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 MDN, Nasoni moved to Cornell Presbyterian in New York City, where he became the section chief.
of Interventional Radiology there and join him in July 2019 is now. Professional radiology and medical oncology section, chief of interventional radiology and vice chair for visas in the Department or radiology and biomedical imaging. 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. One of the forces behind the great developments that. I've been brought by interventional radiology in the treatment of liver cancer,
and he in particular is very interested in all the methods 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 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
00:02:25.355 --> 00:02:28.183 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.

A 2021 update. 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, quite interesting.

These are my disclosures. Some of which I'm going to be speaking about today. So, as you all know, Interventional radiology is involved.
in numerous types of tumors, right? We treat both primary liver cancer and metastatic liver cancer for the purpose of this talk today to focus primarily on each CC, with the understanding that a lot of the local local regional therapies that we can offer. Actually can be translated into other disease types. So 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
00:04:44.665 --> 00:04:46.850 ablation for early stage disease.
NOTE Confidence: 0.757946888888889
00:04:46.850 --> 00:04:49.618 We also I guess you briefly mentioned my
NOTE Confidence: 0.757946888888889
00:04:49.618 --> 00:04:52.630 area of interest in liver regeneration.
NOTE Confidence: 0.757946888888889
00:04:52.630 --> 00:04:55.108 We can convert patients who are
NOTE Confidence: 0.757946888888889
00:04:55.108 --> 00:04:56.347 unresectable to resectable,
NOTE Confidence: 0.757946888888889
00:04:56.350 --> 00:04:59.646 and that can typically be done by portal,
NOTE Confidence: 0.757946888888889
00:05:01.302 --> 00:05:02.954 vein, embolization, radiation, lobectomy,
NOTE Confidence: 0.757946888888889
00:05:02.960 --> 00:05:05.020 and transarterial embolow therapy,
NOTE Confidence: 0.757946888888889
00:05:05.020 --> 00:05:07.540 And for those patients that are
NOTE Confidence: 0.757946888888889
00:05:07.540 --> 00:05:09.570 of intermediate and advanced age,
NOTE Confidence: 0.757946888888889
00:05:09.570 --> 00:05:12.454 we really can offer what’s called palliation.
NOTE Confidence: 0.757946888888889
00:05:12.460 --> 00:05:14.148 Which is, you know,
NOTE Confidence: 0.757946888888889
00:05:14.148 --> 00:05:15.836 can be transarterial embolization
NOTE Confidence: 0.757946888888889
00:05:15.836 --> 00:05:17.390 and or ablation.
NOTE Confidence: 0.757946888888889
00:05:17.390 --> 00:05:19.721 So all of the different types of
00:05:19.721 --> 00:05:21.719 therapies that we offer really
00:05:21.719 --> 00:05:24.049 depends on patients tumor Histology,
00:05:24.050 --> 00:05:26.402 the number and location of the
00:05:26.402 --> 00:05:27.970 tumors within the liver,
00:05:27.970 --> 00:05:29.930 the extent of the underlying
00:05:29.930 --> 00:05:31.890 liver disease and of course,
00:05:31.890 --> 00:05:34.715 the presence or absence of
00:05:34.715 --> 00:05:35.845 extrahepatic disease.
00:05:35.850 --> 00:05:38.178 Now what I want to do first was
00:05:38.178 --> 00:05:40.950 getting to the whole idea of defining
00:05:40.950 --> 00:05:43.065 the different types of procedures.
00:05:43.070 --> 00:05:45.958 It turns out that a lot of practitioners,
00:05:45.960 --> 00:05:48.417 yet a lot of the time you get a
00:05:48.417 --> 00:05:50.528 lot of the types of procedures
00:05:50.528 --> 00:05:53.540 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, even your image, even your image. Reports.

taste, for example, is sometimes used in the place of taec or transarterial embolization,

is sometimes used for debt ace and vice versa.

When we talk about microwave ablation 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, an ablation cavity, and this really isn’t the case and this really isn’t the case and the reason why I’m saying this and the reason why it’s so important is that it 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.
This is a case that I want to show
which is a 64 year old female with squamous cell cancer of the tongue
base 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.
OK, it’s at the very edge of the
liver is literally right under
the pericardium and diaphragm,
and there really is no correlation
with imaging findings.
But you know,
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.
So the reason why I bring this up is that these procedures that you see here can be very, very difficult. 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 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. Or ablation resection or transplant.
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. 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 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 oblating 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 or we can electrocute them and that would be called irreversible electroporation and will go into a little bit more detail in a second.

