Oklahoma Innovations Radio Show

Air Date: October 4, 2009

Guests: **William C. (W. C.) Goad**, medical director, ProCure

[Music]

>> From the OCAST Radio Network, this is *Oklahoma Innovations*, a weekly science and technology radio magazine brought to you as a service of OCAST, the Oklahoma Center for the Advancement of Science and Technology. OCAST is the state's only agency whose sole focus is technology, its development, transfer, and commercialization. OCAST mission is to identify and fund promising research in technologies that allow Oklahoma to compete in a global market economy from our own backyard. This program features some of the state's most gifted and talented scientists, inventors, entrepreneurs, manufacturers, and business leaders who all have one common goal, developing technology-based economic growth for all Oklahomans. Now here are your hosts, Gary Owen and Steve Paris.

>> **Gary:** Welcome, thank you for joining us on this week's edition of Oklahoma's science radio magazine, *Oklahoma Innovations*. I am Gary O, and he is Steve P.

>> **Steve:** That's me.

>> **Gary:** Steve Paris from OCAST, the Oklahoma Center for the Advancement of Science and Technology. This program each week brings you interesting guests from around the state who are involved in some capacity related to or interrelated to or interlinked to science, research, development.

>> **Steve:** Technology.

>> **Gary:** Education.

>> **Steve:** Innovation.

>> **Gary:** Innovation. Business and innovation.

>> **Steve:** Yes it is.

>> **Gary:** It's all kinds of things, so.

>> **Steve:** And we want everybody to listen closely because this is going to be a very special show.

>> **Gary:** Cancer, everybody's touched by cancer in some or another.

>> **Steve:** Everybody is. ProCure is a full service proton therapy center developer in the, and operator founded in 2005 to improve the lives of patients with cancer by increasing access to proton therapy. And our guest today is Dr. William C. Goad. He goes by W. C. Dr. Goad, we're going to tell you more about him in just a little bit, but he's, he has a lot of information about proton therapy, what it means, its location here in central Oklahoma. And I think you're going to be fascinated with this, so make sure you listen in.

>> **Gary:** Yes, yes, you will. If you have a family member, or perhaps you yourself have had, or are concerned about having cancer, you're going to learn about proton therapy. It's going to be very interesting. What's going on at OCAST lately?

>> **Steve:** You know Gary there's a lot going on at OCAST. We've, we're in the fall of the year, and we're preparing for the, always prepare for the spring when the legislature comes into town, and we hope that, that they're going to have an understanding this year, as they've had in the past of the importance of, of the state of Oklahoma investing in R&D, science and technology, domestic and innovation. If we don't do that, we know what happens, we fall behind. And so that's going to be part of our message this year is to talk to other Oklahomans about the importance of doing research and what it means, not only now, but down the road as time progresses, and we've, we've kind of noticed this is pretty much proven that states that invest in R&D are much better positioned to deal with economic downturns. And I think Oklahoma has done a much better job this go around than we did maybe 25 years ago when we had the last big, you know, economic downturn. And a lot of that has to do, at least some of the people in Oklahoma, some of the leaders think that has to do with our investment in R&D, science and technology.

>> **Gary:** Absolutely.

>> **Steve:** And innovation. And so we're much better prepared.

>> **Gary:** And look at some of the talent that we've recruited to the state.

>> **Steve:** Well you know, every time I start to think about who came to Oklahoma as a result of this major investment, and, and let's talk about that just a minute. Oklahomans have invested through their state government roughly 165 million dollars over a 22-year period.

>> **Gary:** Wow.

>> **Steve:** But that's only a small part of the story. The big story is how much money that has research dollars, that has attracted. And it's well over three billion. And you know, we require one to one match for most of, of the research projects that we fund. And some of them bring 10 to one, it just happens that way.

>> **Gary:** Wow.

>> **Steve:** And they're required to bring one to one, but you know, sometimes they're able to get a lot more. Sometimes just that little bit of money that we give, a couple of three hundred thousand dollars over a three year period, will wind up attracting a 10 million dollar award from, from NIH, or any number of federal agencies, or from private sector sources. So it's an important part of what we have become in Oklahoma. We love oil, we love energy, we love agriculture. They're still very important parts of our economy and a very important part of a lot of our research.

>> **Gary:** Sure.

>> **Steve:** But we've added to that. We have diversified. We've expanded our focus to where we're doing a lot of health research, we're doing a lot of applied research.

>> **Gary:** Right.

>> **Steve:** We're trying to get Oklahomans to be more successful in applying for SBIR, Small Business Innovation Research and SBTTR, Small Business Technology Transfer, those are federal programs. But we kind of look at it this way, if we can bring more of those federal dollars to Oklahoma for research, we don't, we don't mind other states doing their job of bringing

money to their, but we want to get all we can for Oklahoma. We're, we're a little bit self-centered that way.

>> **Gary:** Well look at all the strategic partners that have evolved since OCAST.

>> **Steve:** Oh yeah.

>> **Gary:** With i2E, and of course the manufacturing.

>> **Steve:** Of course.

>> **Gary:** Alliance. Organizations like that which have helped Oklahoma continue to stay on the steady path of economic growth, so.

