So it’s sort of a nice segue to the last talk because we’re going to talk about different interventions that would treat pain of the lower extremities, so different forms of pain therapy. My only disclosure for this talk comparing endovascular interventions to surgically vascularization is that at least in my practice I am an endovascular first enthusiast but I will try to temper my judgment here.

And this will be the outline of my talk, it will take about 30-35 minutes to go through that. A little background and then we’ll talk a little bit about the diagnosis and treatment of peripheral vascular disease but I really want to focus on the treatment of critical limb ischemia as opposed to claudication and then we’ll go over some of the outcomes of surgical bypass, outcomes of endovascular interventions. What are the things that can predict failures of endovascular intervention and then discuss some of the pros and cons of endo versus surgery.

So some epidemiology, truly peripheral vascular disease is perhaps an epidemic, lower extremity atherosclerosis affects 10% or more of all patients and it does result in episodes of limb threatening ischemia in many patients, up to 80 thousand individuals per year many of whom would require some form of revascularization.

You are all very familiar with the risk factors, smoking, diabetes, hyperlipidemia and hypertension and the presentation of patients with peripheral vascular disease are part of a spectrum. Many patients are actually asymptomatic but when they are symptomatic the simplest presentation or the most benign presentation is that of claudication and then once you get into the presentation of rest
pain, ulceration or gangrene, then you fall into the symptom category of what is known as critical limb ischemia.

So claudication by definition is pain in the muscle group that is triggered by exercise, it is reproducible, it is oftentimes in the same muscle group and it is relieved by rest within minutes. Usually this is not a limb threatening situation but it’s a quality of life issue because some patients cannot perform what they want to perform.

Rarely can it progress to critical limb ischemia which is again a manifestation of rest pain or tissue loss, typically occurs in the toe or in the forefoot and the patient will usually describe to you that their pain is worse at night, they oftentimes cannot sleep in their bed and they will end up sleeping in a recliner chair because their symptoms are aggravated by leg elevation. The little kick that they get from gravity by dangling their foot down can actually relieve their pain and this is why they end up sleeping in a recliner chair.

So critical limb ischemia poses a significant toll on the annual healthcare cost, over a billion a year and this is perhaps ulceration affect up to 15% of diabetic patients. Oftentimes diabetic patients as you know can present with foot sepsis and the infections are commonly polymicrobial with osteomyelitis being present in up to 70% of patients with tissue loss.
The simplest way to determine whether they really have peripheral vascular disease or not is to just feel their pulses behind the knee in the popliteal distribution as well as at the level of their foot, on top of the foot where you feel for the dorsalis pedis pulse and behind the ankle where you will feel for the posterior tibial pulse.

One will also look for capillary refill and as we were discussing earlier, just look at the patient because if you see that the skin is shiny and you have hair loss those are markers that you can just observe, markers of essentially vascular insufficiency. Of course and especially in diabetic patients one has to look for wounds, foot hygiene, toenails and their sensory exam to make sure whether they have neuropathy or not.

Now for a vascular surgeon the Doppler exam is sort of an extension of the clinical exam and we heavily rely on the Doppler exam not only so much to make the diagnosis but to determine the level of the disease and the severity of the disease. And this is very important because the hemodynamic data that one can get from the Doppler exam can allow you to predict whether someone is going to heal a wound that they have on their foot. So the predictors of nonhealing include a flat line waveform at the forefoot, you get a pulse volume recording tracings at the ankle and if these are flat it means that that patient has severe vascular insufficiency. You measure the pressures at the ankle and if the pressure at the ankle is less than 50 then this is a predictor of nonhealing. The toe pressures are very important especially in those patients with diabetes and patients on dialysis because they may
have noncompressible vessels and their pressure at the ankle may be falsely elevated. This is why it’s important to measure the toe pressure in the vascular lab because oftentimes these are not affected by calcification and would not be falsely elevated and the toe systolic pressure of less than 30 is bad and is a predictor of nonhealing. So if you have any of these, the outlooks are of limb salvage without revascularization is 5% at best.

So let’s move on to treatment. For claudicants of course life style changes, medications such as Cilostazol and exercise therapy in a regimented way on a weekly basis, sometimes revascularization if they are truly disabled by their symptoms. But for those patients with critical limb ischemia there’s not question that they require revascularization for limb salvage and those are again those patients who present with rest pain or tissue loss.

