00:00:00.000 --> 00:00:01.616 Thank you for coming.

00:00:01.616 --> 00:00:04.040 I'm happy to introduce two speakers today.

00:00:04.040 --> 00:00:08.324 Our first speaker is Doctor Ehud Mendel.

00:00:08.330 --> 00:00:10.208 Who is executive Vice chair professor

00:00:10.208 --> 00:00:12.042 of neurosurgery here and director of

00:00:12.042 --> 00:00:13.890 the Spine and I called you program.

00:00:13.890 --> 00:00:15.852 He actually joined Yale recently in

00:00:15.852 --> 00:00:18.235 September of this year where he came

00:00:18.235 --> 00:00:20.263 from the Wechsler Wexner Medical Center,

00:00:20.270 --> 00:00:22.314 the Ohio State University,

00:00:22.314 --> 00:00:24.869 and the James Cancer Hospital.

00:00:24.870 --> 00:00:26.580 He received his medal called degree

00:00:26.580 --> 00:00:27.720 from Louisiana State University

00:00:00.000 --> 00:00:01.616 Thank you for coming.
School of Medicine and further clinical training at the University of South Carolina and the University of Florida School of Medicine. And his team has pioneered new surgical techniques to reconstruct the spine following surgery to remove spinal tumors, including advancing minimally invasive neurological spinal surgery. So it’s a great pleasure to welcome you to Yale and to your first grand rounds here. Thank you, but I appreciate the opportunity to give this talk and I want to thank all of you and Renee too, and make this arrangement for me.
Talk about these Sid topic did it?

I’ve been very passionate about over many years and that’s the surgical management of patients with spine tumors. So.

Uhm? Let’s see how well this forward. 

Would you rather. 

Arrows.

OK, so when we talk about patients with spine tumors, we’re talking about two kinds of patients.

We’re talking about two kinds of patients.

Population patients with primary spine tumors means the tumor is growing directly from the bone itself within the spine itself.

These are primary bone
tumors coming from the spine.

The most common type of tumors are patients who have ministered disease to the spine, and those are two very different patient population.

The primary tumor growing from within the bone of the spine versus the metastatic spine tumors. The goal is different.

The adjuvant therapy is different and the surgical options are very different.

So the goal for primary tumors are really to try and cure the patient of the disease. The idea is to try and get this tumor out of there. It’s the only side of disease,
and the idea is to get a tumor out without interfering with the tumor capsule.
So the idea is that if you take the tumor out in one piece without really breaking into the tumor itself, there is a potential of curing the patient of cancer.
And sometimes, even if it’s not feasible, the idea is to at least give him long term survival.
When you’re dealing with patients with menist attic disease, which is the most common issue, then you’re really dealing more with palliation and quality of life.
The Advent therapy is different for those two patient populations.

Multiple agile in therapy, options for patient with metastatic disease.

You can come in. And the primary ones, it’s very limited.

Surgical techniques are also very different to those two patient population, and I’m going to talk about both of them.

I’m going to talk first about the metastatic spine tumors, because these are the most common patient population.

So there is about 1.2 million new cancer cases per year in the United States. But more than half a million deaths per year.
It’s a major cause of death is complication due to metastatic disease, and if you look at this patient population, the skeletal system, the spine is the third most common site of disease after it spread to the lung and liver. And the spinal column is the most common sites of skeletal metastases. So third of this third patient population, the spine, is a is the most common place for to end up with and as many as 90% of cancer patients will have spinal metastases at autopsy.
Studies and out of those 90%, ten to 30% of this patient cancer will suffer from symptoms. Symptomatic symptom, symptomatic spinal Mets, or whether they have severe pain or whether they’re presenting with their. Significant or logical issues? The primary tumor, the other group that I’ve talked about a very different patient population. These are very unique tumors. They’re growing typically from with the bone itself of the spine, and these are the osteoid osteomas, the osteoblastoma giant cell.
tumor aneurysm bounces, kodamas, chondrosarcoma, Ewing sarcomas, medical ecology should deal with these type of patients are very familiar with this type of tumors. So when we think about surgeries on this patient population, we have to keep in mind whether this patient population that we’re dealing with, especially the patient with metastatic disease. They are typically immuno compromised. They have decreased white blood cell count so they have higher risk of post op infection,
high risk of bad infection.
NOTE Confidence: 0.750648214545454
They have lack of fever response.
NOTE Confidence: 0.750648214545454
They have lack of appeal cytosis.
NOTE Confidence: 0.750648214545454
There are sometimes issues with these patients get cement injection into broken vertebrae.
Easily infected,
Their nutritional status is not that great.
They lose a lot of weight there.
They've increased catabolic state,
decrease intake their serum of human is low,
and so you have to think about preoperative nutritional support.
They are typically on steroids to supplement some of the agents that they are on,
which obviously leads to a multitude of side effects related to the steroids that are listed over here and for the sake of time. I'm not going to go over it. They are a lot of patients are coagulopathic with Trump cytopenia they may not be ambulatory, so they’ve increased for DVTS. So you have to think if you’re doing surgeries on these patients or sometimes if you don’t about DVD prophylaxis for these patients. And if you end up thinking about
operating in these patients,

some of these tumors are very vascular tumor,

which means significant blood loss during the surgery itself.

If you think about the primary bond tumor,

you know the aneurysmal bone cyst,

the giant cell tumor,

These are known to be super vascular tumors,

and as you get in there and

start removing this tumor out,

you encounter significant blood loss.

In essence,

any tumor that has the word him in

it you have to worry about a very vascular tumor during surgery.
And these are just the primary tumors. If you talk about the metastatic patients, the renal circle cinemas there, potassium, local cinema, the thyroid, the pheochromocytoma are also highly vascular tumors and you have to anticipate it as you’re planning on getting these out. Sometimes you have to think about wound closure and the reason is because sometimes the tumors is large, which leaves significant defects.
Sometimes there is a risk of just the increase age they altered immune system capsia patients have been radiated on chemotherapy, so their wounds don’t heal as well, and so they’ll active won’t breakdown or infection is higher. And so these are all the issues that gets into, you know, when do you need to start thinking about the wound issues when it comes to home closure and so plastic surgery becomes to be a very good friend of us when it comes to ability to close this wound and
NOTE Confidence: 0.744148268888889
00:07:32.540 --> 00:07:34.775 minimize the post op complication

NOTE Confidence: 0.744148268888889
00:07:34.775 --> 00:07:36.563 related to home closure.

