This is Dr. David Bluemke in Madison, Wisconsin. I’m the Editor of the journal Radiology. This is part two of our November, 2019 podcast. The goal of these podcasts is to present a brief summary of key research in our field to keep you up-to-date. Today four topics; a discussion with Dr. Perry Pickhardt, monoenergetic CT, ethics of AI in radiology, and a consensus statement on adnexal cyst management. One brief note, the November issue has a few topics we’ll not have time to cover today, but you might need to know. From the group at Brigham and Women’s in Boston, a report on ground glass nodules and part solid nodule. In this report, nodules in Lung-RADS 2 and 3 the rates of malignancy were three and thirteen percent. This is three to four times greater than previously thought. From Dr. Linda Moy at NYU and her colleagues, an article that has received a lot of attention, a review about applications of AI for evaluation of breast cancer. Next, on to our podcast topics for November.

Automated Liver Fat Quantification at Nonenhanced Abdominal CT for Population-based Steatosis Assessment
Radiology 2019; 293:334–342
Peter M. Graffy, BA, MPH • Veit Sandfort, MD • Ronald M. Summers, MD, PhD • Perry J. Pickhardt, MD

To start today we have a special guest; our senior author for today's first new research topic. The title of the new report Automated Liver Fat Quantification at Nonenhanced Abdominal CT for Population-based Steatosis Assessment. The first author Dr. Peter Graffy, the senior author Dr. Perry Pickhardt, Professor of Radiology at the University of Wisconsin, Madison. Dr. Pickhardt, Perry, welcome to our podcast.

Perry J. Pickhardt Thank you. It’s a pleasure to join you.

DAB My brief introduction of Dr. Pickhardt for listeners, Dr. Pickhardt is probably the one radiologist whose work led most directly to clinical use of CT colonography and I don’t mean to exclude contributions of many others in the field. Lots of radiologists helped develop this even while Perry was still a radiology resident. But before Perry, CT colonography was not a clinical test. There were more failures than successes. After Dr. Pickhardt started, critical software improvements, new clinical trial data, a key publication in New England Journal of Medicine that changed the game for radiologists. So many places we could begin, but for starters Perry let’s go all the way back. Like me, you started your undergraduate work at UW-Madison majoring in Physics with a 4.0 grade point average. Then what happened from budding physicist to medical student at University of Michigan? How did that happen?

PJP Well toward the end of my undergraduate experience I started taking some classes in medical physics which, as you know, has a very rich history at the UW. I became fascinated with not only medical image creation, but also the desire to be the one interpreting the images and solving the mysteries if you will which led to my switch from a planned career in physics to one in medicine and specifically in radiology.

DAB Okay so going from equations, problem solving learning principles, what was it like to transition from physics to medicine? Did you take to it right away?

PJP Well I agree it was quite an abrupt turn to go from math heavy theoretical work to largely rote memorization, but I actually feel like I took the easy way out in some ways. I have a lot of respect for true scientists and hardcore research which generally requires a lot of deep thought.

DAB Okay so you decided on Radiology, you trained at Mallinckrodt at Washington University, St. Louis. And then after residency on to the military where you did some spectacular work we’re just going to get to in a few moments. I’ve worked with a lot of military staff over the years, but I’ve not seen remarkable achievements in such a short time that you accomplished. And I’m wondering how did you do all of that? Was I something about your training at Mallinckrodt or your military experiences or just your personal DNA that sort of sets you apart?

PJP I think my residency experience at Mallinckrodt reinforced a strong work ethic and instilled a love for clinical research which continues to this day for me. In terms of military medicine, it can actually provide for some very unique opportunities for rapid advancement if you’re willing to be very proactive and vigilant.

DAB Yeah and a little bit complicated at times. You got sent to Guantanamo Bay, Cuba, Guantanamo was made known to me and civilians in the United States after 9/11/2001 holding prisoners during the war on terror, but you there just before the storm from 1999 to 2000. What was your experience there?

PJP Well in retrospect they probably didn’t need me there at all and it actually kept me from going to Duke for a planned abdominal imaging fellowship. In fact I was one of the last radiologists to be stationed at Guantanamo Bay as the radiology work there now is supported remotely by tele-medicine.

