OK, welcome to the second episode of our yearly after my lecture series. Today we are going to have our cheaper international. An ideology, namely. Doctor Madoff, David Madoff, David Madoff. Did his Bachelor degree and Emory University, and then the MD and University speech book from there went to SUNY for the residency? It was Othello, and then a faculty member at MD Anderson. From MDN, Nasoni moved to Cornell Presbyterian in New York City, where he became the section chief.
00:00:53.278 --> 00:00:55.850 of Interventional Radiology there and join him in July 2019 is now.

00:00:55.951 --> 00:00:59.119 Professional radiology and medical oncology section, chief of interventional radiology and vice chair for visas in the Department of radiology and biomedical imaging.

00:01:01.970 --> 00:01:04.195 David is a great aspect in liver tumor treatment without correctional treatment, and if you look at his CV and his publication, he has been.

00:01:11.050 --> 00:01:13.506 One of the forces behind the great developments that have been brought by interventional radiology in the treatment of liver cancer,
and he in particular is very interested in all the method to which we can increase liver regeneration before and after surgery on Echologics surgery to deliver. David. Is one of the members of our team as as highlighted in this slide. The treatment of Reperta circus numbers very complex. We have Transformers, action ablation, radiation, systemic therapy. We need to mind also the liver disease that is present in all if not. Most if not all, the patient liver cancer, and so it really takes a village.
to be able to manage and treat this patient and it is very important concept that this patient should be treated in referral centers. Yeah, you can see some of our members. Actually there should be 2 times than the pictures that are shown here, but I don’t want to take more time to our. Lecture tonight then, so I’ll stop here and I like the baby in the beginning. Jay Silva I assume you can see my screen. Yep. OK, so thanks Mario for that really nice introduction. What we’re going to talk about today is
local regional therapies for liver tumors.

What I wanted to do is really go through a whirlwind tour of what IR or IO can actually offer. And not necessarily bore a lot of the audience with a lot of really hardcore data, which I definitely have, but I think to make it more interesting and palatable, I think we're going to show a lot of cases and make this quite interesting.

As you all know, Interventional radiology is involved.
We treat both primary liver cancer and metastatic liver cancer for the purpose of this talk today. We focus primarily on each CC, with the understanding that a lot of the local regional therapies that we can offer can be translated into other disease types. When talking about the goals of therapy, there are really 3. There is what you would call curative therapy and that could be, you know, transplantation resection and transplantation resection and transplantation resection.
Ablation for early stage disease. We also I guess you briefly mentioned my area of interest in liver regeneration. We can convert patients who are unresectable to resectable, and that can typically be done by portal, vein, embolization, radiation, lobectomy, and transarterial embolization therapy, which we'll get into later. And for those patients that are of intermediate and advanced age, we really can offer what's called palliation. Which is, you know, can be transarterial embolization and or ablation. So all of the different types of
therapies that we offer really depends on patients tumor Histology, the number and location of the tumors within the liver, the extent of the underlying liver disease and of course, the presence or absence of extrahepatic disease. Now what I want to do first was getting to the whole idea of defining the different types of procedures. It turns out that a lot of practitioners, yet a lot of the time you get a lot of the types of procedures that we do kind of misinterpreted,
meaning that the terminology is often used interchangeably, and when you go to tumor boards or you listen to or you read your image NG, even your image NG. Reports. Taste, for example, is sometimes used in the place of taec or transarterial embolization, and vice versa. When we talk about microwave ablation as well as you’ll hear later, it’s always called RFA, even if it’s not really.
Medium embolization is sometimes referred to as radiation therapy, and in addition you know when I’m reading these reports. There’s often times where will do an embolization where we’re discussing, you know, an ablation cavity, and this really isn’t the case and this really has major implications for patient care. Medical record keeping and billing, so I see a lot of times where a patient may.
Get a treatment for an image in finding and in fact it may actually not be necessary and I’ll get into an example of that later. Of course, before we can even talk about treatment, I want to stress the importance of percutaneous biopsy. OK now, interventional radiologists often think of this as kind of a mundane procedure. It’s kind of basic and. In my opinion, percutaneous biopsy is probably one of the most important and impactful procedures that we do. This is a case that I want to show which is a 64 year old female with squamous cell cancer of the tongue which is a 64 year old female with squamous cell cancer of the tongue who has a PET CT positive avid.
lesion in the left lobe of the liver
and of course because of the location
because of the disease,
it’s very important to get a diagnosis now.
We would all agree that this lesion.
It’s probably very difficult to biopsy.
We were able to do the biopsy
as you see here,
and this is actually the bottom of the heart.
OK, and in fact the patient did not have squamous cell carcinoma but actually had low grade B cell lymphoma, which completely changed the patients' Management. So the reason why I bring this up is that these procedures that you see here can be very, very difficult. OK from a technical perspective, but I think that it would be very important for the referring physicians to actually reach out to one of us in IR to see if it's actually feasible or not. And in this case, I think it really helped the patients.
No diagnosis and therefore prognosis.

So just to talk about HCC a little bit, we’re all aware of the Barcelona Clinic liver Cancer Staging system.

As you know, we see patients all the range from very early stage or stage zero to very early stage or stage zero to terminal stage or stage D and the treatments obviously fit into where patients fall on this staging system.

So typically patients that are very early stage or early stage have very limited disease, are often considered.
and depending on where they fall into this, that will determine the outcome of what kind of procedures that you would actually do.

Intermediate stage is what we typically do for local for regional therapy, or maybe chemoembolization, or radio embolization, which will get into and then systemic therapy and basic supportive care are released. It reserved for the more advanced age is the reason why I put the. Question mark for survival. Is that we go through the gamut of. Procedures that we can offer and then at the end of the talk, we’re actually going to fill in
where the survival actually is at this time. So there are multiple treatment options for Liberty Mears for surgery. We obviously have transplant or hepatectomy and we if the patient has two small liver remnants, we can optimize the future liver remnant or FLR with a PV or something else. Portal animalization we can talk about a blade of techniques which are divided into thermal and non thermal. And for those that are thermal, we can look at those that are heat based in those that are cold based. And then there’s a whole host of
transarterial therapies we can offer, including chemo, infusion embolization, chemoembolization, as well as radio embolization. So just to bring up local oblated therapies first. The goal here is to percutaneously eradicate all viable malignant cells while sparing as much normal liver tissue as possible. We can treat tumors with unfavorable locations or patterns, patterns of distribution for resection, or patients that have multiple comorbidities that probably cannot tolerate resection, but maybe have resectable disease.
It’s these are most often used in patients that have what we consider low volume disease. It can be used for debulking an nowadays in recent years. I guess we can also use it to incite antigen stimulation for immunotherapy, and these are typically done as outpatient and repeatable. So the way we can do tumor treatment with local oblated therapies is by cooking, and that’s what we would consider radiofrequency ablation. We can boil them. Which would be microwave ablation?
We can freeze them, which can obviously be cryo ablation. We can electrocute them and that would be called irreversible electroporation and will go into a little bit more detail in a second. So this is a case of radiofrequency ablation. This is a 61 year old female with colorectal cancer and an isolated metastatic tumor in segment 6. Here we see a 2.2 centimeter tumor. Here there is an axle, the avid lesion in segment six, we place the needle proteins ablation, and here is one year. Follow up OK. Each major frequency ablation works is
that you have oscillating electrical currents via electrodes to tumor, which results in a resistive heating and tissue hyperthermia. The tissue nearest the electrode is heated most effectively, and the side of toxicity of course depends on the tissue impedance. Now one of the reasons why I bring this up in the setting of colorectal cancer is with the next therapy that I'm going to discuss. Radiofrequency ablation is becoming less and less performed. And in fact,
I haven’t performed a radiofrequency ablation since my days at MD Anderson, now more than 10 years ago in terms of microwave ablation.

