

00:00:00.160 --> 00:00:01.920 Funding for Yale Cancer Answers
NOTE Confidence: 0.9429003

00:00:01.920 --> 00:00:03.679 is provided by Smilow Cancer
NOTE Confidence: 0.9429003

00:00:03.679 --> 00:00:04.180 Hospital.
NOTE Confidence: 0.9525311

00:00:06.160 --> 00:00:08.080 Welcome to Yale Cancer Answers
NOTE Confidence: 0.9525311

00:00:08.080 --> 00:00:09.200 with the director of the
NOTE Confidence: 0.9525311

00:00:09.200 --> 00:00:11.039 Yale Cancer Center, doctor Eric
NOTE Confidence: 0.9525311

00:00:11.039 --> 00:00:11.539 Winer.
NOTE Confidence: 0.99430835

00:00:12.255 --> 00:00:14.435 Yale Cancer Answers features conversations
NOTE Confidence: 0.9997091

00:00:14.735 --> 00:00:15.475 with oncologists
NOTE Confidence: 0.99821216

00:00:15.775 --> 00:00:16.895 and specialists who are on
NOTE Confidence: 0.99821216

00:00:16.895 --> 00:00:18.095 the forefront of the battle
NOTE Confidence: 0.99821216

00:00:18.095 --> 00:00:18.995 to fight cancer.
NOTE Confidence: 0.9909795

00:00:19.614 --> 00:00:20.994 This week, it's a conversation
NOTE Confidence: 0.9909795

00:00:21.055 --> 00:00:22.255 about the care of patients
NOTE Confidence: 0.9909795

00:00:22.255 --> 00:00:23.775 with brain tumors with doctor
NOTE Confidence: 0.9909795

00:00:23.775 --> 00:00:24.595 James Hansen.

NOTE Confidence: 0.9949629
00:00:25.150 --> 00:00:26.770 Doctor Hansen is an associate
NOTE Confidence: 0.9949629
00:00:26.829 --> 00:00:28.990 professor of therapeutic radiology at
NOTE Confidence: 0.9949629
00:00:28.990 --> 00:00:30.289 the Yale School of Medicine.
NOTE Confidence: 0.8924776
00:00:30.830 --> 00:00:31.970 Here's doctor Winer.
NOTE Confidence: 0.998027
00:00:33.150 --> 00:00:34.350 How did you get interested
NOTE Confidence: 0.998027
00:00:34.350 --> 00:00:35.650 in radiation oncology?
NOTE Confidence: 0.97131485
00:00:36.750 --> 00:00:38.715 That goes back
NOTE Confidence: 0.97131485
00:00:38.955 --> 00:00:40.395 way back to when I
NOTE Confidence: 0.97131485
00:00:40.395 --> 00:00:41.935 was a kid growing up,
NOTE Confidence: 0.97131485
00:00:42.075 --> 00:00:42.875 and I was a big
NOTE Confidence: 0.97131485
00:00:42.875 --> 00:00:44.795 fan of Marvel comic books.
NOTE Confidence: 0.97131485
00:00:44.795 --> 00:00:46.575 And if anybody remembers those,
NOTE Confidence: 0.97131485
00:00:46.795 --> 00:00:48.235 all those superheroes got their
NOTE Confidence: 0.97131485
00:00:48.235 --> 00:00:50.795 powers from radiation. Spiderman
NOTE Confidence: 0.97131485
00:00:50.795 --> 00:00:51.595 was bitten by a
NOTE Confidence: 0.97131485

00:00:51.595 --> 00:00:52.655 radioactive spider.
NOTE Confidence: 0.98017657

00:00:53.229 --> 00:00:54.750 The Incredible Hulk was bombarded
NOTE Confidence: 0.98017657

00:00:54.750 --> 00:00:55.650 with gamma rays.
NOTE Confidence: 0.9639507

00:00:56.110 --> 00:00:57.710 I figured, who wouldn't want
NOTE Confidence: 0.9639507

00:00:57.710 --> 00:00:58.670 to have a career in
NOTE Confidence: 0.9639507

00:00:58.670 --> 00:00:59.730 radiation?
NOTE Confidence: 0.94078064

00:01:00.270 --> 00:01:01.170 So, unfortunately,
NOTE Confidence: 0.9753599

00:01:01.710 --> 00:01:02.910 I've been a radiation doctor
NOTE Confidence: 0.9753599

00:01:02.910 --> 00:01:04.350 for years now, and I'm
NOTE Confidence: 0.9753599

00:01:04.350 --> 00:01:05.229 here to tell you, those
NOTE Confidence: 0.9753599

00:01:05.229 --> 00:01:07.145 comics are actually fiction. I've
NOTE Confidence: 0.9753599

00:01:07.145 --> 00:01:08.524 not yet seen anybody
NOTE Confidence: 0.95083207

00:01:08.825 --> 00:01:10.524 exposed to radiation get superpowers.
NOTE Confidence: 0.9654531

00:01:11.384 --> 00:01:12.825 But I have witnessed some
NOTE Confidence: 0.9654531

00:01:12.825 --> 00:01:14.685 incredible courage in our patients.
NOTE Confidence: 0.9654531

00:01:14.744 --> 00:01:15.545 And I would say those

NOTE Confidence: 0.9654531
00:01:15.545 --> 00:01:16.905 are the real superheroes for
NOTE Confidence: 0.9654531
00:01:16.905 --> 00:01:17.405 sure.
NOTE Confidence: 0.99841857
00:01:17.784 --> 00:01:18.825 Why don't you tell us
NOTE Confidence: 0.99841857
00:01:18.825 --> 00:01:19.725 a little bit
NOTE Confidence: 0.9993837
00:01:20.300 --> 00:01:20.800 about
NOTE Confidence: 0.9002139
00:01:21.420 --> 00:01:23.360 gamma knife? What is this?
NOTE Confidence: 0.99228925
00:01:23.740 --> 00:01:25.360 It's a form of radiation.
NOTE Confidence: 0.99228925
00:01:25.500 --> 00:01:26.220 I think a lot of
NOTE Confidence: 0.99228925
00:01:26.220 --> 00:01:27.500 people know that, but they
NOTE Confidence: 0.99228925
00:01:27.500 --> 00:01:28.700 don't know much in the
NOTE Confidence: 0.99228925
00:01:28.700 --> 00:01:30.480 way of specifics and
NOTE Confidence: 0.99568367
00:01:30.780 --> 00:01:32.060 where we might use it
NOTE Confidence: 0.99568367
00:01:32.060 --> 00:01:33.820 and where we wouldn't use it.
00:01:34.715 --> 00:01:36.895 I absolutely
NOTE Confidence: 0.9661934
00:01:37.034 --> 00:01:38.235 love the Gamma Knife. I
NOTE Confidence: 0.9661934
00:01:38.235 --> 00:01:39.775 think it's a fantastic machine.

NOTE Confidence: 0.9995898

00:01:40.395 --> 00:01:41.615 I have just one

NOTE Confidence: 0.98575765

00:01:41.915 --> 00:01:43.194 problem with it, and that

NOTE Confidence: 0.98575765

00:01:43.194 --> 00:01:45.034 is its name. I wish

NOTE Confidence: 0.98575765

00:01:45.034 --> 00:01:45.915 for all the world it

NOTE Confidence: 0.98575765

00:01:45.915 --> 00:01:46.875 would not have included the

NOTE Confidence: 0.98575765

00:01:46.875 --> 00:01:48.940 word knife because that scares

NOTE Confidence: 0.98575765

00:01:48.940 --> 00:01:50.140 all of our patients. There

NOTE Confidence: 0.98575765

00:01:50.140 --> 00:01:51.660 is no knife involved. It's

NOTE Confidence: 0.98575765

00:01:51.660 --> 00:01:52.400 just a machine

NOTE Confidence: 0.999762

00:01:52.700 --> 00:01:54.060 that is designed to give

NOTE Confidence: 0.999762

00:01:54.060 --> 00:01:54.560 radiation

NOTE Confidence: 0.9008353

00:01:54.940 --> 00:01:56.800 extremely accurately and, specifically,

NOTE Confidence: 0.9955757

00:01:57.580 --> 00:01:59.360 extremely accurately in the brain.

NOTE Confidence: 0.9724441

00:01:59.675 --> 00:02:00.475 And when we're talking about

NOTE Confidence: 0.9724441

00:02:00.475 --> 00:02:02.555 the brain, accuracy is literally

NOTE Confidence: 0.9724441

00:02:02.555 --> 00:02:04.895 everything because we're using radiation

NOTE Confidence: 0.9724441

00:02:04.955 --> 00:02:06.395 to kill things, which is

NOTE Confidence: 0.9724441

00:02:06.395 --> 00:02:07.835 good for tumors, but not

NOTE Confidence: 0.9724441

00:02:07.835 --> 00:02:09.375 great for normal tissue cells.

NOTE Confidence: 0.9893357

00:02:09.675 --> 00:02:10.635 A gamma knife can get

NOTE Confidence: 0.9893357

00:02:10.635 --> 00:02:11.435 us to less than a

NOTE Confidence: 0.9893357

00:02:11.435 --> 00:02:12.555 tenth of a millimeter of

NOTE Confidence: 0.9893357

00:02:12.555 --> 00:02:14.070 error in our targeting.

NOTE Confidence: 0.9893357

00:02:14.150 --> 00:02:15.030 We can leave

NOTE Confidence: 0.9893357

00:02:15.030 --> 00:02:15.830 the rest of the normal

NOTE Confidence: 0.9893357

00:02:15.830 --> 00:02:16.650 brain alone.

NOTE Confidence: 0.9966901

00:02:17.430 --> 00:02:18.550 We do that with a

NOTE Confidence: 0.9966901

00:02:18.550 --> 00:02:19.670 combination of a 3D

NOTE Confidence: 0.9966901

00:02:19.670 --> 00:02:20.870 targeting box that goes on

NOTE Confidence: 0.9966901

00:02:20.870 --> 00:02:21.930 the patient's head,

NOTE Confidence: 0.9977837

00:02:22.470 --> 00:02:24.630 some complex MRI imaging, and

NOTE Confidence: 0.9977837
00:02:24.630 --> 00:02:26.410 then some very sophisticated arrangements
NOTE Confidence: 0.9977837
00:02:26.470 --> 00:02:27.290 of some actual
NOTE Confidence: 0.9721195
00:02:27.745 --> 00:02:29.985 radioactive sources that give a
NOTE Confidence: 0.9721195
00:02:29.985 --> 00:02:30.945 hundred and ninety two beams
NOTE Confidence: 0.9721195
00:02:30.945 --> 00:02:32.145 to one little tiny dot
NOTE Confidence: 0.9721195
00:02:32.145 --> 00:02:32.805 in space.
NOTE Confidence: 0.9766665
00:02:33.264 --> 00:02:34.145 And so we can position
NOTE Confidence: 0.9766665
00:02:34.145 --> 00:02:35.105 the patient so that one
NOTE Confidence: 0.9766665
00:02:35.105 --> 00:02:36.545 little dot is right where
NOTE Confidence: 0.9766665
00:02:36.545 --> 00:02:37.825 we want it. It's kinda
NOTE Confidence: 0.9766665
00:02:37.825 --> 00:02:39.985 like painting by pointillism, where
NOTE Confidence: 0.9766665
00:02:39.985 --> 00:02:41.200 you just dot dot dot
NOTE Confidence: 0.9766665
00:02:41.200 --> 00:02:42.239 dot dot to cover your
NOTE Confidence: 0.9766665
00:02:42.239 --> 00:02:43.440 target, and you leave the
NOTE Confidence: 0.9766665
00:02:43.440 --> 00:02:44.819 rest of the brain alone.
NOTE Confidence: 0.9766665

00:02:44.959 --> 00:02:46.099 We call those shots.
NOTE Confidence: 0.9620072
00:02:46.480 --> 00:02:48.639 So you can target very
NOTE Confidence: 0.9620072
00:02:48.639 --> 00:02:49.620 small tumors.
NOTE Confidence: 0.9755042
00:02:50.160 --> 00:02:51.440 The smaller, the
NOTE Confidence: 0.9755042
00:02:51.440 --> 00:02:53.060 better. We love small. Yes.
NOTE Confidence: 0.9996062
00:02:53.360 --> 00:02:53.860 And
NOTE Confidence: 0.99601436
00:02:54.385 --> 00:02:55.905 what's the largest tumor you
NOTE Confidence: 0.99601436
00:02:55.905 --> 00:02:57.264 can target with a gamma
NOTE Confidence: 0.99601436
00:02:57.264 --> 00:02:57.764 knife?
NOTE Confidence: 0.917902
00:02:58.385 --> 00:02:59.764 There's no limit,
NOTE Confidence: 0.9988459
00:03:00.465 --> 00:03:01.925 but the larger the tumor,
NOTE Confidence: 0.98701614
00:03:02.305 --> 00:03:03.425 the greater the volume of
NOTE Confidence: 0.98701614
00:03:03.425 --> 00:03:04.545 normal brain around it that
NOTE Confidence: 0.98701614
00:03:04.545 --> 00:03:05.505 is getting hit by some
NOTE Confidence: 0.98701614
00:03:05.505 --> 00:03:06.545 degree of radiation. So we
NOTE Confidence: 0.98701614
00:03:06.545 --> 00:03:07.025 have to be a little

NOTE Confidence: 0.98701614
00:03:07.025 --> 00:03:08.520 bit careful. We've got ways
NOTE Confidence: 0.98701614
00:03:08.520 --> 00:03:09.320 that we can deal with
NOTE Confidence: 0.98701614
00:03:09.320 --> 00:03:10.760 that by adjusting our dose
NOTE Confidence: 0.98701614
00:03:10.760 --> 00:03:11.960 or maybe having the patient
NOTE Confidence: 0.98701614
00:03:11.960 --> 00:03:13.320 come back for a couple
NOTE Confidence: 0.98701614
00:03:13.320 --> 00:03:14.520 treatments instead of doing it
NOTE Confidence: 0.98701614
00:03:14.520 --> 00:03:15.800 all in one day. So
NOTE Confidence: 0.98701614
00:03:15.800 --> 00:03:17.160 there's no real limit,
NOTE Confidence: 0.98701614
00:03:17.160 --> 00:03:17.660 truthfully.
NOTE Confidence: 0.92899376
00:03:18.760 --> 00:03:21.004 But, practically, when
NOTE Confidence: 0.92899376
00:03:21.004 --> 00:03:22.605 would you stop thinking about
NOTE Confidence: 0.92899376
00:03:22.605 --> 00:03:23.905 doing gamma knife
NOTE Confidence: 0.9956881
00:03:24.205 --> 00:03:25.485 and start thinking about doing
NOTE Confidence: 0.9956881
00:03:25.485 --> 00:03:27.245 something different in terms of
NOTE Confidence: 0.9956881
00:03:27.245 --> 00:03:27.745 size?
NOTE Confidence: 0.9298716

