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Masters in ultrasound

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The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Our support includes access to fantastic facilities, study tools and career consultants, plus practical help to access everything from funding to childcare. Live Science is part of Future US Inc, an international media group and leading digital publisher. Visit our corporate site. © Future US, Inc. Full 7th Floor, 130 West 42nd Street, New York, NY 10036. For most women today, it's hard to imagine going through a pregnancy without having an ultrasound. But these iconic black-and-white images of a developing fetus, generated by the reflection of high frequency sound waves, have only been around since the mid-1950s.A new book explores the history of ultrasounds, in both their technical and social dimensions. In "Imaging and Imagining the Fetus: The Development of Obstetric Ultrasound" (The Johns Hopkins University Press, 2013), authors Malcolm Nicolson, a history of medicine professor at the University of Glasgow in Scotland, and engineer John Fleming look at how ultrasounds came into wide use, and why their images lie at the crossroads of several hotly debated issues today.When it was invented? You may like Ultrasound was first used for clinical purposes in 1956 in Glasgow. Obstetrician Ian Donald and engineer Tom Brown developed the first prototype systems based on an instrument used to detect industrial flaws in ships.They perfected its clinical use, and by the end of the 1950s, ultrasound was routinely used in Glasgow hospitals, Nicolson said. But it didn’t really take off in British hospitals until the 1970s, and it was well into the 1970s before it became widely used in American hospitals, he said. [Blossoming Body: 8 Odd Changes That Happen During Pregnancy]By the end of the 20th century, ultrasound imaging had become routine in maternity clinics throughout the developed world. The technology has undergone extensive development over the past 20 years, Nicolson told LiveScience, but "has probably reached more or less the pinnacle of its acuity."How does it work?Ultrasound imaging involves bouncing "ultrasonic" sound waves — above the audible range of human hearing — at body structures or tissues, and detecting the echoes that bounce back.Obstetric ultrasonography is used to image a human fetus inside its mother's womb. It's used to confirm a pregnancy, to identify the sex and number of fetuses and to detect fetal abnormalities such as microcephaly (an abnormally small head), absence of kidneys, and spinal problems.During a scan, ultrasound waves are aimed at a pregnant women's abdomen. Based on the angle of the beam, and the time it takes for echoes to return, an image of body structures inside the fetus can be generated.Early in the use of fetal ultrasound, clinicians could only detect the baby's head, Nicolson said. "But gradually, with developing expertise, they could discern fine structures in the fetus," he said.Is it safe?One of the main advantages of ultrasound is that it's noninvasive. The procedure has been safely performed on millions of pregnant women. Concerns about its safety have periodically surfaced, but Nicolson said he thinks these stem more from anxiety over the role of technology in pregnancy than from evidence of harm."We can be confident that at the levels currently used for clinical investigation, ultrasound is safe. No pattern of damage has been found," Nicolson said.However, at high power, ultrasound waves are able to damage human tissue. Researchers don't know exactly at what level this occurs, Nicolson said, adding that testing the threshold at which it becomes dangerous in humans would be unethical.He said that ultrasound scans should only be done for clinically justified reasons. For example, so-called "bonding scans," images taken purely for commemorative purposes, unnecessarily expose a fetus to the high-energy sound waves, Nicolson said.What's the emotional impact? Ultrasound has enjoyed an enthusiastic reception by pregnant women. In addition to revealing the baby's health, the images themselves provide a keepsake. "Overwhelmingly, pregnant women expect to be scanned, and are moved and excited by seeing the fetus," Nicolson said — especially if the baby moves. In fact, Nicolson said, some women report not feeling pregnant until they've seen the ultrasound image.Seeing a developing fetus has a humanizing effect, too. Donald, the physician who helped develop the technology, was a devout High Anglican, and knew the images carried moral significance for women contemplating having an abortion.Are there social implications?Ultrasound images sometimes play a role