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 axile, the avid lesion in segment six, we place the needle proteins ablation, 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 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

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
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 paint 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, be hypoxic events may actually cause activation of several genes, including veg F, which can then lead to compensatory angiogenesis, and tumor growth.

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
very close to a budding the heart.

So I thought that this would be a very challenging lesion to a blade, and I opted for embolization.

We see the Hypervascular territory within the artery here.

At the end of the procedure, there's no more tumor blush, and now on the post embolization MRI, no contrast enhancement is seen. And this is another case where this was a patient that was going to have a combined bland embolization, followed by portal embolization in order to increase hypertrophy prior to resection. 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. By emulsion that functions as a vector. To carry these cytotoxic toxic 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 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. I'm sorry. Taste monthly or every two months, so they had a scheduled time where they had it and as you can see there is a
00:26:56.738 --> 00:26:58.265 statistically significant difference

00:26:58.265 --> 00:27:01.115 in taste versus supportive care.

00:27:01.120 --> 00:27:03.050 So how does this work?

00:27:03.050 --> 00:27:04.304 Well, basically aside,

00:27:04.304 --> 00:27:07.995 all Orlopp Idol is a poppy seed oil and

00:27:07.995 --> 00:27:11.181 it acts as a drug carrier that seeks out

00:27:11.181 --> 00:27:14.592 the tumors and also acts as an embolic agent.

00:27:14.600 --> 00:27:17.240 And we know that we can do this with the

00:27:17.306 --> 00:27:19.681 understanding that there's very complex

00:27:19.681 --> 00:27:22.526 sinusoidal anatomy and such that the

00:27:22.526 --> 00:27:25.340 hepatic artery and the portal vein are

00:27:25.340 --> 00:27:27.806 actually connected in this time besides.

00:27:27.806 --> 00:27:30.735 And the reason why that's important is

00:27:30.735 --> 00:27:33.276 that you can get in paddock arterial

00:27:33.276 --> 00:27:35.508 and portal venous occlusion such that

NOTE Confidence: 0.84367865
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 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. About the fact that it’s really important to know what this is lipiodol. 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

get is born out here.

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 in segment 8. 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 floro scopic 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.

00:29:36.630 --> 00:29:38.838 So at the end of the procedure,

00:29:38.838 --> 00:29:41.018 we can see that there is a complete filling of two of tumor with dilipbhai at all.

00:29:41.018 --> 00:29:42.896 And then this is the before.

00:29:42.900 --> 00:29:44.923 And then this is one month after.

00:29:44.923 --> 00:29:47.069 We see a basically a whole.

00:29:47.070 --> 00:29:50.994 And then this is one month after.
the patient had complete necrosis, an now at nine months. Follow-up has no residual disease. So one of the things that I think is really important and we can discuss this in all the different types of embolization. But because of applied all being radiopaque we can see I’m using this opportunity to talk about advanced imaging, so it’s very important to get high quality imaging during procedures, which I believe is critical to optimize tumor targeting and this can be done with the 3D 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 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 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

One tumor treated here. One tumor treated here an on cone beam CT.

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.
We see the tumor up here. We then see I’m selective image here. So when we do the cone beam CT thinking that we may have had the whole thing, we’re missing half the tumor. OK, so we treated the patient. And we see a basically a Half Moon where half of it’s missing. So we even got into the other branch. C. Feeling of the tumor. And at the end we can see that the tumor is completely treated and then on final cone beam CT. There is complete embolization with lipiodol 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 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
is a liver directed therapy.

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. 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
procedure that the tumor was treated,

because there is no iodine in

these particles and then this is

what it looks like afterwards.

So this is just a couple of.

I have a couple of studies

which show the benefit of.

Of drug eluting beads.

I don’t want to get into all the details,

but just show that there

are promising results,

but in my personal opinion I am much

more a fan of using conventional

rather than dip tastes and then

this is just a recent study
published in radiology which is a prospective single arm study which also shows the benefit of idarubicin alluding beads for the treatment of patients with unreflectively CC. So there’s been a lot of interest in recent years in radio embolization. Here we have an implanted radiation source that’s directly sent to the tumors via the attic artery. Use Yttrium 90 as the source, which is a beta emitter which penetrates only 2.5 millimeters in the tissue. There are glass and resin microspheres available.
These are thea 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 are 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 an because I did this with Therasphere for
00:37:57.266 --> 00:37:59.849 example it was a micro embolic Ann.

00:37:59.850 --> 00:38:01.950 I treated her as an outpatient.

00:38:01.950 --> 00:38:04.050 OK, so here is the tumor.