00:03:28.285 --> 00:03:29.965 Well, it depends very much
NOTE Confidence: 0.9298716

00:03:29.965 --> 00:03:30.465 on
NOTE Confidence: 0.97528577

00:03:30.845 --> 00:03:31.885 what kind of a cancer
NOTE Confidence: 0.97528577

00:03:31.885 --> 00:03:33.644 we are dealing with, because
NOTE Confidence: 0.97528577

00:03:33.644 --> 00:03:34.989 as you know, it's an
NOTE Confidence: 0.97528577

00:03:34.989 --> 00:03:36.110 entirely new world now with
NOTE Confidence: 0.97528577

00:03:36.110 --> 00:03:37.810 targeted therapies and such.
NOTE Confidence: 0.9988966

00:03:38.349 --> 00:03:38.849 If
NOTE Confidence: 0.9961978

00:03:39.150 --> 00:03:40.349 we are worried that a
NOTE Confidence: 0.9961978

00:03:40.349 --> 00:03:41.870 cancer is spread widely throughout
NOTE Confidence: 0.9961978

00:03:41.870 --> 00:03:43.069 the brain, it's not just
NOTE Confidence: 0.9961978

00:03:43.069 --> 00:03:44.690 in the one area, then
NOTE Confidence: 0.94949293

00:03:45.069 --> 00:03:46.290 we'll need to have conversations
NOTE Confidence: 0.94949293

00:03:46.349 --> 00:03:47.470 about perhaps we might need
NOTE Confidence: 0.94949293

00:03:47.470 --> 00:03:48.750 to revert to the standard
NOTE Confidence: 0.94949293

00:03:48.750 --> 00:03:50.245 technique of the whole brain

NOTE Confidence: 0.94949293
00:03:50.385 --> 00:03:50.885 radiation.
NOTE Confidence: 0.9702225
00:03:51.825 --> 00:03:52.785 But we try to avoid
NOTE Confidence: 0.9702225
00:03:52.785 --> 00:03:53.905 that for as long as
NOTE Confidence: 0.9702225
00:03:53.905 --> 00:03:54.944 we can because we do
NOTE Confidence: 0.9702225
00:03:54.944 --> 00:03:56.165 have this gamma knife technology.
NOTE Confidence: 0.999329
00:03:57.505 --> 00:03:58.005 And
NOTE Confidence: 0.99842834
00:03:58.385 --> 00:03:59.364 with this technology,
NOTE Confidence: 0.9922218
00:03:59.825 --> 00:04:01.105 you can give much higher
NOTE Confidence: 0.9922218
00:04:01.105 --> 00:04:02.785 doses of radiation than with
NOTE Confidence: 0.9922218
00:04:02.785 --> 00:04:03.685 standard radiation?
NOTE Confidence: 0.9694123
00:04:05.050 --> 00:04:06.810 That's basically true. Yeah. It's
NOTE Confidence: 0.9694123
00:04:06.890 --> 00:04:07.790 it comes down
NOTE Confidence: 0.98345584
00:04:08.170 --> 00:04:09.530 to the biology of radiation,
NOTE Confidence: 0.98345584
00:04:09.530 --> 00:04:10.490 and we didn't need to
NOTE Confidence: 0.98345584
00:04:10.490 --> 00:04:11.530 get too far into the
NOTE Confidence: 0.98345584

00:04:11.530 --> 00:04:13.050 woods on that. But there's
NOTE Confidence: 0.98345584

00:04:13.050 --> 00:04:14.670 a difference between giving radiation
NOTE Confidence: 0.99929273

00:04:15.050 --> 00:04:16.510 all in one big dose
NOTE Confidence: 0.96250117

00:04:16.970 --> 00:04:18.170 versus a bunch of small
NOTE Confidence: 0.96250117

00:04:18.170 --> 00:04:19.735 doses. And what the gamma
NOTE Confidence: 0.96250117

00:04:19.735 --> 00:04:20.695 knife can do, because it's
NOTE Confidence: 0.96250117

00:04:20.695 --> 00:04:21.435 so accurate,
NOTE Confidence: 0.99880344

00:04:21.815 --> 00:04:22.855 we can really hit the
NOTE Confidence: 0.99880344

00:04:22.855 --> 00:04:23.755 target hard
NOTE Confidence: 0.98067266

00:04:24.055 --> 00:04:24.555 once
NOTE Confidence: 0.9836091

00:04:24.935 --> 00:04:26.055 compared to having to treat
NOTE Confidence: 0.9836091

00:04:26.055 --> 00:04:27.815 the entire brain over multiple
NOTE Confidence: 0.9836091

00:04:27.815 --> 00:04:29.435 fractions with a tinier dose
NOTE Confidence: 0.9836091

00:04:29.495 --> 00:04:30.714 to let the brain recover.
NOTE Confidence: 0.97417367

00:04:31.330 --> 00:04:33.169 And when you do those
NOTE Confidence: 0.97417367

00:04:33.169 --> 00:04:35.570 multiple fractions, say over two

NOTE Confidence: 0.97417367
00:04:35.570 --> 00:04:37.589 weeks or even longer sometimes,
NOTE Confidence: 0.99358845
00:04:38.930 --> 00:04:40.850 the total dose has to
NOTE Confidence: 0.99358845
00:04:40.850 --> 00:04:42.550 be increased.
NOTE Confidence: 0.99767494
00:04:43.490 --> 00:04:43.990 It's
NOTE Confidence: 0.99133164
00:04:44.370 --> 00:04:45.330 a little bit of hand
NOTE Confidence: 0.99133164
00:04:45.330 --> 00:04:46.370 waving in terms of how we
00:04:47.545 --> 00:04:48.985 say which dose is equivalent
NOTE Confidence: 0.9898747
00:04:48.985 --> 00:04:49.705 to the other, and not
NOTE Confidence: 0.9898747
00:04:49.705 --> 00:04:50.745 all of us believe those
NOTE Confidence: 0.9898747
00:04:50.745 --> 00:04:51.245 equations.
NOTE Confidence: 0.96601117
00:04:52.185 --> 00:04:53.945 But theoretically, yes, we might
NOTE Confidence: 0.96601117
00:04:53.945 --> 00:04:55.385 treat in a single fraction,
NOTE Confidence: 0.96601117
00:04:55.385 --> 00:04:56.585 for example, to a dose
NOTE Confidence: 0.96601117
00:04:56.585 --> 00:04:57.645 of twenty gray,
NOTE Confidence: 0.96738416
00:04:57.945 --> 00:04:58.985 whereas the total dose of
NOTE Confidence: 0.96738416
00:04:58.985 --> 00:05:00.025 a whole brain treatment is

NOTE Confidence: 0.96738416
00:05:00.025 --> 00:05:00.525 typically
NOTE Confidence: 0.91441536
00:05:00.904 --> 00:05:01.645 thirty gray.
NOTE Confidence: 0.9970169
00:05:02.105 --> 00:05:03.710 But it's not a perfect
NOTE Confidence: 0.9970169
00:05:03.710 --> 00:05:04.210 correlation at all.
00:05:06.990 --> 00:05:08.830 And when you're treating cancer
NOTE Confidence: 0.9987632
00:05:08.830 --> 00:05:09.650 in the brain,
NOTE Confidence: 0.9906492
00:05:10.110 --> 00:05:12.110 this is both cancers that
NOTE Confidence: 0.9906492
00:05:12.110 --> 00:05:13.310 start in the brain as
NOTE Confidence: 0.9906492
00:05:13.310 --> 00:05:14.670 well as cancers that spread
NOTE Confidence: 0.9906492
00:05:14.670 --> 00:05:15.410 to the brain?
NOTE Confidence: 0.9981636
00:05:16.190 --> 00:05:17.890 That's right. It does
NOTE Confidence: 0.9993207
00:05:18.335 --> 00:05:19.855 depend very much on exactly
NOTE Confidence: 0.9993207
00:05:19.855 --> 00:05:21.075 what we are treating.
NOTE Confidence: 0.9668489
00:05:21.615 --> 00:05:22.575 By far and away, the
NOTE Confidence: 0.9668489
00:05:22.575 --> 00:05:23.395 most common
NOTE Confidence: 0.99727184
00:05:24.735 --> 00:05:25.695 tumors that we are treating

NOTE Confidence: 0.99727184
00:05:25.695 --> 00:05:26.735 are cancers that have spread
NOTE Confidence: 0.99727184
00:05:26.735 --> 00:05:27.695 to the brain, which are
NOTE Confidence: 0.99727184
00:05:27.695 --> 00:05:28.975 things that we call brain
NOTE Confidence: 0.99727184
00:05:28.975 --> 00:05:29.475 metastases.
NOTE Confidence: 0.9718212
00:05:30.270 --> 00:05:31.229 There are other forms of
NOTE Confidence: 0.9718212
00:05:31.229 --> 00:05:32.190 tumors that we treat as
NOTE Confidence: 0.9718212
00:05:32.190 --> 00:05:33.229 well that start in the
NOTE Confidence: 0.9718212
00:05:33.229 --> 00:05:34.449 brain, meningiomas,
NOTE Confidence: 0.93890727
00:05:34.750 --> 00:05:36.529 pituitary adenomas, and such.
NOTE Confidence: 0.98544025
00:05:37.069 --> 00:05:37.870 But far and away, the
NOTE Confidence: 0.98544025
00:05:37.870 --> 00:05:39.550 metastases are our number one
NOTE Confidence: 0.98544025
00:05:39.550 --> 00:05:40.370 that we treat.
NOTE Confidence: 0.99704224
00:05:41.629 --> 00:05:42.129 And
NOTE Confidence: 0.9526584
00:05:42.525 --> 00:05:43.025 metastases
NOTE Confidence: 0.9990511
00:05:43.325 --> 00:05:45.245 happen in patients who have
NOTE Confidence: 0.9990511

00:05:45.245 --> 00:05:46.385 an initial cancer
NOTE Confidence: 0.9652494

00:05:46.845 --> 00:05:48.605 and then develop a recurrence
NOTE Confidence: 0.9652494

00:05:48.605 --> 00:05:50.545 of that cancer. And sometimes
NOTE Confidence: 0.97821045

00:05:51.245 --> 00:05:52.625 it spreads to the brain.
NOTE Confidence: 0.97821045

00:05:52.685 --> 00:05:54.625 Recently, there's been talk that
NOTE Confidence: 0.97821045

00:05:54.925 --> 00:05:56.765 brain metastases seem to be
NOTE Confidence: 0.97821045

00:05:56.765 --> 00:05:57.265 increasing.
NOTE Confidence: 0.99349

00:05:58.000 --> 00:05:59.199 Do you have thoughts about
NOTE Confidence: 0.99349

00:05:59.199 --> 00:05:59.699 that?
NOTE Confidence: 0.9761977

00:06:00.800 --> 00:06:02.800 I think that's in large
NOTE Confidence: 0.9761977

00:06:02.800 --> 00:06:05.680 part credit to oncologists like
NOTE Confidence: 0.9761977

00:06:05.680 --> 00:06:08.080 yourself, that are getting better
NOTE Confidence: 0.9761977

00:06:08.080 --> 00:06:09.760 and better at treating disease
NOTE Confidence: 0.9761977

00:06:09.760 --> 00:06:11.460 everywhere else in the body.
NOTE Confidence: 0.99828833

00:06:11.919 --> 00:06:13.220 The brain, unfortunately,
NOTE Confidence: 0.999331

00:06:13.680 --> 00:06:14.615 is a little bit tougher

NOTE Confidence: 0.999331
00:06:14.615 --> 00:06:16.235 to get those medicines into.
NOTE Confidence: 0.9955127
00:06:16.695 --> 00:06:17.654 As we know, there's
NOTE Confidence: 0.9955127
00:06:17.654 --> 00:06:18.775 something called the blood brain
NOTE Confidence: 0.9955127
00:06:18.775 --> 00:06:20.214 barrier that keeps those drugs
NOTE Confidence: 0.9955127
00:06:20.214 --> 00:06:21.735 out. So while we're doing
NOTE Confidence: 0.9955127
00:06:21.735 --> 00:06:23.095 better at controlling disease outside
NOTE Confidence: 0.9955127
00:06:23.095 --> 00:06:23.755 the brain,
NOTE Confidence: 0.99175835
00:06:24.535 --> 00:06:25.735 we still need better ways
NOTE Confidence: 0.99175835
00:06:25.735 --> 00:06:26.855 to control disease in the
NOTE Confidence: 0.99175835
00:06:26.855 --> 00:06:28.380 brain. And that's getting
NOTE Confidence: 0.99175835
00:06:28.380 --> 00:06:30.540 better and better. So we're
NOTE Confidence: 0.99175835
00:06:30.540 --> 00:06:32.139 relying less and less on
NOTE Confidence: 0.99175835
00:06:32.139 --> 00:06:33.120 the whole brain radiation,
NOTE Confidence: 0.9696214
00:06:33.580 --> 00:06:34.699 more on the gamma knife
NOTE Confidence: 0.9696214
00:06:34.699 --> 00:06:36.380 as these better targeted therapies
NOTE Confidence: 0.9696214

00:06:36.380 --> 00:06:37.680 come along to help us.
NOTE Confidence: 0.99619555

00:06:38.539 --> 00:06:40.139 And there have been studies
NOTE Confidence: 0.99619555

00:06:40.139 --> 00:06:41.360 that have shown that
NOTE Confidence: 0.9739158

00:06:41.975 --> 00:06:43.495 patients actually do better when
NOTE Confidence: 0.9739158

00:06:43.495 --> 00:06:45.115 treated with gamma knife
NOTE Confidence: 0.99672014

00:06:45.415 --> 00:06:46.955 or related technologies
NOTE Confidence: 0.9727268

00:06:47.415 --> 00:06:49.755 than getting whole brain.
NOTE Confidence: 0.96785945

00:06:50.294 --> 00:06:52.535 Sure. Absolutely. The normal
NOTE Confidence: 0.96785945

00:06:52.535 --> 00:06:53.975 brain doesn't wanna get exposed
NOTE Confidence: 0.96785945

00:06:53.975 --> 00:06:55.175 to that radiation. It can
NOTE Confidence: 0.96785945

00:06:55.175 --> 00:06:56.375 have an effect on things
NOTE Confidence: 0.96785945