This is a patient, a 60 year old female with HPV induced cirrhosis and a 2 centimeter HCC in segment seven who was awaiting transplant.

Here we see the lesion here, which was simply done with microwave ablation and a 2.7 year follow up.

There’s no residual tumor so the way microwave ablation works is that you can propagate microwave energy via an electromagnetic field, and this induces tissue...
hyperthermia via dielectric height,

historist hysteresis with that also means

is basically you dehydrogenated the tumor

and actually cause it to rapidly shrink.

This actually is done in a way where you

get higher ablation efficiency because

you can actually get higher tissue

temperatures and therefore you can get

larger ablation zones with shorter times.

And with this kind of treatment,

it readily penetrates through long

or chart issue where RFA is limited

and it’s not influenced by heat sink

effects in the same way RFA is.

What that means is that if you
have a tumor that’s sitting on a portal vein or some kind of vessel that can draw heat away from it. With microwave ablation, it’s actually less common. And this is just a study that just shows that there similar overall and recurrence free survival when you compare microwave ablation RFA. There was no difference in local tumor progression. The technical effectiveness as well as the major complication rates. So now that we know that RFA is all it can be used as a first line therapy. So can microwave ablation.
In terms of cryoablation, the goal here is to achieve temperatures less than 190 degrees Celsius. It results in direct cellular injury, vascular injury, and even immunological injury. What’s interesting here is that you can place multiple simultaneous probes. You actually get in a natural anesthetic effect from the ice, and as you can see from this example. Here we see the ice ball, which is easily seen, so you can actually sculpt the lesion that you want to treat.
And because of this you actually can get very predictable and reproducible. The treatments in terms the disadvantages because there's so many. Needle probes are there that are used. You can have longer procedure times. There's a theoretical bleeding risk and you can actually crack the liver, and patients could actually result in cryo shock, which is a form of tumor lysis syndrome. Now this is 1 case that I got from a paper from 2007, and the reason why I'm showing this like that is that I've never used cryo ablation in the liver,
so I just want to show you that the example that we can do it. It is being used in other institutions or be it rarely.

And then the last one is irreversible electroporation, a way that you can alter membrane ionic potentials and therefore induce irreversible disruption of the cell membrane integrity. The thought here is that this is a non thermal ablation. However there are studies now.

They have been published,
which actually does show a mild thermal component to it.

So here we see a patient with cirrhosis and had a very challenging tumor where you see it right here in segment 4B and it’s sitting right on the bile duct and right near the portal vein so. So we thought that thermal ablation with heat may be very difficult and may result in some kind of injury to the bile duct or the portal vein. The electroporation needles placed. Now these need to be very symmetrical with so that you get very good electrical potentials across and here we see the
tumor well treated and then at seven months follow-up there’s no tumor at all, and that’s a great result that’s exactly. What we wanted to happen. In terms of ablation versus surgery in these early stage patients, we can see that there’s survival and recurrence free survival and overall survival are not statistically significant in terms of all comers. However, when looking at those tumors that are central, that means that if a patient was to have a reception of a central tumor, it would be a very large and
difficult reception that rate
NOTE Confidence: 0.84893936
that ablation actually is favored,
NOTE Confidence: 0.84893936
and in fact,
NOTE Confidence: 0.84893936
when you look at the major complication rate.
NOTE Confidence: 0.84893936
The ablation group is statistically
NOTE Confidence: 0.84893936
significantly better than the resection.
NOTE Confidence: 0.90414697
And then.
NOTE Confidence: 0.88377416
Free in terms of overall and disease,
NOTE Confidence: 0.88377416
free survival, but it also looks
NOTE Confidence: 0.88377416
at the overall quality of Life OK,
NOTE Confidence: 0.88377416
So what they found is that there’s
NOTE Confidence: 0.88377416
really no difference in overall
NOTE Confidence: 0.88377416
and disease free survival when
NOTE Confidence: 0.88377416
comparing both ablation and surgery.
NOTE Confidence: 0.88377416
However, there was a significant difference
NOTE Confidence: 0.88377416
in the quality of life scores such that
the surgery does get a little better, but never to the level of the ablation. So when we look at a lot of the interventional procedures that we do. We're always looking at quality of life initiatives and then of course in these particular patients, again with low volume disease, we're always looking to treat these patients as a bridge to transplant. So this just is a few studies that just shows how the results of keeping patients on the transplant list so they don’t drop out. So in terms of transarterial therapies.
The rationale is that most liver tumors receive blood supply largely from hepatic artery, that these liver tumors are often hypervascular, especially HCC, and that this new metastases are less common than in other epithelial neoplasms. This has been initiated over 40 years ago. Some of the techniques we still use today when I talk to patients about some of these therapies, I do tell them that some of this therapy has been done for decades. However, it still is not the same therapy and I’ll get into that a little later.

So the goal here is to selectively...
and locally deliver these.

Intra arterial therapeutics to the tumor bed thereby effectively targeting the tumor, sparing the surrounding hepatic parenchyma and minimizing complications in toxicities. But again, as we discussed, we really need to understand what the term tases, because again, there’s a lot of difficulty within the literature and within just our own tumor boards and reporting structures that seem to use these terms interchangeably. Now, all utilized selective catheterization of the paddock artery branches, but.
Once that’s done, the procedures are actually very different.