NOTE Confidence: 0.744148268888889
00:07:36.570 --> 00:07:37.760 And this is just some of the

NOTE Confidence: 0.744148268888889
00:07:37.760 --> 00:07:38.480 issues we’re dealing with.

NOTE Confidence: 0.744148268888889
00:07:38.480 --> 00:07:41.003 Here is a patient with sarcoma soft

NOTE Confidence: 0.744148268888889
00:07:41.003 --> 00:07:43.121 tissue tumor that invaded all the

NOTE Confidence: 0.744148268888889
00:07:43.121 --> 00:07:45.976 tissues of the spine so we can take this.

NOTE Confidence: 0.744148268888889
00:07:45.980 --> 00:07:48.437 Out, but clearly we need our plastic

NOTE Confidence: 0.744148268888889
00:07:48.437 --> 00:07:50.470 care colleagues to be able to

NOTE Confidence: 0.744148268888889
00:07:50.470 --> 00:07:52.300 deal with these types of tumors.

NOTE Confidence: 0.744148268888889
00:07:52.300 --> 00:07:53.698 And as we remove him out,

NOTE Confidence: 0.744148268888889
00:07:53.700 --> 00:07:55.916 it’s not just about how to remove it,

NOTE Confidence: 0.744148268888889
00:07:55.920 --> 00:07:58.936 but planning on once the tumor is removed,

NOTE Confidence: 0.744148268888889
00:07:58.940 --> 00:08:00.536 how to be able to close it.

NOTE Confidence: 0.744148268888889
00:08:00.540 --> 00:08:04.103 So these are a lot of these cases tends

NOTE Confidence: 0.744148268888889
to be multidisciplinary in nature.

In the with the ability to remove the tumor and then the ability to do some sort of flap to be able to close these wounds. Sometimes you’re dealing with a very large tumors. This is a large stake of Chordoma with big reconstruction. Again, gotta rely and plan on plastic closure to close these wounds, so I wanted to go over some cases just to kind of give you the.
spine tumor person and deal with in

a commonly and let’s just take these cases and what’s unique about the cases I’m going to show you is that they are all presenting the same, so these are patients are presenting with back pain. Here is a patient with multiple myeloma. Is 57 years old,

has some pain in the back going to the legs already get maximum pain medications. Biopsy revealed multiple myeloma already underwent. Radiation stem cell transplantation still have progressive disease
and is not logically intact, so this is very common in the multiple myeloma ward, where patients come in and they have back pain and you can see right here. Here’s the MRI and you can see there’s a fracture of the vertebrae in the lumbar spine here, so there’s a broken vertebra related to the multiple myeloma, and so we get called and said, can you do something here? What can you do? You’re the second case, presenting the same way, patient. It can’t be back.
Pain has metastatic renal cell carcinoma and you can see here the MRI kind of look the same. There is a metastatic lesion here. At L1 is a little bit of a fracture here. Maybe even new fracture at T12 here, but the presentation is the same. The location of the tumor is in exactly the same place. The patient has no logical deficit, just back pain. The only difference between those two cases is that the first case was multiple myeloma. The second case was a renal cell carcinoma.
Are we going to treat it the same, or is the tumor biology dictate the treatment option?

Here's a third case on a 52 year old again or logically intact. Just having back pain has a diagnosis of chondrosarcoma based on a CT guided biopsy, and you can see right here in other lumbar fracture. The first two cases were lumbar fracture. Multiple myeloma renal cell carcinoma. Here is a chondrosarcoma with a lumbar fracture right here at L4 representing exactly the same with back pain. So should we treat that tumor the same way?
With reading the multiple myeloma adrenal. Tell casino. Here is a case 68 year old with thymic carcinoma coming in at the seed. Already radiation and you can see right here at T11 and T12. There’s lesions right here at those two variables which may be a little bit of a fracture right here again. Tarako lumbar junction location is about the same, but the different type of cancer. So the question that we always asking ourselves all these cases require surgery, does their differences in the tumors or the tumor biology really makes a difference?
And which approach should we take to treat and help these patient populations? And when it comes to my job as a surgeon dealing with these patients there, only these are the four options that I have. I can do what we call an intralesional resection where we enter the tumor with piece meal the tumor out. That’s the intralesional component. We can do what we call an unblocker section, where in one piece we take the tumor out without. That’s the intralvascular component. We can do just chemotherapy,
immunotherapy, conventional radiation, or stereotactic radiosurgery. Or sometimes we can just inject some end into the vertebrae just to restore some mechanical stability, which is minimally invasive. So I wanted to show you some specific cases because the four cases that I showed there are presented with the neurological non or logical deficit, which always increase the level of concern. But when they do have a neurological deficit and things becomes even more urgent as to what can be done,
here is a 23 year old patient who comes in stood up complaining of some weakness. And when you look at the exam, the exam shows a little bit of weakness in her legs. Four out of five strength in both of her legs. And here is an MRI which showed 9 broken. There is severe tumor compressing the back of the spinal canal. Pressing this power code and unfortunately here she’s in the emergency room and there is no diagnosis. We do not know what this looks like a tumor, but she presented the emergency room and this is what the MRI looks like.
and the question is what to do, and that’s where we get called. Then. The unfortunate thing here is that unlike the first four cases here we are faced with the situation. With a patient presenting with cord compression with mild weakness in the legs but no diagnosis and so here is some of the views you can see on the axial cut severe cord compression, the podis squashed. There’s a lot of tumor around the
vertebral body and but the patient is 

a very minimal weakness in her legs. 

And so these patients here is the CAT scan shows mild compression fracture at T9 and 

no surgical consultation was requested. 

And the question is should that each patient 

And we don’t know what it is or wait on 

the surgery trying to establish a 

diagnosis and based on the diagnosis 

make a decision of what to do. 

And so on. This case, the patient. 

Make that accommodation by the nose surgeon. 