DAB Okay and one of the biggest events in your career then looks to be your transfer to Naval Bethesda Hospital in Maryland. This is located across the street from the NIH and there you were involved in a critical clinical trial very early in your career as an assistant professor. The Department of Defense study to evaluate CT colonography in about 1,200 patients. Your study set the tone for many GI radiologists after you published the results in New England Journal of Medicine in 2003. I really can’t think of any other assistant professor radiologist who became so influential in the field so quickly. Can you tell us just a bit about the trial and how you came to play such a major role?

PJP Well as I alluded to, the military can provide for some unique opportunities and case in point, one year out from residency and without a fellowship under my belt, I had situated myself and the PI of a multi-million dollar multi-center prospective trial. I wasn’t really inherently interested in CTC at the outset of this, but when I saw that opportunity I felt I really had to pursue it.

DAB Right. Opportunity, timing is everything. Whatever comes up take that opportunity. Really successful people seem to be luck again and again. The right place at the right time. But I think it’s more than luck.
To paraphrase Louis Pasteur I think opportunity favors the prepared and motivated.

Okay. Would you just take a moment to summarize your New England Journal Medicine publication on CT colonography? It's still a landmark research study cited over 1,300 times; a clinical trial comparing about 1,200 patients who had both conventional colonoscopy and CT colonography. What should we remember about the results of that trial?

In a head-to-head screening comparison, CTC essentially matched or exceeded optical colonoscopy for detecting the most clinically relevant colorectal lesions that are large, pre-cancerous adenomas and cancers. Large adenomas are found in about five present of adults or about 1 in 20, and CTC detected 92 percent of these compared with 88 percent for colonoscopy. Now cancers are found only about once per 500 adults, but CTC found both of these and colonoscopy missed one in the trial. In addition, CTC detected a number of cancers outside of the colon and had no complications. Whereas colonoscopy which is a colon only test, had seven colonic perforations in this cohort of 1,233 adults.

One in 500 patients has a cancer, that's even lower than the screening rate for mammography. That's two or three per 500. Surprising number of colonic perfs; seven out of 1233. So Perry, you accomplish a huge, impactful clinical trial as on an assistant professor in the military, then you came back to UW Madison on staff in 2003. What brought you back to UW Madison at that time leaving the military after having so much success?

Well I'm grateful for the early career opportunities that the Navy afforded me. I think I ultimately needed to return to a more academic environment for the ensuing phases of my career.

So fast forward to 2014, I invited you to give the grand rounds at the NIH for the entire NIH campus. You gave a great overview of the development and the rationale for doing CT colons. Your video is on-line if listeners want to review it. Google search Perry Pickhardt NIH lecture. Any thoughts on that lecture?

That lecture was a great experience for me, a really nice way to culminate a decade of CTC research and clinical implementation. And since then my focus has largely moved from beyond the colon.

It was really a nice lecture. Very motivating. And to switch gears then your most recent work. You call it opportunistic screening using CT. What's opportunistic screening and how does it differ from incident abnormalities on CT?

I like to think of opportunistic screening as the positive side of CT additional imaging findings which are incidental to the clinical indication, whereas incidentalomas have had a more negative connotation. In essence, it's the notion of leveraging data present within all abdominal CT scans, but which are seldom utilized in current practice.

So opportunistic information already there used like calcium scores of the heart used to be. What information from the CT is likely to give you the biggest gain?

I would say that opportunistic osteoporosis screening using CT based bone mineral density measurements is the most mature of these areas, perhaps followed by quantification of abdominal aortic calcium for cardiovascular risk profiling and muscle assessment for sarcopenia assessment. As you know, osteoporosis is a major public health issue and remains under diagnosed and under treated.

And great treatments already available which is a big factor. Now in your current publication, you focus on fat in the liver. You want to diagnose non-alcoholic fatty liver disease or NAFLD. How and why do you make that diagnosis?