>> **Steve:** Well you're absolutely right. Without the Oklahoma manufacturing alliance serving Oklahoma manufacturers and people, say well what kind of manufacturing facilities are there in Oklahoma? Well it's close to 150,000 people are employed in manufacturing facilities here in the state of Oklahoma. Some of them are very small, maybe five, 10 people. But they're there, they're a main stay of our, of our economy, they're very important. And i2E of course does a great job of trying to commercialize the research and technology that comes out of Oklahoma. And if they can find investment capital and get them ready, where they can have an up and running business with receipts, then that can do nothing but good things for the economy of the state of Oklahoma.

>> **Gary:** Anything on the OCAST calendar we need to know about?

>> **Steve:** No, nothing specific. There's a lot of deadlines, I'd drive everyone if I could, drive is a marketing term.

>> **Gary:** That's right.

>> **Steve:** Tell everybody let's, let's go to the OCAST website, just type in OCAST in your browser and you'll find it. And there's we have a, we have a list of events coming up of deadlines, of research solicitations. They're always on the website. So if you need to know about those, look on our website and by the way you can pick up this radio show.

>> **Gary:** That's right.

>> **Steve:** On our website.

>> **Gary:** That's right. Well now, it's time for . . . [Music] This week's news in science and technology from around the globe. But first of all a spacecraft orbiting Mars has spotted water ice in several impact craters midway between the North Pole and equator. The first time ice so close to the surface. Mars has been discovered so far south on the red planet. Instruments on NASA's Mars Reconnaissance Orbiter estimated that the new found ice is 99 percent pure. Previous spacecraft spied ice lurking below the Martian surface. Before the Phoenix lander froze to death last year, it dug trenches and touched ice specks at its arctic landing site. The findings published in the recent journal science. Two satellites are in orbit as a part of a missile defense program demonstration. The pair a part of a, the space tracking and surveillance system demonstration for the U.S. Missile Defense Agency. And satellite developer Northrop Grumman, the satellites, say the satellites will demonstrate technology that can detect infrared and invisible light of missiles launched from Earth. The space surveillance system will provide global tracking for the ballistic missile defense system. A gecko. You know what a gecko is.

>> **Steve:** I do.

>> **Gary:** Yeah, have you ever watched the little Geico commercials, you know what a gecko is. Well a gecko with leopard like spots on its body, and the fanged frog that eats birds, are among 163 new species discovered last year in the Macon River region of South East Asia. This according to an environmental group. WU, WWF International says the, that the scientists in 2008 discovered 100 plants, 28 fish, 18 reptiles, 14 amphibians, two mammals and one bird species in the region. That works out to be about three species a week and is addition the 1,000 new species cataloged there from 1997 to 2007. Can you believe that? Wow. Millions of Monarch butterflies migrate to Mexico for the winter. And scientists have long speculated on how the insects find their way. Did you ever wonder about that?

>> **Steve:** I do. Saw some this week by the way.

>> **Gary:** It's what?

>> **Steve:** I saw some this.

>> **Gary:** Did you?

>> **Steve:** This week.

>> **Gary:** Did you see some Monarchs?

>> **Steve:** Yeah.

>> **Gary:** Well.

>> **Steve:** Watch for them every fall.

>> **Gary:** Turns out their antennas are the key. How do we know? Well researchers say they've painted butterfly antennas black, and the insects get lost.

>> **Steve:** Oh my goodness.

>> **Gary:** So managing to fly south may not sound like a big deal to you, but armed with maps and GPS receivers, who cares, right? But all butterflies have for navigation is the sun and the sky. And the sun apparently keeps moving, so the little creatures have to constantly adjust to stay on course throughout the day. Isn't that interesting? How about that. There was some, some research I'm sure you heard about recently about teens driving cars. Findings in two studies by researchers of Children's Hospital of Philadelphia, funded by State Farm Insurance Company. This research showed that teenagers with their own cars, or free use of one, are much more likely to get in crashes than those who share a car. And crashes are much less common among teens whose parents set clear driving safety rules. The researchers say the findings can help parents keep their kids from becoming a grim statistic. Traffic crashes are the leading cause of deaths for U.S. teens, killing more than 5,000 each year. The new research shows that that hands on approach does pay off. Now here's a little diddy that I, I pulled out that I just thought was most amusing. If you're a champagne lover, listen to this.

[Music]

>> **Gary:** I had to do this. [Song] [Chuckles] Well it so happens that Don Ho was right. It is in the tiny bubbles, according to a team of researchers in Europe, not surprisingly, found that champagne's bursting bubbles not only tickle the nose, they create a mist that wafts the aroma to the drinker. In the Hawaiian singer's 1966 hit you just heard there, make me happy, make me

feel fine, well science is now taking a look at the source of those feelings. And they say they've used high-resolution mask spectra, spectrometry, we, you and I always have trouble with that word.

>> **Steve:** We do don't we.

>> **Gary:** High resolution mask spectrometry to study the chemicals in champagne and sparkling wines, and in the bubbles and the mist they produce. They discovered that some of the chemicals that impart the special toasty, fruity aromas to the beverage are captured by the bubbles and brought to the surface in higher concentrations than the wine itself. It's sort of like how the bursting of bubbles at the sea surface imparts that special oceanic scent to the nearby air. Isn't that interesting?