Nonoperative therapy should be offered for everyone, as you’ve heard this morning from Dr. Edmundowicz’s lecture, risk reduction is really important for all those patients with peripheral vascular disease because they oftentimes, almost all of them will have concomitant coronary artery disease. So you screen for diabetes, you treat their hypertension, of course you optimize the management of their coronary disease and their carotid disease and you treat their lipids. Exercise therapy is particularly important for those patients with claudication, weight management, almost all of my patients are on aspirin and a statin and of course needless to say, counseling about smoking cessation is very important. Not because it’s only important for their risk reduction but it is one of the most important predictors of recurrence and failure of revascularization if they keep on smoking.
So some of the basic tenets of the management of vascular disease with tissue loss are the following: if someone presents with an infection in their foot you have to control that first. And this can be done with IV antibiotics, if they have an infected abscess or an infected toe you have to surgically débride that to control the foot sepsis. And then you move on to look for ischemia, you feel their pulses, oftentimes you would feel a part of a pulse in a diabetic patient. They have a bad toe and then you treat that but they don’t really need any further evaluation for arterial insufficiency.

The noninvasive vascular lab with the Doppler exam is very instrumental, rarely do we use MRA or CTA or angiography just purely for diagnostic purposes but those are typically utilized when you’re planning for an intervention for revascularization.

Once you sort of control the infection with antibiotics with or without débridement, then revascularization is in order and some patients who present with tissue loss may need further débridement or closure of an amputation once they are done with the revascularization surgery. So interventions have clearly evolved for revascularization, whereas surgery was essentially the mainstay to re-establish blood flow to a lower extremity with an endarterectomy or with a bypass, this is the vein graft coming down here and a distal endo stenosis. It is still commonly performed nowadays but endovascular intervention with balloon angioplasty and stenting and a variety of techniques have become the mainstay therapy at many institutions.
If you look at the vascular spectrum of instrumentation that a vascular surgeon would utilize nowadays it’s just no longer the scissors and the retractors and so on and so forth. But there are atherectomy devices which can allow you to chew up the ___ from a percutaneous approach. Different devices that can allow you to tackle challenging complete occlusions, there are robots through which you can perform bypass surgery through the abdomen without having to make a huge incision on the belly, laser atherectomy which can pulverize the plaque and a variety of different balloons and techniques and technologies, many gizmos really available for a vascular surgeon nowadays.

This has caused a significant transformation in vascular surgery and this is only in the peripheral vascular disease, we’ve discussed a little bit aneurysms here but it has really occurred on all levels. And this is what was very common back in 1994, this is a vein graft that would be utilized for a bypass and this is what the bypass would look like on an angiogram. This is still commonly performed nowadays but a vascular surgeon is more commonly seen in an angio suite. So this is what Will Anderson showed you this morning, this is an OR hybrid suite essentially where you have an x-ray suite in the operating room and back there you have balloons and catheters and wires, this is not me by the way, I’m more fit than this. But a vascular surgeon would spend most of the times with angioplasties and angiograms such as treating here a complete superficial femoral artery occlusion with an angioplasty. So it is actually projected back that back in 2010 up to 70% of revascularization procedures across the U.S. have been endovascular in nature.
So we’re going to discuss over the next few slides whether it works and what are the differences between infrainguinal bypass and open surgery and endovascular interventions. There’s no question that bypass works very well, this is a result from a randomized cryo looking at a bypass to the popliteal artery or femoral popliteal bypass. If you look at the patency slide here 68% patency rate at 60 month, 60 month is not a number that you’re going to see with endovascular interventions. Typically it’s 9 month, 12 month, maybe 24 month, from a patency perspective there’s no question that a popliteal bypass especially when its done with autogenous vein lasts quite long. And it’s the same when you’re doing a tibial bypass, about 50% patency at 4 years. Again you’re not going to see patency numbers at 4 years for a tibial angioplasty. It’s just uncommon because most of those patients will recur earlier than that. Best success when these are done with vein using autogenous tissue.

But this comes at a price. You all know that those patients are sick, they have heart disease, they have diabetes, they have renal failure oftentimes. So the mortality rate is not insignificant and ranges from 1.4 to 6.7%. The 6.7% number is from the Albany group. As important is the fact that they’re going to develop a significant proportion of wound morbidity. Up to 30% of patients will have some issues with their wound. Not only at the surgical site but remember that those patients are oftentimes having a vein bypass and to harvest that vein you may end up with a big wound on your leg which may not heal.
The time to healing can take up to 10 months, not only of the lesion that they’re presented with but also of the wounds that are inflicted upon them through the surgical approach.