On call was to take the patient to
00:13:59.714 --> 00:14:01.388 surgery and do a decompression.
00:14:01.390 --> 00:14:03.853 And so I Laminectomy was done and
00:14:03.853 --> 00:14:04.768 you can see right here.
00:14:04.770 --> 00:14:06.604 The back of the spine is removed.
00:14:06.610 --> 00:14:08.266 The canal has been opened up.
00:14:08.270 --> 00:14:09.758 You can see right here on
00:14:09.758 --> 00:14:10.502 the postoperative MRI.
00:14:10.510 --> 00:14:12.558 Did spinal cord looks a little bit better.
00:14:12.560 --> 00:14:14.480 There’s nothing much compression there,
00:14:14.480 --> 00:14:16.504 but if you look at the axial cut
00:14:16.504 --> 00:14:18.418 the majority of the tumors left
00:14:18.418 --> 00:14:20.103 behind the entire vertebral bodies,
00:14:20.110 --> 00:14:24.907 encased in tumor and all of that was not.
00:14:24.910 --> 00:14:26.602 Touched by their purpose of the
00:14:26.602 --> 00:14:28.389 surgery was really to just take
the portion within the canal that’s pressing on the spinal cord. The postoperative specimen came back to be lymphoma. And so the question was, was that the right choice for the patient considering it being a highly radiosensitive tumor, highly responding to adjuvant therapy and rarely actually needs any surgery, there the right choice for the patient and part one of the downsides is not a patient needs to recover from the surgery. There’s a fresh wound that will not tolerate with the Asian so quickly,
so there’s some downside for doing

the surgery and now have to wait

for the treatment.

Now, let’s say we take the same case,

but instead of four out of five weakness,

the patient only had two out

and would that have made a difference when

it comes to taking the patient to surgery?

So how much of a weakness is acceptable,

and how much of a weakness is not acceptable?

That becomes a very difficult

question to decide whether to take

to the patient’s surgery or not.

It is another patient with a 51 year
00:15:32.148 --> 00:15:35.109 old 51 year old who comes in with
NOTE Confidence: 0.7114232525
00:15:35.109 --> 00:15:36.653 weakness and some incontinence,
NOTE Confidence: 0.7114232525
00:15:36.660 --> 00:15:37.956 and you can see there is a tumor.
NOTE Confidence: 0.7114232525
00:15:37.960 --> 00:15:39.927 In the sacrum there’s a lot of
NOTE Confidence: 0.7114232525
00:15:39.927 --> 00:15:42.738 tumor in the canal pressing on the
NOTE Confidence: 0.7114232525
00:15:42.738 --> 00:15:44.634 spinal canal explained incontinence,
NOTE Confidence: 0.7114232525
00:15:44.640 --> 00:15:47.139 and some of the weakness and you
NOTE Confidence: 0.7114232525
00:15:47.139 --> 00:15:49.427 can see another MRI here shows
NOTE Confidence: 0.7114232525
00:15:49.427 --> 00:15:51.707 the finding of a broken sacrum.
NOTE Confidence: 0.7114232525
00:15:51.710 --> 00:15:53.552 Some tumor in the canal and
NOTE Confidence: 0.7114232525
00:15:53.552 --> 00:15:54.780 the patient under men.
NOTE Confidence: 0.7114232525
00:15:54.780 --> 00:15:56.211 Emergent surgical intervention
NOTE Confidence: 0.7114232525
00:15:56.211 --> 00:15:58.596 with the Laminectomy and fixation,
NOTE Confidence: 0.7114232525
00:15:58.600 --> 00:16:01.048 but unfortunately this turns out to be a
NOTE Confidence: 0.7114232525
00:16:01.048 --> 00:16:03.368 primary bound tumor with a counter sarcoma,
NOTE Confidence: 0.7114232525
00:16:03.370 --> 00:16:04.534 and when they found out it
00:16:04.534 --> 00:16:05.310 was a conscious or

00:16:05.360 --> 00:16:07.366 comma, the patient underwent

00:16:07.366 --> 00:16:08.530 stereotactic radiosurgery.

00:16:08.530 --> 00:16:10.684 Unfortunately, this is one of those

00:16:10.684 --> 00:16:12.438 tumors were the recommendation is

00:16:12.444 --> 00:16:14.244 to try and do an unblocker section.

00:16:14.250 --> 00:16:16.364 Once you enter this tumor and you

00:16:16.364 --> 00:16:18.649 take it in piece meal version,

00:16:18.650 --> 00:16:21.415 then there is 100% chance of recurrence.

00:16:21.420 --> 00:16:23.164 So really the only chance of the queue

00:16:23.164 --> 00:16:25.066 for this patient would have been during

00:16:25.066 --> 00:16:27.006 the first surgery with attempt to remove

00:16:27.006 --> 00:16:28.665 it in one piece without entering it,

00:16:28.670 --> 00:16:29.456 unfortunately here.

00:16:29.456 --> 00:16:31.421 The patient may have done
well with the decompression,

but the tumor have entered and death

leads to spillage in the surrounding,

which ultimately leads,

will lead 100% to recurrence.

And sure enough,

this patient came back three years

later and presented with this little

bump in the back they thought was maybe

one of the screws are getting loose.

But when you look at the MRI you see

the entire tumor is now recurring,

that bump is actually a

metastatic disease underneath the skin,

which was expected considering

the surgery.
It was done with unfortunately intralesional instead of an unblocker section in.

Not only dead.

Now the rise is broken and then ended up taking this back patient back to surgery.

We remove the lesion itself in an unblock fashion, but it really makes no difference now since the tumor has spread, and here is a specimen revising the cancer here and the plastic surgeons came by and did a flap to close this one. So the take home message meant message in all these is that this could be a miss management.
In a way of trying to think through the process of what to do here and it could be related to bad timing operations or sometimes operation with no diagnosis where you don’t really know what to do, so I’m just. I call it a triple W phenomena to be aware of the triple W of the wrong operation on the wrong patient, sometimes by the wrong surgeon, or emphasizing neurological issues versus uncle logical issues. So when you’re dealing with that this type of tumors and I’m going to go out fast just for the sake of time I mentioned.
Some of these issues here when it comes to the goal and a lot of these things has to be done with making the right diagnosis and now what it is that you’re dealing with. Biopsy is extremely critical as much as possible. Anytime you have a chance, you have an option of doing a biopsy. Make sure that you do the biopsy up front. It is a patient that they supposedly thought that it has a contractor comma or a chordoma will schedule the surgery. A biopsy was done and it turned out that this was in a pending Mama,
which was a completely. Different tumor require completely different surgery, so biopsies are very critical. Make sure on this particular case is that you avoid a transol or a trans rectal biopsies because. If the idea is to take the entire piece of tumor out, the track itself can lead to contamination, and so we typically mark where the track of the biopsy is being done, and then we’ll remove the entire specimen with the track itself to make sure that the whole specimen is being removed in one piece.
and you can see right here some of the cases where the place where the skin was violated with that biopsy is being removed with the specimen itself, which means that the biopsy needs to be very close to the midline.

Stay away from these type of issues where the biopsy is done very far way out to the side where we are unable to remove the track itself with the specimen. The biopsy needs to be very close to the midline.

Uhm, I mentioned some of these intralesional options unblock options. These are really the surgical
options that we have.