>> **Steve:** That's fascinating Gary.

>> **Gary:** And now Steve has our Innovations in History.

>> **Steve:** Thank you Gary. Imagine paying just 825 dollars for a new car? That's what it cost to buy the new Model T, which was introduced by Henry Ford October 1, 1908. I bet you can't get one for 825 dollars today. The pre-moistened hand towel was introduced on October 2nd, 48 years ago. And the motor driven vacuum cleaner was patented on October 3, 1893 by J. S. Thurman of St. Louis, Missouri.

>> **Gary:** Wow.

>> **Steve:** And on that same date in 1901, the Victor Talking Machine Company was incorporated after a merger with Radio Corporation of America, RCA Victor became the leader in phonographs and many of the records played on them. The famous Victrola Phonograph logo with Nipper the dog, and the words, his master's voice, appeared on all RCA Victor phonographs and record labels.

[Dog sounds]

>> **Steve:** Ruff. The space age officially began October 4, 1957 when the USSR launched the world's first artificial satellite, Sputnik One. And on October 6, 1889, the first movies were shown at the Edison Labs. That's Innovations in History this week Gary.

>> **Gary:** And we'll take a break, come back and talk with our guest, W, Dr. W.C. Goad about ProCure, when we return on *Oklahoma Innovations*.

[Music]

>> As you drive across Oklahoma, you can see thousands of gas wells sprinkled throughout the countryside. Many of these wells don't produce enough natural gas to justify pipelines. But without this access, thousands of well sites are abandoned. With the support of the Oklahoma Center for the Advancement of Science and Technology, one company is creating a portable device transported on a flat bed truck to process natural gas at well sites. This technology optimizes the amount of gas that can be captured and releases no by-products into the atmosphere. This idea provides new opportunities from small oil and gas producers while bringing us one-step closer to energy independence. Supporting innovation. That's what OCAST is all about. OCAST is looking for small business owners, serious about investigating new product services, and processes. For more information, call OCAST toll free at 866-265-2215.

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>> You're listening to *Oklahoma Innovations*, with Gary Owen and Steve Paris on the OCAST Radio Network.

[Music]

>> **Gary:** We have too much fun on this show. Just call me Mr. Sound, you know.

>> **Steve:** That's right.

>> **Gary:** We're going to talk, this show, about proton therapy, which basically is a form of radiation therapy that destroys cancer cells. We're going to find out more about that from our guest Dr. W. C. Goad who is the medical director of ProCure. And W. C. nice to have you on the program.

>> **W. C.:** Well thank you, appreciate it.

>> **Gary:** Tell us a little bit about yourself.

>> **W. C.:** Well I'm from Oklahoma. I grew up in Oklahoma. Born in Checotah, Oklahoma.

>> **Gary:** Macintosh County.

>> **W. C.:** That's right. And really, I graduated from high school in Tulsa, Tulsa Central in 1971. Went to Baylor University as an undergraduate, and I returned to Oklahoma in 1976 and did a couple of years of graduate school and started medical school.

>> **Gary:** Very good. A native Oklahoman and you're, right now you're in Oklahoma City. Let's talk about a little bit of your, you've got, you're board certified, you're American Board of Radiology and Radiation Oncology. Been certified since 1992. And I'm going to let you talk about the rest of this. You have expertise, IMRT. And, is it bracket therapy?

>> **W. C.:** Bracket therapy's right.

>> **Gary:** Very good. And you've, your hospital affiliations, you're involved with Integris BMC at Shawnee, the Regional Medical Center, Western Oklahoma Cancer Center at Elk City.

>> **W. C.:** Right.

>> **Gary:** In addition to ProCure which is located on Northwest Highway if I'm, if I remember.

>> **W. C.:** At Memorial.

>> **Gary:** No Memorial. I'm, further north of Northwest Highway.

>> **W. C.:** At Kirkpatrick Turnpike. We're on the Kirkpatrick Turnpike.

>> **Gary:** You're absolutely right.

>> **W. C.:** Part of.

>> **Gary:** And I know that. I don't know, for some reason I got all mixed up there.

>> **Steve:** That's a beautiful building. You know when I was first going up, I thought what is that going to be? It was.

>> **W. C.:** It's turned out beautiful.

>> **Steve:** It is a.

>> **W. C.:** Absolutely beautiful.

>> **Steve:** Gorgeous facility.

>> **W. C.:** Yeah.

>> **Gary:** Well let's talk about the, the technology and what this means. I mean we can talk about the building, want to hear about that, because it's new, you've been open in that facility since July of this year. And it, it brings something to Oklahoma to central Oklahoma but to the rest of the state too.

>> **W. C.:** Right.

>> **Gary:** It would not have before.

>> **W. C.:** Right.

>> **Gary:** And talk to us, kind of give us an overview, and overarching view of.

>> **W. C.:** Sure.

>> **Gary:** Of proton therapy.