Why is that so? Because they have many risk factors, I mentioned the vein harvesting, this is essentially a breakdown of the vein harvest site and you clearly see that there’s the ____ of that wound. The limbs are oftentimes ischemic so now you’re placing a new incision on an ischemic limb to harvest the vein that may not heal. They are oftentimes diabetic with a poor wound healing potential. Because there’s a significant amount of recurrence at some point in time a lot of these procedures are redos which means that those wounds are at a higher risk of infection and breakdown.

And those patients as we mention can present with tissue loss in their foot and potentially infection in their foot which can put the surgical site at the secondary risk of infection.

Now this and the mortality rate and the wound issues really have fueled some of the technologic advances that are available nowadays. There are so many gizmos and devices, this is a big market as one could imagine, but the technology has really helped us also provide some of those endovascular interventions to our patients. This is a picture of a balloon angioplasty essentially but it’s no longer just a simple balloon. There are many variations on this topic such as CryoPlasty a balloon that can freeze the plague with nitric oxide to hopefully minimize the rate of recurrence. There are cutting balloons which can create a more controlled dissection, there are different types of stents, some of them are balloon mounted, some of them are self-expanding, some of them are straight, some of their tapered, some of them are covered with a graft on the inside so you can imagine how many variations
of these things there are and perhaps one of the messages that you can get for this, if you have so many devices and tools to treat the same problem, it’s perhaps that none of them really works perfectly well. And this is why you see many iterations of different things.

But the important thing to remember is that all these tools and gizmos have allowed us really to tackle more and more challenging lesions. Whereas it is sort of easy to treat a stenosis or a partial blockage of an artery just because you have a flow channel through which you can pass a wire and then perform an angioplasty or whatever technique you want to utilize. It is more challenging to treat 100% occlusion because it’s just, there’s just no flow channel and you cannot get through. So what we oftentimes would do is essentially go behind the plaque in what is called the subintimal plane and then go down here and then the challenge would be to re-enter into what is called the true lumen and this is when some of those new devices will allow us to do, be able to re-enter into the true lumen and be able to complete the intervention even on a 100% occluded vessel.

But does this work? We had initially reported some of the, one of the initial series on the outcomes of percutaneous interventions for critical limb ischemia, this was presented in ’06 at the Eastern Vascular Society meeting. Reporting on the outcomes of 342 limbs that were treated with percutaneous interventions. And if you look at the limb salvage rate at about 3 years, it was 83% in this _____ Meyer curve but if you look at the patency rate at 3 years it’s just going to fall down to about 59% and this is a common slide that you’re going to see across most series of endovascular interventions. Preserve limb salvage rate comparable to surgical bypass but lower patency and a
higher rate of re-interventions. We have reported following that on a larger series of 1000 percutaneous interventions and this was presented at the American Surgical Association meeting, 50% of those patients had critical limb ischemia but look at the 30 day mortality rate, it’s not zero but it’s fairly low, it’s .5% which is significantly lower than what had been reported historically with surgical bypass. The limb salvage again close to 80% or so with a low patency rate of 55%, much lower than what we see with a bypass intervention.

So across the board when you look at series of percutaneous interventions for critical limb ischemia you’re going to see a fairly high limb salvage rate no matter what technology you would utilize, any variation of a balloon. But when you look at the different outcomes limb salvage is again maintained but you have a drop in patency rate starting at one year. You can see how the curve significantly drops at one year following the intervention.

So what are some of the anatomic considerations that one has to keep in mind when offering an endovascular intervention to patient presenting with critical limb ischemia? For an aortoiliac occlusive disease above the inguinal ligament the endovascular options have really assumed their primary role because they work very well, they are as doable as a bypass. The slides that I’ve shown you before are all infrainguinal interventions. Surgical bypass nowadays for aortoiliac occlusion is really uncommon, it is very doable and effective but it’s pretty morbid and we would reserve that nowadays for those patients who have extensive disease distribution, complete occlusion of their
aortoiliac ____ or for those patients who have failed angioplasty and stenting and interestingly we’re seeing more and more of those nowadays as we get more and more followup.

For infrainguinal disease it’s a little bit of a different story because the anatomy is far more challenging for endovascular intervention and I will illustrate that to you in a minute or so. Surgical bypass for those lesions continues to be a key player for revascularization. And those are some of the anatomic challenges that endovascular interventions would face.