in decisions to maintain or terminate a pregnancy. Anti-abortion proponents take ultrasound images as proof that a fetus is fully alive and therefore should not be aborted.On the other hand, ultrasound can be used to diagnose potentially fatal or debilitating abnormalities in the fetus, which can encourage termination of the pregnancy.In some East Asian countries, ultrasound is used to detect the sex of the baby expressly so that a fetus of less desirable sex (usually female) can be aborted, Nicolson said. He called the practice "unfortunate and worrying."Still, anecdotal evidence suggests that if pregnant women see images of a fetus — especially their own — they are less likely to terminate a pregnancy, Nicolson said."The realm of human reproduction is an area that is contested, and bound to be emotive," Nicolson said.Follow Tanya Lewis on Twitter and Google+. Follow us @livescience, Facebook & Google+. Original article on Live Science.Editor's note: This article was updated on August 3, 2022 by Live Science contributor Alice Ball following the Supreme Court's decision to overturn Roe v. Wade on June 24, 2022. This decision eliminated the constitutional right to abortion that was established by the 1973 court case and later affirmed by a 1992 case called Planned Parenthood of Southeastern Pennsylvania v. Casey. Get the world’s most fascinating discoveries delivered straight to your inbox. No results were found You will be able to select from a number of clinical options including obstetrics, gynaecology and / or abdominal ultrasound.Additional clinical areas can be studied via work-based learning modules, if appropriate clinical support is available within the students' clinical department.The course is also designed to develop transferable skills to support clinical practice development.MSc ModulesStudents undertake the compulsory modules RDM033 (ultrasound physics) and RCM022 (Developing Professional Skills in Ultrasound).Those progressing to MSc must take either a 15 or 30 credit research methods module.Students take clinical modules to the value of 75 credits (60 if the 30 credit research methods module is chosen) and a 60 credit dissertation module.PGDip ModulesStudents undertake the compulsory modules RDM033 (ultrasound physics) and RCM022 (Developing Professional Skills in Ultrasound) and clinical modules to the value of 90 M level credits.Example module choices for a typical PGDip: 30 credit Obstetric module, 15 credit Gynaecology module, 30 credit Abdominal module and 15 credit Work Based Learning module.PGCert ModulesStudents undertake the compulsory modules RDM033 (ultrasound physics) and RCM022 (Developing Professional Skills in Ultrasound) and clinical modules to the value of 30 M level credits.Example module choices for a typical PGCert: 15 credit Gynaecology module, 15 credit Early Pregnancy Work Based Learning module30 credit Abdominal or Obstetric module.PGCert + 15 credits ModulesStudents undertake the compulsory modules RDM033 (ultrasound physics) and RCM022 (Developing Professional Skills in Ultrasound) and clinical modules to the value of 45 M level credits.Example module choices for a typical PGCert = 15: 15 credit Gynaecology module,30 credit Abdominal or Obstetric module.Some modules on this course are also available as Continuing Professional Development (CPD) short courses. Where this is available, links are provided within the module descriptions below. No assets were found under #686015. Programme specification The programme specification contains more information on how the course is organised, the requirements for progression for each part and credits required for awards. Download course specification: PSMULT-MSc-Medical-Ultrasound.pdf An Overview of Ultrasound History and Discovery The technology used in medical ultrasound is continuously evolving and currently contributing to important improvments in patient diagnosis and treatment. The science and technologies employed in sonography have a long and interesting history. This story begins with the women and men (and yes animals) from across the world who have contributed to the evolution of ultrasound over the past 225+ years. Let’s take a look back at the history of ultrasound and learn how the use of sound waves as a diagnostic tool made their way into clinics and hospitals across the globe. Echolocation and Ultrasound’s Early Beginnings Lazzaro Spallanzani Many ask, who invented the ultrasound? Italian biologist, Lazzaro Spallanzani is most often credited person for discovering ultrasonography. Lazzaro Spallanzani (1729-1799) was a physiologist, professor and priest who carried out numerous experiments that led to great insights in human and animal biology. In 1794 Spallanzani performed