00:38:04.050 --> 00:38:05.800 We do a mapping study,

00:38:05.800 --> 00:38:07.550 so this is the difference.

00:38:07.550 --> 00:38:09.300 When you do the other

00:38:09.300 --> 00:38:10.350 kinds of chemoembolization,

00:38:10.350 --> 00:38:13.278 you basically take the product off the shelf.

00:38:13.280 --> 00:38:15.470 At the time of the procedure,

00:38:15.470 --> 00:38:15.768 however,

00:38:15.768 --> 00:38:16.364 with 190,

00:38:16.364 --> 00:38:18.925 you really have to map out the patients

00:38:18.925 --> 00:38:21.816 to make sure that you’re not getting

00:38:21.816 --> 00:38:23.453 nontarget embolization to other

00:38:23.453 --> 00:38:25.685 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. we can see some technetium 99 M. actually getting into the duodenum. So if you were not care if you
were if you were not careful, you would actually send radioactivity down there and that would result in an ulcer. So what I want to also highlight here. Now a recent article came out talking about recommendations. A standardized recommend. Nations 4Y-90, in this case, resin microspheres and what they say is that if you do not use cone beam, CT or advanced imaging techniques that companies or vendors that are supporting clinical trials won’t actually want them as part of one of their sites. OK, this just shows some data from Europe 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.

There’s the 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, AB&C where you see BCLC AB&C, 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 hypertrophié 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. Being resectable the pathophysiology of this is that you are getting
some scarring and fibrosis of the liver in the side that was treated, and therefore you’re getting compared to T ori 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
00:43:57.426 --> 00:43:59.206 segments with a low bardo.
00:43:59.210 --> 00:44:01.418 So you’re basically taking this large
dose that you do for the whole lobe,
00:44:01.418 --> 00:44:04.259 and putting it into one or two segments.
00:44:04.260 --> 00:44:07.908 OK, you get much higher.
00:44:13.140 --> 00:44:15.135 Active activity to each of those areas
00:44:15.135 --> 00:44:17.568 and in some cases it’s been adopted
00:44:17.568 --> 00:44:19.468 as first line transarterial therapy.
00:44:19.470 --> 00:44:22.158 So the idea here that is that it
00:44:22.158 --> 00:44:24.129 really needs to. In my opinion,
00:44:24.129 --> 00:44:26.460 it really needs to be more validated,
00:44:26.460 --> 00:44:29.421 but you can see from this case that you’re
00:44:29.421 --> 00:44:32.120 placing the catheter right up to the tumor.
00:44:32.120 --> 00:44:34.292 The tumor here is completely hot
00:44:34.292 --> 00:44:37.022 and then after six weeks later you
00:44:37.022 --> 00:44:39.522
00:44:37.022 --> 00:44:39.434 see complete necrosis of the tumor.
NOTE Confidence: 0.8509198
00:44:39.440 --> 00:44:41.967 So I also wanted to focus on
NOTE Confidence: 0.8509198
00:44:41.967 --> 00:44:43.050 portal vein embolization.
NOTE Confidence: 0.8509198
00:44:43.050 --> 00:44:45.216 This is a transvenous therapy supportively,
NOTE Confidence: 0.8509198
00:44:45.220 --> 00:44:47.900 and embolization is is that it’s a way
NOTE Confidence: 0.8509198
00:44:47.900 --> 00:44:50.285 of redirecting portal blood flow to the
NOTE Confidence: 0.8509198
00:44:50.285 --> 00:44:52.807 future liver remnant and by doing so
NOTE Confidence: 0.8509198
00:44:52.807 --> 00:44:55.237 could initiate hypertrophy of the non
NOTE Confidence: 0.8509198
00:44:55.237 --> 00:44:57.486 embolize segments and by doing that
NOTE Confidence: 0.8509198
00:44:57.486 --> 00:44:58.922 can reduce perioperative complications
NOTE Confidence: 0.8509198
00:44:58.922 --> 00:45:01.406 such that we can increase the number
NOTE Confidence: 0.8509198
00:45:01.406 --> 00:45:03.116 of potential surgical candidates who
NOTE Confidence: 0.8509198
00:45:03.179 --> 00:45:05.399 have what we call marginal anticipated
NOTE Confidence: 0.8509198
00:45:05.399 --> 00:45:06.879 future liver remnant volumes.
NOTE Confidence: 0.8509198
00:45:06.880 --> 00:45:09.456 We can also achieve looks like similar.
NOTE Confidence: 0.8509198
00:45:09.460 --> 00:45:10.312 Survival rates surgical
patients not requiring PV.