This is an angiogram of a patient who has critical limb ischemia and we’re going to look at it from the groin down. This is the iliac artery, this is the femoral head here, the common femoral and this is where the femoral artery would bifurcate into the profunda and the superficial femoral artery in the thigh. So you can see that there’s no superficial femoral artery, it’s completely occluded.

Moving down to the knee this is the knee joint here, there’s reconstitution of some vessels here but again you don’t really see much. This is all in the calf here, there are really no good main vessels that one could identify and this is at the level of the foot, perhaps there is reconstitution of a plantar vessel here. This is another collateral here. So if one were to perform an endovascular intervention in this patient, you have to figure out a way essentially to pass your device from up here in the groin to down here and reenter somewhere in the foot to be able to treat that. So it’s pretty challenging and whereas with bypass you just go here with your vein graft and you bypass all that. So those are some of the anatomic challenges with infrainguinal occlusive disease.
So the key factors to consider of course first and foremost is really the big picture. What is the general health of the patient, the age, comorbidities, the ambulatory status, you’re not going to be very aggressive in a patient who has tissue loss who doesn’t walk much. Subjecting them to the bypass, they may never walk again. The severity of the limb ischemia is a key player also because I’m going to show you later on that the worse your ischemia then you may be better off with a bypass because of the amount of hemodynamic increment that you get with a bypass as opposed to an angioplasty.

We’ve discussed the anatomic distribution of the disease, the more excessive it is the more challenging it is to do an endovascular intervention. Prior intervention are of course very important. If someone has had a prior bypass that failed, it’s always more challenging to do one. If someone has had many angioplasties that have failed, perhaps they should have something else done.

And of course the other thing that we would look at is the availability of the autogenous vein, the saphenous vein in the thigh is really what we would primarily use for a bypass and lack of an adequate conduit can sometimes sway us to do an endovascular intervention.

So endovascular intervention for limb salvage have become first line at many centers, it’s certainly first line in our practice at UPMC. But they are continuously evolving and their advantages are that
they are less invasive with a lower incidence of morbidity and mortality. Patients recovered pretty quickly, it is oftentimes an outpatient procedure, at most patients stay overnight.

But there are some potential disadvantages that one has to keep in mind. Reduce efficacy in terms of hemodynamics. You do not essentially get as big of an increase in your pressure at the foot as you do with a bypass, the durability I’ve shown you is a big issue because they recur within 9 months to a year. There is a risk of limb deterioration, the frequency is not quite well known but if you imagine a patient who presents with an ulcer or a gangrenous toe and then that patient is really not followed very closely and the lesion that you created with an angioplasty recurs within 9 months than that lesion on the foot can easily progress if someone doesn’t catch it early on and re-intervene on that. Which means that some patients can really present with deterioration of their tissue loss and present with a non-salvageable foot, so you may lose that, that battle unless you follow those patients very closely.

Endovascular interventions can affect surgical options if you have a complication during the procedure, if you have embolization or you damage your target vessel than that can burn a bridge because you may not be able to bypass through that vessel anymore.

And of course there’s the issue of cost because if you’re re-intervening on patients every 9 months to a year, then that can be costly, significantly costly.
The other thing is that the techniques are not well standardized, I’ve shown you that there are so many gizmos on the market and it’s essentially the dealers choice. People will utilize whatever they’re most comfortable with knowing that none of those techniques has a significant advantage over the other.

So the results are also not very well documented, the outcomes that you see published out there are mostly from small single center series and the followup quality is not always very well standardized. So lots of technology for every vascular event there’s essentially one gizmo study from the iliacs to the femorals to the tibials, but there’s not must data to support the use of one versus the other in any vascular event.

What one has to keep in mind essentially, the key advantage in my mind which is illustrated by the comorbidities and the physiologic considerations. This is an 81-year old patient who is essentially a cardiac cripple, had a recent MI, is diabetic, had a previous CABG and both saphenous veins in the leg have been harvested. So there’s no conduit that one would utilize for a bypass. The ejection fraction is pretty low on ECHO and that patient now has rest pain with a big ulcer on the foot. So this patient is not going to do well with a bypass because of the multiple comorbidities and the lack of a conduit and it you look at the Doppler exam, this is what the flat tracing would look like at the foot. So clearly this patient has critical limb ischemia and without revascularization is going to end up with an amputation.
To walk you through the angiogram with that patient, this is the femoral artery down through the thigh, it’s open. At the level of the knee there’s a complete occlusion of the popliteal artery and then in the midcalf or so the anterior tibial artery comes back. And this patient was treated with a laser atherectomy and angioplasty and the key here is to establish in line flow to the foot. It is very important to have one straight channel to the foot in those patients who have critical limb ischemia.