00:06:56.375 --> 00:06:56.875 like
NOTE Confidence: 0.99527127

00:06:57.220 --> 00:06:58.580 short term memory and
NOTE Confidence: 0.99527127

00:06:58.580 --> 00:06:59.560 just overall
NOTE Confidence: 0.9894673

00:06:59.940 --> 00:07:01.860 energy levels. So if we
NOTE Confidence: 0.9894673

00:07:01.860 --> 00:07:03.380 can avoid it, we should

NOTE Confidence: 0.9894673
00:07:03.380 --> 00:07:04.900 when we can. That's not
NOTE Confidence: 0.9894673
00:07:04.900 --> 00:07:05.700 to say that there isn't
NOTE Confidence: 0.9894673
00:07:05.700 --> 00:07:06.760 a time and a place
NOTE Confidence: 0.9894673
00:07:06.820 --> 00:07:08.200 for the whole brain radiation.
NOTE Confidence: 0.9894673
00:07:08.500 --> 00:07:09.540 It's we just have to
NOTE Confidence: 0.9894673
00:07:09.540 --> 00:07:10.660 pick and choose our battles,
NOTE Confidence: 0.9894673
00:07:10.660 --> 00:07:11.400 for sure.
NOTE Confidence: 0.99959916
00:07:11.875 --> 00:07:12.375 And
NOTE Confidence: 0.998094
00:07:12.835 --> 00:07:14.035 when would you give whole
NOTE Confidence: 0.998094
00:07:14.035 --> 00:07:14.855 brain radiation?
NOTE Confidence: 0.9994085
00:07:16.115 --> 00:07:16.615 So
NOTE Confidence: 0.95978516
00:07:16.995 --> 00:07:18.435 it's very much dependent on
NOTE Confidence: 0.95978516
00:07:18.435 --> 00:07:19.895 the patient and the situation.
NOTE Confidence: 0.9832999
00:07:20.755 --> 00:07:21.875 If we don't have
NOTE Confidence: 0.9832999
00:07:21.875 --> 00:07:23.315 a good targeted therapy to
NOTE Confidence: 0.9832999

00:07:23.315 --> 00:07:24.835 back us up and we
NOTE Confidence: 0.9832999

00:07:24.835 --> 00:07:25.335 have
NOTE Confidence: 0.99516183

00:07:25.940 --> 00:07:27.380 many, many spots to go
NOTE Confidence: 0.99516183

00:07:27.380 --> 00:07:29.140 after, you know, thirty, forty,
NOTE Confidence: 0.99516183

00:07:29.140 --> 00:07:29.640 fifty,
NOTE Confidence: 0.9957565

00:07:30.420 --> 00:07:31.220 then we know if we
NOTE Confidence: 0.9957565

00:07:31.220 --> 00:07:33.060 see fifty spots, there's probably
NOTE Confidence: 0.9957565

00:07:33.060 --> 00:07:34.100 another ten or twenty that
NOTE Confidence: 0.9957565

00:07:34.100 --> 00:07:35.220 we can't see, and it
NOTE Confidence: 0.9957565

00:07:35.220 --> 00:07:36.180 makes more sense for the
NOTE Confidence: 0.9957565

00:07:36.180 --> 00:07:36.680 patient
NOTE Confidence: 0.999804

00:07:36.980 --> 00:07:37.880 to treat everything.
NOTE Confidence: 0.9689173

00:07:39.275 --> 00:07:40.395 Other types of disease, for
NOTE Confidence: 0.9689173

00:07:40.395 --> 00:07:41.835 example, small cell lung cancer
NOTE Confidence: 0.9689173

00:07:41.835 --> 00:07:43.775 is a type that tends
NOTE Confidence: 0.9805781

00:07:44.314 --> 00:07:45.354 to very commonly go to

NOTE Confidence: 0.9805781
00:07:45.354 --> 00:07:46.074 the brain, and we tend
NOTE Confidence: 0.9805781
00:07:46.074 --> 00:07:47.034 to have a lower threshold
NOTE Confidence: 0.9805781
00:07:47.034 --> 00:07:48.875 for activating that whole brain
NOTE Confidence: 0.9805781
00:07:48.875 --> 00:07:50.235 decision in that case. But
NOTE Confidence: 0.9805781
00:07:50.235 --> 00:07:51.275 even that, we're trying to
NOTE Confidence: 0.9805781
00:07:51.275 --> 00:07:52.335 back off on nowadays.
00:07:55.280 --> 00:07:56.480 I have to say as
NOTE Confidence: 0.9609666
00:07:56.480 --> 00:07:58.020 a medical oncologist
NOTE Confidence: 0.95781386
00:07:59.040 --> 00:08:00.880 taking care of mostly women
NOTE Confidence: 0.95781386
00:08:00.880 --> 00:08:01.940 with breast cancer,
NOTE Confidence: 0.998452
00:08:03.520 --> 00:08:05.220 that the advances in radiation
NOTE Confidence: 0.9377571
00:08:06.074 --> 00:08:07.675 largely through techniques like the
NOTE Confidence: 0.9377571
00:08:07.675 --> 00:08:09.134 gamma knife, have been incredible
NOTE Confidence: 0.9377571
00:08:09.275 --> 00:08:10.014 over the years.
NOTE Confidence: 0.9981839
00:08:10.315 --> 00:08:10.815 And
NOTE Confidence: 0.9985981
00:08:11.755 --> 00:08:14.074 radiation oncologists have been able

NOTE Confidence: 0.9985981
00:08:14.074 --> 00:08:15.294 to treat
NOTE Confidence: 0.9997481
00:08:15.835 --> 00:08:17.294 more and more with
NOTE Confidence: 0.9803024
00:08:17.595 --> 00:08:19.375 really less and less toxic
NOTE Confidence: 0.9803024
00:08:19.435 --> 00:08:19.935 approaches.
NOTE Confidence: 0.9622487
00:08:21.035 --> 00:08:23.010 Yeah. And I'm particularly excited
NOTE Confidence: 0.9622487
00:08:23.010 --> 00:08:24.370 about what we're seeing with
NOTE Confidence: 0.9622487
00:08:24.370 --> 00:08:26.770 these new antibody drug conjugates
NOTE Confidence: 0.9622487
00:08:26.770 --> 00:08:28.470 like HER2 that are really
NOTE Confidence: 0.9987772
00:08:29.330 --> 00:08:31.010 helping us delay that need
NOTE Confidence: 0.9987772
00:08:31.010 --> 00:08:32.309 to activate the whole brain
NOTE Confidence: 0.9987772
00:08:32.370 --> 00:08:34.050 protocol. So we can help
NOTE Confidence: 0.9987772
00:08:34.050 --> 00:08:34.550 you
NOTE Confidence: 0.99245834
00:08:34.895 --> 00:08:36.255 target just the most important
NOTE Confidence: 0.99245834
00:08:36.255 --> 00:08:37.695 tumors, and the drugs can
NOTE Confidence: 0.99245834
00:08:37.695 --> 00:08:38.495 perhaps take care of the
NOTE Confidence: 0.99245834

00:08:38.495 --> 00:08:40.415 smaller ones, which is a
NOTE Confidence: 0.99245834

00:08:40.415 --> 00:08:41.695 big change from
NOTE Confidence: 0.99245834

00:08:41.695 --> 00:08:42.655 even just a few years
NOTE Confidence: 0.99245834

00:08:42.655 --> 00:08:43.155 ago.
NOTE Confidence: 0.9952498

00:08:44.415 --> 00:08:45.554 Yeah. Which is,
NOTE Confidence: 0.9984947

00:08:46.015 --> 00:08:47.535 of course, among the many
NOTE Confidence: 0.9984947

00:08:47.535 --> 00:08:48.835 reasons why having
NOTE Confidence: 0.99449533

00:08:49.679 --> 00:08:51.620 people participate in multidisciplinary
NOTE Confidence: 0.99388146

00:08:52.160 --> 00:08:53.620 teams is so important.
NOTE Confidence: 0.99960697

00:08:54.320 --> 00:08:54.820 Absolutely.
NOTE Confidence: 0.98317003

00:08:55.520 --> 00:08:56.800 We wouldn't have nowhere near
NOTE Confidence: 0.98317003

00:08:56.800 --> 00:08:58.160 the confidence to do what
NOTE Confidence: 0.98317003

00:08:58.160 --> 00:08:59.679 we do if we didn't
NOTE Confidence: 0.98317003

00:08:59.679 --> 00:09:00.720 know we had the backup
NOTE Confidence: 0.98317003

00:09:00.720 --> 00:09:03.120 of people like Veronica Chiang,
NOTE Confidence: 0.98317003

00:09:03.120 --> 00:09:04.179 who's one of our neurosurgeons,

NOTE Confidence: 0.98317003

00:09:04.480 --> 00:09:06.315 who can operate when we

NOTE Confidence: 0.98317003

00:09:06.315 --> 00:09:07.675 need help or operate the

NOTE Confidence: 0.98317003

00:09:07.675 --> 00:09:09.115 the laser technology when there's

NOTE Confidence: 0.98317003

00:09:09.115 --> 00:09:10.475 some radiation treatment effect that

NOTE Confidence: 0.98317003

00:09:10.475 --> 00:09:11.375 we need to fix.

NOTE Confidence: 0.97614527

00:09:12.635 --> 00:09:14.315 I always need someone to

NOTE Confidence: 0.97614527

00:09:14.315 --> 00:09:15.515 call when I say, you

NOTE Confidence: 0.97614527

00:09:15.515 --> 00:09:16.554 know, I'm this is close

NOTE Confidence: 0.97614527

00:09:16.554 --> 00:09:17.934 to needing whole brain, but

NOTE Confidence: 0.98259515

00:09:18.320 --> 00:09:19.120 can you back me up?

NOTE Confidence: 0.98259515

00:09:19.120 --> 00:09:20.080 Do you have any targeted

NOTE Confidence: 0.98259515

00:09:20.080 --> 00:09:21.679 therapy that I can argue

NOTE Confidence: 0.98259515

00:09:21.679 --> 00:09:22.480 will take care of the

NOTE Confidence: 0.98259515

00:09:22.480 --> 00:09:23.280 smaller spots, and I can

NOTE Confidence: 0.98259515

00:09:23.280 --> 00:09:24.080 just go after the

NOTE Confidence: 0.98259515

00:09:24.080 --> 00:09:25.200 important ones right now?
00:09:26.080 --> 00:09:27.700 You can't do this
NOTE Confidence: 0.9841038
00:09:27.840 --> 00:09:29.460 by any one specialty anymore.
NOTE Confidence: 0.9841038
00:09:29.760 --> 00:09:30.800 Not sure maybe you ever
NOTE Confidence: 0.9841038
00:09:30.800 --> 00:09:31.460 could, truthfully.
00:09:33.360 --> 00:09:35.194 It's absolutely the case.
NOTE Confidence: 0.9738833
00:09:35.415 --> 00:09:36.554 And what about
NOTE Confidence: 0.97946054
00:09:37.095 --> 00:09:39.255 patients who have primary brain
NOTE Confidence: 0.97946054
00:09:39.255 --> 00:09:40.315 tumors where
NOTE Confidence: 0.96550053
00:09:40.694 --> 00:09:41.894 the cancer starts in the
NOTE Confidence: 0.96550053
00:09:41.894 --> 00:09:43.755 brain? Cancers like glioblastoma
NOTE Confidence: 0.9815855
00:09:44.615 --> 00:09:46.694 and other forms of
NOTE Confidence: 0.9815855
00:09:46.694 --> 00:09:47.434 brain cancer?
NOTE Confidence: 0.96266335
00:09:48.309 --> 00:09:49.190 Are there times when you
NOTE Confidence: 0.96266335
00:09:49.190 --> 00:09:51.190 use Gamma Knife after someone
NOTE Confidence: 0.96266335
00:09:51.190 --> 00:09:52.170 has had surgery?
NOTE Confidence: 0.9314866
00:09:52.790 --> 00:09:53.690 Very rare,

NOTE Confidence: 0.9899848
00:09:54.069 --> 00:09:55.750 especially here in our own
NOTE Confidence: 0.9899848
00:09:55.750 --> 00:09:56.889 institution.
NOTE Confidence: 0.97551435
00:09:57.269 --> 00:09:58.230 For example, the
NOTE Confidence: 0.97551435
00:09:58.230 --> 00:09:58.730 glioblastomas,
NOTE Confidence: 0.9993431
00:09:59.350 --> 00:10:00.569 we tend to think
NOTE Confidence: 0.99595886
00:10:01.074 --> 00:10:02.934 because of their infiltrative nature
NOTE Confidence: 0.99595886
00:10:03.154 --> 00:10:04.514 and the larger volume that
NOTE Confidence: 0.99595886
00:10:04.514 --> 00:10:05.634 you need to cover to
NOTE Confidence: 0.99595886
00:10:05.634 --> 00:10:06.535 get all
NOTE Confidence: 0.9902854
00:10:06.995 --> 00:10:07.875 the hands of the cells
NOTE Confidence: 0.9902854
00:10:07.875 --> 00:10:08.695 that are extending,
NOTE Confidence: 0.932189
00:10:09.154 --> 00:10:10.595 it's better to go with
NOTE Confidence: 0.932189
00:10:10.595 --> 00:10:12.115 that longer, what we call
NOTE Confidence: 0.932189
00:10:12.115 --> 00:10:14.295 fractionated course and in combination
NOTE Confidence: 0.932189
00:10:14.434 --> 00:10:15.334 with the chemotherapy.
NOTE Confidence: 0.9102759

00:10:16.160 --> 00:10:17.520 The Gamma Knife for other
NOTE Confidence: 0.9102759

00:10:17.520 --> 00:10:19.679 radiosurgery techniques might come into
NOTE Confidence: 0.9102759

00:10:19.679 --> 00:10:20.179 play
NOTE Confidence: 0.9733285

00:10:20.640 --> 00:10:22.400 after that. So if later
NOTE Confidence: 0.9733285

00:10:22.400 --> 00:10:23.280 down the road there was
NOTE Confidence: 0.9733285

00:10:23.280 --> 00:10:24.559 just one little spot that
NOTE Confidence: 0.9733285

00:10:24.559 --> 00:10:25.920 came back, then I might
NOTE Confidence: 0.9733285

00:10:25.920 --> 00:10:26.720 get a call from, for
NOTE Confidence: 0.9733285

00:10:26.720 --> 00:10:28.559 example, doctor Contessa or doctor
NOTE Confidence: 0.9733285

00:10:28.559 --> 00:10:29.620 Bindra to say,
NOTE Confidence: 0.959794

00:10:30.000 --> 00:10:30.554 do you think you
NOTE Confidence: 0.959794

00:10:30.554 --> 00:10:31.835 could gamma knife that one
NOTE Confidence: 0.959794

00:10:31.835 --> 00:10:33.035 little spot? I've already given
NOTE Confidence: 0.959794

