WNPR Radio: Funding for Yale Cancer Answers is provided by Smilow Cancer Hospital. Welcome to Yale Cancer Answers with the director of the Yale Cancer Center, Dr. Eric Winer. Yale Cancer Answers features conversations with oncologists and specialists who are on the forefront of the battle to fight cancer. Here's Dr. Winer.

Dr. Winer: Cancer surgery has come a long way over the last 10, 20, 30 years. Radical procedures used to be commonly performed. That was true in the setting of breast cancer, it was true in the setting of pancreatic cancer. A whole variety of different types of cancer were treated with very aggressive surgical approaches. And while some of these approaches are still occasionally used in highly selected patients, minimally invasive techniques have really become something that surgeons focus on a great deal. Joining us today is Dr. Kevin Billingsley. Dr. Billingsley is the Chief Medical Officer at Smilow Cancer Hospital and Yale Cancer Center and a professor of surgery at Yale School of Medicine. He is an expert in surgical oncology. Dr. Billingsley specializes in the surgical treatment of complex cancers, particularly gastrointestinal cancers and pancreaticobiliary cancers. That is clearly a very long word. He has a great deal of experience in cancer research, patient care, advancing surgical techniques, and helping us set up our systems so that we're optimally and efficiently taking care of patients. So it's great to have you here, Kevin. Welcome to Yale Cancer Answers. Dr. Billingsley: Eric, thank you. It's great to be here. I've been looking forward to it, and I want to thank you for giving me an opportunity to provide our audience with some new insights into the evolving role of surgical care for the cancer patient. Dr. Winer: Well, I think it's fair to say that apart from patients who have diseases like leukemia or lymphoma, when we're talking about what is often referred to as solid tumors—breast cancer, lung cancer, various gastrointestinal cancers, and sarcomas—cancer treatment is a multidisciplinary approach. It involves surgical oncologists, medical oncologists, and radiation oncologists. And of course, behind the scenes, people like pathologists and imaging experts. Surgery, of course, is critically important. For years and years, it was the only treatment that we had. So maybe first, because I think this is a little confusing to a lot of people, there are many different types of surgeons involved in cancer surgery. Yet, surgical oncology doesn't really refer to all of them. A typical surgical oncologist is someone who has trained in surgical oncology and is board-certified in surgical oncology. What areas do those people specialize in? Dr. Billingsley: I appreciate that question. I think, narrowly speaking, surgical oncology is the surgical practice that focuses primarily on the surgical treatment of the gastrointestinal system, as well as soft tissue tumors such as melanoma, sarcoma, and breast cancer. But as surgical techniques have become more sophisticated and specialized, and as the multidisciplinary interactions you've described have become more nuanced, surgical oncology as a field has also evolved. In the current era, particularly in places like the Yale Cancer Center, it's important to think of surgical oncology broadly. A surgical oncologist is not just a technical expert in cancer surgery but also has the broad background and training to understand cancer care within a multidisciplinary