So what is bland embolization? Bland embolization is embolization without chemotherapy, only using the embolic agent. The goal here is to completely occlude the tumor feeding vessels, which then can cause ischaemia and process. Now, because of this, the pain the procedures can be sometimes quite painful. So because of the way that we do it with very small particles, that actually leads to this kind of pain,
it may have very different effects on the vasculature.

There’s been a lot of extensive research, but the precise effect on the tumor cells largely remain unknown, and because this is done through a scheme, yeah, be hypoxic events may actually cause activation of several genes, including veg F, which can then lead to compensatory angiogenesis, and tumor growth so. Like I said, the most common techniques that are used are these very very small particles.
which get very distal into the tumor.

They don’t actually make it to the capillary level,

which may be an issue,

but the goal was always really to get to near stasis or stasis while preserving flow to the larger arterial branches.

This is just a case of a 61 year old female with HCV cirrhosis who had a 4.8 centimeter HCC.

The goal here was to embolize her to get her as a bridge to transplant because she was very close to being over the five centimeters that would keep her within the Milan criteria.
We did this very quickly and we were able to treat this tumor. As you can see here. Totally included and then one month later totally necrotic and now is at 4 centimeters, so she ultimately underwent a transplant that few months after the embolization. This is a patient that in a different location, probably would have gotten oblated. So here we see a very small lesion in segment 8. That’s a solitaire E lesion that’s
00:22:43.270 --> 00:22:46.440 very close to a budding the heart.
NOTE Confidence: 0.8375181
00:22:46.440 --> 00:22:49.936 So I thought that this would be a
NOTE Confidence: 0.8375181
00:22:49.936 --> 00:22:52.480 very challenging lesion to a blade,
NOTE Confidence: 0.8375181
00:22:52.480 --> 00:22:54.630 and I opted for embolization.
NOTE Confidence: 0.8375181
00:22:54.630 --> 00:22:56.846 We see the Hypervascular
NOTE Confidence: 0.8375181
00:22:56.846 --> 00:22:59.616 territory within the artery here.
NOTE Confidence: 0.8375181
00:22:59.620 --> 00:23:01.438 At the end of the procedure,
NOTE Confidence: 0.8375181
00:23:01.440 --> 00:23:02.950 there’s no more tumor blush,
NOTE Confidence: 0.8375181
00:23:02.950 --> 00:23:05.064 and now on the post embolization MRI,
NOTE Confidence: 0.8375181
00:23:05.070 --> 00:23:07.340 no contrast enhancement is seen.
NOTE Confidence: 0.8375181
00:23:07.340 --> 00:23:09.706 And this is another case where this
NOTE Confidence: 0.8375181
00:23:09.706 --> 00:23:12.415 was a patient that was going to
NOTE Confidence: 0.8375181
00:23:12.415 --> 00:23:14.445 have a combined bland embolization,
NOTE Confidence: 0.8375181
00:23:14.450 --> 00:23:16.688 followed by portal embolization in order
NOTE Confidence: 0.8375181
00:23:16.688 --> 00:23:18.929 to increase hypertrophy prior to resection.
NOTE Confidence: 0.8375181
00:23:18.930 --> 00:23:21.174 So here we see the tumor
00:23:21.174 --> 00:23:22.670 we have replaced right?

00:23:22.670 --> 00:23:24.540 Hepatic artery from the smam.

00:23:24.540 --> 00:23:26.415 The patient was embolized with

00:23:26.415 --> 00:23:27.915 100 Micron microspheres and

00:23:27.915 --> 00:23:29.779 then a tolling aquatic tumor.

00:23:29.780 --> 00:23:32.482 But in this case we actually saw

00:23:32.482 --> 00:23:34.066 significant regeneration to the

00:23:34.066 --> 00:23:35.866 point where the patient never

00:23:35.866 --> 00:23:37.760 actually needed to get there.

00:23:37.760 --> 00:23:39.875 Pve and and ultimately underwent

00:23:39.875 --> 00:23:41.144 a successful resection,

00:23:41.150 --> 00:23:44.486 and this is just some data that I

00:23:44.486 --> 00:23:47.938 wanted to to show where we see some,

00:23:47.940 --> 00:23:50.060 you know, 33% median survival.

00:23:50.060 --> 00:23:52.598 21 months, you know three years.
We also see some patients that have very good response rates and reasonable survival rates. And then when you have post-op recurrence meeting, survival can be as high as 46 months. So what is conventional taste or see taste? So conventional taste is an infusion of a mixture of chemotherapeutic agents with iodized oil followed by embolization with microparticles. To carry these cytotoxic agents to the panic sinusoids where drugs gradually are released.
from this unstable mixture.
So like I said, these procedures have been done now for like for more than four decades.
But when I consent or consult patients, I tell him that it’s not. You know, the same. We don’t do it the same way as we did in 1977, and based on the global utilization of this technique, the Society of Interventional Radiology has called in the first line.
therapy for inoperable HCC patients
with well preserved liver function.
So unfortunately, at this time conventional taste is kind of non standardized.
The trend over the years has gone from whole liver to low bar to selective. And also from occlusive to not necessarily occlusive again, the hypoxic insult may lead to actually stimulation of growth.
Factors that may lead to tumor.
To more tumor growth, there’s various chemotherapeutic regimens and actually in 2019 in the Journal cardiovascular.
Interventional Radiology,

there was a global survey which basically showed that there’s lots of different ways you can do this,

But the most common embolic agents that we use these days are again our LOPI, Dolores Idol, PVA gel foam, and some others.

So this is one of the two landmark randomized control trials, first showing the benefit of.

Embolization it’s interesting that the procedure was performed for 25 years before we actually were able to show benefit.
This was a study that was performed from the Barcelona Cancer Center and it showed largely that it was working in a select group of patients. 112 out of 903 that had well encapsulated, smaller sized tumors in patients with good liver function and good performance status. So that was one way that we were able to justify the use of Conventional taste and this was another study that was performed in an Asian population, mostly with HPV that also had taste on demand. Taste monthly or every two months, so they had a scheduled time where they had it and as you can see there is a
statistically significant difference
in taste versus supportive care.
So how does this work?
Well, basically aside,
all Orlopp Idol is a poppy seed oil and
it acts as a drug carrier that seeks out
the tumors and also acts as an embolic agent.
And we know that we can do this with the
understanding that there’s very complex
sinusoidal anatomy and such that the
hepatic artery and the portal vein are
actually connected in this time besides.
And the reason why that’s important is
that you can get in paddock arterial and portal venous occlusion such that
the oil ends up in the tumors crosses
from the artery into the portal vein
and then kind of sits there and then
you block up with particles because the
forward flow is the arterial pressure
is still pushing the oil across into
the portal vein so you block it up
with particles to stop that flow.
This is just a case of a.
53 year old man with multifocal
HCC with chronic HCV and elevated
AFP who has multifocal disease.
This large tumor in segments in savings
for taking some eight and four a.
Here we see it on the CAT scan.
Here’s the tumor.
The Lipiodol has iodine in it so you can actually see it on an X Ray and here you can see after the procedure is over where the lipiodol is staining. The reason why I brought up in the beginning is that I had a report recently of a patient that I treated with this that kind of called the Lipiodol Council vacations of uncertain etiology. A whole plethora of why you know what’s going on here. But when we simply just apply it all, so like I said,
there’s arterial portal communication

is very important to understand,

and the more you get into the portal

vein that apply at all in motion,

the better results you actually

Now we do see in our tumor boards that

sometimes patients do have some portal,

vein, bland thrombus,

and that may be a reason why their

outcomes for at least their tumor.