Non-alcoholic fatty liver disease, or NAFLD as I call it, is a highly prevalent condition. It's affecting around half of the general adult population in fact. While ultrasound can subjectively assess for fatty liver or steatosis, CT and MR can go further and quantify the fat content. In relative work, we previously have shown that there is a linear correlation between non-contrast CT attenuation and MR PDFF or proton density fat fraction, the current clinical standard. Mild steatosis is typically defined as at least five percent fat fraction by MR PDFF; which corresponds to about 57 Hounsfield units at CT when scanned at 120 kV. There's a fair amount of measurement noise at these low fat levels so I generally focus reporting on more moderate or severe levels of steatosis which corresponds to about 40 to 45 Hounsfield units or lower and this in turn corresponds to a 15 percent MR proton density fat fraction. Interesting, histopathology from liver biopsy provides only a crude estimate of liver fat content which is based on subjective visual assessment by the pathologist. They define mild and moderate steatosis as lipid droplets in five percent and 30 percent of hepatocytes respectively and note that this scale is different from the more objective MR and CT quantification. On a portal venous contrast enhanced CT, we need to compare against the spleen where a liver density of about 20 Hounsfield units less than the spleen corresponds to moderate steatosis, but unenhanced CT is more accurate.

And non-alcoholic fatty liver disease can lead to NASH, non-alcoholic steatohepatitis. NASH is associated with liver inflammation that can ultimately lead to fibrosis and cirrhosis. What do you tell patients about fatty liver?

As we've already discussed, NAFLD is a highly prevalent clinical condition, but the actual implications are uncertain at the individual patient level. The actual risk of liver progression from benign steatosis all the way to cirrhosis is actually extremely low, certainly less than one percent, but it's actually the metabolic syndrome associated cardiovascular complications such as myocardial infarction that are much more relevant. I would say the first line therapy should simply be lifestyle modification including diet and exercise. We simply can't refer over 100 million people in the US to a hepatologist especially given the low risk for actual liver progression. However, one thing is becoming clear, and that is for liver related mortality from cirrhosis and hepatocellular carcinoma, it is really only the presence of fibrosis and not inflammation or NASH that appears to matter. Fortunately, we can readily detect advanced fibrosis and cirrhosis on both MR and CT and we published a number of recent papers on CT detection of hepatic fibrosis.

So for me to measure fatty liver, I put a region of interest in the right lobe of the liver on non-contrast CT, not hard to do. But in this study you made the extra effort. You used AI. What's the underlying reason for using AI for this?

This automation allows for both scale and objectivity allowing for rapid and consistent results which could be available to the radiologist when the study is first opened, and it also allows for much larger population based research and for objective longitudinal assessment over time.

Yes population research or even automatically calculating liver fat for anyone in your hospital whoever had a CT of the abdomen, then look at their outcomes in ten years. Let's conclude with points about the article. The aim: use AI to detect non-alcoholic fatty liver disease. Using AI derive a CT fat fraction. Fatty liver was more than five percent fat. What are some other key results of this study?

First of all our study directly confirms how prevalent non-alcoholic fatty liver disease is amongst otherwise healthy, asymptomatic adults effecting just over fifty percent of all patients. Ten percent had moderate or severe levels of steatosis. Secondly, the automated volumetric results matched very
well with manual measures and could be useful at both the individual and population levels. And finally, we found that liver fat content was only weakly correlated with BMI or body mass index as well as age and gender; meaning that imaging is generally required to diagnose this non-alcoholic fatty liver disease. This also allows us to gain more insight into the metabolic syndrome.

DAB And to follow-up on that point, if a patient is obese or has a high body mass index, apparently that’s not good enough. We can’t just weigh the patient, put them on a scale, isn’t that good enough to detect bad health habits, fatty liver?

DAB As mentioned, BMI does not predict liver fat very well nor does it predict aortic calcification or the amount of visceral fat. You simply can’t judge a book by its cover when it comes to liver fat content and these other important measures. CT can provide all of these tissue measures that are highly relevant to the metabolic syndrome and general health and can do so in an opportunistic fashion.

DAB Perry I can’t thank you enough for discussing this topic with us. I know you have to get back to the hospital to read a few dozen cases this afternoon, but any other final thoughts on this topic? These AI tools are just one small piece of the puzzle. Seems like it would be nice to get an automated tool for every one of these measurements that we need to make. What’s your take on AI putting us out of business?