The Intralesional the

mentions of peace meals.

Here's a patient with two level metastatic disease at T3 and T4.

We as surgeons need to be comfortable with being able to approach the spine from any direction.

Possible weather through the front to the side through the back.

It is a case where the spinal cord is being suspended.

The nerve roots has been ligated and you can see that gives us access to the interior of the tables.

Find through the vertebrae we can.
They then put the screws in our place and then we can actually remove the vertebral bodies through the back and then get underneath this power cord and sneakers a cage to replace the broken vertebrae.

And that's what it looks like after the surgery. The unblocker sections where we going in around the tumors are much more complicated is it is what more complicated is it is what we actually want to achieve with the entire segment of the spine being removed in one piece without interrupting it and that.
Takes a lot of planning when it comes to work to make the cuts, ultimately to be able to remove the specimen in one piece and you can see in this picture again, the tumor has not been violated on a primary bone tumor and you can see right here are the entire segment of the vertebrae. Is able to be removed from around the spinal cord without interruption. Radiation obviously is a huge component to what we do. There is a conventional option just so the Asian there is a surgery followed by radiation and then
here it's Milo.

And in major cancer hospital we have the option of spinal radiosurgery.

We've written about there's a lot of cases out there about radiotherapy and radiation treatment option for patients with metastatic disease,

Recently we just published our series when I was at the James Cancer Hospital, but postoperative stereotactic body radiotherapy for spa metastasis and predictor of local control,

and it's an amazing tool. To supplement our.
You know our intervention and maintaining control of these tumors, so you know the data is very promising. This is some of the cases you can see. These are cases that don’t need surgery. Here is a tumor with a recurrence around vertebral artery, and so really this is a totally non invasive alternative adjuvant treatment there to surgery. Cement injections allow you mentioned this patient know that this is a very good tool for patients with mild fractures who needs to continue going with treatment who...
cannot go through major surgeries. So either you do it you plasty or you can do a kyphoplasty is where we put a ballooning. You can inflate the balloon, correct some of the deformity removed the balloon and then injected cement into the bone. There’s lots of papers that they would have been looked at the show that these treatments of cement injections are an amazing, not just diagnostic, but also therapeutic indications for patients with spine tumors.
Sometimes we can’t do it. You know if there’s a lot of fracture, bad, fractional sometimes. That bone is already in the canal. The idea is to make sure that cement doesn’t leak into the canal and press the spinal cord, then lead to us nor logical issues. Or sometimes you can see right here with the tumor. It’s through the back of the bone and write it right through it. So there are some contraindications when not to do it. This is what we don’t want to see happen with cement leak.
into the spinal canal or right here where you can see a lot of cement was injected and cement. Its kind of overlying the entire pickle sake sometimes. You see cement in other places, even in the brain you can see particle of cements going to. Here is a case where you don’t want to see again with cement was injected in the a lot of the cement leak into the canal leading to a patient presenting right after the surgery with neurological deficit. So you gotta watch for those things.
Here is a patient who has a lesion in the odontoid and we used to treat this with significant reconstruction of the cervical spine to help with mechanical neck pain. But now, if you really push the limits, cement is a huge tool and on this case, we don’t need to do big surgeries. We can actually go through the back of the mouth and inject cement directly into the odontoid and you can see what it looks like after the surgery and we actually published.
this technique where we can use the stereotactic CT guided images and fluoroscopy, unable to go through the back of the mouth without EMT colleagues and able to inject the cement. Right into the broken vertebrae. Instead of putting the patient through some sort of exhibit cervical fixation, so some of those country indication we can refute them, and we actually publish our series at MD Anderson. When it comes to when to do.
it and when not to do it, and a conclusion was that relative contraindications can be relaxed for patient without other options with no clinically significant increase in complications. So I want to, for the sake of time, just go quickly through my last slide. Here, you know the key if you want to take one. Slide audible this is that this is when we’re thinking doing surgery for patient when we think that we can make a difference that we can after the prognosis we think

48
about doing surgery when there is significant spinal instability.
The spine is so broken that the patient unable to get out of bed with thinking to do surgery when there isn’t nor logical deficits and painted by itself even without deficits, is also an indication for surgery.
And so. Spine instability.
if you look at these MRI you can see that the fan is broken. This is something we can fix with surgery and there are now a scale that helps us that we have developed
to define what is finding stability in patients with metastatic disease.

And I'm not going to take you through it, but it's a very nice since code that you can add all these numbers when it comes to location pain that abolition is is there alignment or know how much of their bodies involved you can add all of these?

Points and that will lead to deciding whether the patient is stable and unstable, which may help deciding whether to do surgery or not. Nor logical deficit is clearly something that we get called on and
then we have to make a decision as to whether to go on with surgery or not. And as I mentioned, just pain sometimes also helps us help with surgery, especially when we deal with the mechanical type NC traumatology which indicate a fracture. When you thinking about surgery, just always make sure that it’s physically technically feasible to do adequate approach. Good strategy, satisfaction, reconstruction, and that ultimately it’s going to give it doable.
Patient benefits, because ultimately these are very very large lesion for these patients, so I just want to get to the last part and that is the primary tumors. These are not metastatic disease, these are the most challenging cases. Some of them can be treated with adjuvant therapy, but most the converse of trauma in the chordoma cannot, and some of them can response to preoperative chemotherapy. But most don’t. They good example,
for example, is denosumab, which helps very much in patient with giant cell tumor. We used to think that all this patient needs surgery, but you can see they present with big holes in the vertebrae. But on denosumab, here is a patient with an L3 fracture. You can see on the CAT scan. There is no L3, it’s completely eaten away by the. Tumor and you can see the PET scan over here. Here is the CT reconstruction.
of this L3 lesion.

Very large region, but you can see that with the NASA map you know the voter becomes very calcified and strong to the point that there may not be a role for surgery anymore for this patient population.

Here is a pharmacist again, the odontoid. All we did here is we stabilize is fine. We did not take the tumor out. You can see right here. There's posterior stabilization and within couple of months the entire
bond filled in here and there is normal hall that was there before, so there is definitely a clear role for Asian therapy. Now why these unblock resections? Because that’s really the only way to give a chance for these patients. And here is a patient with a Seiko tumor that we can go in. We can like get a tickle sakkinen and unblock fashion. You can see the margins or clean all the way around it. And we know from all the data that’s out there that unblock resection can be
can lead to Q of this patient period.

The patient with sarcoma in the meter at 6

We don’t want to enter this terminal.

We want to be able to remove this tumor out in one piece.