Is really well because you’re actually

doing an arterial importal embolization.

So I want to show a few cases.

This is a patient.

You see the tumor up here
00:29:26.727 --> 00:29:30.020 And.

00:29:30.020 --> 00:29:32.108 Again, we see the tumor here.

00:29:32.110 --> 00:29:34.084 You see, the lipiodol staining the tumor on the single floral microscopic image.

00:29:34.084 --> 00:29:36.630 and you can actually see the portal vein here next to the tumor as well as down here.

00:29:41.018 --> 00:29:42.896 So at the end of the procedure,

00:29:44.923 --> 00:29:47.069 we can see that there is a complete filling of two of tumor with dilipbhai at all.

00:29:54.850 --> 00:29:57.928 And then this is the before.

00:29:57.930 --> 00:30:00.926 And then this is one month after.

00:30:00.930 --> 00:30:04.026 We see a basically a whole.
00:30:04.932 --> 00:30:07.187 the patient had complete necrosis,
NOTE Confidence: 0.81704414
00:30:07.190 --> 00:30:09.440 an now at nine months.
NOTE Confidence: 0.81704414
00:30:09.440 --> 00:30:12.640 Follow-up has no residual disease.
NOTE Confidence: 0.81704414
00:30:12.640 --> 00:30:14.544 So one of the things that I
NOTE Confidence: 0.81704414
00:30:14.544 --> 00:30:16.107 think is really important and
NOTE Confidence: 0.81704414
00:30:16.107 --> 00:30:18.494 we can discuss this in all the
NOTE Confidence: 0.81704414
00:30:18.494 --> 00:30:20.299 different types of embolization.
NOTE Confidence: 0.81704414
00:30:20.300 --> 00:30:22.112 But because of applied all being
NOTE Confidence: 0.81704414
00:30:22.112 --> 00:30:24.464 radiopaque we can see I’m using this
NOTE Confidence: 0.81704414
00:30:24.464 --> 00:30:26.630 opportunity to talk about advanced imaging,
NOTE Confidence: 0.81704414
00:30:26.630 --> 00:30:28.744 so it’s very important to get high
NOTE Confidence: 0.81704414
00:30:28.744 --> 00:30:30.290 quality imaging during procedures,
NOTE Confidence: 0.81704414
00:30:30.290 --> 00:30:32.456 which I believe is critical to
NOTE Confidence: 0.81704414
00:30:32.456 --> 00:30:33.900 optimize tumor targeting and
NOTE Confidence: 0.81704414
00:30:33.900 --> 00:30:36.151 this can be done with the 3D
NOTE Confidence: 0.81704414
00:30:36.151 --> 00:30:37.948 angiography combing or cone beam CT,
which is some of what I showed or combining a multidetector CT angiography system. In your interventional suite and we know that from studies as early as 2007, of which I was involved in one from MD Anderson that you do see a lot of information that is important. Over standard digital subtraction angiography and back then, when we had very poor cone beam CT, it showed that we were able to impact the procedure in 19% of the cases. There's also now new software that helps precisely identify tumor feeders,
so we’re not just relying on
standard DSA alone.
And then we also with the pie at all,
which isn’t the same as with
the other kinds of therapies.
We can actually use this to immediately
look at post procedure imaging.
To show the benefit of the tumor targeting as well as
having confirmation that you effectively treated the tumor.
So here you see a tumor in. I said,
once you fast here, let me go back.
So in this case we have two HCC’s in
segments for a in segment 7 and what
I want to show is a tumor sitting.
Here. And here OK.

And when you do the angio it’s very unclear where these tumor feeders are.

So you have one. It’s definitely in the right, but you have one here, which is unclear if it’s coming from the left, so you can so you can do a cone beam CT from the left and see no tumor vascularity and then you do it from the right and we can see a tumor there and then the tumor there. And now we know that we’re in the right lobe.

So after the procedure is over,
we can see on a plane image or a flora scopic image. One tumor treated here an on cone beam CT. You can see tumor here. So now we know that it was effectively treated.

So this is a case that I did just last week and I thought it would be interesting to show 74 year old patient with alcoholic cirrhosis. This is the CT scan right here. This is a previous treatment area. We did the angiogram.
00:33:06.038 --> 00:33:08.270 We see the tumor up here.

00:33:10.760 --> 00:33:12.594 We then see I'm selective image here.

00:33:12.600 --> 00:33:17.067 So when we do the cone beam CT thinking

00:33:17.070 --> 00:33:20.350 that we may have had the whole thing,

00:33:20.350 --> 00:33:24.718 OK, so we treated the patient.

00:33:24.720 --> 00:33:26.785 And we see a basically a Half

00:33:26.785 --> 00:33:28.790 Moon where half of it’s missing.

00:33:28.790 --> 00:33:32.734 So we even got into the other branch.

00:33:32.740 --> 00:33:35.340 C. Feeling of the tumor.

00:33:35.340 --> 00:33:38.156 And at the end we can see that

00:33:38.156 --> 00:33:40.357 the tumor is completely treated

00:33:40.357 --> 00:33:43.626 and then on final cone beam CT.

00:33:43.630 --> 00:33:46.384 There is complete embolization with lipiodol

00:33:46.384 --> 00:33:50.088 so you can see this is very important.
And I just wanted to show that we have also imaging software that we can use to track these tumors very nicely. I don’t want to get all details, but you can see that we have a road map simply goes straight to the tumor and that I think results in a much more effective therapy. And we published on this back in a 2019. When we look at treating with chemoembolization, we can see that you get much better local tumor progression and overall survival when combing CT is used. And then we look at adverse events. We always tell patients that this
00:34:30.252 --> 00:34:32.490 is a liver directed therapy.

00:34:32.490 --> 00:34:32.865 However, their study that came out of Johns Hopkins back in 2008 showed that you can get systemic effects from the chemoembolization or conventional tastes, and this is what led to the institution or development of drug eluting beads.