>> **W. C.:** Well let me, let me put that into the perspective of what I do in terms of my, my specialty in medicine which is radiation therapy. And I'll back up just a little bit if I may about why I had interest in, in cancer care medicine in general. When I went to medical school, I planned to, to go into internal medicine. I was going to become a medical oncologist. As a graduate student, I always had an interest in, in cancer biology, cancer proteins. So it was a natural assumption that when I started medical school, when I specialized it would be in medical oncology providing cancer care to patients, but primarily using chemotherapy. And in that rotation, or that program, I learned about radiation oncology. And I thought this is the best of all worlds. It kind of combines the technology of somebody who, you know, my interest with treating cancer patients, and provide cancer care. So I changed from my direction of medical oncology, chemotherapy to radiation oncology. And I began my practice in radiation oncology in 1988 actually. I started in '84, at a radiation therapy program at OEU. Was the fellow, chief resident fellow in radiation oncology and then went into private practice at St. Anthony Hospital in Oklahoma City. And at that time, when I went in practice, and again, I kind of put this into perspective about why protons are so important, that kind of have to put it historically as to where things were 20, 25 years ago when I started. When, when I treated patients back in, in the mid-80s, we would have patients come in. They would lay down on a table. We'd take an x-ray, very much like a plain chest x-ray. It would be very one-dimensional. We would look at that film, and say this looks like the area that needs to be treated. And we would treat them with a nice square field of radiation. There was no shaping, there was no comformality to it. It was just, that's the area that needs to be treated, and everything in that path from front to back or side to side would get exposed to radiation.

>> **Gary:** Even if it was healthy tissue, right?

>> **W. C.:** Even if it was healthy tissue. So that would be our planning process, looking at a simple film, saying this is what we want to treat, and we treat them with a big open field of radiation. And obviously with that there were lots of complications and side effects and, and radiation therapy developed a terrible reputation if you will for causing more grief than good.

>> **Gary:** Right.

>> **W. C.:** Well over the years, kind of submerging of different areas of medical specialties if you will, that diagnostic radiology has changed. We now have cat scans and MRI scans and pet scans, all of those things enable us to vary precisely define, you know, the, the size, shape, dimension, confirmation of a tumor volume. The radiation therapy technologies have changed so that now we can treat with photo beam or conventional x-ray beam radiation therapy much more localized to the area. If I want to treat an area that let's say is up next to the airway of the lung, but not include the trachea necessarily, I can, I can do that better. I want to treat a man with prostate cancer, I can treat his prostate more specifically but still expose a lot of tissue to low doses of radiation with conventional x-ray therapy. But it all has to do with the combination of diagnostic imaging and a refinement of the radiation therapy technologies that allow you to manipulate the beam, shape the beam, vary the intensity of the beam. So we have.

>> **Gary:** So now, you've got a more defined target area.

>> **W. C.:** Right and we can defy, define it and treat it more precisely. But it's still treating with x-ray therapy, or conventional photon beam radiation therapy. You mentioned the IMRT, that means Intense Modulated Radiation Therapy. That's a further advance with x-ray therapy to take that beam and vary the rate at which the photons that are deposited and the distribution of the photons across a path. And when you treat with x-rays or photons, there's truly a path of radiation from where that beam of radiation enters to where it exits. So what we try to do is manipulate that path, narrow down the focus, and we, comparing again to where we started in the mid-80s to what we do now, we would treat a patient with may be one or two fields of radiation therapy. Maybe say for a lung cancer patient, a patient would come in, lay down, be treated with the field, directly from the front. The machine might rotate around behind them, and treat from the back. So now they come in, they might get 10 or eight fields of radiation coming from many different directions. So you're getting a more focused beam or target of radiation, but you're exposing a lot of normal tissue to radiation. Then it becomes the balance of how much normal tissue do you want to expose to radiation. How much do you want to shape that beam of radiation to what really needs to be treated.

>> **Gary:** Yeah.

>> **W. C.:** And then it becomes more difficult because we add chemotherapy. Chemotherapy's really evolved tremendously the last 25 years. And most patients do get some kind of combination of chemo and radiation therapy. More, then you have to look at the side effect of that profiles or complications that we cause by combining chemo and radiation therapy.

>> **Gary:** More balance.

>> **W. C.:** More balance.

>> **Gary:** Constantly.

>> **W. C.:** You know, it's all good. I think about what we do now in terms of providing cancer care to what we were doing 15 or 20 years ago, that's incredible. And that leads me up to the, the proton part.

>> **Gary:** Okay, we're going to take a little break. We're talking with Dr. W. C. Goad. He's medical director of ProCure. More to come on *Oklahoma Innovations*.

[Music]

>> There's more to learn on *Oklahoma Innovations* with Gary Owen and Steve Paris on the OCAST radio network.

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>> Research and development, technology transfer and commercialization, creating high paying jobs in Oklahoma it's what OCAST is all about. This is *Oklahoma Innovations* on the OCAST radio network.

[Music]

>> **Gary:** Since the first hospital based proton treatment center opened in California in 1990, nearly 30,000 people to receive proton therapy in the United States and more than 60,000 people worldwide, the experts conservatively estimate that about 250,000 cancer patients in the U.S. could benefit from proton therapy. Our guest is Dr. W. C. Goad. We call him W. C. here. He's medical director of ProCure, a proton therapy center in Oklahoma City. Steve.