context, as well as the clinical and relational skills to work effectively within a multidisciplinary team. That may include thoracic surgeons specializing in lung cancer and esophageal cancer, breast surgeons, and people who do what I do, which is mainly gastrointestinal cancers. Even within gastrointestinal cancer, we've further narrowed our focus into subspecialties. For example, some surgeons specialize in cancers of the colon and rectum, while others, like me, focus on the upper GI tract, liver, and stomach. Dr. Winer: And for example, if a man has prostate cancer, he is typically not treated by a surgical oncologist. He is typically treated by a urologist. But what has also happened over the last, oh, I'd say 10 to 20 years, is that there are fewer and fewer urologists who do general urology—a little bit of prostate cancer and a lot of other things—and more and more urologists who specialize in cancer surgery. What we've seen in surgery for people with cancer is that it has fallen to a small group of people who focus on cancer exclusively within their own field. These are surgeons who are very comfortable interacting with radiation oncologists and medical oncologists. And of course, what's so important about this is that there are pretty good data showing that the more you do something, the better the patient does. While there are exceptions, doing a large volume of the same type of procedure makes a real difference. Dr. Billingsley: I 100% agree. There are two pieces to this that I really want the audience to understand. One is that practice makes perfect. In surgery, as in virtually everything else, the more you refine your work—particularly as techniques evolve—the better the outcomes are going to be. The second piece is that cancer care, as we've said, is a team sport. Surgeons who are specialists become very well-versed in working within the framework of a multidisciplinary team, making decisions in coordination with their patients, families, and the broader team. One of the things we've seen evolve in surgical oncology is that it used to be that someone would be diagnosed with a tumor, and there would be no question—surgery would be the first treatment in the pathway. That is actually more the exception than the rule in the current era. So often, patients are seen by a surgeon, but surgery is integrated into a multidisciplinary treatment package. Often, it's later in the course of care after patients receive chemotherapy, immunotherapy, or radiation. It's critical that patients and families seek out surgical care from an expert who is integrated into a team structure and making the right decision, delivering the right treatment at the right time. It's very difficult to play catch-up if treatment is not sequenced correctly. Dr. Winer: Yeah, and I guess the one big exception to that is patients who present with very early-stage cancer, where we're not even sure they're going to need any kind of medical therapy. In those cases, surgery first is often the way to go and is the most direct approach. But for any patient with a more advanced type of cancer where you're convinced additional therapy will be needed, that therapy often comes first these days.

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Dr. Winer: Good evening. This is Eric Winer, and we're back for the second half of Yale Cancer Answers. We're joined tonight by Dr. Kevin Billingsley, a surgical oncologist and professor of surgery at Yale School of Medicine. Dr. Winer: So I want to move on and talk about minimally invasive surgery and surgery that uses robotic techniques. I personally had a couple of surgeries over the summer with these techniques, and I couldn't believe the little tiny scars that were used—or the little tiny incisions that led to basically no scars—and how quick my recovery time was. What's happened? Surgery seems like a completely different field than it once was. Dr. Billingsley: I couldn't agree with you more. This has been a game changer in surgery and surgical oncology. To trace the history briefly, minimally invasive surgery refers to traditional operations done through smaller incisions to facilitate quicker recovery and less post-operative pain. This started with laparoscopy about 25 years ago, where operations were done under video guidance but using straight instruments. What has changed in the past 10 years—and changed very quickly—is the rapid emergence of robotic surgical techniques. These involve the use of wristed instruments working inside the body cavity under 3D optical guidance, with the surgeon sitting away from the patient in the same room at an operating console. Dr. Winer: And just to be clear, you said wristed instruments. So these instruments have joints? Dr. Billingsley: Correct, which expands our capacity to perform delicate and complex technical maneuvers by an order of magnitude. For example, just yesterday I did an operation where I removed 80% of the pancreas and the spleen. The patient is in the hospital today and will leave tomorrow. We can do that because we have magnification with the robot, as well as the ability to suture and manipulate tissues very precisely under direct vision. Dr. Winer: You're looking at a screen the whole time? Dr. Billingsley: Actually, you're looking through binocular viewing, which gives the operator a 3D image of the operative field. It's almost like wearing a virtual reality headset, if you will. Dr. Winer: And how do you manage to remove the spleen or most of the pancreas through a little tiny incision? Or in this case, does the incision have to be a little bit bigger to allow for that? Dr. Billingsley: We want the incision large enough to extract the specimen, which we place in a specimen retrieval bag. The incision is expanded slightly, but once the spleen is in the bag—which is the largest part of this particular case—we were able to break it up a little bit because it's not diagnostically useful in this particular operation. This allows us to bring both specimens out through an incision that's about two and a half to three centimeters wide. Dr. Winer: And do you ever find yourself having to expand the incision? Dr. Billingsley: Absolutely. For example, I do robotic liver surgery, and the liver is a pretty big organ. If it's a big tumor, we have to make a larger incision. But one of the critical factors is the location of the incision. That makes a big difference in healing and post-operative discomfort. If we can avoid incisions in the upper abdomen and make a limited lower abdominal incision, that often facilitates recovery, reduces the risk of post-operative hernias, and is just easier for patients to recover from. Dr. Winer: And your operations that used to have people in the hospital for 5 to 7 days are now reduced to just a day or two? Dr. Billingsley: Exactly. It makes a huge difference, especially if we're