00:34:49.210 --> 00:34:50.690 So the idea here? Is that the chemotherapy is then loaded into beads and added to water soluble contrast and can act as a vector for drug delivery and embolic agent to block arterial blood flow or supply to the tumor?
As we discussed.

The actually just you’re aware that Luppino has some limitations where their attention is variable, and it could wash out quite rapidly if we don’t use those particles.

And then, like I just showed, there could be some systemic toxicity. So with drug alluding beads you can get predictable retention and this can lead to overall less systemic toxicity, and this is just a case that I did awhile back showing a force .6 centimeter tumor.

which we did with drug eluting beads. However, you can’t see at the end of the
NOTE Confidence: 0.79313654
00:35:42.616 --> 00:35:44.498 procedure that the tumor was treated,
NOTE Confidence: 0.79313654
00:35:44.500 --> 00:35:46.252 because there is no iodine in
NOTE Confidence: 0.79313654
00:35:46.252 --> 00:35:48.061 these particles and then this is
NOTE Confidence: 0.79313654
00:35:48.061 --> 00:35:49.526 what it looks like afterwards.
NOTE Confidence: 0.79313654
00:35:49.530 --> 00:35:51.595 So this is just a couple of.
NOTE Confidence: 0.79313654
00:35:51.600 --> 00:35:54.060 I have a couple of studies
NOTE Confidence: 0.79313654
00:35:54.060 --> 00:35:56.040 which show the benefit of.
NOTE Confidence: 0.79313654
00:35:56.040 --> 00:35:57.320 Of drug eluting beads.
NOTE Confidence: 0.79313654
00:35:57.320 --> 00:36:00.399 I don’t want to get into all the details,
NOTE Confidence: 0.79313654
00:36:00.400 --> 00:36:02.075 but just show that there
NOTE Confidence: 0.79313654
00:36:02.075 --> 00:36:03.080 are promising results,
NOTE Confidence: 0.79313654
00:36:03.080 --> 00:36:05.264 in my personal opinion I am much
NOTE Confidence: 0.79313654
00:36:05.264 --> 00:36:07.327 more a fan of using conventional
NOTE Confidence: 0.79313654
00:36:07.327 --> 00:36:09.499 rather than dip tastes and then
NOTE Confidence: 0.79313654
00:36:09.568 --> 00:36:11.704 this is just a recent study
NOTE Confidence: 0.79313654
00:36:11.704 --> 00:36:13.766 published in radiology which is a
NOTE Confidence: 0.79313654
00:36:13.766 --> 00:36:15.356 prospective single arm study which
NOTE Confidence: 0.79313654
00:36:15.356 --> 00:36:17.544 also shows the benefit of idarubicin
NOTE Confidence: 0.79313654
00:36:17.544 --> 00:36:19.878 alluding beads for the treatment of
NOTE Confidence: 0.79313654
00:36:19.878 --> 00:36:21.688 patients with unreflectively CC.
NOTE Confidence: 0.79313654
00:36:21.690 --> 00:36:25.140 So there’s been a lot of
NOTE Confidence: 0.79313654
00:36:25.218 --> 00:36:26.769 interest in recent years
NOTE Confidence: 0.8352394
00:36:26.770 --> 00:36:31.404 Here we have an implanted radiation
NOTE Confidence: 0.8352394
00:36:29.308 --> 00:36:31.404 source that’s directly sent to
NOTE Confidence: 0.8352394
00:36:31.404 --> 00:36:33.414 the tumors via the attic artery.
NOTE Confidence: 0.8352394
00:36:33.420 --> 00:36:35.766 Use Yttrium 90 as the source,
NOTE Confidence: 0.8352394
00:36:35.770 --> 00:36:38.619 which is a beta emitter which penetrates
NOTE Confidence: 0.8352394
00:36:38.619 --> 00:36:40.850 only 2.5 millimeters in the tissue.
NOTE Confidence: 0.8352394
00:36:40.850 --> 00:36:42.805 There are glass and resin
NOTE Confidence: 0.8352394
00:36:42.805 --> 00:36:43.587 microspheres available.
These are theras spheres or Sir spheres, but I just wanted to make sure you’re all aware that these are not interchangeable. They’re very different products and they have very different characteristics. The main idea, I guess, is that the glass beads have a much smaller number of spheres, so each year themselves is much hotter. So if you want to treat a much larger area, you may need to use something which is much more embolic than these very small ones. But again, these have much less activity per sphere.
but here you get a much more minimal embolic, which is much more like real radiation therapy. Whereas the Sir spheres are more like embolization. So this is just a case of a 92 year old female with multifocal HCC who actually had a tumor rupture. Um, here in segment 8 with the satellite tumor as well, and as we know, when patients have tumor rupture, they have a very dismal prognosis. So like I said, this is a 92 year old female and because I did this with therasphere for
example it was a micro embolic Ann.

I treated her as an outpatient.

OK, so here is the tumor.

We do a mapping study, so this is the difference.

When you do the other kinds of chemoembolization, you basically take the product off the shelf.

At the time of the procedure, however, with 190, you really have to map out the patients to make sure that you’re not getting nontarget embolization to other areas which include extra product sites,
and you also have to calculate a lunch on fraction, which is how much of the material gets to the lungs because there exist very small communication between artery and veins, and therefore if you give too high a dose, you can actually get pulmonary fibrosis. So in this patient we were able to see that the radiation went exactly to where we wanted to tumor. Here we see the patient for years later, so this patient lived to 98 years old and this again is the fact that I treated a 92 year old patient with an outpatient therapy.
I kind of thought was pretty amazed. These are the toxicities that can occur by doing very good cone beam CT. This actually highlights the reason for it that we can reduce the toxicities by doing all these advanced imaging techniques. This was just the case. I want to show it with the utilization of cone beam CT where on cone beam CT we see in this patient a retro portal artery that on mapping study we can see some technetium 99 M. Maa actually getting into the duodenum. So if you were not care if you
were if you were not careful, 
NOTE Confidence: 0.8365445
you would actually send radioactivity down 
NOTE Confidence: 0.8365445
there and that would result in an ulcer. 
NOTE Confidence: 0.8365445
So what I want to also highlight here. 
NOTE Confidence: 0.8365445
Is that? Now a recent article came 
NOTE Confidence: 0.8365445
out talking about recommendations. 
NOTE Confidence: 0.8365445
A standardized recommend. 
NOTE Confidence: 0.8365445
Nations 4Y-90, in this case, 
NOTE Confidence: 0.8365445
resin microspheres and what they say 
NOTE Confidence: 0.8365445
is that if you do not use cone beam, 
NOTE Confidence: 0.8365445
CT or advanced imaging techniques that 
NOTE Confidence: 0.8365445
that companies or vendors that are 
NOTE Confidence: 0.8365445
supporting clinical trials won’t actually 
NOTE Confidence: 0.8365445
want them as part of one of their sites. 
NOTE Confidence: 0.8365445
OK, this just shows some data from Europe 
NOTE Confidence: 0.8365445
on those patients that are all within
all across all the PC else stages.