>> **Steve:** Thank you Gary. And before the break, Dr. Goad was talking about the history of treatment for cancer patient radiation treatment along with, with chemotherapy and other things. He gave us a good start, a good overview of, of what has happened over the last 30, 40 years. And you, you were coming right up to the point where you were going to talk about proton therapy.

>> **W. C.:** Yes.

>> **Steve:** And that's why we're here today. Tell us about proton therapy. Give us everything you know about that. Might take a long time.

>> **W. C.:** It won't, it might, maybe not. Actually back, up one second.

>> **Steve:** Okay.

>> **W. C.:** Actually, for, for proton being x-ray therapy, it's really over 100 years now, 110 years actually.

>> **Steve:** Wow.

>> **W. C.:** The first patient I think was created in 1898. So, so radiation therapy as a science or discipline or a way of treating patients.

>> **Steve:** It's not new.

>> **W. C.:** It's not at all new.

>> **Steve:** Yeah, that's right.

>> **W. C.:** And, and proton therapy is really not new. I mean it was, in 1946, I thought about, you know, it could be used to treat patients. And in 1950s, clinical research was being done to treat patients with proton therapy. So there's nothing really new about the, the consideration for and application of protons for treating patients.

>> **Steve:** Wow.

>> **W. C.:** So, but, now back to, to protons. Protons have changed tremendously over the last 20 years in terms of more precise, localization of high dose radiation to very small volume. But that comes at the expense of exposing a lot of normal tissues to radiation. And then as treatment moralities have changed and we combine more chemo and radiation therapy together, there are challenges that we face every time with the patients, in terms of balancing that large volume of normal tissue, getting low dose radiation to patients getting chemo therapy and having those combined, what we call toxicities, but combined side effects of complications are problems that really limit effective treatment. The beauty of proton is it has, it has the physical property to deposit it's radiation very precisely at one point. I can say I want to start here and I want to stop there. And you cannot.

>> **Steve:** Extremely important.

>> **W. C.:** You cannot do that with protons. Protons you can think of, or x-rays you can think of bathing the tissues in radiation.

>> **Steve:** Right.

>> **W. C.:** Protons it's the one area. Always say if you want to treat one ice cube in the glass, you can do that with protons. If you want to treat the glass of water and not that one ice cube, you can do that with protons. So protons physically very, very different from x-ray therapy. And, and the difference is protons have no mass, no charge, they release their radiation just as they slow down. And just think it's the way a car, you don't even put the break on the car. The car, you just turn off the gas and it just comes to a stop.

>> **Steve:** Right.

>> **W. C.:** That's proton beam, radiation if you will. Proton is instant.

>> **Steve:** Okay.

>> **W. C.:** As soon as that begins to slow, as soon as there's a change in, in what we call the velocity, all the radiation's deposited.

>> **Gary:** I have a question for you because for those of us listening to your description of the therapy, who've never experienced treatments for cancer, is this a, an invasive, non-invasive, mild invasive?

>> **W. C.:** Not non-invasive. You, with a proton would be more photon being radiation therapy. You would come in, you lay on a table, you get your treatment, you get up and go home.

>> **Steve:** So you don't really feel anything, but afterwards is where you have to worry about, right?

>> **W. C.:** What we do in radiation therapy generally is we have a dose that we want to prescribe, a total dose to an area. And we divide that does into fractions. So you'll hear patients come for radiation therapy over a period of days or weeks. What we're doing is taking a dose and dividing into fractions.

>> **Steve:** I see.

>> **W. C.:** So lung cancer patients, for example, may come for 30, 35 treatment days. Each day they're coming in, they're getting 1/35th of some total dose.

>> **Steve:** Wow.

>> **W. C.:** So on a daily basis, you can't see, feel, taste, no side effects. You come in good, you go home feeling good. That sort of thing. But there is an accumulation of effect over time.

>> **Steve:** Tremendous advantage over what it was as you said a couple decades ago where, where you suffered somewhat.

>> **W. C.:** Sure, yeah.

>> **Steve:** Possibly from having skin burns, from having burns to internal organs.

>> **W. C.:** Very much so.

>> **Steve:** You've got that under control. And, and that to me, maybe this isn't a fair question, but just as, how do you control the depth, how do you control, I mean I know that that's probably more than my mind can comprehend. But.

>> **W. C.:** The, actually it's not that difficult in terms of.

>> **Steve:** Yeah, but you know what you're doing so.

>> **Gary:** Don't give it, don't give it to Steve, he'll over shoot.

>> **Steve:** No, no, no.

>> **W. C.:** It, protons have a mapping charge. They're moving at a certain speed.

>> **Gary:** Okay.

>> **W. C.:** And when they begin to slow down, they release that radiation. That's, that's the physical process of proton therapy. Now how do we know where, where to direct that?

>> **Gary:** Right.