00:10:33.035 --> 00:10:33.755 what I can do from
NOTE Confidence: 0.959794

00:10:33.755 --> 00:10:34.955 the Linac side, which is
NOTE Confidence: 0.959794

00:10:34.955 --> 00:10:36.395 called a linear accelerator, the

NOTE Confidence: 0.959794
00:10:36.395 --> 00:10:37.375 normal radiation.
NOTE Confidence: 0.9945047
00:10:38.235 --> 00:10:39.195 It's a fairly
NOTE Confidence: 0.9945047
00:10:39.195 --> 00:10:40.155 rare occurrence that we would
NOTE Confidence: 0.9945047
00:10:40.155 --> 00:10:40.815 do that.
NOTE Confidence: 0.99855554
00:10:41.595 --> 00:10:42.090 Yeah.
NOTE Confidence: 0.8486808
00:10:45.370 --> 00:10:46.270 I think that,
NOTE Confidence: 0.9940806
00:10:47.050 --> 00:10:48.170 you know, all of this
NOTE Confidence: 0.9940806
00:10:48.170 --> 00:10:49.790 shows that these decisions
NOTE Confidence: 0.9940806
00:10:49.850 --> 00:10:52.590 are really very, very complicated.
NOTE Confidence: 0.9901794
00:10:53.130 --> 00:10:54.910 And then what about other
NOTE Confidence: 0.99053705
00:10:55.385 --> 00:10:56.665 cancers in other parts of
NOTE Confidence: 0.99053705
00:10:56.665 --> 00:10:58.025 the body other than the
NOTE Confidence: 0.99053705
00:10:58.025 --> 00:10:59.545 brain? Do you use gamma
NOTE Confidence: 0.99053705
00:10:59.545 --> 00:11:01.325 knife in those situations too?
NOTE Confidence: 0.9895475
00:11:02.265 --> 00:11:03.705 Not the gamma knife. The
NOTE Confidence: 0.9895475

00:11:03.705 --> 00:11:04.925 gamma knife is specifically
NOTE Confidence: 0.94721293

00:11:05.304 --> 00:11:07.225 built around that head
NOTE Confidence: 0.94721293

00:11:07.225 --> 00:11:08.265 frame and such so that
NOTE Confidence: 0.94721293

00:11:08.265 --> 00:11:09.065 we can have a 3D
NOTE Confidence: 0.94721293

00:11:09.065 --> 00:11:10.605 targeting specifically
NOTE Confidence: 0.9970705

00:11:11.040 --> 00:11:12.639 in the brain. But the
NOTE Confidence: 0.9970705

00:11:12.639 --> 00:11:13.139 concept
NOTE Confidence: 0.9956888

00:11:13.440 --> 00:11:14.179 of radiosurgery,
NOTE Confidence: 0.9728047

00:11:14.720 --> 00:11:15.860 meaning giving radiation
NOTE Confidence: 0.9775967

00:11:16.639 --> 00:11:19.040 extremely accurately in one dose
NOTE Confidence: 0.9775967

00:11:19.040 --> 00:11:19.920 or a couple of
NOTE Confidence: 0.9775967

00:11:19.920 --> 00:11:20.420 doses,
NOTE Confidence: 0.9989243

00:11:20.800 --> 00:11:22.639 absolutely applies elsewhere in the
NOTE Confidence: 0.9989243

00:11:22.639 --> 00:11:23.139 body.
NOTE Confidence: 0.9906799

00:11:23.600 --> 00:11:24.795 We just call it something
NOTE Confidence: 0.9906799

00:11:24.795 --> 00:11:26.495 else. We call it stereotactic

NOTE Confidence: 0.913414
00:11:27.115 --> 00:11:28.335 body radiotherapy,
NOTE Confidence: 0.97345555
00:11:28.715 --> 00:11:29.455 or SBRT.
NOTE Confidence: 0.9926551
00:11:29.995 --> 00:11:30.735 For example,
NOTE Confidence: 0.9454703
00:11:31.515 --> 00:11:33.195 doctor Johung tends to use
NOTE Confidence: 0.9454703
00:11:33.195 --> 00:11:34.735 this for our pancreatic cancers.
NOTE Confidence: 0.9454703
00:11:34.875 --> 00:11:36.315 Doctor Park uses this for
NOTE Confidence: 0.9454703
00:11:36.315 --> 00:11:37.215 our lung cancers.
NOTE Confidence: 0.9505465
00:11:38.300 --> 00:11:39.580 Absolutely, the field of radiation
NOTE Confidence: 0.9505465
00:11:39.580 --> 00:11:41.280 has exploded in terms
NOTE Confidence: 0.9667593
00:11:41.660 --> 00:11:42.240 of new,
NOTE Confidence: 0.9973715
00:11:42.620 --> 00:11:44.059 faster, better ways to use
NOTE Confidence: 0.9973715
00:11:44.059 --> 00:11:45.820 radiation to treat cancer. And
NOTE Confidence: 0.9973715
00:11:45.820 --> 00:11:46.780 so what is it that
NOTE Confidence: 0.9973715
00:11:46.780 --> 00:11:48.080 led to this bifurcation
NOTE Confidence: 0.89676493
00:11:48.460 --> 00:11:51.200 between Gamma Knife and stereotactic
NOTE Confidence: 0.99348766

00:11:51.900 --> 00:11:52.400 radiosurgery?
NOTE Confidence: 0.994421

00:11:54.455 --> 00:11:56.395 Well, the concept of stereotactic
NOTE Confidence: 0.994421

00:11:56.455 --> 00:11:57.895 radiosurgery just means we're treating
NOTE Confidence: 0.994421

00:11:57.895 --> 00:11:59.975 something super accurately with a
NOTE Confidence: 0.994421

00:11:59.975 --> 00:12:01.095 high dose in a few
NOTE Confidence: 0.994421

00:12:01.095 --> 00:12:01.595 fractions.
NOTE Confidence: 0.96035993

00:12:02.695 --> 00:12:04.135 The gamma knife is entirely
NOTE Confidence: 0.96035993

00:12:04.135 --> 00:12:06.535 based on basically a brand
NOTE Confidence: 0.96035993

00:12:06.535 --> 00:12:07.495 and the use of that
NOTE Confidence: 0.96035993

00:12:07.495 --> 00:12:09.470 specific head frame. So you
NOTE Confidence: 0.96035993

00:12:09.470 --> 00:12:10.350 may have heard of things
NOTE Confidence: 0.96035993

00:12:10.350 --> 00:12:11.410 like the CyberKnife.
NOTE Confidence: 0.9904596

00:12:12.429 --> 00:12:13.790 Again, they decided to use
NOTE Confidence: 0.9904596

00:12:13.790 --> 00:12:14.829 the word knife. I think
NOTE Confidence: 0.9904596

00:12:14.829 --> 00:12:15.809 that was a mistake.
NOTE Confidence: 0.9314473

00:12:16.910 --> 00:12:17.870 So that's just

NOTE Confidence: 0.9314473
00:12:17.870 --> 00:12:19.629 a different brand?
NOTE Confidence: 0.9314473
00:12:19.629 --> 00:12:20.910 Yeah. It does not use the
00:12:22.944 --> 00:12:24.225 cobalt sources like the
NOTE Confidence: 0.9784512
00:12:24.225 --> 00:12:25.345 gamma knife does, but it's
NOTE Confidence: 0.9784512
00:12:25.345 --> 00:12:26.464 the same idea of giving
NOTE Confidence: 0.9784512
00:12:26.464 --> 00:12:28.545 radiation hyper accurately just to
NOTE Confidence: 0.9784512
00:12:28.545 --> 00:12:29.524 the problem areas.
NOTE Confidence: 0.9984804
00:12:30.384 --> 00:12:30.884 And
NOTE Confidence: 0.96594214
00:12:31.345 --> 00:12:32.545 just back to gamma knife
NOTE Confidence: 0.96594214
00:12:32.545 --> 00:12:33.824 for a second. So a
NOTE Confidence: 0.96594214
00:12:33.824 --> 00:12:35.665 a patient has a gamma
NOTE Confidence: 0.96594214
00:12:35.665 --> 00:12:36.404 knife treatment.
NOTE Confidence: 0.9990988
00:12:36.990 --> 00:12:37.710 Do they need to be
NOTE Confidence: 0.9990988
00:12:37.710 --> 00:12:39.070 in the hospital? Can they
NOTE Confidence: 0.9990988
00:12:39.070 --> 00:12:40.690 go home that same day?
NOTE Confidence: 0.9990988
00:12:40.910 --> 00:12:41.730 What are the

NOTE Confidence: 0.99758935
00:12:42.190 --> 00:12:43.630 consequences a day or two
NOTE Confidence: 0.99758935
00:12:43.630 --> 00:12:44.130 later?
NOTE Confidence: 0.992259
00:12:44.590 --> 00:12:46.130 It's remarkably well tolerated.
NOTE Confidence: 0.9973682
00:12:47.070 --> 00:12:48.270 Almost all of our patients
NOTE Confidence: 0.9973682
00:12:48.270 --> 00:12:49.470 go home the very same
NOTE Confidence: 0.9973682
00:12:49.470 --> 00:12:49.970 day.
NOTE Confidence: 0.98073506
00:12:50.975 --> 00:12:51.775 They're a little tired for
NOTE Confidence: 0.98073506
00:12:51.775 --> 00:12:52.895 a couple days and a
NOTE Confidence: 0.98073506
00:12:52.895 --> 00:12:54.335 little sore where the frame
NOTE Confidence: 0.98073506
00:12:54.335 --> 00:12:55.235 has been attached.
NOTE Confidence: 0.9822544
00:12:55.615 --> 00:12:56.815 But other than that, it's
NOTE Confidence: 0.9822544
00:12:56.815 --> 00:12:58.175 a very well tolerated treatment.
NOTE Confidence: 0.9822544
00:12:58.175 --> 00:12:59.054 And that is a huge
NOTE Confidence: 0.9822544
00:12:59.054 --> 00:12:59.554 benefit
NOTE Confidence: 0.9859951
00:12:59.934 --> 00:13:01.054 because it's so much faster
NOTE Confidence: 0.9859951

00:13:01.054 --> 00:13:02.675 than other forms of radiation.

NOTE Confidence: 0.9911325

00:13:03.230 --> 00:13:04.110 We can get them on

NOTE Confidence: 0.9911325

00:13:04.110 --> 00:13:05.309 to the next phase of

NOTE Confidence: 0.9911325

00:13:05.309 --> 00:13:06.130 either chemotherapy

NOTE Confidence: 0.97061837

00:13:06.430 --> 00:13:08.030 or targeted therapy or clinical

NOTE Confidence: 0.97061837

00:13:08.030 --> 00:13:09.490 trial without any delay.

NOTE Confidence: 0.9596449

00:13:12.030 --> 00:13:13.870 Even beyond that, who wants

NOTE Confidence: 0.9596449

00:13:13.870 --> 00:13:15.070 to feel badly from a

NOTE Confidence: 0.9596449

00:13:15.070 --> 00:13:16.930 treatment? The

NOTE Confidence: 0.9596449

00:13:17.105 --> 00:13:18.465 easier a treatment

NOTE Confidence: 0.9596449

00:13:18.465 --> 00:13:20.145 is, the more you can

NOTE Confidence: 0.9596449

00:13:20.145 --> 00:13:21.684 think about getting it.

NOTE Confidence: 0.9907809

00:13:23.025 --> 00:13:24.865 Well, we're gonna take a

NOTE Confidence: 0.9907809

00:13:24.865 --> 00:13:27.105 very brief break. And when

NOTE Confidence: 0.9907809

00:13:27.105 --> 00:13:28.645 we come back, we'll continue

NOTE Confidence: 0.9907809

00:13:28.705 --> 00:13:29.605 talking to

NOTE Confidence: 0.96891224
00:13:30.110 --> 00:13:32.110 James Hansen, associate professor of
NOTE Confidence: 0.96891224
00:13:32.110 --> 00:13:33.090 therapeutic radiology,
NOTE Confidence: 0.99936306
00:13:33.870 --> 00:13:35.550 and we'll move on to
NOTE Confidence: 0.99936306
00:13:35.550 --> 00:13:36.290 talk about
NOTE Confidence: 0.9943037
00:13:36.750 --> 00:13:38.130 some of his own research,
NOTE Confidence: 0.98869085
00:13:39.150 --> 00:13:40.910 focused on a very different
NOTE Confidence: 0.98869085
00:13:40.910 --> 00:13:41.410 area.
NOTE Confidence: 0.9549862
00:13:41.950 --> 00:13:43.550 Support for Yale Cancer Answers
NOTE Confidence: 0.9549862
00:13:43.550 --> 00:13:45.490 comes from Smilow Cancer Hospital,
NOTE Confidence: 0.9651667
00:13:45.995 --> 00:13:47.695 where their thyroid care ablation
NOTE Confidence: 0.9651667
00:13:47.755 --> 00:13:50.175 program offers an alternative nonsurgical
NOTE Confidence: 0.9839518
00:13:50.554 --> 00:13:52.394 approach to treating symptomatic or
NOTE Confidence: 0.9839518
00:13:52.394 --> 00:13:54.735 aesthetically unappealing thyroid nodules.
NOTE Confidence: 0.7659271
00:13:55.355 --> 00:13:55.855 Smilowcancer
NOTE Confidence: 0.8527115
00:13:56.235 --> 00:13:57.615 hospital dot org.
NOTE Confidence: 0.9980401

00:13:59.860 --> 00:14:01.540 Genetic testing can be useful
NOTE Confidence: 0.9980401

00:14:01.540 --> 00:14:02.740 for people with certain types
NOTE Confidence: 0.9980401

00:14:02.740 --> 00:14:03.780 of cancer that seem to
NOTE Confidence: 0.9980401

00:14:03.780 --> 00:14:04.920 run-in their families.
NOTE Confidence: 0.99796593

00:14:05.380 --> 00:14:06.980 Genetic counseling is a process
NOTE Confidence: 0.99796593

00:14:06.980 --> 00:14:08.840 that includes collecting a detailed
NOTE Confidence: 0.99796593

00:14:08.900 --> 00:14:10.520 personal and family history,
NOTE Confidence: 0.97694325

00:14:10.934 --> 00:14:11.915 a risk assessment,
NOTE Confidence: 0.9996111

00:14:12.295 --> 00:14:13.815 and a discussion of genetic
NOTE Confidence: 0.9996111

00:14:13.815 --> 00:14:14.795 testing options.
NOTE Confidence: 0.9719718

00:14:15.335 --> 00:14:16.615 Only about five to ten
NOTE Confidence: 0.9719718

00:14:16.615 --> 00:14:17.975 percent of all cancers are
NOTE Confidence: 0.9719718

00:14:17.975 --> 00:14:19.895 inherited and genetic testing is
NOTE Confidence: 0.9719718

00:14:19.895 --> 00:14:21.355 not recommended for everyone.
NOTE Confidence: 0.9989085

00:14:21.975 --> 00:14:23.639 Individuals who have a personal
NOTE Confidence: 0.9989085

