

Good afternoon, everyone. I'd like to welcome you all to the symposium here today. I hope everybody – it looks like everybody's grabbed their lunch and will be able to enjoy the presentation while you eat. I'm very pleased to be able to introduce our speakers today and give you a little introduction of the Xoft Electronic Brachytherapy System. My name is Kathy O'Shaughnessy. I'm the Vice President of regulatory and clinical affairs at Xoft, and I'll be giving an introduction to the speakers and overview of the presentations today and a little bit about the system as well, just to give you some background. This is our second symposium that we've held at the AAPM meeting, and last year was more focused on the early introduction, a little bit more description of the system itself. This year we're focusing more on what you, as physicists, would need to know to introduce the system into your clinics. So we've assembled the following speakers for you to share some of their insights and their expertise. Our second speaker is Julius Turian, Assistant Professor and a medical physicist at Rush University Medical Center, and he'll be going over some of the testing that they did at that facility and what we're calling "our preclinical use," some initial measurements that they've independently made with the system. The next speaker is George Mardirossian from University of Oklahoma, Associate Professor there. And he'll be focusing on the treatment planning aspects of the Xoft System. All of you – many of you would be involved in helping your facility understand how to plan treatments with the Xoft System and so he'll show you some examples of how that's done. And, finally, Mark Rivard, Associate Professor and Chief Medical Physicist at Tufts University School of Medicine, will be talking about quality assurance and regulation. It's very early on in the adoption of the system, but obviously as medical physicists again, your facility is looking to you to come up with a system that's going to meet the guidelines in general for brachytherapy and therapy and so Mark will share with you some of the progress we've made in establishing what those requirements and guidelines will be. And finally at the end, you'll have the opportunity to ask questions of anyone in the panel. I would ask you if there's a clarification during a presentation, you're more than welcome to ask the speaker during their presentations, but it's a little easier for us to just take the questions at the end, and we will have time for a Q & A at the end as well and get you out to the next talk. So after that overview, let me proceed and go forward. One disclosure, Dr. Rivard does serve as a consultant to Xoft and does receive research support from us for his work. I want to just give you a little background on the company. We're a very new medical device company so many of you haven't heard of us before. We're a venture capital startup in Silicon Valley in California. In 1998, the company was founded to take the design of a miniaturized x-ray tube for medical purposes and produce that. The initial indication that they were designing for was intervascular brachytherapy. I'm sure some of you had experience with the systems. Obviously the market for that changed substantially in the end of 2001 when drug-eluting stents were introduced. So the company was essentially reformed in early 2002 and the indication of partial breast irradiation was chosen for the first indication that would be used for the device. At this point in time, the system's been used for benchtop measurements and several animal experiments. There have not yet been human patients treated with the system; however, we are FDA cleared for use at this time. As an overview, you can see the different components of the system here. It's a full radiation treatment system; it's not just a source, although the source is the heart of the system and the unique aspect of our system. We have a set of disposable applicators that can be used to position the source in the breast after a lumpectomy for breast cancer. We have the disposable x-ray source that is going to be described and basically produces the radiation within the lumpectomy cavity, and then there's a controller equivalent to an afterloader that basically controls the high voltage timing and stepping of the source and has the user

interface. So those are the main components of the system and the different speakers will introduce different aspects of the system that they tested and used in their own facility. Here's a little bit more information about the balloon applicator. It is – it has multiple lumens and some unique features of this are there are drainage holes located at the distal and proximal end of the balloon, so within the cavity you have a way of extracting buildup of seroma and other fluids that might be in the cavity. There's a valve to pull the fluid out of the cavity, the drainage valve, an inflation valve, and then the source itself will insert in the center. Another interesting aspect of this applicator compared to other balloon applicators is that you don't put contrast inside the balloon to be able to see it on a CT or other imaging. We have a radiolucent material built into the wall of the balloon instead so that way you have a controlled amount of attenuation in the wall as opposed to some variable attenuation from contrast injected in the middle of the balloon. This is a simple – again, simple picture of the controller. As I mentioned, it delivers the power to the electronic brachytherapy source, it does the control of the stepping through the balloon applicator and it's, as the name suggests, basically responsible for the control of the overall system. And that's the device where you input the treatment parameters. The parameters are described using a TG43 formalism, and George will go into that in his presentation. This is a picture of the source itself and one of the things that people ask a lot is, "Well, how am I going to put my x-ray tube inside the patient?" And you can see we've just miniaturized the very basic concept of an x-ray source. You have a filament, a hot cathode, you accelerate the electrons through the vacuum inside the tube up to 50 kV potential, the electrons hit the anode and produce a bremsstrahlung spectrum of x-rays in roughly a spherical distribution around the anode. So, again, a very simple concept; the difficulty, of course, is making them in a very tiny – very, very tiny source. And I would encourage any of you who are interested in seeing the source, please stop by our booth. We have some models that we can show you and just be able to explain to you the layout of the source itself. The x-ray source, you can see it on the fingertip, that's the native source. When it's actually used in the system, we need to run a little bit of cooling water around the anode to keep it cool. So when it's fully – when it's put together with its cooling sheath, it has the picture – the middle picture appearance where you've got your high-voltage cable connection and then the cooling catheter around the source. One of the aspects of having a 50-kV source is obviously less shielding requirements compared to some other high-dose rate brachytherapy sources. So you don't need to have a specially designed shielded room with the system. The operator is – the system is designed so the operator is in the room with the patient when the procedure is being done. The controller itself is also fairly mobile. It has wheels on the bottom so you can put it away for storage or perhaps have several rooms in your facility that are licensed for its use. It doesn't require any particular power or any other thing. It can be used with a standard wall outlet. The first human use of the device is – will be done under IRB protocol, and I'm just going to give you a couple slides on the overview of that particular study. The inclusion and exclusion criteria are going to be very similar to other protocols that are run for a partial breast irradiation low – they're invasive ductal carcinomas or DCIS, small in size with certain pathology restrictions. We're going to be treating 40 patients under this protocol at up to nine sites. The performance endpoints for this particular study are going to be more short term. They're not going to be the long-term follow up that some of the other registries have used. It's basically reliability, ease of use, patient satisfaction, any safety endpoints, are there any acute reactions to the radiation, and any unanticipated adverse events. So as you would expect when you are using a system with patients, we want to make sure we do it in a very well-controlled, methodical way. There are up to nine sites that have been chosen for this study. They're a combination of university and

community facilities. We want to make sure we understand what types of questions or training that users at different places would need, and the sites are geographically distributed around the country. In terms of the protocol itself for treatment of the patients, we will be using the 50 kV operating voltage. Just as you do with any other breast brachytherapy, there will be treatment plans developed from CT images using commercial treatment planning systems. There will be twice daily confirmatory imaging using x-ray, ultrasound or CT to ensure that the applicator has maintained its position and size, and a very similar dose regimen 34 Gy delivered in ten fractions, two fractions a day. And that's the same as the dose that's implemented in the NSABP trial. So that's a very, very quick overview of the system and some of our plans. The idea was that we have our speakers spend most of the time talking to you about their experiences, so I'd like to present Julius Turian to give you the next section of the slide.