trying to get people back to chemotherapy or some other oncologic treatment. Facilitating that quicker recovery also makes a big difference. Dr. Winer: I can understand how a young surgeon, someone perhaps 30 to 35 years old, could take advantage of all the gaming they did as a kid and use that to their benefit when learning these new techniques. But I daresay you're a few years more advanced than that, and you probably didn't grow up playing a lot of video games. How hard was it for you to learn to use these robots? Dr. Billingsley: Great question. It has required a lot of practice. Most surgeons of my generation know the operative anatomy almost intuitively, and we have muscle memory for more traditional surgical procedures. It does require shifting your perspective to a different view of the anatomy. But thousands of hours of operating in a more traditional setting still hold value, even when adopting this new approach. Dr. Winer: When this first came out—10, 12 years ago, or so—did you end up going in and taking courses? Dr. Billingsley: Like many surgical oncologists, I was initially reticent and skeptical. One of the things we, as cancer surgeons, always have to be mindful of is that while recovery and post-operative pain are important, job number one is curing the cancer. We need to ensure we're doing a complete cancer operation. Before jumping into robotic procedures in my arena, I spent time watching the field evolve. I had to be sure we could do these operations safely and with oncologic efficacy comparable to traditional open surgery. Once I made the commitment, it took several years of practice, working with other surgeons, attending informal courses, and traveling around the world to observe others. It's a relatively small community, and we all learn from each other. Dr. Winer: This equipment must be quite expensive to purchase. Is it available everywhere? Dr. Billingsley: It's not available everywhere. The equipment is evolving rapidly, and like all technology, it requires ongoing capital investment from health systems to stay current. Fortunately, Yale-New Haven Health System has made a strong commitment to robotic surgery and surgical oncology, and we have the latest robots in our fleet. Dr. Winer: How often do you find yourself having to convert a minimally invasive robotic procedure into an open procedure? Is there a time when something goes wrong and the only way to fix it is by doing a much larger incision? Dr. Billingsley: Great question. For me, less than 10% of cases require conversion to an open procedure. But a big part of this is selecting patients carefully. Some situations are simply not safe or appropriate for minimally invasive surgery. The operation might be better, the margins cleaner, and the control safer with a traditional open surgery. These are conversations I have candidly with patients. I think for our audience, I'd say that as you talk to a potential surgeon, assess their experience and feel comfortable discussing how the operation is going to be approached—whether it will be minimally invasive or open. Sometimes a minimally invasive operation just isn't the right choice. Dr. Winer: Related to all of this, let's talk a little about organ-sparing surgeries, not just in the abdomen but more broadly. For example, in head and neck cancer, there used to be radical procedures that caused significant deformity and led to problems with talking, swallowing, and eating. Now, there seems to be so much focus on doing adequate cancer surgery while preserving organ function so that patients aren't left debilitated. Dr. Billingsley: Eric, I

think this is one of the most exciting areas in multidisciplinary oncology. As we discussed earlier, there are areas where we're doing significantly less surgery. For example, rectal cancer in the GI space is a good paradigm. It used to be that every patient with rectal cancer had a major operation. Now, with chemotherapy and radiation, we can avoid disfiguring surgery in a significant subset of patients and monitor them long-term, only using surgery if the cancer recurs or progresses.

WNPR Radio: Dr. Kevin Billingsley is a professor of surgical oncology at Yale School of Medicine. If you have questions, the email address is CancerAnswers@Yale.edu. Past editions of the program are available in audio and written form at YaleCancerCenter.org. Funding for Yale Cancer Answers is provided by Smilow Cancer Hospital, where patients diagnosed with pancreatic cancer are provided easy access to specialized care, including innovative treatments and clinical trials. Learn more at SmilowCancerHospital.org