PJP Well I completely agree that CT scans are data rich and readily malleable using AI. Along with my NIH based collaborator Ron Summers, we are working towards a full cardiac metabolic panel of CT based opportunistic measures which we believe will have tremendous prognostic value. This will only enhance our ability to provide good patient care.

DAB Okay, once again thank you so much for your insights on this topic and congratulations on your major contributions to our field.

PJP Thank you very much for the opportunity to chat. Although we currently label much of this work as opportunistic and incidental to the scanning indication, I believe there may come a day where a virtual physical exam using CT is a clinical reality that goes beyond just opportunistic additive value to what we already do.

Review of Clinical Applications for Virtual Monoenergetic Dual-Energy CT
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Moritz H. Albrecht, MD • Thomas J. Vogl, MD • Simon S. Martin, MD • John W. Nance, MD • Taylor M. Duguay, BS • Julian L. Wichmann, MD • Carlo N. De Cecco, MD, PhD • Akos Varga-Szemes, MD, PhD • Marly van Assen, MS • Christian Tesche, MD • U. Joseph Schoepf, MD

David A. Bluemke, MD, PhD The next article, a state of the art review. The title is Review of Clinical Applications for Virtual Monoenergetic Dual-Energy CT. The first author Dr. Moritz Albrecht; the senior author Dr. Joe Schoepf. The authors are from the Medical University of South Carolina. Many listeners have probably heard lectures from Dr. Schoepf at the RSNA or other meetings especially on cardiovascular CT. His lectures are great to listen to. He tells you what you need to know when, how, any why. Very to the point lectures. He has an extraordinary well of experience having published more than 500 scientific articles. If I can be half as clear of Dr. Schoepf in this podcast, well then I’ve made some progress. But let’s start. Background: If you are a CT guru you can skip the background. If you just completed your board exams, you too probably can skip the background. But after you start ready 50 to 100 CT studies a day, the physics of making a CT image is not an upfront issue. But the CT scanners are becoming almost as complex as MRI scanners. I recently was able to do research on a next generation CT scanner. That devise had a combination of more than one million settings, but not today, a brief review of CT. 1973, Sir Godfrey Hounsfield, we named the density units on CT as Hounsfield units after Sir Godfrey of course. He was studying iodine and calcium on CT. Both are dense. But Sir Godfrey figured out a way to determine which bright spots were calcium and which were iodine. Well that’s very useful. It’s what we do all day almost in CT, try to distinguish which bright densities are due to extravasated contrast, which lesions are calcified and so on. Sir Godfrey Hounsfield’s method was to get at least two images; one CT at high energy, one at low energy. This was the beginning of dual energy CT. Next, can you name the three ways to do dual energy CT today on a modern scanner? Number one, the first and oldest approach, it’s called rapid kilovolt switching or rapid kV switching. Voltage, that’s the difference in energy between the anode and cathode of the x-ray tube. To make an x-ray we take a beam of electrons, the source of the electrons is the cathode. They get aimed at the anode. It’s like a little electron beam gun. Electrons streaming towards the anode made of tungsten. Most of that electron energy is wasted as heat, but about one percent of that energy is converted to an x-ray. If we have a higher difference in voltage between the cathode and the anode, the x-ray that results has higher energy. Rapid kV switching is simply that, the energy is switched very rapidly back and forth to high and low levels. This happens very, very rapidly remarkably changing every 5 milliseconds or so high then low. So fast that this can be done while the tube is rotating around the patient with no perceptible motion artifact. This approach is inexpensive and very effective used today by General Electric. Method two, instead of one x-ray source, Siemens has two x-ray tubes positioned at 90 degrees around the patient. One is high energy, the other low energy x-rays. In principle very simple, but it’s also very expensive. X-ray tubes can cost tens to hundreds of thousands of dollars on a modern CT. Method three used by Phillips, this one is harder to explain. Instead of talking about the x-ray energy, Phillips has changed the detector for the x-ray. The Phillips dual energy CT has a fancy detector. The top layer collects the low energy x-rays. The high energy x-rays pass through to the bottom layer where they get detected. So this scanner does dual energy by detecting the low and high energy photons separately. Okay I did not mention Cannon and Toshiba. You might have such a devise. How do they do dual energy? More of a simple approach, take two picture of the same patient. First, the x-ray tube rotates around the patient with the low energy. Then it does another complete circle around the patient with the x-ray tube at high energy. It works unless the patient moves or the heart moves or the vessels move. Just a few years ago