I'm in this particular study.

You can see the median overall survival’s in a PCL CAB&C.

Residents, although common, are fatigue, nausea, vomiting and fever.

GI ulcers are very uncommon and as well as grade three biliary.

And you know one of the most prolific users of Y-90.

This is North data from Northwestern University,
where they looked at their first 1000 patients over a 15 year period,
and you can see all the classification systems, child, Pugh, AB&C where you see BCLC and they've even treated patients with PC LCD and then with those patients that had child Pugh A&B. These are the overall survival rates. And you can see they have very low adverse events. So based on their experience with 1000 patients over 15 years, they use radio embolization as their primary treatment option and this just shows.
think we basically treat probably less than I think we should.

We start tumor board is patients that have portal vein tumor thrombus. This just shows the overall benefit of those patients that with Y-90. And I also believe conventional tastes do a good job, at least getting into the tumor vasculature of these portal vein tumor thrombus. They’re having some advanced radio with embolization concepts. When we first started doing radio embolization, patients got whole liver infusions.
However, overtime with patients getting going into liver failure and having really severe fatigue, it’s turned into a originally low bar.

Infusions OK, which you so from here to here and then overtime. The idea was that we can maybe get segmental infusions and then ultimately get the infusion directly into the.

Into the tumor, provided that there is a single or maybe two feeding arteries.

So here we talk about radio radiation, lobectomy OK,
and this is a way that we can hypertrophied the liver prior to resection while still keeping control of the tumor.

So the idea here is that we can generate future liver remnant hypertrophi that permit resection, allowing for a biological test of time. And as you may have seen from the previous patient, the previous slide we can permit patients with portal vein tumor thrombus to maybe be converted to even.
some scarring and fibrosis of the liver in the side that was treated, and therefore you’re getting compared to Tori hypertrophy of the untreated low. That being said, the treatment changes are comparable to portal vein EMBO. I’ll beat it. Invite at a slightly lower, slower way, but it does have the benefit of tumor control, which portal embolization doesn’t, and then we can talk about radiation segmentectomy, which is directly getting which is supposed to be a curative treatment, similar to ablation, where you treat up to two panic
segments with a low bardo.

So you’re basically taking this large dose that you do for the whole lobe, and putting it into one or two segments.

OK, you get much higher.

Active activity to each of those areas and in some cases it’s been adopted as first line transarterial therapy.

So the idea here that is that it really needs to. In my opinion,

really needs to be more validated,

but you can see from this case that you’re placing the catheter right up to the tumor.

The tumor here is completely hot and then after six weeks later you
See complete necrosis of the tumor.

So I also wanted to focus on portal vein embolization.

This is a transvenous therapy supportively, and embolization is a way of redirecting portal blood flow to the future liver remnant and by doing so could initiate hypertrophy of the nonembolize segments and by doing that can reduce perioperative complications such that we can increase the number of potential surgical candidates who have what we call marginal anticipated future liver remnant volumes. We can also achieve looks like similar.

Survival rates surgical
patients not requiring PV.

Now Kevin Billingslea spoke about this a month ago, so I didn’t want to focus too much on it. But this is just a case of a patient with HTC 10 centimeter solitaire E mass.

We need about 40% of the remaining liver after surgery, so this patient had 33%.

I don’t want to get into all the like how you measure it exactly. It’s kind of beyond the scope here, but basically this patient did.
not have sufficient liver.

A sufficient anticipated future liver remnant.

So this patient was considered a candidate for right Pve.

We do write PVE, we do Pve.

Cricket Aneus Lee where you puncture into the right portal vein and ipsilateral approach.

We infuse particles and coils and we can see that there’s complete diversion of flow from the right into the left.

We do the volumes and this patient increased their size, their liver and 18% so this patient was
considered a candidate for right hip.
Protect me and this is how the liberal looks intra,
procedurally or interactions intraoperatively where you see a very atrophic right lobe and a very. Hypertrophic very pinkish.
Left lobe so this patient underwent a very uneventful hospital course after surgery, but developed recurrence at five years, but then underwent successful transplantation.
A little bit of data on this.
This is the only prospective
clinical trial looking at PVE and in the setting of injured liver. It’s the only clinical trial that will be done because there’s those. Surgeons and interventional radiologists who believe that it’s unethical to submit to subjective patient to a procedure that they think or I should say, not subject to patients to a procedure that those surgeons and radiologists think work. And then if a patient dies because they went into liver failure, that will be a problem. So this just shows how using Portal vein embolization. Actually improves patients
postoperative course.

This was a study that we did at MD Anderson where we see that all of the deaths occur in those patients that did not have Pve and then in terms of survival outcomes.

We have, you can see that there are pretty similar those patients to those patients that have deviated to those that didn’t.