00:14:23.639 --> 00:14:25.480 and or family history that

NOTE Confidence: 0.9989085
00:14:25.480 --> 00:14:27.800 includes cancer at unusually early
NOTE Confidence: 0.9989085
00:14:27.800 --> 00:14:28.300 ages,
NOTE Confidence: 0.99947417
00:14:28.759 --> 00:14:30.360 multiple relatives on the same
NOTE Confidence: 0.99947417
00:14:30.360 --> 00:14:31.639 side of the family with
NOTE Confidence: 0.99947417
00:14:31.639 --> 00:14:32.620 the same cancer,
NOTE Confidence: 0.998387
00:14:33.079 --> 00:14:34.680 more than one diagnosis of
NOTE Confidence: 0.998387
00:14:34.680 --> 00:14:36.300 cancer in the same individual,
NOTE Confidence: 0.98516095
00:14:37.045 --> 00:14:37.785 rare cancers,
NOTE Confidence: 0.9977504
00:14:38.245 --> 00:14:39.605 or family history of a
NOTE Confidence: 0.9977504
00:14:39.605 --> 00:14:41.305 known altered cancer predisposing
NOTE Confidence: 0.99335146
00:14:41.765 --> 00:14:43.445 gene could be candidates for
NOTE Confidence: 0.99335146
00:14:43.445 --> 00:14:44.425 genetic testing.
NOTE Confidence: 0.9797522
00:14:45.045 --> 00:14:46.885 Resources for genetic counseling and
NOTE Confidence: 0.9797522
00:14:46.885 --> 00:14:48.505 testing are available at federally
NOTE Confidence: 0.9797522
00:14:48.645 --> 00:14:50.905 designated comprehensive cancer centers,
NOTE Confidence: 0.95709705

00:14:51.290 --> 00:14:52.730 such as Yale Cancer Center
NOTE Confidence: 0.95709705

00:14:52.730 --> 00:14:54.510 and Smilow Cancer Hospital.
NOTE Confidence: 0.9757914

00:14:54.890 --> 00:14:56.570 More information is available at
NOTE Confidence: 0.9757914

00:14:56.570 --> 00:14:58.350 yale cancer center dot org.
NOTE Confidence: 0.9757914

00:14:58.570 --> 00:15:00.330 You're listening to Connecticut Public
NOTE Confidence: 0.9757914

00:15:00.330 --> 00:15:00.830 Radio.
NOTE Confidence: 0.8920007

00:15:01.770 --> 00:15:03.610 Hello again. This is Eric
NOTE Confidence: 0.8920007

00:15:03.610 --> 00:15:05.470 Winer with Yale Cancer Answers,
NOTE Confidence: 0.8920007

00:15:05.610 --> 00:15:06.830 and I'm here again
NOTE Confidence: 0.9262989

00:15:07.585 --> 00:15:09.765 with our guest, doctor James
NOTE Confidence: 0.9262989

00:15:09.825 --> 00:15:10.325 Hansen,
NOTE Confidence: 0.99803525

00:15:10.865 --> 00:15:12.165 a radiation oncologist
NOTE Confidence: 0.97190017

00:15:12.945 --> 00:15:14.565 who focuses on
NOTE Confidence: 0.90497637

00:15:14.945 --> 00:15:16.165 gamma knife treatment
NOTE Confidence: 0.99779606

00:15:16.465 --> 00:15:17.925 in his clinical work.
NOTE Confidence: 0.9900657

00:15:18.465 --> 00:15:20.565 But beyond that, like many,

NOTE Confidence: 0.9900657
00:15:20.785 --> 00:15:21.765 many physicians,
NOTE Confidence: 0.9500661
00:15:23.430 --> 00:15:25.029 is involved in research as
NOTE Confidence: 0.9500661
00:15:25.029 --> 00:15:25.529 well,
NOTE Confidence: 0.99688995
00:15:26.149 --> 00:15:27.850 involved in research to try
NOTE Confidence: 0.998291
00:15:28.709 --> 00:15:29.370 to make
NOTE Confidence: 0.9997784
00:15:29.750 --> 00:15:31.670 treatment better for patients in
NOTE Confidence: 0.9997784
00:15:31.670 --> 00:15:32.329 the future.
NOTE Confidence: 0.99781406
00:15:32.790 --> 00:15:34.470 Some of that research involves
NOTE Confidence: 0.99781406
00:15:34.470 --> 00:15:35.829 clinical trials. Some of it
NOTE Confidence: 0.99781406
00:15:35.829 --> 00:15:37.510 involves more basic work to
NOTE Confidence: 0.99781406
00:15:37.510 --> 00:15:38.205 try to
NOTE Confidence: 0.99984723
00:15:38.765 --> 00:15:39.345 come up
NOTE Confidence: 0.99980855
00:15:40.125 --> 00:15:41.345 with new approaches
NOTE Confidence: 0.9995207
00:15:43.245 --> 00:15:44.845 that could lead to clinical
NOTE Confidence: 0.9995207
00:15:44.845 --> 00:15:45.985 trials in the future.
NOTE Confidence: 0.9804729

00:15:46.925 --> 00:15:47.965 So I wanna talk to
NOTE Confidence: 0.9804729

00:15:47.965 --> 00:15:48.945 you about
NOTE Confidence: 0.9992061

00:15:50.125 --> 00:15:51.745 lupus related antibodies
NOTE Confidence: 0.98629725

00:15:52.365 --> 00:15:54.065 and how this might
NOTE Confidence: 0.99906397

00:15:54.820 --> 00:15:55.880 ultimately improve
NOTE Confidence: 0.995097

00:15:56.260 --> 00:15:58.420 care for individuals who have
NOTE Confidence: 0.995097

00:15:58.420 --> 00:15:58.920 glioblastoma.
NOTE Confidence: 0.9942274

00:15:59.460 --> 00:16:01.779 And maybe before you talk
NOTE Confidence: 0.9942274

00:16:01.779 --> 00:16:03.560 about lupus related antibodies,
NOTE Confidence: 0.9915592

00:16:04.020 --> 00:16:05.140 maybe you could just talk
NOTE Confidence: 0.9915592

00:16:05.140 --> 00:16:05.640 for
NOTE Confidence: 0.9573315

00:16:06.785 --> 00:16:08.305 a minute or two about
NOTE Confidence: 0.9573315

00:16:08.305 --> 00:16:08.805 glioblastoma
NOTE Confidence: 0.9563076

00:16:09.665 --> 00:16:10.165 and
NOTE Confidence: 0.9961316

00:16:10.704 --> 00:16:12.225 where we stand with that
NOTE Confidence: 0.9961316

00:16:12.225 --> 00:16:13.925 very difficult to treat cancer.

NOTE Confidence: 0.9865449
00:16:14.785 --> 00:16:15.584 Did you say you wanted
NOTE Confidence: 0.9865449
00:16:15.584 --> 00:16:16.704 me to talk about lupus
NOTE Confidence: 0.9865449
00:16:16.704 --> 00:16:19.105 related antibodies in cancer?
NOTE Confidence: 0.9865449
00:16:19.105 --> 00:16:20.225 That sounds a little off
NOTE Confidence: 0.9865449
00:16:20.225 --> 00:16:21.444 the norm here.
00:16:23.780 --> 00:16:24.660 It is, it's your work.
NOTE Confidence: 0.9370552
00:16:24.660 --> 00:16:26.020 Oh, how about that?
NOTE Confidence: 0.9370552
00:16:26.020 --> 00:16:27.620 Alright. Yes. Happy to talk
NOTE Confidence: 0.9370552
00:16:27.620 --> 00:16:28.360 about that.
NOTE Confidence: 0.99979466
00:16:28.820 --> 00:16:29.320 So
NOTE Confidence: 0.9991438
00:16:29.700 --> 00:16:30.200 glioblastoma
NOTE Confidence: 0.99966675
00:16:31.060 --> 00:16:32.340 is one of the most
NOTE Confidence: 0.99966675
00:16:32.340 --> 00:16:32.840 aggressive
NOTE Confidence: 0.9955153
00:16:33.220 --> 00:16:34.900 primary brain tumors that we
NOTE Confidence: 0.9955153
00:16:34.900 --> 00:16:35.400 encounter.
NOTE Confidence: 0.9997285
00:16:36.225 --> 00:16:37.505 And one of the reasons

NOTE Confidence: 0.9997285

00:16:37.505 --> 00:16:38.464 that it's so tough to

NOTE Confidence: 0.9997285

00:16:38.464 --> 00:16:39.445 beat is

NOTE Confidence: 0.982666

00:16:39.904 --> 00:16:41.105 that it has figured out

NOTE Confidence: 0.982666

00:16:41.105 --> 00:16:42.625 ways to sort of cloak

NOTE Confidence: 0.982666

00:16:42.625 --> 00:16:43.985 itself so that it kind

NOTE Confidence: 0.982666

00:16:43.985 --> 00:16:45.265 of, I like to say, it runs

00:16:46.145 --> 00:16:47.904 silent, meaning that our own

NOTE Confidence: 0.982666

00:16:47.904 --> 00:16:49.665 immune system can't see it,

NOTE Confidence: 0.982666

00:16:49.665 --> 00:16:50.865 can't fight it off. So

NOTE Confidence: 0.982666

00:16:50.865 --> 00:16:52.199 we try to be

NOTE Confidence: 0.982666

00:16:52.199 --> 00:16:54.139 aggressive with surgery and radiation

NOTE Confidence: 0.982666

00:16:54.199 --> 00:16:56.360 and chemotherapy, but we really

NOTE Confidence: 0.982666

00:16:56.360 --> 00:16:57.560 need backup from the immune

NOTE Confidence: 0.982666

00:16:57.560 --> 00:16:58.839 system to get after it.

NOTE Confidence: 0.982666

00:16:58.839 --> 00:16:59.980 And, unfortunately,

NOTE Confidence: 0.96163774

00:17:00.439 --> 00:17:01.560 the T cells and such

NOTE Confidence: 0.96163774
00:17:01.560 --> 00:17:02.759 just don't tend to find
NOTE Confidence: 0.96163774
00:17:02.759 --> 00:17:04.539 it. And that's why glioblastoma
NOTE Confidence: 0.990077
00:17:05.080 --> 00:17:06.505 is called immunologically,
NOTE Confidence: 0.93467236
00:17:07.125 --> 00:17:07.784 quote, unquote,
NOTE Confidence: 0.99911773
00:17:08.404 --> 00:17:08.904 cold.
NOTE Confidence: 0.99921703
00:17:09.684 --> 00:17:10.424 So we figured
NOTE Confidence: 0.97757435
00:17:10.884 --> 00:17:11.605 if there was a way
NOTE Confidence: 0.97757435
00:17:11.605 --> 00:17:12.804 to heat up those tumors,
NOTE Confidence: 0.97757435
00:17:12.804 --> 00:17:13.924 maybe we could get better
NOTE Confidence: 0.97757435
00:17:13.924 --> 00:17:14.424 outcomes.
NOTE Confidence: 0.99559426
00:17:14.965 --> 00:17:16.325 And by cold, you mean
NOTE Confidence: 0.99559426
00:17:16.325 --> 00:17:16.825 that
NOTE Confidence: 0.99837124
00:17:17.524 --> 00:17:18.024 immunotherapy
NOTE Confidence: 0.931265
00:17:18.565 --> 00:17:19.865 as we give it today
NOTE Confidence: 0.997001
00:17:20.250 --> 00:17:21.530 doesn't seem to have any
NOTE Confidence: 0.997001

00:17:21.530 --> 00:17:22.590 impact on glioblastomas.
NOTE Confidence: 0.9986521

00:17:23.290 --> 00:17:24.250 You got it. So all
NOTE Confidence: 0.9986521

00:17:24.250 --> 00:17:25.770 those antibody things we see
NOTE Confidence: 0.9986521

00:17:25.770 --> 00:17:27.470 advertised on TV that are
NOTE Confidence: 0.9986521

00:17:27.609 --> 00:17:29.150 really making a huge difference
NOTE Confidence: 0.9986521

00:17:29.290 --> 00:17:30.670 in other kinds of cancers,
NOTE Confidence: 0.9995214

00:17:31.130 --> 00:17:32.430 they're not touching glioblastoma.
NOTE Confidence: 0.99919635

00:17:33.130 --> 00:17:33.930 So we need a way
NOTE Confidence: 0.99919635

00:17:33.930 --> 00:17:35.070 to figure out why
NOTE Confidence: 0.999764

00:17:35.455 --> 00:17:36.655 or how to break that
NOTE Confidence: 0.999764

00:17:36.655 --> 00:17:37.155 cycle.
NOTE Confidence: 0.9988851

00:17:37.935 --> 00:17:39.375 So where would we
NOTE Confidence: 0.9988851

00:17:39.375 --> 00:17:40.595 look to find a hyperactive
NOTE Confidence: 0.9988851

00:17:40.895 --> 00:17:42.515 immune system?
NOTE Confidence: 0.96481353

00:17:42.815 --> 00:17:44.275 How about autoimmunity,
NOTE Confidence: 0.9889104

00:17:45.055 --> 00:17:46.275 like lupus?

NOTE Confidence: 0.9953015
00:17:46.815 --> 00:17:47.875 So in lupus,
NOTE Confidence: 0.99924153
00:17:48.670 --> 00:17:50.430 a patient's own immune system
NOTE Confidence: 0.99924153
00:17:50.430 --> 00:17:52.270 goes a little crazy and
NOTE Confidence: 0.99924153
00:17:52.270 --> 00:17:54.130 starts attacking its own cells
NOTE Confidence: 0.99924153
00:17:54.190 --> 00:17:54.930 and tissues.
NOTE Confidence: 0.9967168
00:17:55.869 --> 00:17:56.830 So we figured, well, if
NOTE Confidence: 0.9967168
00:17:56.830 --> 00:17:57.790 we could figure out what
NOTE Confidence: 0.9967168
00:17:57.790 --> 00:17:58.690 are the mechanisms
NOTE Confidence: 0.99979407
00:17:59.230 --> 00:18:00.130 driving that
NOTE Confidence: 0.9939677
00:18:00.510 --> 00:18:01.710 and just isolate a few
NOTE Confidence: 0.9939677
00:18:01.710 --> 00:18:02.510 of them, maybe we could
NOTE Confidence: 0.9939677
00:18:02.510 --> 00:18:03.490 use some of those
NOTE Confidence: 0.99779975
00:18:03.895 --> 00:18:05.415 to awaken the immune system
NOTE Confidence: 0.99779975
00:18:05.415 --> 00:18:06.635 in glioblastoma.
NOTE Confidence: 0.9769826
00:18:07.815 --> 00:18:08.615 And that's what my lab
NOTE Confidence: 0.9769826

00:18:08.615 --> 00:18:10.934 focuses on, is understanding mechanisms

NOTE Confidence: 0.9769826

00:18:10.934 --> 00:18:11.595 of autoimmunity

NOTE Confidence: 0.9952764

00:18:12.054 --> 00:18:12.934 with the goal of using

NOTE Confidence: 0.9952764

00:18:12.934 --> 00:18:14.155 them against cancer.

