale).


SUPPLEMENTARY FIGURE 9
Playing the piano, International Society of Ultrasound in Obstetrics and Gynecology 2002

Picture by Ilan Timor-Tritsch: “To my all-time role model, John the Great, Ilan 2002 ISUOG.”

SUPPLEMENTARY FIGURE 10
John in action on the tennis court

SUPPLEMENTARY FIGURE 11
John’s latest book, *Doc’s Happy Kitchen*[^20]