Now what we need to understand is that those patients that did not I should say that received portal vein embolization.
not have been a certain would not
NOTE Confidence: 0.7872134
have been a surgical candidate,
NOTE Confidence: 0.7872134
would have probably undergone
NOTE Confidence: 0.7872134
a transarterial therapy,
NOTE Confidence: 0.7872134
and the numbers show that those
NOTE Confidence: 0.7872134
patients would probably have a 20
NOTE Confidence: 0.7872134
to 30% three year overall survival.
NOTE Confidence: 0.7872134
So just by doing the Pve and
NOTE Confidence: 0.7872134
getting the patient to surgery,
NOTE Confidence: 0.7872134
the patient had a much better outcome.
NOTE Confidence: 0.7872134
So when we look at the staging
NOTE Confidence: 0.7872134
system which I discussed in the very
NOTE Confidence: 0.7872134
beginning and by understanding all
NOTE Confidence: 0.7872134
the different procedures that we can
NOTE Confidence: 0.7872134
offered at all the different stages,
NOTE Confidence: 0.7872134
we now see that those patients
NOTE Confidence: 0.7872134
00:48:26.114 --> 00:48:27.997 that have very early or early
NOTE Confidence: 0.7872134
00:48:27.997 --> 00:48:29.527 stage disease can result in.
NOTE Confidence: 0.8070893
00:48:33.280 --> 00:48:35.660 Major stage be can have a greater
NOTE Confidence: 0.8070893
00:48:35.660 --> 00:48:38.500 than 2.5 year survival and then those.
NOTE Confidence: 0.8070893
00:48:38.500 --> 00:48:41.349 Of course that have advanced in terminal
NOTE Confidence: 0.8070893
00:48:41.349 --> 00:48:43.350 stages obviously don’t do as well,
NOTE Confidence: 0.8070893
00:48:43.350 --> 00:48:45.588 but this just shows a recent.
NOTE Confidence: 0.8070893
00:48:45.590 --> 00:48:48.574 This is from a recent Journal of Hepatology
NOTE Confidence: 0.8070893
00:48:48.574 --> 00:48:50.479 Clinical Practice guidelines from Easel
NOTE Confidence: 0.8070893
00:48:50.479 --> 00:48:53.041 that there is really the newest thing.
NOTE Confidence: 0.8070893
00:48:53.050 --> 00:48:55.738 So I just wanted to pretty much finish
NOTE Confidence: 0.8070893
00:48:55.738 --> 00:48:59.020 up by some things that we’re doing now.
NOTE Confidence: 0.8070893
00:48:59.020 --> 00:49:01.964 Some new therapeutic approaches and I want to
NOTE Confidence: 0.8070893
00:49:01.964 --> 00:49:03.969 discuss immunotherapy and interventional on.
NOTE Confidence: 0.8070893
00:49:03.970 --> 00:49:06.718 And how it interacts with interventional
NOTE Confidence: 0.8070893
oncology so we all know that immunotherapy plays an important role in malignant tumor treatment. In particular, immune checkpoint inhibitors have promising clinical applications and we also understand that monotherapy only benefits a small portion of the patients. So for that reason, combination of different immune checkpoint inhibitors with different mechanism of action. Have been utilized. However, despite this there’s been a increase in the incidence of immune
related severe adverse events, so in some cases a lot of patients may not be really amenable to this. We know that our interventional oncology therapies do elicit systemic immune response. However, these responses may be too weak to prevent local recurrence in distant metastases, and it's really unclear how we can regulate the immune system through these different mechanisms, and this is a you know from a paper and which shows a very complex. I used paradigm in how we know therapy can
be used in the setting of chemoembolization, radioembolization, inflation etc. So there is an opportunity for potential synergy with these checkpoint inhibitors with some of the therapies that we can offer. And this just shows how taste and ablation and even breakey therapy, really can result in both immunostimulation an immune suppression. I don’t want to get into all the details of this, but basically it’s something where we can utilize the intervention oncology can utilize the intervention oncology therapies in order to really delve into how we can treat patients much
more effectively with immunotherapy.

And then this just shows that there are numerous ongoing studies.

Looking at the combination of immune therapy with locoregional therapy and this is a study I just wanted to show one that just got activated two days ago.

At Yale Cancer Center, which probably need to discuss soon.

If Mario allows me to at our upcoming one of our upcoming tumor boards, which is the Merkley 012 clinical trial, which is basically taste is the backbone, with or without, you know,
which in this case is a penbro
multi kinase inhibitor
which is live at and if so each
patient will get taste and then they
may or may not be randomized.
Those they get the systemic
therapy and those that don’t,
but we can go into that another time.
And Lastly,
I just wanted to show that
we do treat other patients.
I just have a couple of cases to
show that this is a patient with
colorectal cancer that followed.
They failed multiple
chemotherapeutic Regimen’s who was,
as you can see, has innumerable tumors with colorectal cancer did have normal underlying liver function and we treated this patient with white 90 and you can see that there’s a clear impact on the tumor response and I don’t want to go into all the surf locks, data and all that, but just be aware that. We can do it for this. This is a patient that was referred to me. Well, it was a Cornell from a radiation oncologist. Actually with chair who had breast cancer,
liver,

And as you can see it’s really overtaking the liver.

I was asked to see if we can really do anything for this patient and we did why 90 the page and then this was a situation where the patient was able to see even though she did succumb not within a year, she was able to see her son’s last Thanksgiving with family.

So again, this is where the palliative nature comes in.

And then Lastly,
this is a patient with pancreatic cancer, who we were able to. Treat with conventional tastes in a term that I call like just like radiation segmentectomy something I call now chemoembolization segmentectomy, where we can actually you know, in pancreatic cancer, we know these patients have very hypo vascular tumors in a very dismal plastic fibrotic tumor structure where if we can treat the entire segment, the tumors cannot live, so that’s something that we’re also looking at, so I wanted to make it clear that you
HCC is not the only thing we do. If you do have patients that have other types of tumors, we’re actually able to really treat those as well, and we’re happy to speak to you about them. So in conclusion, I hope I demonstrated their local regional therapies do play an important role in the management of both primary and metastatic liver cancer. They often provide benefit for survival, local tumor control, and improve quality of life compared to and in some cases, you know, compared to resection and compared to some systemic therapies, it may result in cure.
In some patients, such as those that have solitaire E small HCC's and can enable patients to be bridge or down stage 2. Transplant or surgery? There's various sublative entrance arterial therapies, and they have very different mechanism of actions, but I think when looking at these kinds of therapies, it's important to really understand the real true nuances of the therapies that you're either performing or requesting is a refer so that you...
really understand what we’re talking about and how to read reports when they come out saying ablation or a key mobilization. I’ve also hope to have shown advanced that both advanced imaging an catheter based technology has been very helpful in treatment decisions. By providing intraprocedural guidance and therapeutic confirmation that we were able to effectively treat the tumors, and we’re also now on the precipice of looking at combination therapies which appear promising, such as those found in immuno oncology. So with that I think I’ll stop here.
Think I was on time, but you know I’m sure we have some time for questions.

Thank you very much, Sir David. For anybody has a question and type it please in the chat and then we will respond.

In the end I mean by what people may be thinking.

Are this great review of all the possible. Approach is there.

Interventional radiology can provide for the treatment of primary, secondary liver tumor.

I mean from my own point of view, I,
00:56:16.435 --> 00:56:19.115 I think you really showed the complexity of 
the dictation making that is behind this.

00:56:22.000 --> 00:56:25.312 It’s you know, as you said at the beginning, 
we think in a very simplified way.

00:56:27.910 --> 00:56:31.095 Yeah, let’s sub later if aid is.

00:56:31.100 --> 00:56:35.438 But in reality, you really do.

00:56:35.440 --> 00:56:38.618 Send the patient to centers that have 
all these possibilities, Anan abilities, 
and they can really tailor.

00:56:38.618 --> 00:56:41.048 The treatment of the patient to the.