Will plan where we going to make our accounts to deliver this vertebra from around the spinal cord and ultimately able to remove. The entire vertebrae in one piece without entering it and able to then reconstruct it and and and give the patient a chance for Q of patient.

The sacral tumors are the biggest ones to deal with, and are the most complicated one.
There are lots of methodologies, and I'm sharing some slides here about how we approach these tumors. There are lots of techniques that I'm not going to get into this. Most surgery oriented talk about how to be able to remove. A lot of these sacral tumor and ultimately able to achieve an unblocker section on these tumors. Some of these techniques we have described here is some big example of the counter sarcoma that's going up to the lumbar spine up to the pelvis. List is obviously combined with
multidisciplinary approach,

or an unblocker section was performed with orthopedics and urology and plastic surgery,

and this tumor was removed with vascularized bone graft.

We published this technical aspect of using a talaga.

Bone graft.

And dental reconstruction obviously was significant issue about how to reconstruct these tumors when it comes to be able to do this type of surgery.

This is these are very highly significant issue about how to be able to do this type of surgery.

very is a big time surgeries.
that we’ve done that ended up being the front cover. These are highly complex type surgeries when it comes to do and you can see interactive pictures of the vascular grafts that has been. Use on this particular patients, and these patients ultimately fuses very well. This is the post operative picture. This have been looked at when it comes to getting engineering involved.
00:30:32.475 --> 00:30:34.709 with personalized model 3D printers.
NOTE Confidence: 0.752332653809524
00:30:34.710 --> 00:30:36.095 Try to predict which voters
NOTE Confidence: 0.752332653809524
00:30:36.095 --> 00:30:37.203 are going to break.
NOTE Confidence: 0.752332653809524
00:30:37.210 --> 00:30:40.258 We're looking at animal models in
NOTE Confidence: 0.752332653809524
00:30:40.258 --> 00:30:41.782 unblock tissue characterization.
NOTE Confidence: 0.752332653809524
00:30:41.790 --> 00:30:43.954 We aiming toward personalized.
NOTE Confidence: 0.752332653809524
00:30:43.954 --> 00:30:47.200 Surgeries and its patients take the
NOTE Confidence: 0.752332653809524
00:30:47.283 --> 00:30:50.067 patients CAT scan the patient MRI,
NOTE Confidence: 0.752332653809524
00:30:50.070 --> 00:30:52.250 creating these 3D reconstruction
NOTE Confidence: 0.752332653809524
00:30:52.250 --> 00:30:54.430 models for these patients,
NOTE Confidence: 0.752332653809524
00:30:54.430 --> 00:30:55.453 creating those models,
NOTE Confidence: 0.752332653809524
00:30:55.453 --> 00:30:57.158 and then ultimately figuring out
NOTE Confidence: 0.752332653809524
00:30:57.158 --> 00:30:59.035 this is some of the 3D models
NOTE Confidence: 0.752332653809524
00:30:59.035 --> 00:31:00.816 that we have done on the lady
NOTE Confidence: 0.752332653809524
00:31:00.816 --> 00:31:02.276 with breast cancer and figuring
NOTE Confidence: 0.752332653809524
00:31:02.276 --> 00:31:04.594 out what type of surgeries with
benefits these patients at the most. And then you can see some of the implants some of the 3D implants vertebres that can be patient specific for the patient you can see. Half his sacrum patient specific for these particular patients, we’re looking at different modeling to reconstruct the spine. Again, these are all specifically for the patients itself, so it’s just some of the slides that we are doing right now. So in conclusion,
the management is challenging, it can restore and protect neurological function. It can improve pain, it can impact the quality of the patients life. Understanding the biology of these tumors is critical in defining the goal of treatment in a given patient and determining the most appropriate therapeutic options. Surgeons dealing with this neoplasm really should be familiar with. All surgical approaches as well as complex anterior posterior construction techniques in order to provide...
optimal care for these patients.

So overall I want to end up as saying it, try it. Don’t try to be good.

Uhm, thank you.

OK, thank you very much for a really fascinating talk and let it challenging field.

Unfortunately, since we’re running late, we won’t have time for questions.

I know there are some,

so please direct your questions directly to Doctor Mandel,

but we do have a second speaker today.

Thank you very much.

Thank you so our second speaker
today is Henry Park and you can maybe get your slides up. Henry is an assistant professor of therapeutic radiology here and chief of Rip Thoracic radiotherapy. He received his undergraduate and medical degrees from Yale and completed internal medicine. He returned to Yale for radiation oncology. He specializes in radiation therapy for lung cancer and neck cancer and brain tumors and is also quite active in comparative effectiveness in health and Serbian services research. As our program Director,
residency director in therapeutic radiology. So Henry on the floor is yours.

OK, thank you very much for the very kind introduction.

So today I'll be speaking about the new directions in Lung SBRT.

So here my disclosures.

So that my my goals today to discuss updated evidence on the role of SBRT in early stage.

Non small cell lung cancer as well as long although ministered disease will also be reviewing our lung cancer clinical trials that involve longest.
period T that we’ve had open here at Yale.

So first we’ll start with early stage, non small cell, medically inoperable patients. So if here we have an elderly patient with lung nodule that’s deemed medically inoperable to because of the patient’s pulmonary status, how do we treat so really? It’s all about the real estate mantra. It’s about location, location, location. How we end up treating this so SPFT those fractionation just to kind of walk you through a few terms here when we talk about conventionally
00:34:05.838 --> 00:34:07.518 factoring fractionated radiation,
00:34:07.520 --> 00:34:09.249 we talk about low dose per fraction,
00:34:09.250 --> 00:34:11.610 about two grade per day over many fractions,
00:34:11.610 --> 00:34:13.770 usually about 30 to 35 fractions
00:34:13.770 --> 00:34:15.720 over six to seven weeks.
00:34:15.720 --> 00:34:17.106 Hypofractionated radiation is
00:34:17.106 --> 00:34:19.416 a moderate dose per fraction,
00:34:19.420 --> 00:34:20.967 about three to seven grade per day
00:34:20.967 --> 00:34:22.618 over a fewer number of fractions,
00:34:22.620 --> 00:34:24.708 about 8 to 20 on SBRT would be
00:34:24.708 --> 00:34:26.579 a high dose per fraction,
00:34:26.580 --> 00:34:28.160 so usually tend to 18,
00:34:28.160 --> 00:34:30.296 but really up to even 34 grave over
00:34:30.296 --> 00:34:32.418 a very few number of fractions,
00:34:32.420 --> 00:34:34.212 which is defined in the US as
one to five fractions.