studies on bats that concluded that they could navigate using sound rather than sight. This is now known as echolocation where locations are determined or identified through sound waves being reflected or bounced back from objects in an environment. These same principles are how medical ultrasound technology functions today. RELATED: 7 Female Pioneers in Medical Imaging Ultrasound is characterized as sound waves with a frequency higher than what is audible to the human ear. “The first detailed experiments that indicated that non-audible sound might exist were performed on bats by Lazzaro Spallanzani,” states D. Kane, W. Grassi, R. Sturrock, P. V. Balint; A brief history of musculoskeletal ultrasound: ‘From bats and ships to babies and hips’, Rheumatology, Volume 43, Issue 7, 1 July 2004. What is Echolocation? We can find several additional examples of echolocation in nature. Echolocation pulses are short bursts of sound at frequencies that span from about 1,000 hertz in birds to at more than 200,000 hertz in whales. Early Experiments in Ultrasound Gerald Neuweiler, in his book The Biology of Bats, describes how Spallanzani brought owls into his lab and observed that they would not fly around the room if there was no source of light. “When he repeated the same experiment using bats, these small mammals flew confidently around the bishop’s study, even in total darkness, managing to avoid the wires that Spallanzani had hung from the ceiling,” wrote Neuweiler. Neuweiler adds that the Italian scientist even blinded the bats by burning them with a “red-hot needle” and still they were able to avoid the wires. Spallanzani knew this because bells were attached to the ends of the wires. The physiologist gained insight that the bats were relying on the sense of sound for navigation because when he placed closed brass tubes inside the mammals’ ears, they could not navigate the room properly and would fly into the wires. Although he did not know that the bats were emitting their own sound for orientation, sound higher than he or any human would be able to hear, Spallanzani was able to conclude that the creatures were using their ears to navigate their environment. Medicine Benefits from Developments in Ultrasound As time passed, others continued to build on Spallanzani’s work. It was in 1942 that Neurologist Karl Dussik is credited with being the first to use ultrasonic waves as a diagnostic tool. He transmitted an ultrasound beam through the human skull in attempts of detecting brain tumors. This is still very early in the history of diagnostic medical sonography, but it was clear that this noninvasive technology had tremendous possibility. Ultrasound technology and its application in healthcare have continued to mature. The advancement of tools and refinement of procedures are happening everyday. Most recently, smaller portable scanners have become more widespread, and have helped further integrate the use of ultrasound in more areas and stages of patient care. Ultrasound History Timeline Here’s a look back at some of the key milestones in the development and history of ultrasound technology. Date Historical Achievement or Event 1794 Physiologist Lazzaro Spallanzani was the first to study echolocation among bats, which forms the basis for ultrasound physics. 1877 Brothers Pierre and Jacques Currie discover piezoelectricity. Ultrasound transducers (probes) emit and receive sound waves by way of the piezoelectric effect. 1915 Inspired by the sinking of the Titanic, Physicist Paul Langevin was commissioned to invent a device that detected objects at the bottom of the sea. Laugevin invented a hydrophone – what the World Congress Ultrasound in Medical Education refers to as the “first transducer”. 1920s-1940s Sonography was used to treat members of European soccer teams as a form of physical therapy, to appease arthritic pain and eczema and to sterilize vaccines, states Joan Baker who holds several ARDMS ultrasound certifications. 1942 Neurologist Karl Dussik is credited with being the first to use sonography for medical diagnoses. He transmitted an ultrasound beam through the human skull in attempts of detecting brain tumors. 1948 George D. Ludwig, M.D., an Internist at the Naval Medical Research Institute, developed A-mode ultrasound equipment to detect gallstones. 1949-1951 Douglas Howry and Joseph Holmes, from the University of Colorado, were some of the leading pioneers of B-mode ultrasound equipment, including the 2D B-mode linear compound scanner. John Reid and John Wild invented a handheld B-mode device to detect breast tumors. 1953 Physician Inge Edler and Engineer C. Hellmuth Hertz performed the first successful echocardiogram by employing an echo test control device from a Siemens shipyard. 