Now Kevin Billingslea spoke 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
NOTE Confidence: 0.7872134
00:47:22.610 --> 00:47:23.450 postoperative course.
NOTE Confidence: 0.7872134
00:47:23.450 --> 00:47:26.996 This was a study that we did at MD Anderson where we see that all of
NOTE Confidence: 0.7872134
00:47:29.905 --> 00:47:32.496 the deaths occur in those patients
NOTE Confidence: 0.7872134
00:47:32.496 --> 00:47:35.576 that did not have Pve and then
NOTE Confidence: 0.7872134
00:47:35.576 --> 00:47:38.204 in terms of survival outcomes.
NOTE Confidence: 0.7872134
00:47:38.204 --> 00:47:39.296 We have,
NOTE Confidence: 0.7872134
00:47:39.300 --> 00:47:41.743 you can see that there are pretty
NOTE Confidence: 0.7872134
00:47:41.743 --> 00:47:43.945 similar those patients to those patients
NOTE Confidence: 0.7872134
00:47:43.945 --> 00:47:46.479 that have deviated to those that didn’t.
NOTE Confidence: 0.7872134
00:47:46.480 --> 00:47:48.490 Now what we need to understand
NOTE Confidence: 0.7872134
00:47:48.490 --> 00:47:50.548 is that those patients that did
NOTE Confidence: 0.7872134
00:47:50.548 --> 00:47:52.486 not I should say that received
NOTE Confidence: 0.7872134
00:47:52.486 --> 00:47:54.020 portal vein embolization.
NOTE Confidence: 0.7872134
00:47:54.020 --> 00:47:55.452 Those patients typically would
NOTE Confidence: 0.7872134
have been a surgical candidate, would probably undergone a transarterial therapy, and the numbers show that those patients would probably have a 20 to 30% three year overall survival. So just by doing the Pve and getting the patient to surgery, the patient had a much better outcome. So when we look at the staging system which I discussed in the very beginning and by understanding all the different procedures that we can offer at all the different stages, we now see that those patients
that have very early or early stage disease can result in.

Major stage be can have a greater than 2.5 year survival and then those. Of course that have advanced in terminal stages obviously don’t do as well, but this just shows a recent. This is from a recent Journal of Hepatology Clinical Practice guidelines from Easel that there is really the newest thing. So I just wanted to pretty much finish up by some things that we’re doing now.

Some new therapeutic approaches and I want to discuss immunotherapy and interventional on. And how it interacts with interventional.
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
from current oncology reports in 2020,
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 and 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 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,
therapy,
which in this case is a pen bro

plus at multi kinase inhibitor

which is live at and if so each

 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 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,
00:52:42.490 --> 00:52:42.821 liver,
NOTE Confidence: 0.8445389

00:52:42.821 --> 00:52:43.152 Mets.
NOTE Confidence: 0.8445389

00:52:43.152 --> 00:52:45.469 And as you can see it’s really
NOTE Confidence: 0.8445389

00:52:45.469 --> 00:52:47.258 really overtaking the liver.
NOTE Confidence: 0.8445389

00:52:47.260 --> 00:52:49.897 I was asked to see if we can really
NOTE Confidence: 0.8445389

00:52:49.897 --> 00:52:52.451 do anything for this patient and we
NOTE Confidence: 0.8445389

00:52:52.451 --> 00:52:55.586 did why 90 the page and then this
NOTE Confidence: 0.8445389

00:52:55.586 --> 00:52:57.992 was a situation where the patient
NOTE Confidence: 0.8445389

00:52:58.000 --> 00:53:00.464 was able to see even though she
NOTE Confidence: 0.8445389

00:53:00.464 --> 00:53:02.650 did succumb not within a year,
NOTE Confidence: 0.8445389

00:53:02.650 --> 00:53:04.757 she was able to see her son’s
NOTE Confidence: 0.8445389

00:53:04.757 --> 00:53:07.018 wedding and also spend their her
NOTE Confidence: 0.8445389

00:53:07.018 --> 00:53:08.738 last Thanksgiving with family.
NOTE Confidence: 0.8445389

00:53:08.740 --> 00:53:09.456 So again,
NOTE Confidence: 0.8445389

00:53:09.456 --> 00:53:12.320 this is where the palliative nature comes in.
NOTE Confidence: 0.8445389

00:53:12.320 --> 00:53:13.394 And then Lastly,
00:53:13.394 --> 00:53:15.900 this is a patient with pancreatic cancer,

00:53:15.900 --> 00:53:17.800 who we were able to.