I'll also talk about this concept, called biologically effective dose orbed.

This speed increases with higher dose per fraction and actually increases.

With a lower number of fractions,

So in an effort for us for tumors that are outside was called No fly zone, we call this the fly zone,
which is within two centimeters of proximal tracheal bronchial tree. Anything that’s peripheral to that are outside of it can be treated in in, so we know from the chisel trial the best is superior to conventionally fractionated radiation for stage one non small cell lung cancers like this. But we know that if you’re treating within the central region of this. This area, then the plastic can be too high, whereas the opening treat outside of it. The outcomes of an excellent 98% control at
three years and 90% control in five years.

Uh so so we did some work here as well as some other places where we looked at for central tumors.

How do we proceed with SBRT here?

So this is a program that was started by Roy Decker several years ago and really to decrease the dose,

but also standard fractionation to five sessions.

So using looking at your retrospective data,

we found that overall survival local control and toxicity were similar between central and peripheral tumors that have been followed up with an RPG 0813 trial phase one two study.
How that that was using those escalation with five fractions to see that there really it really all there, the doses that they were using. This is safe and effective. For central tumors. This is a dose deescalated 3 fraction measurement. We need to call it dream. This is for central but not Ultra central lung tumors. So either primary non small cell
lung cancers or metastases that uses a similar BB to current five fraction regiments but lower than current three fraction regiments to be more convenient for patients. Given that we’re not necessarily sure that those D escalation as well as extending fractionation is really essential in this case. So we’re looking at a lower dose fraction instead for the central tumors, we define this as being within 2 centimeters, but not a budding the Safa, guess hard or the tricky monkey tree. So as a phase one two study, we’re targeting 60 patients in total
over the course of five years.

We had this open for the past year and have a clear about 13 patients.

Our primary endpoints are grade three plus toxicity as well as local control.

Also, for Ultra Central tumors, were there either a budding or within a centimeter or critical central structures.

Do we avoid SBRT altogether and then use a more fractionated Benjamin?

It’s the highest trial here, just published this year that looked at high dose 8 fraction regiments with a similar be the to the current
five fraction regimen and found actually the closer you get to the mainstem bronchi or the trachea, the higher likelihood of fatal toxicities. So it’s a very serious. This news in general, but actually even having grade 5 toxicity was up to the 30 to 40% of Maine. When you get that close to the mainstem bronchi or trachea. A much lower risk if you’re on your low bar bronchus instead. So these are things that are very concerning to us with using these very high doses and ultra central tumors.
So what do we do instead when they’re not candidates for SBRT based on either tumor size or based on location like we talked about? You know we’ve been doing some work with this medical students here. Nadia Saeed and all sassy and using the National Cancer database of you know, with retrospective studies showing that there was higher survival among stage one non small cell lung cancer patients who are receiving hyperfractionated radiation compared to conventionally fractionated radiation, especially when using a higher higher BD.
So we also look I’m looking at a yield databases as well.

Comparing a lower dose 15 fraction regimen to a higher dose eating fraction regimen to those who are not candidates for SBRT and we hope that.

One day I will be.

We can maybe compare this winter to do an SPRT veg. And for those who are, you know, maybe a lower dose SP regimen to see what works best for these ultra central teams.

On a different topic here for multiple targets, if we have multiple nodes,
muscle lung cancers, which we sometimes do encounter, can they be treated simultaneously with SPRT? This is work that we just published this past week that looking at and we look at our own data here among 60 patients treated over the last 12 years to 126 lesions and found 87% local control and 70% overall survival at the two year mark with acceptable toxicity. Grade 2 toxicity and only 3% grade. Three plus toxicity in both of those cases we would have used a different regimen. These days those were both treated.
A long time ago.

So now moving on to SBRT plus systemic therapy so you know,

we know from the surgical that is shared.

Putting some words,

you know those done done here from Dan Buffa and his group that that patients may who undergo surgery may benefit from chemotherapy and even more recent trials showing that immunotherapy may help in selected patients as well.

So can SBRT patients also benefit from systemic therapy as well?

We looked at our data here that showed that patients who were perceived.

Mantis stomach therapy,
you know did have a lower risk of regional distant failure,
so but we do also do know that chemotherapy is is challenging in
this offering fail SPT population,
which has garnered a lot of interest in using immunotherapy instead,
so can be immune checkpoint inhibitors.
One study we have two studies open here at Yale that are looking at this question.
One is the keynote 867 trial,
which is a phase three study targeting 500 patients.
This would look at SBRT plus. Concurrent in admin panel is a man versus.
For stage one and two non-small cell lung cancer this is open.

It’s been opened at the in New Haven and North Haven only at this point, but this would be a cute free week infusion.

Either way, whether you get the immunotherapy or placebo.

But the endpoints being event free survival and overall survival,

we also are about ready to activate this new study.

which has been activated nationally but ready to open here and all of our care centers.

So it’s a phase three that’s targeting 480 patients.
Similar question, but the slightly different SBRT plus minus MU Advent concurrent attachment therapy, which will be in this case different mean therapy would be. No friend only for six months instead of 12. A big difference is that. Truly just got the SBRT and then there’s only including high risk factors which are size greater than two centimeters SUV Max of 6.2 or a grade of two to three on lapsing. And again this will be open at all care centers that have yellow radiation. So moving out the early station.
as muscle lung cancer.

Medically operable patients, so can ask European alternative to surgery for medically operable patients.

First was work from there, from James you and Kerry Gross.

Looking at CR Medicare, looking at a retrospective study here that founded overall survival was improved for patients who received surgery versus those who received SPRT. The short term plasticity did seem to favor SPRT, but then even out by about two years out in the National Cancer Database from Denver.
Office Group found that overall survival was higher among those who got surgery than those who got SPR T even after adjusting for known confounders, including selecting for only patients who had refused. He had refused surgery, but we’re recommending surgery for those who had no committees or Hello Committee score. However, we know that selection and indication bias is a concern when comparing surgery and SBRT retrospectively there have been there’s work out of
here as well as other places showing patients who are considered operable who do receive SRT do have higher overall survival and progression free survival compared to those who are inoperable, so it’s difficult to compare these patients. Contracted an apples to apples comparison even though they do have similar local control and regional distant failure as well among operable versus inoperable SBRT patients. So I think that because like this, this four part reviews here that I’ve drawn a few figures from.
You know one thing you should use was showing here is that randomized phase three trials of surgery versus SBRT are ongoing, but have been historically difficult to recruit in these four here have accrued a total of 2.9% of the targets, so really they all had the clothes being very underpowered. There’s a Fowler study at the VA that is probably the most promising ongoing trial. So far as accrued more than I think more than all these have combined so far, yet this is targeting 670 patients and is not due to read out for at least five years.
So in the meantime, what do we do?