And this is what you see, normalization of the tracings of the foot with an ABI of .87. So to me this particular example is really one of the perfect examples one we should push the limit for an endovascular intervention.

Now what are some of the factors that are potentially associated with poor results. We know that patients who present with claudications do better than those who have critical limb ischemia just because they have less challenging disease distribution. Those patients who have a stenosis and those patients who have a short lesion do better because they have less extensive disease. Those patients who have a poor runoff meaning that not much flow into their foot, they don’t do that well.

And what I’m going to discuss over the next few slides is the effect of an isolated perineal artery runoff, the effect of renal insufficiency and renal failure, diabetes, age and gender because there is more and more data nowadays to suggest that those particular patients may not do as well with endovascular interventions.
This is a series that we recently published looking at the predictors of failures and success of those tibial interventions, below knee tibial interventions for patients presenting with critical limb ischemia, 123 limbs, 83% had tissue loss and the rest had rest pain. And if you look at the wound healing in those patients treated with that endovascular intervention, 41% were able to completely heal their wound, but look how long it took, 10.7 month. Often times those patients may require reintervention, they really require close follow-up with wound care and wound debridement.

39% had improvement in their wound but did not quite heal, but the follow-up was low, 4.4 month in those patients. By logistic regression what was interesting is that the factors that were associated with empiric wound healing were an intervention on an isolated perineal artery and the need for hemodialysis. So those patients who were on dialysis did not do as well in terms of wound healing. Although the limb salvage was 75% at one year, the factors that were associated with limb loss at 1 year included again renal insufficiency and very distal disease in the foot requiring a pedal angioplasty. Limb salvage in those patients who had renal failure on dialysis was significantly lower than those patients who were not on dialysis. Interestingly it was not affected by diabetes, smoking and was not affected by statin therapy.

Diabetes however may not, although it does not affect limb salvage it has a significant impact on the recurrence rate and the rate of re-interventions such as what was shown in this series from New York. Clearly diabetic patients have a lower patency rate starting at 1 year than non-diabetic patients;
but with repeated re-interventions they can achieve, as we’ve discussed, the same limb salvage rate as non-diabetic patients.

We looked at the impact of gender and age on the outcomes of tibial artery endovascular interventions for critical limb ischemia, 221 limbs, 40% were women and almost 40% were octogenarians or older, 74% of the patients had tissue loss and 26% had rest pain. It is interesting to see that limb salvage was not affected by gender, but limb salvage was significantly better in those patients who were 80 or older. And this is perhaps that in this particular series a lot of patients treated for critical limb ischemia were considered as having what we call premature peripheral vascular disease, meaning vascular disease presenting in their 60s or 50s and 40s, and those patients who present with peripheral vascular disease at such an early age have perhaps a more aggressive form of the disease and their outcomes are just not as good even when compared to those patients who are 80 or older. So the risk of a major amputation following the intervention was much less frequent in octogenarians compared to younger patients.

If you look at patency, it was not affected by gender or by age, but the reintervention rate was significantly higher at 1 year in women, and this is perhaps the recurrences that occurred in men did not so much require a reintervention because some of them could be asymptomatic. Now are those reinterventions benign? The general thought at least in the vascular world is that yeah, well it’s another angioplasty, fairly minimally invasive, how bad can it be? But those reinterventions in patients with critical limb ischemia may not be as benign as we think they are, and when we looked
at the impact in 235 limbs treated for critical limb ischemia, gangrene 49% and ulceration 51%, 41% of those patients had developed essentially a restenosis and those are the patients who required the reintervention. 10% of them were asymptomatic, so they did not need any more work, 16% presented back with rest pain, 32% had a persistent wound. But if you look at this, 42% of patients had a new or a worsened wound following their recurrence.

So in 96 patients who required a reintervention for a tibial restenosis, some of them required a secondary tibial angioplasty, 44%, but 27% essentially lost their legs because those are the patients who come initially with tissue loss and by the time they come back and by the time the restenosis is diagnosed, the amount of tissue loss on the foot is just too late, it’s just too much and you cannot salvage that foot. So this is a very important number here. Some of them were converted to a bypass, and 12% were just observed. So the message here is that although the overall limb salvage rate is up to 87% the amputation rate is significantly higher in those patients who require a reintervention and who are not very closely followed, 27% versus 13%.