1958 Dr. Ian Donald incorporated ultrasound into the OB/GYN field of medicine. 1966 Don Baker, Dennis Watkins, and John Reid designed pulsed Doppler ultrasound technology; their developments led to imaging blood flow in various layers of the heart. 1970s The 1970s saw many developments including the continuous wave Doppler, spectral wave Doppler and color Doppler ultrasound instruments. 1980s Kazunori Baba of the University of Tokyo developed 3D ultrasound technology and captured three-dimensional images of a fetus in 1986. 1989 Professor Daniel Lichtenstein began incorporating lung and general sonography in intensive care units. 1990s Starting in the 1980s, ultrasound technology became more sophisticated with improved image quality and 3D imaging capabilities. These improvements continued into the 1990s with the adoption of 4D (real time) capabilities. Ultrasound guided biopsies (endoscopic ultrasounds) also began in the 1990s. 2000s – present Just like personal communication devices are continuously evolving and becoming more convenient, so are ultrasound technologies. A variety of compact, handheld devices have come onto the market in recent years. The iPhone now has a telesonography app and NASA has developed a virtual guidance program for non-sonographers to perform ultrasounds in space. History of Sonography in Obstetrics and Gynaecology In our current culture, ultrasounds might best known for their use during pregnancy to produce a sonogram, a visual image produced from an ultrasound examination. Within the larger ultrasound family of specializations, Obstetrics and Gynaecology have seen some important historical moments as well. You’ll find some of the more notable developments in the OB/GYN specialization below. Date Historical Event 1958 This year marked the publication of the first paper in Obstetric Ultrasound “Investigation Of Abdominal Masses By Pulsed Ultrasound” by Ian Donald, M.B.E., B.A. Cape Town, M.D. Lond., F.R.F.P.S., F.R.C.O.G. J Macvicar, M.B. Glasg., M.R.C.O.G. T.G Brown. This study marked the first ultrasound image of a fetal head. 1962 – late 1960’s George Kossoff of Australia engineers the Octason static scanner. The Octason mark 2 images allow us to see detailed fetal anatomy, and marks an important time in the development of ultrasound. 1970’s Advancements in sonography equipment and techniques progressed throughout the late 1960’s and into the 1970’s. Methods to determine the fetal biometry and fetal abnormalities continued to advance and be refined with the adaption and replacement of various techniques. 1983 Sam Maslak develops a machine that sets new standards in both spatial and contrast resolution. If you would like to become a part of this evolving field, you can complete a degree at one of the numerous ultrasound schools across the country. Please note applications for September 2025/26 entry are now open. Please apply directly through this course page. Both Home and International students will be eligible to apply; however, we are only accepting applications from students who have secured suitable NHS placements prior to applicationThe MSc in Clinical Ultrasound provides a contemporary research-enhanced curriculum with a minimum of 800 hours of professional practice experience and an accelerated route into the profession. It is an ideal study pathway for trainee sonographers and existing Healthcare Professionals wishing to achieve excellence in all aspects of clinical ultrasound practice. The programme has a strong emphasis on the development of professional skills for effective communication, evidence-based practice, and leadership in healthcare, alongside promoting a systematic understanding of the core principles underpinning ultrasound practice to guide image optimisation and clinical reasoning. Entry at PG Cert level is suitable for healthcare professionals learning ultrasound for the first time. This 1-year part-time PG Cert focuses on understanding the science and technology underpinning ultrasound examinations and supports students in gaining clinical proficiency in General Medical Ultrasound, Obstetrics and Gynaecology Ultrasound, or Specialist Ultrasound Practice (e.g. Point-of-Care, Gynaecology, Musculoskeletal, or Vascular Ultrasound). On completion of the PG Cert, graduates will be able to practice ultrasound independently (although a 3-month preceptorship period is recommended). Entry at PG Dip level is aimed at existing PG Cert-qualified ultrasound practitioners who wish to extend their clinical and professional training through a second year of part-time study. The PG Dip year emphasises the importance of improving the delivery of ultrasound services through education, leadership, and research. The 1-year