We know that the stars and roselle trials have been actually merged together and pooled analysis that again both underpowered and closed early due to poor accrual. They did find it. In this case. A surprising result that SBRT patients actually had higher overall survival and in this population. Which was a very small population again, but it was similar in recurrence Crucible. A larger study was done more
recently a nonrandomized study, so single ARM SBRT trial that that had better accrual but from Indy Anderson that looked at that actually had a protocol specified comparison to an institutional surgical cohort and found that certain outcomes in this population was similar to surgery and overall survival progression. Free survival and other outcomes and again surprising results that 87% overall survival. At five years for SBRT so hard to know how to extrapolate some of the older studies that included patients who were
not great surgical candidates in terms, especially in terms of overall survival.

So at the end you know with the fact that it beckoned, and several Members who are here right now is at the love you know from different disciplines. We all got together and it’s been working on this four part yield guideline. That’s a collaboration that that transformative, practical framework for weighing short term versus long term benefits and downsides.

So this is one of many figures in this paper that are are looking at, you know how? How can we go through all the
data that’s out there right now,
as imperfect as it is, and?
Trying to figure out which patients
you may benefit from SPRT, lobectomy,
sublumbar resection, or ablation,
and as you can see in this figure,
there’s nuances with and patient selection
that’s really critical and,
that was very proud of
how well our team has worked,
as in a tumor board,
as well as just on the phone.
Otherwise working through these.
Working through the decisions about
how to handle each individual patient.
So I’m moving on to long arguments that disease, uhm, here we pick up all the mess that disease as an intermediate state between local and systemic disease where the the kind of original helmet and excellent definition was that there may be a small subset for whom radical local treatment of primary cancer and almost at legions might have a curative potential, often defined as 123 or one to five patients. So we know the surgery or radiation may have a larger role in localized disease. With an stomach there be having
00:46:43.020 --> 00:46:44.430 a much smaller role in Wylie,
NOTE Confidence: 0.768281687222222
00:46:44.430 --> 00:46:46.008 metastatic disease is really the opposite,
NOTE Confidence: 0.768281687222222
00:46:46.010 --> 00:46:48.670 where it’s stomach therapy is a primary
NOTE Confidence: 0.768281687222222
00:46:48.670 --> 00:46:50.809 role over surgery and radiation.
NOTE Confidence: 0.768281687222222
00:46:50.810 --> 00:46:52.126 But alchemist axes disease,
NOTE Confidence: 0.768281687222222
00:46:52.126 --> 00:46:54.490 there may be a role for both.
NOTE Confidence: 0.768281687222222
00:46:54.490 --> 00:46:57.024 So here this is some going for
NOTE Confidence: 0.768281687222222
00:46:57.024 --> 00:46:59.415 the papers here that some trials
NOTE Confidence: 0.768281687222222
00:46:59.415 --> 00:47:01.869 that are phase two looking at
NOTE Confidence: 0.768281687222222
00:47:01.869 --> 00:47:04.089 local consolidative therapy.
NOTE Confidence: 0.768281687222222
00:47:04.090 --> 00:47:06.578 In this case the Gomez studied in the
NOTE Confidence: 0.768281687222222
00:47:06.578 --> 00:47:08.037 Anderson showed that either surgery
NOTE Confidence: 0.768281687222222
00:47:08.037 --> 00:47:09.990 or SBRT for stage four non small
NOTE Confidence: 0.768281687222222
00:47:10.049 --> 00:47:12.226 cell lung cancer patients with one to
NOTE Confidence: 0.768281687222222
00:47:12.226 --> 00:47:13.864 three metastases and no progression
NOTE Confidence: 0.768281687222222
after three plus months of chemo, actually had increased progression, free survival and overall survival. Median of 41 versus 17 months compared to not. Using a local resolves OK and then use it stomach therapy alone after this point. This was also shown you know this study just the best PRT but similar population stage four non small cell lung cancer from the southwestern after three plus months of chemotherapy this had to be stopped early because of the very clear progression free survival improvement this was.
This was shut down by the IRB because it’s not about to be ethical to continue this study. Uh, and then come see if a comment looked at at all domestic cases of any primary and found the five year overall survival of 42% versus 18%. So actually quite similar to the Golden study showed that really, that’s where 4.5% in this case. So they they did have three that’s in this population, but there was no quality of life difference among among the best. So you know, there’s always caution.
Of course it needs to be taken when you do this, all those were the chemotherapy alone era. Now we're in the immunotherapy area as well. So energy LU002 is the current ongoing phase three study that's looking at a similar population, but now allowing for immunotherapy in the most recent amendment. So I think we still quite relevant question to ask at this point. They do require that you use SBRT for at least one lesion, but can use surgery for other regions as well. So now for long, oligo progressive disease.
This is a somewhat different concept in that there you may not necessarily have just a few minutes up front. You may have several types of disease and have good control with stomach therapy, but when you stay on this systemic therapy or when you’re off of it, if one or a few areas grow, then you’re faced with choices. Do you switch therapy to continue therapy, or do you add therapy and so this is some workouts from staff get injured. I’m looking at the SBRT for oligo, progressive mounts, muscle lung cancer.
After immunotherapy, a small study of 26 patients who had acquired resistance to immune checkpoint inhibitors, 15 of them had local therapy without immediate salvage systemic therapy, so they either were treatment holiday systemically or just remain on their same amino therapy. It’s a somewhat busy the figure here, the circles are where you got local therapy. The green is when they were able to stay on. The green is when they were able to stay on. The green is when they were able to stay on. Immunotherapy and then Gray is when they had to switch to something. 96
else to your overall survival was 92% and quite a few patients were able to maintain mean checkpoint inhibitors for years. In some cases after local therapy, Redecan Allison Campbell, an investigator initiated trials here that looked at SBRT for all the progressive, non small cells lung cancer. After immunotherapy as well, this is a 21 patients faced Pembroke until progression, one and two study where he gave SBRT and then then
00:50:17.735 --> 00:50:18.776 restarted Kimbrough again.

NOTE Confidence: 0.872031570588235

00:50:18.780 --> 00:50:20.535 Right afterwards the endpoint was

NOTE Confidence: 0.872031570588235

00:50:20.535 --> 00:50:22.755 overall response rate and non irradiated

NOTE Confidence: 0.872031570588235

00:50:22.755 --> 00:50:24.795 legions to really to investigate.