this idea of getting two separate CT scans did not seem so smart, but there’s always a but, and now this approach is looking a little better. Why? Because we have artificial intelligence. Even if the patient moves a little bit the software, advanced AI, can figure out just how much the patient moved and match up the low and high energy scans, remove the motion artifact working most of the time. Now some questions and some answers. I’ve been asking the RSNA to get you CME for listening to these podcasts. Well, they’re still working on it but until then I have some practice CME based on this article by Dr. Schoepf. Question one: For years and years what was the traditional energy setting on your CT scanner? Answer: 120 kVp. When in doubt use 120 kVp. Questions two: If you want to image high density areas of the body like the skull, what kVp do you use? Answer: High kVp energy like 140 kVp. These x-rays have enough energy to penetrate all the way through the dense bone and not get stuck. If all of the x-rays get stuck in the body, then all we’ve accomplished is to irradiate the patient and cause some DNA damage without getting an image. Question three: What’s the...
difference between a photon and an x-ray? Answer: Hmm, well for our purposes, they’re the same. X-rays behave like little particles. We call those particles photons. But we know it’s more complicated. Those photons can also behave like sign waves with a frequency. I previously mentioned photon counting CT, a new type of CT scanner that’s still coming. That devise actually counts the x-ray photons when they hit the detector. Question four: Now it gets tricy. What’s the K-edge of iodine? Answer: What’s a K-edge anyway? Very simple concept. X-rays can interact with the electrons that are circulating around the nucleus of the iodine atom. The nucleus is the protons and neutrons. So a very neat thing, if I fire an x-ray at the iodine atom, that’s just above the binding energy of the electron of the inner-shell, then my x-rays gets absorbed by the photoelectric effect. The attenuation of the x-ray goes way up. Meaning the Hounsfield unit density of the electrons goes up. For iodine, this happens at 33 kiloelectron volts, keV, kilo-electron volts. That’s a pretty low voltage compared to the 120 kVp used by most of our CT scanners. Question five: What exactly is a so-called monoenergetic CT image? Answer: This is very cool. The monoenergetic image does not actually exist. We have to make it up with equations. To repeat, there is no CT scanner today that directly makes a monoenergetic image. Why? Because all CT scanners shoot x-rays at the patient that have a range of energies. If you take an ordinary CT scan, normal setting of 100 kVp, remember kVp the p stands for peak voltage. The top energy of the x-rays shooting into the patient is at 120 kiloelectron volts. But there are also some x-rays with a voltage of 119 and 118 and so on all the way down to zero. All, and I mean all of our CT scans, irradiate the patient between the peak voltage all the way down to x-rays with near zero voltage. Our normal CT image, we could call that many energy CT, or polychromatic CT, lots of energies. I’ve not yet answered the question, how do we then make a CT image as if there was only energy say 80 keV? The answer: Use the solution of Dr. Godfrey Hounsfield. We take two pictures, high energy x-ray picture and low energy picture. Calcium and iodine and other atoms behave differently at different energies. We mathematically make a single energy, monoenergetic image. It exists as an approximation, only inside the computer. It’s completely synthetic. That’s a quick reminder of CT physics. Next, some tips to quiz your technologist for dual energy from this review article. I’ll give you the problem then the monoenergetic image reconstruction that can save the day for your patient making the image quality better. Problem one: Recovering from a bad iodine injection. The injector failed, the angi-cath leaked iodine out of the vein, terrible enhancement. In this case, you should generate monoenergetic images with low keV setting of 50. Remember the low keV near the 33 keV K-edge of iodine, that makes the iodine enhancement much better. Problem two: Portal phase CT but you want to see the arteries better. Use as low as possible keV setting, perhaps 40 keV. The arteries are seen much better. By the way, if you want to reduce iodine load, that approach is the same. You use 50 keV monoenergetic reconstruction. Problem three: A local VIP comes for a CT scan. You want the best image quality. Less noisy images, use 70 keV monoenergetic CT. Problem four: Reduce metal artifact for example around the hips. Use 120 keV scan. This is one of the few times that high energy scans are helpful. Fewer streak artifacts, fewer beam hardening artifacts. This can make a tremendous difference to your image quality. That’s a quick summary of this nice article from Dr. Joe Schoepf and his group at the Medical University of South Carolina. Online we have a number of nice images that demonstrate all of these points and more. I hope you have time to take a look and I promise Dr. Jeff Klein and I are looking into getting CME for you in these podcasts. CME while driving is a great concept.