>> **W. C.:** We obtain a CT scan, MRI scan, we have patients lay in a certain position. We make devices that hold them in that same position. And then we take a combination of the, any diagnostic, any diagnostic imaging they've had, CT scan, PET scan, MRI scans, and we put all

of those together. Not just side by side, but we actually take volumetrically all of those diagnostic studies to put them together to define the size and shape of that lung tumor or that prostate cancer, that brain tumor, or that consult tumor. That defines us, defines for us what we need to treat. And then when we then look at how proton beam radiation therapy is absorbed, we measure with computer modeling.

>> **Gary:** Okay.

>> **W. C.:** And you have different energies of protons that we work with.

>> **Gary:** Okay.

>> **W. C.:** We can actually shape the field of, of protons by putting devices between the patient and the source of the protons that'll fit it to that.

>> **Gary:** Okay.

>> **W. C.:** Location. So now, we can pick up.

>> **Gary:** Kind of like dodging on a photograph,

>> **W. C.:** Yeah, so we can pick a depth, we can say we want to treat from one inches to two inches. And I can shape it to look like a star.

>> **Steve:** So are you using image scans to help you modify the, the proton treatment?

>> **W. C.:** Yes, every day when a patient comes in and they, they're positioned in a position ready for their treatment, there's a verification of, of the process and the volume we're treating, the area we're treating.

>> **Steve:** Right.

>> **W. C.:** And the dose that we're giving is exactly the same. And it's verified before they leave the room actually.

>> **Gary:** Now is this a therapy that would be an alternative to surgery? In combination of? Or?

>> **W. C.:** I think it depends on the individual patient.

>> **Gary:** Okay.

>> **W. C.:** I mean it doesn't.

>> **Gary:** I guess a lot of it depends on the location of the cancer too.

>> **W. C.:** What we, what we too many times encounter are patients who are surgically, they have surgically operable disease, but they're not medically operable because they have other medical problems.

>> **Gary:** Okay.

>> **W. C.:** So I would say it's not meant to be a replacement for surgery. But it certainly has the opportunity to, to provide equally effective treatment of surgery for patients who can't have surgery.

>> **Steve:** It gives the healthcare deliverer much, many more options.

>> **W. C.:** Right.

>> **Steve:** In an approach to treating a patient.

>> **W. C.:** Yeah.

>> **Gary:** I wanted to talk some more about this. But right now, I want to talk a little bit about the business side of it. And what I mean by that is the establishment of your center that, that was opened here in Oklahoma City in July of this year. And some of the things that went in to making that decision and how it all came about. So if you could go back and give us a little bit of the genesis of the ProCure Proton Therapy Center?

>> **W. C.:** Okay, I'll start at the very beginning.

>> **Gary:** Okay.

>> **W. C.:** I was in clinic one morning, this was about four or five years ago, not very long at all in terms of the scale of this project. But about four or five years ago, I was in clinic and I was seeing a patient that I treat. And I was very clear, a tumor, a patient with a brain tumor. And she had been through what we call conventional radiation therapy, IMRT, not at all conventional, but.

>> **Gary:** Yeah.

>> **W. C.:** You know now we think of it as fairly common. And she'd also had treatment with the knife. So she really had the best. And in Oklahoma, Oklahoma City, we have wonderful spectrum of radiation therapy treatment options. I mean just a great city for the services that we can provide in terms of radiation therapy. Now I was talking with the lady and she was probably a year out of her treatment, and she was doing great. And I thought, my gosh, think about what I would have, or how I would have been able to treat her five or 10 years earlier.

>> **Gary:** Oh yeah.

>> **W. C.:** Versus now. And I thought how, how is it ever going to get any better? How can I do my job better? And there isn't really, there really isn't more that we can do with photon beam radiation therapy. A photon beam's a photon beam. An x-ray beam's an x-ray beam. Imaging has some great opportunities I think to refine imaging that we'll just define [inaudible] to be treated better. But it was really this patient and thinking how can we do our job better? How can we provide better patient care? And it was protons, it has to be proton radiation therapy. So I was reading an article and it was about protons. And I looked over and I saw a, an ad for proton therapy in a practice.

>> **Gary:** Sure.

>> **W. C.:** And I thought well why can't we do that?

>> **Gary:** Of course.

>> **W. C.:** Why not? So I picked up this ad and I'd never in my entire life sent out an email say, to a vendor type.

>> **Gary:** Right.

>> **W. C.:** Person. And so I said what do you think? Here's the size of our practice, here's the size of our community. I would like to see protons in our practice. What's, what do you think? You know. And I thought I'll never hear from them. And the next day I got an email back saying, funny you should ask, we'd like to come and talk with you.

>> **Steve:** Wow.

>> **Gary:** That's fabulous. We're visiting with Dr. W. C. Goad. He's medical director of the ProCure Proton Therapy Center in Oklahoma City. We've got a lot more to talk about in our next segment, so stick around. Hope that you are being enlightened by this great therapy now being offered in Oklahoma. More to come in *Oklahoma Innovations*.

[Music]

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>> **Gary:** The first hospital based proton treatment center in the United States was built in 1990 at Loma Linda University Medical Center in Loma Linda, California. And as of July of this year, six facilities were operating in the U.S. and Oklahoma's proud to say the ProCure Proton Therapy Center in Oklahoma is one of those six facilities. Our guest is Dr. W. C. Goad. And he's the medical director of that facility. We're learning a lot more about proton therapy for cancer treatments.