NOTE Confidence: 0.872031570588235

00:50:24.800 --> 00:50:26.016 Can you reinvigorate this

NOTE Confidence: 0.872031570588235

00:50:26.016 --> 00:50:27.536 immune response and maybe even

NOTE Confidence: 0.872031570588235

00:50:27.536 --> 00:50:29.120 get enough scope of response

NOTE Confidence: 0.82679625

00:50:29.120 --> 00:50:30.980 to sites that were not treated?

NOTE Confidence: 0.82679625

00:50:30.980 --> 00:50:33.760 Disease Control overall was 57%,

NOTE Confidence: 0.82679625

00:50:33.760 --> 00:50:36.760 but interestingly there were two patients.

NOTE Confidence: 0.82679625

00:50:36.760 --> 00:50:38.824 10% of the group that had a partial

NOTE Confidence: 0.82679625

00:50:38.824 --> 00:50:40.746 response for more than a year and and,

NOTE Confidence: 0.82679625

00:50:40.750 --> 00:50:43.564 and there’s lots of ongoing studies now

NOTE Confidence: 0.82679625

00:50:43.564 --> 00:50:45.746 investigating more about about who this

NOTE Confidence: 0.82679625

00:50:45.746 --> 00:50:48.237 you know the the the factors that may

NOTE Confidence: 0.82679625

00:50:48.237 --> 00:50:50.435 have led to that for those patients.
So just Astro the last month was presented this curb study out of MSK that looked at a similar population of knots, muscle lung cancer patients, or breast cancer patients, and interestingly, found a large PFS benefit for SBRT for non small cell lung cancer patients, but not for breast cancer patients. You can see in lung 44 nine weeks whereas breast was 18 versus 19. No difference there. Paper still yet to come out, so I think there’s still a lot of questions here, but this is.
Intriguing data that maybe this is not this.

Maybe histology independent in terms of the role of SBRT.

In this context stuff Joe Hung is about to activate this study as well for renal cell carcinoma.

This is a phase two study where we're looking at ICI until disease progression and then SPR T.

And then I see I again at the end point being progression free survival.

So there's a lot going on in this arena.

Just again for the CD three study. We do include all capacities.

all progressive disease as well.
This teams that are central, so we’ve had this review here that we were last here on local updated therapies. If you want more details, feel free to refer to this on other studies that have come out as well. So in summary, we come for early season of muscle lung cancer. You know our future directions here are that we’re really looking to optimize patient selection and SBRT dose fractionation for peripheral tumors for central tumors, or we have this D3 trial like I mentioned, as well as Ultra central tumors.
which we're currently investigating retrospectively and hopefully leading to a prospective study.

At some point we’re looking to add immunotherapy to SPR T and seeing to investigate whether that is helpful or not, in which populations may be useful.

Two ongoing trials open it, yell as well.

The keynote and the swab studies Olga Ministik.

Another progressive disease, optimizing patient selection, and those fractionation as well as sequencing, combining SPR T without CI.

So we
make sure that the prospective
studies. If you’re in credit,
that’s his name going forward.
So outside the scope today we
have a lot of exciting, ongoing,
pending trials at and pending
trials at the yield a lung dart,
as well as the T Red Dart.
I’m not going to get into this today,
but locally advanced non small cell
lung cancer limited stage and extensive
stage small cell lung cancers.
There’s a lot going on,
so we’re excited to be working on that.
And finally, like to acknowledge our
yield domestic radiotherapy program, the members of our team have been phenomenal. We've been working weekly and chart rounds ever since. I had the honor of taking this over this program in 2019 from Roy Decker, who's been just amazing mentor of mine and we really started the SPR T program here at Yale several years ago, and among our six sides, we go over all of radiation plans having to do with lung cancer every week to be sure we're improving communication and quality assurance and standardizing practice and then sharing and sharing information.
So I'm very blessed to work with this wonderful team.

Thank you all very much for your time today.

Thank you Henry.

It's very impressive results.

Some of the trials you showed us are there questions.

I see someone has a hand up, but I can't see who that is.

Or the questions in the chat.

I see someone has a hand up, but I can't see who that is.

So Henry in your time here, what do you think has been the biggest step advance? In radiotherapy specifically, I think our ability.
00:54:37.750 --> 00:54:40.250 to really use the imaging that
NOTE Confidence: 0.886416345
00:54:40.250 --> 00:54:43.708 we have of and and and be able to
NOTE Confidence: 0.886416345
00:54:43.708 --> 00:54:45.803 target even more precisely overtime,
NOTE Confidence: 0.886416345
00:54:45.810 --> 00:54:47.224 and I think you know we’re excited
NOTE Confidence: 0.886416345
00:54:47.224 --> 00:54:48.940 to have a new reflection machine.
NOTE Confidence: 0.886416345
00:54:48.940 --> 00:54:51.569 You know that’s coming in soon to be able
NOTE Confidence: 0.886416345
00:54:51.569 --> 00:54:53.170 to target all of them attached season Algo.
NOTE Confidence: 0.886416345
00:54:53.170 --> 00:54:53.866 Progressive disease.
NOTE Confidence: 0.886416345
00:54:53.866 --> 00:54:55.954 I think that’s really the future
NOTE Confidence: 0.886416345
00:54:55.954 --> 00:55:01.300 in terms of, you know,
NOTE Confidence: 0.886416345
00:55:01.300 --> 00:55:02.840 Therapy.
NOTE Confidence: 0.886416345
00:55:02.840 --> 00:55:04.838 There’s been so impressive and
NOTE Confidence: 0.886416345
00:55:04.838 --> 00:55:06.600 and especially in lung cancer,
NOTE Confidence: 0.886416345
00:55:06.600 --> 00:55:08.520 where we see just, you know,
so much better survival than we've ever seen before. Vestige for patients you know and combine this with targeted agents and immunotherapy and chemotherapy to really extend survival and and, you know, are we going to seek? You know we're seeing more patients at that 10 year Mark? Now you know even more who are still disease free, so you know, it’s it’s. It’s very exciting time that you know, as a technology improves in our. Ability to select patients
properly for this improves.

We're hoping to really see more patients benefit from,

you know,

from using SBRT

in this setting. Perfect

we have doctor D. Do you have a question?

I see a hand. Uhm, maybe not.

OK, well thank both speakers again.

It was a terrific series and I

learned a lot and I hope the

audience did. Also thank you.

Thank you.