Ethics of Artificial Intelligence in Radiology: Summary of the Joint European and North American Multisociety Statement

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N ext, a very different topic. Several weeks ago our major radiology societies released a joint statement about artificial intelligence. The title of this article Ethics of Artificial Intelligence in Radiology: Summary of the Joint European and North American Multisociety Statement. The lead author Dr. Raymond Geis from the American College of Radiology Data Science Institute in Reston, Virginia. Background: The background and concerns about AI are real and throughout the media. We have AI all around us on our iPhones, on our Alexa at home, AI analyzing our shopping habits on Amazon. But, one place we are relatively free of AI at the moment is in the hospital. For a lot of business executives at Google, Facebook, Apple, Micro-

American Association of Physicians in Medicine. The full statement is actually 49 pages long full of concerns. But the rationale, the overriding concern, is that you as a physician could lose control to a machine programmed by Silicon
Valley, but people who never went to medical school in the first place. I’ll briefly summarize some of the key statements and problems that are raised by these multiple professional groups in radiology. Number one, AI is already using your medical data. We have all seen reports that large medical centers have made big deals with AI companies. This September, in 2019, Google announced a ten year deal with Mayo Clinic to transform healthcare. We have probably all think of someone who made their way to Mayo Clinic for an appointment. Do they get any credit for Google using their medical data? If Mayo develops a new AI that works in Minnesota, how will that work in Southern California or in other parts of the world? In short, we do not yet have methods to determine the bias of AI. We really need to understand how one specific AI works when transfers to another population. Number two, transparency. Exactly how does that AI model work? Is it ethical to use a piece of software that no one can understand? To make this somewhat worse, AI can be attacked by viruses or fooled on purpose. What we really need is a trustworthy AI, but we don’t have yet any idea how to achieve this. Number three, an interesting topic called automation bias. We have talked about automation bias in a prior podcast but my real-world example. Remember when Apple released its mapping program on the iPhone. It was supposed to compete with Google maps. The problem, it didn’t work. When I first used Apple maps I was trying to drive to a rental car company in Florida. Apple maps did not know there was a difference between a business on West 8th Avenue versus East 8th Avenue. It kept taking me to an abandon warehouse area. You have heard about people blindly following the Apple map and completely driving off the road into a lake or something. That’s automation bias. If the phone said to keep going straight even when the road ends, well we tend to believe the phone and we have automation bias already in radiology. A program to measure breast density at MGH in Boston worked only 80 percent of the time when it was developed in the lab, 20 percent errors. But when the AI was put into the reading room, radiologists agreed with it more than 90 percent of the time. That’s impossible. It was only right 80 percent in carefully done tests. That’s automation bias. If the machine said dense breasts I’m going to agree with it since it is the machine. Number four, last issue from the ethics article. The authors indicate that in order to ethically use AI, we as physicians need to educate ourselves about AI. We need to know enough about it to determine if AI should be applied to our patients. I like that concept. The authors argue that we need to have sufficient expertise to be the judge of the AI, not the other way around. Why? Because we’re not trying to identify the picture of a cat or a turtle. AI itself has no ethics. It’s just a piece of computer code. As a result, the ethics of AI is also the ethics of radiologists using due diligence. Making sure we know the limits of the AI, adequate testing of the AI, monitor the AI, test it after hardware upgrades. We are entrusted with the care of patients. The AI, not so much. At best, we hope AI can make us better doctors, more effective, less burnout. Many concerns were expressed by the RSNA, ACR, and other societies in this paper, but only a few answers right now.