part-time MSc dissertation is aimed at existing PG Dip qualified ultrasound practitioners. Academic support is provided for completing a Clinical Ultrasound research project to publication standard. If you are an early career registrant you may be eligible to apply for top-up funding to complete the MSc dissertation though an NIHR INSIGHT award: for September 2025 will open 1st April 2025. The final application deadlines for this programme are: Overseas (international) fee status: 25 July 2025 (23:59 UK time) Home fee status: 25 August 2025 (23:59 UK time) Both Home and International students will be eligible to apply; however, we are only accepting applications from students who have secured suitable NHS placements prior to application. If high numbers of applications are received, we may close the application before the advertised closing date. If you are interested and you meet the academic and placement requirements, we recommend that you submit your application as soon as possible as we may need to request further information from you to assess your application. The figures above don't include accommodation and living costs. Tuition fees are set annually and are subject to review each year. The University may therefore raise tuition fees in the second or subsequent years of a course, in line with inflation and/or the maximum permitted by law or Government policy. Students will be notified of any changes as soon as possible. There will be some additional costs associated with the course including stationery, textbooks, field trips and membership fees although some of these features are optional. Books are reviewed annually and are therefore subject to change, course welcome information will provide you with an indicative list for the year.There will be some additional costs. For example all students will need to purchase stationery and may wish to purchase some text books. Extra costs may also be applicable to cover field trips, membership fees etc. although such features are usually options within the course. Books are reviewed annually and are therefore subject to change, course welcome information will provide you with an indicative list for the year. Books and JournalsReading lists are reviewed annually and are therefore subject to change, course welcome information will provide you with an indicative reading list for the year via the student hub (OneList). The university holds copies of core texts (including some as ebooks, which are accessible online). Some students may wish to spend approximately £100-£200 on purchasing their own copies of certain text books and scripts although this cost can be reduced considerably by sourcing second hand copies of these resources. Below are some of the ‘set texts’ which you may wish to purchase for core modules: Hoskins, P., Martin, K. and Thrush, A. (2010) Diagnostic Ultrasound: Physics and Equipment. (2nd edn.) Cambridge: Cambridge University Press. Gibbs, V., Cole, D. and Sassano, A. (2009) Ultrasound Physics and Technology: How, Why and When. (2nd edn.) London: Churchill Livingstone. Herring J. (2014) Medical Law and Ethics. Oxford University Press StationeryStudents should budget for stationery and consumables for your own personal use. This should include notebooks, pens and pencils for taking notes in class and/or in the field. Students should also budget for the purchase of USB pen drives, as well as occasional printing and photocopying costs incurred in the preparation or submission of coursework. Whilst you will choose how much you need, expect to pay around £30 - £40 per year for these items. Clothing and EquipmentFull time students are required to wear a uniform whilst on clinical placement which is fully provided by the university. This includes tunics and plain black trousers. Any additional or replacement items are funded by the student dependant on the reasons for replacement. (see PU Uniform Policy). Footwear is not included and must be purchased by the student. Sensible, plain black, comfortable and supportive flat footwear is suggested but you will be further advised on this subject by uniform policy from the Trust you are allocated to. Students should budget approximately £40 or more for footwear but be realistic about replacing this over the 3 years. You may also wish to purchase different footwear to use in the hospital theatre environment (if required). OtherFull-time students will be expected to incur all travel and any potential accommodation costs which are required to attend allocated placement sites and university academic blocks, as well as any required university campus attendance such as examinations and assessments. Any costs associated with elective placement activity is incurred by the student.