00:56:43.720 --> 00:56:46.730 To amend personalized treatment

00:56:49.160 --> 00:57:00.990 My questions and terminology, 
embolus therapy versus embolization.
Is there any difference?

Well, that's actually a very interesting question because I like to always call things embolotherapy. Now clearly there's really not a major difference between.

Well, I guess the term embolization implies that similar to like, what a pulmonary embolism uses that you’re taking a catheter, and your iatrogenic Lee moving one particle or or structure to another area. Now that could be with one particle, right?

But that doesn’t have to be with. The whole thing, so I guess embol
therapy is actually defined.

Should be defined as the treatment of patients with.

You know, using these transcatheter transarterial methods,

but I guess embolization doesn’t necessarily have to be therapeutic.

So that’s actually a great I think about that all the time.

And you know when we talk about in reports, for example, embolization of that,

would you know?

And I think that’s the actual difference.

That’s the actual difference.

Can you expand a little bit of
the possible adverse effect of combination therapy with the. They send the email uncle immunotherapy. Well, basically we don’t know that yet, right? I mean, that’s why we’re doing these. We also also don’t know if you should do the if you should do the. There are which therapy used to 1st right? Like should you do the should you start with taste and and then follow it with immunotherapy or should you start with your therapy and then do the taste right?
You know each. I guess trial is very different, right? And each. I guess therapy has its own company, has its own adverse events. The thought is that you would do the immunotherapy. You know, after the at least two weeks you would do the therapy immunotherapy after the taste. That by then the tastes adverse events should already be taken out of the equation. Because in the time that you’re getting the immunotherapy, those patients would already be beyond that time. So in terms of the actual combination is kind of hard to understand. I mean,
particularly in the Merck study where.

Pizza getting taste first.

So you know, we still don’t know.

I mean, we’re still very early in in all of these, you know, in all of these studies.

So I don’t have a very good answer yet.

Switch an ATC and different histopathology dash subtypes with different molecular bases.

Do you predict?

If there is a possibility that the different subtype of ACC can be treated differently by locoregional
01:00:21.271 --> 01:00:23.609 therapies and they, I would have
NOTE Confidence: 0.81619465
01:00:23.610 --> 01:00:25.860 to say the answer is yes.
NOTE Confidence: 0.81619465
01:00:25.860 --> 01:00:28.428 The reason why I think that is that
NOTE Confidence: 0.81619465
01:00:28.428 --> 01:00:30.932 there’s a very big difference is as
NOTE Confidence: 0.81619465
01:00:30.932 --> 01:00:33.648 you know in colon cancer and right
NOTE Confidence: 0.81619465
01:00:33.648 --> 01:00:36.216 sided versus left sided colon cancer
NOTE Confidence: 0.81619465
01:00:36.216 --> 01:00:38.636 and actuality when there’s been studies
NOTE Confidence: 0.81619465
01:00:38.636 --> 01:00:40.970 out there that with colon cancer
NOTE Confidence: 0.81619465
01:00:41.038 --> 01:00:43.090 that there’s when patients get why
NOTE Confidence: 0.81619465
01:00:43.090 --> 01:00:45.798 90 to deliver in patients that have.
NOTE Confidence: 0.81619465
01:00:45.800 --> 01:00:47.910 Different types of colon cancer.
NOTE Confidence: 0.81619465
01:00:47.910 --> 01:00:51.150 They actually get different.
NOTE Confidence: 0.81619465
01:00:51.150 --> 01:00:53.140 Response rates.
NOTE Confidence: 0.81619465
01:00:53.140 --> 01:00:56.844 So that way you would actually be able
NOTE Confidence: 0.81619465
01:00:56.844 --> 01:01:00.959 to tailor it so I do believe that in time.
NOTE Confidence: 0.81619465
01:01:00.960 --> 01:01:02.630 You know, as I said,
I mean right now we’re only like 40 years into really treating patients with these kinds of therapies for liver cancer. So which means to me that in 100 years we’re going to be so far advanced that I don’t see how you wouldn’t have, you know, genetics involved into a personalized treatment algorithm for these kinds of therapies, so that’s what we’re here to do. That’s why we’re doing the research here, and I think that’s a great question, so I think that that’s a great question, and I think that. Like I said, we’re in the infancy.
So the agency is acquisitively sensitive. How do you decide between taste and why? 90? Because in certain institution actually went 90 is preferably with days. Can you comment? So I thought I had a slide and where it went, which was a meta analysis of. And actually, the slide said how to decide now? So I went through. Maybe I clicked the button too fast, but at the end of the taste. Question I thought I had a meta analysis which basically shows that there’s very similar outcomes in both taste and MY90, so you know the way that we’ve
used to think about it is that.

In in, in patients that were older patients that you know we want to do it as outpatient.

You know, back then, those were all considered.

You know why 90 patients?

OK? Now we do taste all the time as outpatient as well.

So when I'm looking at it I'm looking at, if tumors are all in different locations

The I guess you need to look at the patient.

In general the performance status you need to look at is it low bar or BI lo bar.

You have to look at how you're going to like.

If tumors are all in different locations
where you have to cherry pick each one. Sometimes you opt for. Radioembolization or the other one so so basically. If you have if you have multiple tumors in a lobe. And you're doing radioembolization. You either have to treat the whole lobe. OK, which is a very big low bar taste or you have to do all of this difficulty which is changing out catheters, splitting doses. You know it’s very complex the way the anatomy is OK, so the other thing I said is that
sometimes you have patients where you don’t know what you want to do and chemoembolization or the other embolization is besides why 90. Are ones where you can get them. You can get the product off the shelf. OK, so instead of having to order it and waiting and all that kind of stuff so you know there’s a lot of different opportunities for treatment. Unfortunately, and this is where. You know, institutional. I guess expertise comes in is that there is no answer.
OK, there really isn’t, and you know, I, as we’ve discussed in the past, I personally believe taste is a great option for portal vein tumor thrombus, because you know, if you look at a lot of the Asian publications, you can see the actual apidel sitting in the portal vein canal. OK, where it’s very difficult to see that with Y-90. So I know that why 90 right now seems to be the hot option. Technically I used in figuratively for portal vein tumor thrombus, but it’s a very very delicate situation.
I mean. I don't really get too much into the expensive at all, which we haven't even discussed at all, but. A lot of it is just institutional northwestern. I guess you would most likely get away 90 even though I do know they do taste so you know it's very difficult to choose.

Alright, so if there are no other questions, I think we need we. We need to thank David Matter for this. Very nice, informative in broad
lecture an and keep that in mind
when we have a patient with the.
Metastatic of primary liver cancer.
Thank you very much to all
and have a good evening.
Thanks Mary for the invitation.