Briefly I want to touch upon the impact of other technologies that are available nowadays and we may see more and more of these. Atherectomy devices, as I mentioned, have been more and more available on the market and those are devices that can essentially not create a dissection of the plaque like what an angioplasty would do, but they will completely remove the plaque either by essentially piece-mealing it and removing it outside the body, or generating micro-particles such as with this device or this device that can go through the capillary circulation. So this is what some of those
devices can do. But if you look at the outcomes limb salvage is essentially the same and so is patency rate as balloon angioplasty alone. So although those devices might work they don’t seem to offer a clear advantage over conventionally available and less expensive techniques.

But what might be important is drug eluting technology. We know that in the coronary bed drug eluting stents have really revolutionized coronary angioplasty and stenting. It hasn’t done so much so yet in the periphery as it fails femoral angioplasty using drug eluting stents. The ones that have been used nowadays have not shown a significant difference, but there are nowadays many randomized trials that are underway looking at numerous stent technologies with drug eluting stents and drug coated balloons that are actually now available in Germany and there is essentially a lot of promise with these techniques because they could potentially decrease the recurrence rate and the need for reintervention with endovascular techniques.

So what are the problems with some of the studies that are published on the outcomes of endovascular interventions? They are retrospected and we are all familiar with the limitations of these studies. The end points are not always standardized, there is usually not a control group because you typically would read a paper, well these are my outcomes but there is no control group. The series are small with short follow-up, there is no standardization of reporting standards and often times studies would combine claudication and critical limb ischemia in the analysis, and those patients don’t do the same to start with.
And the reason I mention all that is to really introduce a new trial that may be underway. It’s now in the second round of submission at the NIH and it’s called the BEST Trial, which is a multicenter trial looking at surgery versus endovascular interventions for patients with critical limb ischemia and this will be a multidisciplinary trial that will hopefully answer some of those questions about one technique versus the other and potentially allow us to identify which patients will truly benefit from one revascularization or the other.

So to sum up I think that if you are treating a patient with critical limb ischemia you have to really adopt a patient selective specific approach. You have to recognize the factors that would modify the primary strategy. Clearly if you have an elderly, frail patient who has a poor survival, this is in favor of endo. If you have a younger healthier patient with a good conduit and a good saphenous vein perhaps you may want to offer that patient a bypass. If you have a lot of wounds on the legs, severe edema, venous stasis changes where you cannot really place an incision at the level of the leg, perhaps this is in favor of endo. And again if you have an extensive amount of tissue loss such as gangrene, as an indication for your revascularization there is really no margin for error for those patients. I’ve shown you that up to 27% of them may lose their legs unless you follow them very closely and perhaps those patients may be better served with a bypass.

So endovascular therapy as a primary option should be really offered in patients with favorable anatomy, those patients who have minimal tissue loss and of course if they have a high surgical risk and no otogenous conflict. You have to really keep a very close eye on those patients. In the vascular
lab we follow them with ultrasound to detect any restenosis and some of those patients who require reintervention, especially if they have a persistent wound on their leg.

Those patients should receive an aggressive wound management and meticulous foot care so if it’s not a vascular surgeon who is performing these procedures the interventionalist should make sure that the podiatrist or the wound care specialist is really keeping an eye and keeping the lines of communication open because many times the signs of a recurrence is really a wound that stops to adequately heal. And then you can investigate that further. And one should always consider an alternative strategy in those patients who develop a restenosis, especially in females, patients with tissue loss and diabetic patients because those are the patients who have the highest recurrence rate.

Now there are some unknown factors that could influence the decision making. If you have to choose between an endovascular intervention versus a prosthetic bypass with a plastic graft, I would say perhaps endo is the way to go. The role of other modalities may not be completely clear. I think that atherectomy and laser devices are effective but they perhaps do not have a clear advantage as opposed to angioplasty alone and there is a lot of promise with drug eluting technology. The effect of the genomic makeup is not quite known nowadays. There is some data coming out of UCSF suggesting that some patients with certain mutations may have a higher recurrence rate so we may see more of that in the future, and of course as with everything we do really a good judgment, multidimensional thinking and a multidisciplinary approach between internists, diabetologists and podiatrists is really critical to achieve the best outcomes in those patients.
So I did leave up to 10 minutes and I’m happy to take your questions. Thank you very much.