>> **Steve:** Gary you know as we went into the break, W. C. was talking about how he, his thought process came along with, with, to the point where he was looking in a publication and, and came up with the idea, you know, why can't we do this here in Oklahoma. And that is the genesis of the ProCure Proton Therapy Center. And you were kind of carrying it on. I don't, I don't want to stop you, it's a great story. I want to hear more about this story, the business side of it, how you got the investment capital to put it together. Who got involved. And, and we want to eventually get to what it means for Oklahoma, and talk a little bit about the future too.

>> **W. C.:** Absolutely. Well I, I responded, or sent out a contact about a company offering proton therapy. And I didn't really expect a call back. But you know it's just one of those things. And so within a day or two they said you know, funny you should ask, we're thinking about the same thing, why don't you come met us at our national meeting. And I hadn't planned to go to the national meeting, so I'd asked my group that I work with, you know, can I take off and go next week, and they said sure you go. And I told them why I wanted to go and they thought I was a little nuts. Nobody was ever going to have proton therapy. But I met.

>> **Steve:** Especially in Oklahoma, I mean.

>> **W. C.:** Well it really was not on the radar screen. But I, I met these people from ProCure and, and amazingly honest, I mean it was a small group of people. There was Dr. John Cameron the

founder of ProCure. Hadley Ford the CEO for ProCure. And it was really their two talents, John Cameron being the physicist, the academician. He built a proton center, and he really has a strong passion to provide proton therapy for pediatric patients who really, really can benefit from protons. Then Hadley Ford had background in banking and finance. So the two of them together really created that team with the, the, the skills in different areas to advance, if you will, the option for proton therapy. And everything they set to meeting, it was all about do the right thing, provide the right care. You know, it, it there is a business side to it obviously.

>> **Steve:** Of course.

>> **W. C.:** But if you, you don't let that drive it.

>> **Steve:** No.

>> **W. C.:** You take care of the patient and the business will sort of take care of itself. And I'm not a businessperson. I don't understand all this. But I was really attracted to the passion to have and make protons available. And that's really the mission of ProCure is to expand the access of proton therapy.

>> **Steve:** There you go. In, in your defense, and everyone's defense who does research, it's very difficult, if not impossible to put together a facility like this without some capital investment.

>> **W. C.:** Right.

>> **Steve:** And that's the business side of it. And, and that gives you the opportunity to, to do the treatment.

>> **W. C.:** We, that and I liked them, I, I invited them back and met our group. It was a very good, strong, positive relationship, both sides if you will. And we put together a business plan, a pro forma to look at the patient population. There was no doubt in my mind as far as just from some, some, you know, an intuitive way that proton therapy was good for my patients.

>> **Steve:** Of course.

>> **W. C.:** Or that you had the patient volumes to support it. So we went through the, the business plan looking at the cost, looking at, you know, the number of patients we have. What would be the expected volumes, and, and it was only a very strong business plan. One of the people that works with ProCure also works at Chesapeake Energy. And he was working out and, in the gym one day, and low and behold, here came Aubrey McClendon. He said what are you doing tonight? I'm visiting my brother who's in town with this company called ProCure and they're doing a proton center. And that kind of sparked the interest from Aubrey McClendon.

>> **Steve:** Who became an investor.

>> **W. C.:** Who became an investor. And, and he too has this great passion for, you know, how does this benefit our patient. How do we bring something to the community that.

>> **Steve:** Sure.

>> **W. C.:** That this is really going to change the dynamic change, level, transform if you will, what we can provide in terms of radiation therapy. So it was a good business plan for him, I think it was also doing the right thing in terms of expanding patient care.

>> **Steve:** Well I'm sure he has a desire to help out his home state, and help the citizens there, and, and that's a part of that process. So these folks are called venture capitalist, some of them are called angel investors, and, and other levels of investment.

>> **W. C.:** Right.

>> **Steve:** But very important for the continuation process.

>> **W. C.:** Absolutely. If it weren't for that we wouldn't be here, I don't think.

>> **Steve:** Exactly.

>> **Gary:** You touched on something a while ago about pediatrics and I want to bring this point up about proton therapy being used to treat children with cancer. Talk about the importance of that if you will.

>> **W. C.:** Oh in our pediatric patients who, who require radiation therapy, radiation therapy can be very damaging to normal tissues even in low doses. The kids who are treated with photon beam radiation therapy usually end up with stunted growth, lower IQs, with the kids that are treated with protons, we, we don't have the collateral damage to bone and soft tissues like lung and heart. So they don't have the lifelong complications from treatment. They don't have the stunted growth like they get from radiation. Radiation if you're treating bone or tissues that are growing, it stops growing.

>> **Gary:** Yeah.

>> **W. C.:** And everything else around it continues to grow so that becomes kind of a problem. The kids who are treated with like brain tumor patients who are treated with photons their IQs are about 25 points lower than those who are treated with protons. And then also there's a risk of second malignancies, if they survive and many pediatric tumors are long-term survivors. Risk of a second malignancy after a photon radiation therapy is about 25 to 30 percent. With proton radiation therapy, I think it's about five to six percent.