00:53:17.800 --> 00:53:19.275 Treat with conventional tastes in

00:53:19.275 --> 00:53:22.130 a term that I call like just like

00:53:22.130 --> 00:53:23.882 radiation segmentectomy something I

00:53:23.882 --> 00:53:26.050 call now chemoembolization segmentectomy,

00:53:26.050 --> 00:53:28.408 where we can actually you know,

00:53:28.410 --> 00:53:29.577 in pancreatic cancer,

00:53:29.577 --> 00:53:32.300 we know these patients have very hypo

00:53:32.366 --> 00:53:34.934 vascular tumors in a very dismal

00:53:34.934 --> 00:53:36.646 plastic fibrotic tumor structure

00:53:36.717 --> 00:53:39.413 where if we can treat the entire segment,

00:53:39.420 --> 00:53:41.766 the tumors cannot live, so that’s

00:53:41.766 --> 00:53:44.130 something that we’re also looking at,

00:53:44.130 --> 00:53:47.775 so I wanted to make it clear that you

NOTE Confidence: 0.8445389

88
00:53:47.775 --> 00:53:51.369 know HCC is not the only thing we do.
NOTE Confidence: 0.80918545
00:53:51.370 --> 00:53:53.596 If you do have patients that have
NOTE Confidence: 0.80918545
00:53:53.596 --> 00:53:55.764 other types of tumors, we’re actually
NOTE Confidence: 0.80918545
00:53:55.764 --> 00:53:58.123 able to really treat those as well,
NOTE Confidence: 0.80918545
00:53:58.130 --> 00:54:01.775 and we’re happy to speak to you about them.
NOTE Confidence: 0.80918545
00:54:01.780 --> 00:54:04.426 So in conclusion, I hope I demonstrated
NOTE Confidence: 0.80918545
00:54:04.426 --> 00:54:06.691 their local regional therapies do play
NOTE Confidence: 0.80918545
00:54:06.691 --> 00:54:09.162 an important role in the management of
NOTE Confidence: 0.80918545
00:54:09.231 --> 00:54:11.817 both primary and metastatic liver cancer.
NOTE Confidence: 0.80918545
00:54:11.820 --> 00:54:14.130 They often provide benefit for survival,
NOTE Confidence: 0.80918545
00:54:14.130 --> 00:54:15.360 local tumor control,
NOTE Confidence: 0.80918545
00:54:15.360 --> 00:54:17.820 and improve quality of life compared
NOTE Confidence: 0.80918545
00:54:17.820 --> 00:54:20.258 to and in some cases, you know,
NOTE Confidence: 0.80918545
00:54:20.258 --> 00:54:22.053 compared to resection and compared
NOTE Confidence: 0.80918545
00:54:22.053 --> 00:54:23.780 to some systemic therapies,
NOTE Confidence: 0.80918545
00:54:23.780 --> 00:54:25.710 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. I want to thank you for the these. 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,
I think you really showed the complexity of the dictation making that is behind this. It's you know, as you said at the beginning, we think in a very simplified way. Yeah, let's sub later if aid is. But in reality, you really do. Send the patient to centers that have all these possibilities, Anan abilities, and they can really tailor. The treatment of the patient to the. To amend personalized treatment to the patient, and. Great. So we have a question from even a rukundo great informative presentation. 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. That’s the actual difference. Baby, do you have? 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.

So you know, we still don’t know.

we’re still very early in all of these,

we know, in all of these studies.

So I.

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
therapies and they, I would have

The reason why I think that is that there’s a very big difference is as you know in colon cancer and right sided versus left sided colon cancer and actuality when there’s been studies out there that with colon cancer you know in patients that have. They actually get different. So that way you would actually be able to tailor it so I do believe that in time.
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, so I think 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? Maybe 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 lie 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 patients that were older patients

You know we want to do it as outpatient.

You know, back then,

those were all considered.

You know why 90 patients?

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.

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. 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 codian.
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 to thank David Matter for this. Very nice, informative in broad
01:05:34.350 --> 01:05:38.314 lecture an and keep that in mind
NOTE Confidence: 0.8266201

01:05:38.314 --> 01:05:41.569 when we have a patient with the.
NOTE Confidence: 0.8266201

01:05:41.570 --> 01:05:46.190 Metastatic of primary liver cancer.
NOTE Confidence: 0.8266201

01:05:46.190 --> 01:05:48.290 Thank you very much to all
NOTE Confidence: 0.8266201

01:05:48.290 --> 01:05:52.210 and have a good evening.
NOTE Confidence: 0.7994688

01:05:52.210 --> 01:05:55.210 Thanks Mary for the invitation.