NOTE Confidence: 0.97001725

00:18:14.695 --> 00:18:15.815 And let me just ask

NOTE Confidence: 0.97001725

00:18:15.815 --> 00:18:17.595 you. Lupus, if I remember

NOTE Confidence: 0.97001725

00:18:17.655 --> 00:18:18.475 right, from

NOTE Confidence: 0.9863422

00:18:19.160 --> 00:18:20.299 days when I

NOTE Confidence: 0.94857836

00:18:20.600 --> 00:18:22.220 trained in internal medicine,

NOTE Confidence: 0.9627298

00:18:22.600 --> 00:18:24.280 is actually a disease that

NOTE Confidence: 0.9627298

00:18:24.280 --> 00:18:26.039 occasionally affects the brain as well?

NOTE Confidence: 0.9627298

00:18:26.039 --> 00:18:28.380 Absolutely. And patients,

NOTE Confidence: 0.9601078

00:18:29.080 --> 00:18:31.080 at times, unfortunately, get what's

NOTE Confidence: 0.9601078

00:18:31.080 --> 00:18:32.460 called lupus cerebritis,

NOTE Confidence: 0.9964006

00:18:33.664 --> 00:18:35.905 where those antibodies seem

NOTE Confidence: 0.9964006

00:18:35.905 --> 00:18:37.525 to attack the brain.

NOTE Confidence: 0.99331427
00:18:38.145 --> 00:18:39.445 That's exactly right.
NOTE Confidence: 0.99886715
00:18:39.984 --> 00:18:40.865 But how in the world
NOTE Confidence: 0.99886715
00:18:40.865 --> 00:18:42.484 are they doing that? Antibodies
NOTE Confidence: 0.99886715
00:18:42.625 --> 00:18:43.825 aren't supposed to be able
NOTE Confidence: 0.99886715
00:18:43.825 --> 00:18:45.265 to cross the blood brain
NOTE Confidence: 0.99886715
00:18:45.265 --> 00:18:45.765 barrier.
NOTE Confidence: 0.9991699
00:18:46.660 --> 00:18:47.780 Antibodies aren't even supposed to
NOTE Confidence: 0.9991699
00:18:47.780 --> 00:18:48.840 be able to penetrate
NOTE Confidence: 0.99751616
00:18:49.140 --> 00:18:50.740 into live cells. So that's
NOTE Confidence: 0.99751616
00:18:50.740 --> 00:18:52.280 a good segue. Thank you.
NOTE Confidence: 0.9771672
00:18:54.420 --> 00:18:56.260 Antibody therapy, as we know
NOTE Confidence: 0.9771672
00:18:56.260 --> 00:18:58.100 it currently, is focused on
NOTE Confidence: 0.9771672
00:18:58.100 --> 00:18:59.000 binding things
NOTE Confidence: 0.99616736
00:18:59.345 --> 00:19:00.625 on the outside of cells,
NOTE Confidence: 0.99616736
00:19:00.625 --> 00:19:02.385 things circulating in the blood
NOTE Confidence: 0.99616736

00:19:02.385 --> 00:19:03.345 or on the surface of
NOTE Confidence: 0.99616736
00:19:03.345 --> 00:19:03.845 cells.
NOTE Confidence: 0.99145865
00:19:04.465 --> 00:19:05.185 Now this is where a
NOTE Confidence: 0.99145865
00:19:05.185 --> 00:19:06.545 lot of critics might say,
NOTE Confidence: 0.99145865
00:19:06.545 --> 00:19:08.225 well, no. Some antibodies get
NOTE Confidence: 0.99145865
00:19:08.225 --> 00:19:09.445 eaten by cells.
NOTE Confidence: 0.9925141
00:19:09.825 --> 00:19:10.705 But I say that those
NOTE Confidence: 0.9925141
00:19:10.705 --> 00:19:11.984 don't count because they then
NOTE Confidence: 0.9925141
00:19:11.984 --> 00:19:13.425 get destroyed inside the cell
NOTE Confidence: 0.9925141
00:19:13.425 --> 00:19:14.885 by endosomes and lysosomes.
NOTE Confidence: 0.999907
00:19:15.970 --> 00:19:16.869 What's remarkable
NOTE Confidence: 0.93394667
00:19:17.250 --> 00:19:18.850 about lupus antibodies we have
NOTE Confidence: 0.93394667
00:19:18.850 --> 00:19:19.350 found
NOTE Confidence: 0.9958642
00:19:19.890 --> 00:19:20.850 is that a subset of
NOTE Confidence: 0.9958642
00:19:20.850 --> 00:19:21.350 them
NOTE Confidence: 0.9851427
00:19:21.890 --> 00:19:23.490 are reactive against a patient's

NOTE Confidence: 0.9851427
00:19:23.490 --> 00:19:24.470 own DNA.
NOTE Confidence: 0.9632946
00:19:25.169 --> 00:19:25.890 And so sort of a
NOTE Confidence: 0.9632946
00:19:25.890 --> 00:19:27.250 hallmark of lupus is these
NOTE Confidence: 0.9632946
00:19:27.250 --> 00:19:28.470 anti DNA antibodies.
NOTE Confidence: 0.99167544
00:19:30.065 --> 00:19:31.185 And so they look for
NOTE Confidence: 0.99167544
00:19:31.185 --> 00:19:33.285 DNA, and they find DNA
NOTE Confidence: 0.99167544
00:19:33.585 --> 00:19:34.565 where it is
NOTE Confidence: 0.9653787
00:19:35.025 --> 00:19:36.385 concentrated. So it's kind of
NOTE Confidence: 0.9653787
00:19:36.385 --> 00:19:36.545 like
NOTE Confidence: 0.9884996
00:19:37.585 --> 00:19:39.105 if anybody who's listening has
NOTE Confidence: 0.9884996
00:19:39.105 --> 00:19:40.385 seen the movie Star Trek
NOTE Confidence: 0.9884996
00:19:40.385 --> 00:19:41.825 there is a part
NOTE Confidence: 0.9884996
00:19:41.825 --> 00:19:42.965 of that movie wherein
NOTE Confidence: 0.95480585
00:19:43.460 --> 00:19:45.060 the Enterprise is facing a
NOTE Confidence: 0.95480585
00:19:45.060 --> 00:19:45.560 cloaked
NOTE Confidence: 0.9371047

00:19:46.100 --> 00:19:47.300 bad guy ship, and they
NOTE Confidence: 0.9371047

00:19:47.300 --> 00:19:48.260 can't figure out how to
NOTE Confidence: 0.9371047

00:19:48.260 --> 00:19:49.859 find it. Until suddenly, they
NOTE Confidence: 0.9371047

00:19:49.859 --> 00:19:50.359 realize
NOTE Confidence: 0.98278254

00:19:51.060 --> 00:19:52.020 the thing has to have
NOTE Confidence: 0.98278254

00:19:52.020 --> 00:19:53.460 a tailpipe. And so they
NOTE Confidence: 0.98278254

00:19:53.460 --> 00:19:54.100 figure out a way to
NOTE Confidence: 0.98278254

00:19:54.100 --> 00:19:55.640 fire off a photon torpedo
NOTE Confidence: 0.9976845

00:19:56.260 --> 00:19:57.619 to track its exhaust back
NOTE Confidence: 0.9976845

00:19:57.619 --> 00:19:58.520 to its source.
NOTE Confidence: 0.9623363

00:19:59.455 --> 00:20:01.395 Tumor exhaust is DNA,
NOTE Confidence: 0.9732676

00:20:01.695 --> 00:20:03.215 nucleic acids, as the tumor
NOTE Confidence: 0.9732676

00:20:03.215 --> 00:20:04.575 cells are cycling and releasing
NOTE Confidence: 0.9732676

00:20:04.575 --> 00:20:05.855 them. So we thought, well,
NOTE Confidence: 0.9732676

00:20:05.855 --> 00:20:07.215 maybe these anti DNA antibodies
NOTE Confidence: 0.9732676

00:20:07.215 --> 00:20:09.135 will find tumors by tracking

NOTE Confidence: 0.9732676
00:20:09.135 --> 00:20:10.175 their exhaust back to the
NOTE Confidence: 0.9732676
00:20:10.175 --> 00:20:11.935 source. And, indeed, they do.
NOTE Confidence: 0.9732676
00:20:11.935 --> 00:20:13.455 And what's even more remarkable
NOTE Confidence: 0.9732676
00:20:13.455 --> 00:20:14.675 is when they get there,
NOTE Confidence: 0.97068566
00:20:14.990 --> 00:20:16.369 they're sticking to the nucleoside
NOTE Confidence: 0.97068566
00:20:16.430 --> 00:20:17.490 components of DNA,
NOTE Confidence: 0.95015025
00:20:17.950 --> 00:20:19.070 and then the live tumor
NOTE Confidence: 0.95015025
00:20:19.070 --> 00:20:21.170 cells and other environmental
NOTE Confidence: 0.95015025
00:20:21.230 --> 00:20:21.730 cells
NOTE Confidence: 0.9863708
00:20:22.430 --> 00:20:24.450 are pulling those nucleosides in
NOTE Confidence: 0.9863708
00:20:24.670 --> 00:20:25.550 through this thing called a
NOTE Confidence: 0.9863708
00:20:25.550 --> 00:20:27.250 nucleoside salvage pathway.
NOTE Confidence: 0.9847343
00:20:27.565 --> 00:20:28.525 And so it pulls the
NOTE Confidence: 0.9847343
00:20:28.525 --> 00:20:30.465 antibody in. And the antibody
NOTE Confidence: 0.9847343
00:20:30.605 --> 00:20:32.065 then gets into those cells,
NOTE Confidence: 0.9650427

00:20:32.445 --> 00:20:34.125 skips all the security guys.
NOTE Confidence: 0.9650427

00:20:34.125 --> 00:20:35.805 It skips the lysosomes and
NOTE Confidence: 0.9650427

00:20:35.805 --> 00:20:36.925 the endosomes, and it has
NOTE Confidence: 0.9650427

00:20:36.925 --> 00:20:38.785 free rein inside that cell.
NOTE Confidence: 0.97820246

00:20:39.405 --> 00:20:40.125 Some of them go to
NOTE Confidence: 0.97820246

00:20:40.125 --> 00:20:40.785 the nucleus.
NOTE Confidence: 0.99724895

00:20:41.405 --> 00:20:42.625 Some go to the cytoplasm.
NOTE Confidence: 0.94787073

00:20:43.590 --> 00:20:44.710 What we just found, and
NOTE Confidence: 0.94787073

00:20:44.710 --> 00:20:45.830 we just published in Science
NOTE Confidence: 0.94787073

00:20:45.830 --> 00:20:47.470 Signaling and is getting quite
NOTE Confidence: 0.94787073

00:20:47.470 --> 00:20:48.309 a lot of attention and
NOTE Confidence: 0.94787073

00:20:48.309 --> 00:20:49.369 very excited about,
NOTE Confidence: 0.9909094

00:20:49.910 --> 00:20:50.950 is that one of these
NOTE Confidence: 0.9909094

00:20:50.950 --> 00:20:52.549 antibodies, when it gets into
NOTE Confidence: 0.9909094

00:20:52.549 --> 00:20:54.270 that cytoplasm, the liquid part
NOTE Confidence: 0.9909094

00:20:54.270 --> 00:20:55.190 of the cell, not the

NOTE Confidence: 0.9909094
00:20:55.190 --> 00:20:55.690 nucleus,
NOTE Confidence: 0.99934083
00:20:56.545 --> 00:20:58.005 it's sticking to RNA,
NOTE Confidence: 0.9834965
00:20:58.385 --> 00:20:59.744 a specific type of nucleic
NOTE Confidence: 0.9834965
00:20:59.744 --> 00:21:00.244 acid.
NOTE Confidence: 0.9320717
00:21:00.785 --> 00:21:01.685 And then finally,
NOTE Confidence: 0.98920184
00:21:02.385 --> 00:21:03.905 something inside the cell called
NOTE Confidence: 0.98920184
00:21:03.905 --> 00:21:05.765 a pattern recognition receptor
NOTE Confidence: 0.9671283
00:21:06.385 --> 00:21:07.685 sees that and says,
NOTE Confidence: 0.95084655
00:21:08.465 --> 00:21:09.744 that's not supposed to be
NOTE Confidence: 0.95084655
00:21:09.744 --> 00:21:11.000 here. I don't know what's
NOTE Confidence: 0.95084655
00:21:11.000 --> 00:21:12.679 going on, but something bad
NOTE Confidence: 0.95084655
00:21:12.679 --> 00:21:14.440 has happened. And it triggers
NOTE Confidence: 0.95084655
00:21:14.440 --> 00:21:15.960 off an immune reaction. And
NOTE Confidence: 0.95084655
00:21:15.960 --> 00:21:17.559 it finally says, oh my
NOTE Confidence: 0.95084655
00:21:17.559 --> 00:21:18.059 goodness.
NOTE Confidence: 0.94341546

00:21:18.760 --> 00:21:19.960 There's a tumor here this
NOTE Confidence: 0.94341546

00:21:19.960 --> 00:21:21.000 whole time. We've been sitting
NOTE Confidence: 0.94341546

00:21:21.000 --> 00:21:22.760 amongst this. We didn't realize.
NOTE Confidence: 0.94341546

00:21:22.760 --> 00:21:24.039 And then it recruits T
NOTE Confidence: 0.94341546

00:21:24.039 --> 00:21:25.335 cells, and we do see
NOTE Confidence: 0.94341546

00:21:25.335 --> 00:21:26.554 an improved response.
NOTE Confidence: 0.99472296

00:21:26.855 --> 00:21:27.734 So we figured out a
NOTE Confidence: 0.99472296

00:21:27.734 --> 00:21:29.175 way, we believe, to use
NOTE Confidence: 0.99472296

00:21:29.175 --> 00:21:30.775 a lupus antibody that can
NOTE Confidence: 0.99472296

00:21:30.775 --> 00:21:32.234 cross the blood brain barrier,
NOTE Confidence: 0.9469714

00:21:32.695 --> 00:21:34.875 penetrate into live cells, and
NOTE Confidence: 0.91186196

00:21:35.175 --> 00:21:36.375 tumor cells and non tumor
NOTE Confidence: 0.91186196

00:21:36.375 --> 00:21:37.815 cells fire up the immune
NOTE Confidence: 0.91186196

00:21:37.815 --> 00:21:38.315 system
NOTE Confidence: 0.97943485

00:21:38.720 --> 00:21:39.920 and improve outcomes. It does
NOTE Confidence: 0.97943485

00:21:39.920 --> 00:21:40.820 it by itself.