>> **Gary:** Wow.

>> **W. C.:** So there's a significant benefit in gains.

>> **Gary:** Oh no question.

>> **W. C.:** With protons.

>> **Steve:** Some of that collateral damage that you didn't plan for that just happens.

>> **W. C.:** Right, here's a kind of the Dr. Herman, he has an expression, there's no reason to treat normal tissue with radiation. You treat only what you need to.

>> **Gary:** There you go and this technology allows you to do that. Great, great information here. I want to talk to you about what this means for Oklahoma from a, obviously from the benefits you've talked about. But give me a little bit of scope if you can. Where do your patients come from? If you allow me to end the sentence with a preposition.

>> **W. C.:** Sure.

>> **Gary:** Okay.

>> **W. C.:** I'm in a group of radiation oncologists and we practice throughout Oklahoma City. We go out to western Oklahoma. Our practice extends down to Shawnee, so for our group itself,

it's pretty wide based. Proton therapy patients will come from, from anywhere in the state or even out of the state.

>> **Gary:** Right.

>> **W. C.:** And one thing I think.

>> **Gary:** Referred to by their physicians, the physicians.

>> **W. C.:** Right. I think one thing to keep in mind pretty much is, we at the proton center treat only with protons. Most radiation patients are still going to get conventional radiation therapy. And so we identified early on that we need a clinical partner, a hospital affiliate, somebody to work with. And we, we met and talked with all the hospitals in Oklahoma City, Integris, in Huntsville, were very, very quick to say and recognize this is.

>> **Gary:** Absolutely.

>> **W. C.:** A transformation.

>> **Gary:** Sure.

>> **W. C.:** This is the time.

>> **Gary:** State of the art.

>> **W. C.:** Yeah, well not just state of the, defines the next state of the art I think.

>> **Gary:** There you go.

>> **W. C.:** So, Integris is our clinical partner affiliate for cancer care services, and will provide really the entire spectrum of cancer care. We built the Integris Cancer Institute of Oklahoma next door to the Proton Center.

>> **Gary:** Okay.

>> **W. C.:** Patients will come there for screening, prevention, education. There'll be, you know, diagnostic services provided. Radiology services provided, radiation services provided. Chemotherapy. And the beauty of the Integris system is it reaches out to communities and hospitals all across the state of Oklahoma. So again, most patients will come to our center only for protons. But we're a small element of cancer care services. So we have a very good working relationship back and forth with Integris to make sure that their patients get the full spectrum of care.

>> **Steve:** Good, and if somebody's interested in proton therapy, if they're getting treatment now, or, or being, you know, are concerned about it in the future, do they request it? Can they talk to their doctors about it?

>> **W. C.:** They can request it directly. We, we really accept the referrals from the referring doctor.

>> **Steve:** That's what I mean yeah.

>> **Gary:** Okay.

>> **W. C.:** We get a lot of self-interest.

>> **Gary:** And I think you have a website people can look up and get more information.

>> **W. C.:** ProCure.com.

>> **Gary:** ProCure.com. Easy enough.

>> **W. C.:** P-R-O-C-U-R-E.com.

>> **Steve:** Yeah.

>> **W. C.:** And go there and just click on Oklahoma site for local.

>> **Gary:** There you go.

>> **W. C.:** And it's also a very good site because the general information cancer care in general, but specifically radiation therapy and proton therapy.

>> **Gary:** W. C., we've talked about, we're not going to have time to talk about everything and, I really get frustrated with that sometimes, but that means we'll have you back on okay?

>> **W. C.:** Okay, I'd love to.

>> **Gary:** But, well great. We, we've thoroughly enjoyed this. But let's, let's talk about training. You don't get this kind of training just anywhere. And talk about where.

>> **W. C.:** That's another thing I really like about ProCure and ProCure and the way, the commitment to do things is, is there is a training center, training development center in Bloomington, Indiana, this is a John Cameron, a physicist and the founder of ProCure, but it's built to be exactly the model of a proton treatment center. So we have this phrase, it's before the job training, not on the job training. Every therapist, every dosimetrist, every physicist, every doctor, goes there and goes through a very rigorous training program on proton therapy for patients. It's, it's for the physicians about 160 hours. We make two separate trips.

>> **Gary:** Wow.

>> **W. C.:** We have a, you know, online course, directed readings, you know. We have to credential ourselves if you will for proton therapy.

>> **Gary:** So training doesn't end with medical school. It keeps on.

>> **W. C.:** Oh no, no.

>> **Gary:** Keep on learning don't you.

>> **W. C.:** Keep on going.

>> **Gary:** You've been a great guest. We've learned a lot more about options for cancer therapy and treatment. Dr. W. C. Goad is our guest and medical director of ProCure. And once again, if you want to check out the website, it's basically ProCure.com. Check it out. Thank you for joining us on this week's edition of *Oklahoma Innovations*, Steve.

>> **Steve:** See, see you Gary.

>> **Gary:** See you next week. Have a good week.

[Music]

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