Simple Adnexal Cysts: SRU Consensus Conference Update on Follow-up and Reporting.
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Deborah Levine, MD • Maitray D. Patel, MD • Elizabeth J. Suh-Burgmann, MD • Rochelle F. Andreotti, MD • Beryl R. Benacerraf, MD • Carol B. Benson, MD • Wendy R. Brewster, MD, PhD • Beverly G. Coleman, MD • Peter M. Doubilet, MD, PhD • Steven R. Goldstein, MD • Ulrike M. Hamper, MD • Jonathan L. Hecht, MD, PhD • Mindy M. Horrow, MD • Hye-Chun Hur, MD, MPH • Mary L. Marnach, MD • Ed Pavlik, MD, PhD • Lawrence D. Platt, MD • Elizabeth Puscheck, MD • Rebecca Smith-Bindman, MD • Douglas L. Brown, MD

Now, our last topic for today, the title is Simple Adnexal Cysts: SRU Consensus Conference Update on Follow-up and Reporting. The first author is Dr. Debbie Levine at the Beth Israel Deaconess Medical Center. Background: This is an update from the Society of Radiologists in Ultrasound, the SRU. You may not do a lot of ultrasound, but the issue touches CT or MRI as well. The incidental adnexal cyst. Ultrasound correlation and follow-up is recommended. Is this a simple cyst or not and what’s the management? That’s the topic of this important society statement. To start, define a simple cyst on ultrasound, oval or round, anechoic fluid collection, smooth thin walls, no solid components, no septations, no flow on Doppler. When I trained we also looked for posterior acoustic enhancement. But on more modern ultrasound equipment, that feature is no longer required to define a cyst. It may not be present. There are three types of cysts in or around the ovaries. You need to use the term adnexal cyst if the cyst is not clearly arising from the ovary. If the cyst is directly adjacent to the ovary, indicate this is a paraovarian cyst. Or you can describe this as a paratubal cyst. Very low incidence of malignancy. The issue is the cyst in the ovary. The more concerning risk of a cyst for ovarian cancer is in the pre-menopausal patient. Here are the new guidelines. Cysts up to 1 cm - reporting is optional, no follow-up needed. Cysts 1 to 3 cm describe the cyst in your report, no follow-up needed. Cysts more than 3 cm - a grey area from 3 to 5 cm. If you see it well and it appears simple, no follow-up. If not seen well, then follow. If the cyst is more than 5 cm get follow-up. When and how often do you get the follow-up? The statement is vague. If you are worried or the patient is worried, three to six months. Otherwise, it’s six to twelve months. What happens on the follow-up? If the cyst gets smaller, you can stop following. If the SRU report indicates that follow-up is unlikely to be of further value. If the cyst is stable at the first follow-up, then follow-up at two years to be sure, then you can stop. Finally, if the cysts grow remember this was a simple cyst at baseline. Simple cysts that increase in size are most likely cyst adenomas. That’s about it. The guidelines also have a flow chart for cysts in the pre-menopausal patient. Larger cysts, 5 to 7 cm get followed. Summary: post-menopausal patient, do nothing if the simple cyst is 3 cm or less. Pre-menopausal patient, do nothing if the simple cyst is 5 cm or less. I’ll conclude by quoting the authors, remember a key goal is to reduce unnecessary tests and follow-up for these patients. They state “A woman with asymptomatic isolated simple adnexal cyst that has bene well visualized has no difference in cancer risk compared with a woman without such a cyst irrespective of menopausal status or cyst size.” The key words there are well visualized simple cyst. This guideline and flow chart for the patient management will probably be posted in every ultrasound reading room. It’s out there and available in the November issue of Radiology.

That concludes this week’s articles. I hope these podcasts were helpful to you. Until next time, this is Dr. David Bluemke for the journal Radiology. I hope you have a good rest of your week.