NOTE Confidence: 0.9860163
00:21:41.280 --> 00:21:42.080 And if you throw in
NOTE Confidence: 0.9860163
00:21:42.080 --> 00:21:43.940 an immune checkpoint blockade antibody,
NOTE Confidence: 0.9860163
00:21:44.240 --> 00:21:45.680 like those classic anti PD
NOTE Confidence: 0.9860163
00:21:45.680 --> 00:21:46.180 ones,
NOTE Confidence: 0.9900512
00:21:46.640 --> 00:21:48.160 it works even better. So
NOTE Confidence: 0.9900512
00:21:48.160 --> 00:21:49.680 we're pretty thrilled by
NOTE Confidence: 0.9900512
00:21:49.680 --> 00:21:50.640 this, and we we hope
NOTE Confidence: 0.9900512
00:21:50.640 --> 00:21:51.945 that we can get this
NOTE Confidence: 0.9900512
00:21:52.264 --> 00:21:53.465 to the clinical trials as
NOTE Confidence: 0.9900512
00:21:53.465 --> 00:21:54.764 soon as we possibly can.
NOTE Confidence: 0.99542314
00:21:55.465 --> 00:21:57.465 Now if it
NOTE Confidence: 0.99542314
00:21:57.465 --> 00:21:59.304 also goes to normal cells
NOTE Confidence: 0.99542314
00:21:59.304 --> 00:22:00.664 in the brain, is there
NOTE Confidence: 0.99542314
00:22:00.664 --> 00:22:02.044 some chance it would
NOTE Confidence: 0.9992542
00:22:02.664 --> 00:22:03.725 increase the
NOTE Confidence: 0.9995277

00:22:04.119 --> 00:22:05.659 side effects from immunotherapy

NOTE Confidence: 0.9986771

00:22:06.039 --> 00:22:07.399 in those normal cells in

NOTE Confidence: 0.9986771

00:22:07.399 --> 00:22:08.059 the brain?

NOTE Confidence: 0.96302706

00:22:08.600 --> 00:22:10.039 That's the real trick. Right?

NOTE Confidence: 0.96302706

00:22:10.039 --> 00:22:10.919 Is doing this in a

NOTE Confidence: 0.96302706

00:22:10.919 --> 00:22:12.039 way that we don't cause

NOTE Confidence: 0.96302706

00:22:12.039 --> 00:22:12.539 harm.

NOTE Confidence: 0.99892396

00:22:13.159 --> 00:22:14.440 And this is where it's

NOTE Confidence: 0.99892396

00:22:14.440 --> 00:22:15.179 all about

NOTE Confidence: 0.9639235

00:22:15.640 --> 00:22:17.000 where is the antibody gonna

NOTE Confidence: 0.9639235

00:22:17.000 --> 00:22:18.279 go. And and the beauty

NOTE Confidence: 0.9639235

00:22:18.279 --> 00:22:19.525 of this, and I wish

NOTE Confidence: 0.9639235

00:22:19.525 --> 00:22:20.405 I could take credit for

NOTE Confidence: 0.9639235

00:22:20.405 --> 00:22:21.605 it. I didn't design this.

NOTE Confidence: 0.9639235

00:22:21.605 --> 00:22:23.065 This is a natural antibody,

NOTE Confidence: 0.9639235

00:22:23.205 --> 00:22:25.065 a natural lupus antibody.

NOTE Confidence: 0.9992568
00:22:25.765 --> 00:22:27.465 It will only penetrate cells
NOTE Confidence: 0.9992568
00:22:27.605 --> 00:22:29.525 in areas that are super
NOTE Confidence: 0.9992568
00:22:29.525 --> 00:22:30.425 highly concentrated
NOTE Confidence: 0.9840481
00:22:31.060 --> 00:22:32.680 in the DNA that's released
NOTE Confidence: 0.9840481
00:22:32.740 --> 00:22:34.580 by the tumor because that's
NOTE Confidence: 0.9840481
00:22:34.580 --> 00:22:35.859 its path into the cell.
NOTE Confidence: 0.9840481
00:22:35.859 --> 00:22:37.140 So when it if it
NOTE Confidence: 0.9840481
00:22:37.140 --> 00:22:38.180 finds other areas in the
NOTE Confidence: 0.9840481
00:22:38.180 --> 00:22:39.780 normal brain that are not
NOTE Confidence: 0.9840481
00:22:39.780 --> 00:22:41.380 soaked in DNA, it will
NOTE Confidence: 0.9840481
00:22:41.380 --> 00:22:42.820 not penetrate. And that's the
NOTE Confidence: 0.9840481
00:22:42.820 --> 00:22:43.619 first thing that we looked
NOTE Confidence: 0.9840481
00:22:43.619 --> 00:22:44.725 for. Where does the
NOTE Confidence: 0.9840481
00:22:44.725 --> 00:22:46.005 antibody go? And it just
NOTE Confidence: 0.9840481
00:22:46.005 --> 00:22:47.205 goes into the area of
NOTE Confidence: 0.9840481

00:22:47.205 --> 00:22:48.325 the tumor and the surrounding

NOTE Confidence: 0.9840481

00:22:48.325 --> 00:22:49.845 area, not into the normal

NOTE Confidence: 0.9840481

00:22:49.845 --> 00:22:50.345 brain.

NOTE Confidence: 0.99781275

00:22:51.044 --> 00:22:52.345 So it preferentially

NOTE Confidence: 0.9744559

00:22:52.725 --> 00:22:54.404 goes into the tumor on its own.

NOTE Confidence: 0.9744559

00:22:54.404 --> 00:22:56.725 Correct. Based on

NOTE Confidence: 0.9744559

00:22:56.725 --> 00:22:57.225 targeting

NOTE Confidence: 0.9994037

00:22:57.924 --> 00:22:59.460 the DNA. And if you

NOTE Confidence: 0.9994037

00:22:59.619 --> 00:23:01.399 follow that reasoning further

NOTE Confidence: 0.8513396

00:23:02.260 --> 00:23:03.880 in noncancer applications,

NOTE Confidence: 0.95633435

00:23:04.580 --> 00:23:06.359 these antibodies will also find

NOTE Confidence: 0.95633435

00:23:06.419 --> 00:23:08.179 areas of damage. So for

NOTE Confidence: 0.95633435

00:23:08.179 --> 00:23:08.679 example,

NOTE Confidence: 0.9692379

00:23:08.980 --> 00:23:10.580 my colleagues and my

NOTE Confidence: 0.9692379

00:23:10.580 --> 00:23:12.200 team have found as well,

NOTE Confidence: 0.9995337

00:23:12.695 --> 00:23:14.054 these antibodies will find areas

NOTE Confidence: 0.9995337
00:23:14.054 --> 00:23:14.795 of a stroke
NOTE Confidence: 0.9998537
00:23:15.175 --> 00:23:15.835 in the brain
NOTE Confidence: 0.99556303
00:23:16.215 --> 00:23:17.655 or a heart attack
NOTE Confidence: 0.9909003
00:23:18.054 --> 00:23:19.494 Because DNA is being released
NOTE Confidence: 0.9909003
00:23:19.734 --> 00:23:21.335 by the damaged cells.
NOTE Confidence: 0.9909003
00:23:21.335 --> 00:23:22.315 Exactly.
NOTE Confidence: 0.98893327
00:23:22.695 --> 00:23:24.054 So all this excitement about
NOTE Confidence: 0.98893327
00:23:24.054 --> 00:23:26.315 this antibody by itself as
NOTE Confidence: 0.9606603
00:23:26.619 --> 00:23:27.919 engaging the immune system,
NOTE Confidence: 0.96134645
00:23:28.220 --> 00:23:29.279 I think, is great.
NOTE Confidence: 0.98515415
00:23:29.820 --> 00:23:31.260 There's one more dimension to it.
00:23:32.940 --> 00:23:33.820 Wait a second. If this
NOTE Confidence: 0.974616
00:23:33.820 --> 00:23:35.340 antibody can get into cells
NOTE Confidence: 0.974616
00:23:35.340 --> 00:23:36.940 and it can avoid all
NOTE Confidence: 0.974616
00:23:36.940 --> 00:23:37.600 the security,
NOTE Confidence: 0.9991748
00:23:37.980 --> 00:23:38.880 skip the lysosomes,

NOTE Confidence: 0.985773
00:23:40.205 --> 00:23:41.565 will it carry other things
NOTE Confidence: 0.985773
00:23:41.565 --> 00:23:42.545 with it in?
NOTE Confidence: 0.8304807
00:23:42.925 --> 00:23:43.665 And indeed,
NOTE Confidence: 0.9222479
00:23:44.205 --> 00:23:45.165 we haven't published this yet,
NOTE Confidence: 0.9222479
00:23:45.165 --> 00:23:45.965 but I mean, this
NOTE Confidence: 0.9222479
00:23:45.965 --> 00:23:46.765 is just between you and me, right?
NOTE Confidence: 0.9222479
00:23:46.765 --> 00:23:47.645 No one's listening
NOTE Confidence: 0.9222479
00:23:47.645 --> 00:23:48.365 to this. I hope, oh,
NOTE Confidence: 0.9222479
00:23:48.365 --> 00:23:49.405 wait. There's this radio.
NOTE Confidence: 0.99895895
00:23:50.205 --> 00:23:51.165 I'll still be able to
NOTE Confidence: 0.99895895
00:23:51.165 --> 00:23:51.825 say it.
NOTE Confidence: 0.93268275
00:23:52.859 --> 00:23:55.020 Absolutely. These antibodies can carry
NOTE Confidence: 0.93268275
00:23:55.020 --> 00:23:56.540 cargos in with them, whether
NOTE Confidence: 0.93268275
00:23:56.540 --> 00:23:58.059 they are nucleic acids or
NOTE Confidence: 0.93268275
00:23:58.059 --> 00:23:59.359 linked other antibodies.
NOTE Confidence: 0.94295144

00:23:59.820 --> 00:24:00.700 So we can use these
NOTE Confidence: 0.94295144

00:24:00.700 --> 00:24:02.059 antibodies to deliver things to
NOTE Confidence: 0.94295144

00:24:02.059 --> 00:24:03.820 either increase the effect on
NOTE Confidence: 0.94295144

00:24:03.820 --> 00:24:05.820 tumors or perhaps to treat
NOTE Confidence: 0.94295144

00:24:05.820 --> 00:24:07.575 heart attacks, perhaps to improve
NOTE Confidence: 0.94295144

00:24:07.575 --> 00:24:09.255 improve treatment of stroke. The
NOTE Confidence: 0.94295144

00:24:09.255 --> 00:24:10.775 sky's the limit in my
NOTE Confidence: 0.94295144

00:24:10.775 --> 00:24:11.275 opinion.
NOTE Confidence: 0.9979546

00:24:12.295 --> 00:24:12.795 So
NOTE Confidence: 0.98315805

00:24:13.575 --> 00:24:15.575 almost like what we now
NOTE Confidence: 0.98315805

00:24:15.575 --> 00:24:17.895 call drug antibody conjugates, you
NOTE Confidence: 0.98315805

00:24:17.895 --> 00:24:18.395 could
NOTE Confidence: 0.99874496

00:24:18.960 --> 00:24:20.179 theoretically link
NOTE Confidence: 0.9498955

00:24:20.559 --> 00:24:21.919 a little bit of some
NOTE Confidence: 0.9498955

00:24:21.919 --> 00:24:23.380 drug that would be toxic
NOTE Confidence: 0.9498955

00:24:23.440 --> 00:24:24.880 to the cancer to the

NOTE Confidence: 0.9498955
00:24:24.880 --> 00:24:25.380 antibody.
NOTE Confidence: 0.9833297
00:24:26.559 --> 00:24:28.159 Absolutely. In fact, that was
00:24:29.039 --> 00:24:30.159 a paper from
NOTE Confidence: 0.98416436
00:24:30.159 --> 00:24:31.039 last year, and I'm
NOTE Confidence: 0.98416436
00:24:31.039 --> 00:24:32.159 really, really glad you gave
NOTE Confidence: 0.98416436
00:24:32.159 --> 00:24:33.059 me that segue.
NOTE Confidence: 0.95026433
00:24:33.645 --> 00:24:35.725 I was in, ACS Central
NOTE Confidence: 0.95026433
00:24:35.725 --> 00:24:37.645 Science. So everyone has asked
NOTE Confidence: 0.95026433
00:24:37.645 --> 00:24:38.625 me along the way,
NOTE Confidence: 0.9968799
00:24:39.085 --> 00:24:39.965 why don't you use these
NOTE Confidence: 0.9968799
00:24:39.965 --> 00:24:41.185 antibodies to deliver
NOTE Confidence: 0.88760126
00:24:41.805 --> 00:24:42.925 drugs? And I said, well,
NOTE Confidence: 0.88760126
00:24:42.925 --> 00:24:44.305 it doesn't make sense because
NOTE Confidence: 0.99937636
00:24:44.685 --> 00:24:45.885 the whole idea of an
NOTE Confidence: 0.99937636
00:24:45.885 --> 00:24:47.105 antibody drug conjugate
NOTE Confidence: 0.97906756
00:24:47.645 --> 00:24:48.945 is it gets eaten up,

NOTE Confidence: 0.97906756
00:24:49.240 --> 00:24:50.220 and then the lysosome
NOTE Confidence: 0.9735748
00:24:50.600 --> 00:24:51.480 breaks it down, and that's
NOTE Confidence: 0.9735748
00:24:51.480 --> 00:24:52.779 how the drug gets released.
NOTE Confidence: 0.9986059
00:24:53.320 --> 00:24:54.519 What's gonna release the drug
NOTE Confidence: 0.9986059
00:24:54.519 --> 00:24:55.640 for these antibodies? They don't
NOTE Confidence: 0.9986059
00:24:55.640 --> 00:24:56.619 go to the lysosome.
NOTE Confidence: 0.92115074
00:24:57.240 --> 00:24:57.980 But finally,
NOTE Confidence: 0.9601754
00:24:58.919 --> 00:25:00.039 a great postdoc by the
NOTE Confidence: 0.9601754
00:25:00.039 --> 00:25:00.919 name of Faye Kao in
NOTE Confidence: 0.9601754
00:25:00.919 --> 00:25:03.105 my lab figured out when
NOTE Confidence: 0.9601754
00:25:03.105 --> 00:25:04.465 one of these antibodies goes
NOTE Confidence: 0.9601754
00:25:04.465 --> 00:25:05.845 zipping on into the cell,
NOTE Confidence: 0.96767825
00:25:06.145 --> 00:25:07.185 this one goes into the
NOTE Confidence: 0.96767825
00:25:07.185 --> 00:25:07.685 nucleus,
NOTE Confidence: 0.924718
00:25:08.785 --> 00:25:10.305 something happens and it triggers
NOTE Confidence: 0.924718

00:25:10.305 --> 00:25:11.045 a specific
NOTE Confidence: 0.972248

00:25:12.065 --> 00:25:12.565 protease,
NOTE Confidence: 0.95554316

00:25:12.865 --> 00:25:14.065 a protein that cuts
NOTE Confidence: 0.95554316

00:25:14.065 --> 00:25:15.505 other things apart from a
NOTE Confidence: 0.95554316

00:25:15.505 --> 00:25:16.005 lysosome
NOTE Confidence: 0.98947555

00:25:16.820 --> 00:25:17.940 to chase it into the
NOTE Confidence: 0.98947555

00:25:17.940 --> 00:25:18.440 nucleus.
NOTE Confidence: 0.9911041

00:25:19.300 --> 00:25:20.260 And that's what breaks it
NOTE Confidence: 0.9911041

00:25:20.260 --> 00:25:21.220 down in the nucleus. And
NOTE Confidence: 0.9911041

00:25:21.220 --> 00:25:22.119 then we realized,
NOTE Confidence: 0.9650472

00:25:23.220 --> 00:25:24.580 if we use a linker
NOTE Confidence: 0.9650472

00:25:24.580 --> 00:25:26.280 that that protease will cut,
NOTE Confidence: 0.9650472

00:25:26.580 --> 00:25:27.859 now we can deliver things
NOTE Confidence: 0.9650472

00:25:27.859 --> 00:25:28.760 into the nucleus,
NOTE Confidence: 0.99739915

00:25:29.415 --> 00:25:30.375 and the drug will be
NOTE Confidence: 0.99739915

00:25:30.375 --> 00:25:31.815 released. And so you've heard

NOTE Confidence: 0.99739915
00:25:31.815 --> 00:25:32.635 of ADCs,
NOTE Confidence: 0.9785941
00:25:33.095 --> 00:25:34.315 antibody drug conjugates.
NOTE Confidence: 0.9991307
00:25:35.095 --> 00:25:36.215 We have now coined the
NOTE Confidence: 0.9991307
00:25:36.215 --> 00:25:36.715 phrase
NOTE Confidence: 0.8388974
00:25:37.175 --> 00:25:37.675 ANADCs
NOTE Confidence: 0.94833994
00:25:38.215 --> 00:25:40.535 for anti nuclear antibody drug
NOTE Confidence: 0.94833994
00:25:40.535 --> 00:25:41.895 conjugates. And I'm really trying
NOTE Confidence: 0.94833994
00:25:41.895 --> 00:25:42.720 to get that to stick.
NOTE Confidence: 0.94833994
00:25:42.960 --> 00:25:44.080 So, hopefully, people that are
NOTE Confidence: 0.94833994
00:25:44.080 --> 00:25:45.460 listening will use that too.
NOTE Confidence: 0.99158776
00:25:46.159 --> 00:25:47.760 Well, I mean, of course,
NOTE Confidence: 0.99158776
00:25:47.760 --> 00:25:48.559 we're gonna have to see
NOTE Confidence: 0.99158776
00:25:48.559 --> 00:25:50.240 if this works in people,
NOTE Confidence: 0.99158776
00:25:50.240 --> 00:25:50.720 but,
NOTE Confidence: 0.9983762
00:25:51.359 --> 00:25:53.440 the whole idea sounds pretty
NOTE Confidence: 0.9983762

00:25:53.440 --> 00:25:55.119 cool to me.
NOTE Confidence: 0.9983762

00:25:55.119 --> 00:25:56.260 I think so too.
NOTE Confidence: 0.9960152

00:25:57.520 --> 00:25:58.340 And so
NOTE Confidence: 0.9977378

00:25:58.654 --> 00:25:59.955 in using these
NOTE Confidence: 0.9988933

00:26:00.335 --> 00:26:02.255 lupus antibodies, is there any
NOTE Confidence: 0.9988933

00:26:02.255 --> 00:26:03.394 risk that a patient
NOTE Confidence: 0.99941885

00:26:03.774 --> 00:26:05.774 is gonna develop some symptoms
NOTE Confidence: 0.99941885

00:26:05.774 --> 00:26:06.514 of lupus?
NOTE Confidence: 0.99947345

00:26:07.135 --> 00:26:08.514 Sure. That's the first question
NOTE Confidence: 0.99323714

00:26:08.815 --> 00:26:09.934 on our minds and on
NOTE Confidence: 0.99323714

00:26:09.934 --> 00:26:10.994 everybody's mind.
NOTE Confidence: 0.9571766

00:26:12.070 --> 00:26:13.109 When it comes to an
NOTE Confidence: 0.9571766

00:26:13.109 --> 00:26:14.410 anti DNA antibody,
NOTE Confidence: 0.9946608

00:26:15.190 --> 00:26:16.470 one of the dangers we've
NOTE Confidence: 0.9946608

00:26:16.470 --> 00:26:17.910 seen associated with lupus is
NOTE Confidence: 0.9946608

00:26:17.910 --> 00:26:19.190 that they can get stuck

NOTE Confidence: 0.9946608
00:26:19.190 --> 00:26:20.470 in the kidneys, and then
NOTE Confidence: 0.9946608
00:26:20.470 --> 00:26:21.430 they can trigger an immune
NOTE Confidence: 0.9946608
00:26:21.430 --> 00:26:22.790 response against the kidney to
NOTE Confidence: 0.9946608
00:26:22.790 --> 00:26:23.930 cause this thing called
NOTE Confidence: 0.98135626
00:26:24.310 --> 00:26:26.250 lupus nephritis, just inflammation
NOTE Confidence: 0.9997196
00:26:26.550 --> 00:26:27.290 of the kidney.
NOTE Confidence: 0.9995923
00:26:27.875 --> 00:26:28.935 The good news is
NOTE Confidence: 0.97098154
00:26:29.315 --> 00:26:30.435 most of that is caused
NOTE Confidence: 0.97098154
00:26:30.435 --> 00:26:32.035 by what we call the
NOTE Confidence: 0.97098154
00:26:32.035 --> 00:26:33.815 constant regions of the antibody,
NOTE Confidence: 0.97098154
00:26:33.875 --> 00:26:35.155 the FC tail for
NOTE Confidence: 0.97098154
00:26:35.155 --> 00:26:36.435 those that know any antibody
NOTE Confidence: 0.97098154
00:26:36.435 --> 00:26:36.935 structure.
NOTE Confidence: 0.9788936
00:26:37.875 --> 00:26:38.915 And the magic of these
NOTE Confidence: 0.9788936
00:26:38.915 --> 00:26:40.195 antibodies that allows them to
NOTE Confidence: 0.9788936

00:26:40.195 --> 00:26:41.715 do their thing to bind
NOTE Confidence: 0.9788936

00:26:41.715 --> 00:26:43.095 DNA, bind RNA,
NOTE Confidence: 0.99929416

00:26:43.590 --> 00:26:44.090 penetrate
NOTE Confidence: 0.9583391

00:26:44.549 --> 00:26:45.830 cells, has nothing to do
NOTE Confidence: 0.9583391

00:26:45.830 --> 00:26:47.030 with the FC or any
NOTE Confidence: 0.9583391

00:26:47.030 --> 00:26:48.309 of their constants, all in
NOTE Confidence: 0.9583391

00:26:48.309 --> 00:26:49.830 the variable regions. So we've
NOTE Confidence: 0.9583391

00:26:49.830 --> 00:26:51.770 created what we call fragments,
NOTE Confidence: 0.97210246

00:26:52.309 --> 00:26:53.990 single chain variable fragments and
NOTE Confidence: 0.97210246

00:26:53.990 --> 00:26:55.510 such that don't have any
NOTE Confidence: 0.97210246

00:26:55.510 --> 00:26:56.950 of the dangerous lupus causing
NOTE Confidence: 0.97210246

00:26:56.950 --> 00:26:58.535 parts, but still preserve the
NOTE Confidence: 0.97210246

00:26:58.535 --> 00:26:59.755 cell penetrating activity,
NOTE Confidence: 0.9909537

00:27:00.295 --> 00:27:01.435 the delivery aspects,
NOTE Confidence: 0.98489493

00:27:01.895 --> 00:27:03.175 and the engagement of all
NOTE Confidence: 0.98489493

00:27:03.175 --> 00:27:04.455 those factors that we want

NOTE Confidence: 0.98489493
00:27:04.455 --> 00:27:05.175 to try to fight off
NOTE Confidence: 0.98489493
00:27:05.175 --> 00:27:05.915 these diseases.
NOTE Confidence: 0.9851301
00:27:06.535 --> 00:27:07.255 Well, it sounds to me
NOTE Confidence: 0.9851301
00:27:07.255 --> 00:27:08.375 like we wanna try to
NOTE Confidence: 0.9851301
00:27:08.375 --> 00:27:09.494 encourage you to do this
NOTE Confidence: 0.9851301
00:27:09.494 --> 00:27:10.695 work as quickly as you
NOTE Confidence: 0.9851301
00:27:10.695 --> 00:27:13.010 can because it sounds pretty
NOTE Confidence: 0.9851301
00:27:13.010 --> 00:27:13.510 promising.
NOTE Confidence: 0.981347
00:27:13.970 --> 00:27:14.869 Thank you. Yeah.
NOTE Confidence: 0.8893189
00:27:15.250 --> 00:27:15.890 I can take all the
NOTE Confidence: 0.8893189
00:27:15.890 --> 00:27:17.190 encouragement I can get.
NOTE Confidence: 0.8519861
00:27:21.730 --> 00:27:22.789 The truth is
NOTE Confidence: 0.99289745
00:27:23.250 --> 00:27:24.609 that if we didn't have
NOTE Confidence: 0.99289745
00:27:24.609 --> 00:27:26.049 research, if we didn't have
NOTE Confidence: 0.99289745
00:27:26.049 --> 00:27:26.549 both
NOTE Confidence: 0.9696047

00:27:26.895 --> 00:27:28.115 research in laboratories
NOTE Confidence: 0.9984933

00:27:28.575 --> 00:27:30.595 and research in the clinic,
NOTE Confidence: 0.9816244

00:27:31.295 --> 00:27:33.535 cancer treatment wouldn't change. And
NOTE Confidence: 0.9816244

00:27:33.535 --> 00:27:35.215 what has led to really
NOTE Confidence: 0.9816244

00:27:35.215 --> 00:27:36.994 a revolution in cancer therapeutics
NOTE Confidence: 0.9948084

00:27:37.775 --> 00:27:38.675 over the last
NOTE Confidence: 0.97456586

00:27:39.169 --> 00:27:39.669 twenty,
NOTE Confidence: 0.99985474

00:27:39.970 --> 00:27:41.190 twenty five years
NOTE Confidence: 0.97278696

00:27:41.650 --> 00:27:43.090 has been all the research
NOTE Confidence: 0.97278696

00:27:43.090 --> 00:27:44.369 that has gone on, and
NOTE Confidence: 0.97278696

00:27:44.369 --> 00:27:46.230 it's really quite remarkable.
NOTE Confidence: 0.9990181

00:27:47.010 --> 00:27:47.750 No question.
NOTE Confidence: 0.99333036

00:27:49.010 --> 00:27:50.630 You know, and it's just
NOTE Confidence: 0.99333036

00:27:50.895 --> 00:27:52.035 so very important.
NOTE Confidence: 0.9980963

00:27:52.415 --> 00:27:53.715 So in our last
NOTE Confidence: 0.99772805

00:27:54.015 --> 00:27:55.075 minute or so,

NOTE Confidence: 0.9765194
00:27:55.775 --> 00:27:56.755 maybe you could,
NOTE Confidence: 0.99967986
00:27:57.615 --> 00:27:58.915 look into the future
NOTE Confidence: 0.988027
00:27:59.535 --> 00:28:01.855 and tell us what you
NOTE Confidence: 0.988027
00:28:01.855 --> 00:28:03.395 think are gonna be the
NOTE Confidence: 0.99948245
00:28:04.280 --> 00:28:06.460 new directions for radiation oncology
NOTE Confidence: 0.9799461
00:28:07.000 --> 00:28:08.299 in the years ahead.
NOTE Confidence: 0.9990602
00:28:09.640 --> 00:28:10.840 Yeah. So I I'm very
NOTE Confidence: 0.9990602
00:28:10.840 --> 00:28:11.820 excited about
NOTE Confidence: 0.9997729
00:28:12.679 --> 00:28:13.179 immunotherapy
NOTE Confidence: 0.996694
00:28:13.799 --> 00:28:14.700 and the combination
NOTE Confidence: 0.9491019
00:28:15.080 --> 00:28:15.900 with radiation.
NOTE Confidence: 0.99953526
00:28:17.240 --> 00:28:18.280 And we have so much
NOTE Confidence: 0.99953526
00:28:18.280 --> 00:28:19.419 to learn about
NOTE Confidence: 0.9905596
00:28:20.025 --> 00:28:20.925 how the radiation
NOTE Confidence: 0.9863615
00:28:21.545 --> 00:28:22.744 triggers and talks to the
NOTE Confidence: 0.9863615

00:28:22.744 --> 00:28:23.565 immune system.
NOTE Confidence: 0.99937093

00:28:23.945 --> 00:28:24.905 But when we can figure
NOTE Confidence: 0.99937093

00:28:24.905 --> 00:28:25.945 that out, I think we'll
NOTE Confidence: 0.99937093

00:28:25.945 --> 00:28:27.545 have even more ways to
NOTE Confidence: 0.99937093

00:28:27.545 --> 00:28:28.045 activate
NOTE Confidence: 0.97414505

00:28:28.665 --> 00:28:30.605 those, quote, unquote, cold tumors
NOTE Confidence: 0.97414505

00:28:30.744 --> 00:28:31.945 by giving radiation to the
NOTE Confidence: 0.97414505

00:28:31.945 --> 00:28:33.145 right area at the right time.
NOTE Confidence: 0.97414505

00:28:33.145 --> 00:28:35.340 Doctor James Hansen is
NOTE Confidence: 0.97414505

00:28:35.340 --> 00:28:37.200 an associate professor of therapeutic
NOTE Confidence: 0.97414505

00:28:37.340 --> 00:28:38.940 radiology at the Yale School
NOTE Confidence: 0.97414505

00:28:38.940 --> 00:28:39.600 of Medicine.
NOTE Confidence: 0.9817916

00:28:40.140 --> 00:28:41.500 If you have questions, the
NOTE Confidence: 0.9817916

00:28:41.500 --> 00:28:42.560 address is canceranswersyale
NOTE Confidence: 0.9331751

00:28:43.420 --> 00:28:44.240 dot edu,
NOTE Confidence: 0.96382993

00:28:44.540 --> 00:28:45.900 and past editions of the

NOTE Confidence: 0.96382993

00:28:45.900 --> 00:28:47.760 program are available in audio

NOTE Confidence: 0.96382993

00:28:47.820 --> 00:28:49.225 and written form at yale

NOTE Confidence: 0.96382993

00:28:49.225 --> 00:28:50.684 cancer center dot org.

NOTE Confidence: 0.9955498

00:28:50.985 --> 00:28:52.024 We hope you'll join us

NOTE Confidence: 0.9955498

00:28:52.024 --> 00:28:53.144 next time to learn more

NOTE Confidence: 0.9955498

00:28:53.144 --> 00:28:54.605 about the fight against cancer.

NOTE Confidence: 0.96647334

00:28:55.065 --> 00:28:56.825 Funding for Yale Cancer Answers

NOTE Confidence: 0.96647334

00:28:56.825 --> 00:28:58.585 is provided by Smilow Cancer

NOTE Confidence: 0.96647334

00:28:58.585 --> 00:28:59.085 Hospital.