WEBVTT

NOTE duration: ”00:04:42.240”

NOTE Confidence: 0.90722656

00:00:04.000 --> 00:00:05.220 CAR T cell therapy

NOTE Confidence: 0.9694824

00:00:05.839 --> 00:00:08.000 is a treatment using your

NOTE Confidence: 0.9694824

00:00:08.000 --> 00:00:09.139 own T cells

NOTE Confidence: 0.9980469

00:00:09.519 --> 00:00:10.660 that have been modified

NOTE Confidence: 0.9963157

00:00:11.360 --> 00:00:12.880 outside your body and put

NOTE Confidence: 0.9963157

00:00:12.880 --> 00:00:14.080 back into you to attack

NOTE Confidence: 0.9963157

00:00:14.080 --> 00:00:15.575 cancer. In order to make

NOTE Confidence: 0.9963157

00:00:15.575 --> 00:00:16.695 any sense of that, I

NOTE Confidence: 0.9963157

00:00:16.695 --> 00:00:17.414 have to talk a little

NOTE Confidence: 0.9963157

00:00:17.414 --> 00:00:18.454 bit about what the immune

NOTE Confidence: 0.9963157

00:00:18.454 --> 00:00:19.994 system is. So

NOTE Confidence: 0.9919782

00:00:20.295 --> 00:00:21.814 the immune system is this

NOTE Confidence: 0.9919782

00:00:21.814 --> 00:00:22.715 large organ

NOTE Confidence: 0.99449575

00:00:23.175 --> 00:00:24.294 in your body made up

NOTE Confidence: 0.99449575

00:00:24.294 --> 00:00:25.255 of a huge number of

NOTE Confidence: 0.99449575

00:00:25.255 --> 00:00:25.755 cells

NOTE Confidence: 0.9972796

00:00:26.055 --> 00:00:27.414 that is used to detect

NOTE Confidence: 0.9972796

00:00:27.414 --> 00:00:28.474 foreign agents.

NOTE Confidence: 0.9612427

00:00:29.250 --> 00:00:30.870 T cells are a subset

NOTE Confidence: 0.9612427

00:00:31.090 --> 00:00:31.990 of our lymphocytes,

NOTE Confidence: 0.9735897

00:00:32.610 --> 00:00:34.930 and lymphocytes are important immune

NOTE Confidence: 0.9735897

00:00:34.930 --> 00:00:36.790 cells. They play an important

NOTE Confidence: 0.9735897

00:00:36.850 --> 00:00:39.010 role in, defending us from

NOTE Confidence: 0.9735897

00:00:39.010 --> 00:00:39.909 viral infections

NOTE Confidence: 0.9929865

00:00:40.370 --> 00:00:41.809 and helping other parts of

NOTE Confidence: 0.9929865

00:00:41.809 --> 00:00:43.010 the immune system to fight

NOTE Confidence: 0.9929865

00:00:43.010 --> 00:00:43.510 infection.

NOTE Confidence: 0.9794108

00:00:44.485 --> 00:00:45.284 One of the things that

NOTE Confidence: 0.9794108

00:00:45.284 --> 00:00:47.364 t cells do is to

NOTE Confidence: 0.9794108

00:00:47.364 --> 00:00:48.504 literally recognize

NOTE Confidence: 0.97191596

00:00:49.045 --> 00:00:50.565 when one of our own

NOTE Confidence: 0.97191596

00:00:50.565 --> 00:00:52.504 cells is infected by something,

NOTE Confidence: 0.97191596

00:00:52.725 --> 00:00:54.085 by what are called receptors

NOTE Confidence: 0.97191596

00:00:54.085 --> 00:00:55.045 on the surface of those

NOTE Confidence: 0.97191596

00:00:55.045 --> 00:00:56.485 t cells, and then attack

NOTE Confidence: 0.97191596

00:00:56.485 --> 00:00:57.684 those cells and actually destroy

NOTE Confidence: 0.97191596

00:00:57.684 --> 00:00:58.184 them.

NOTE Confidence: 0.99886066

00:00:59.100 --> 00:01:00.780 Our cancer cells aren't always

NOTE Confidence: 0.99886066

00:01:00.780 --> 00:01:02.060 that much different from our

NOTE Confidence: 0.99886066

00:01:02.060 --> 00:01:02.960 normal cells.

NOTE Confidence: 0.99790734

00:01:04.220 --> 00:01:05.740 Our immune system is just

NOTE Confidence: 0.99790734

00:01:05.740 --> 00:01:06.640 not recognizing

NOTE Confidence: 0.9469401

00:01:06.940 --> 00:01:08.300 these cancer cells as far

NOTE Confidence: 0.9469401

00:01:08.300 --> 00:01:08.800 enough

NOTE Confidence: 0.9991862

00:01:09.180 --> 00:01:10.319 to attack them.

NOTE Confidence: 0.99609375

00:01:11.100 --> 00:01:12.700 But we often know that

NOTE Confidence: 0.99609375

00:01:12.700 --> 00:01:13.600 cancer cells

NOTE Confidence: 0.9995117

00:01:14.060 --> 00:01:14.834 make certain

NOTE Confidence: 0.9213867

00:01:15.795 --> 00:01:16.295 proteins,

NOTE Confidence: 0.944458

00:01:16.755 --> 00:01:18.455 which are little molecules,

NOTE Confidence: 0.99604493

00:01:18.915 --> 00:01:20.055 that are on their surfaces.

NOTE Confidence: 0.97314453

00:01:20.994 --> 00:01:21.955 So we can take t

NOTE Confidence: 0.97314453

00:01:21.955 --> 00:01:23.174 cells out of the body

NOTE Confidence: 0.94412667

00:01:23.475 --> 00:01:24.915 and we can engineer them

NOTE Confidence: 0.94412667

00:01:24.915 --> 00:01:25.575 to recognize

NOTE Confidence: 0.988351

00:01:25.955 --> 00:01:27.475 the specific molecules on a

NOTE Confidence: 0.988351

00:01:27.475 --> 00:01:28.455 particular cancer.

NOTE Confidence: 0.95033485

00:01:29.160 --> 00:01:30.200 And once a t cell

NOTE Confidence: 0.95033485

00:01:30.200 --> 00:01:31.260 recognizes something,

NOTE Confidence: 0.9921875

00:01:31.640 --> 00:01:32.860 it can destroy it.

NOTE Confidence: 0.94945526

00:01:36.600 --> 00:01:37.480 So how do we do

NOTE Confidence: 0.94945526

00:01:37.480 --> 00:01:38.680 it? As I said, we

NOTE Confidence: 0.94945526

00:01:38.680 --> 00:01:39.800 take the t cells out

NOTE Confidence: 0.94945526

00:01:39.800 --> 00:01:40.760 en masse. We do it

NOTE Confidence: 0.94945526

00:01:40.760 --> 00:01:42.060 by something called phoresis.

NOTE Confidence: 0.9539388

00:01:42.535 --> 00:01:43.834 A process that's

NOTE Confidence: 0.95317197

00:01:44.295 --> 00:01:45.515 a little bit more complicated

NOTE Confidence: 0.95317197

00:01:45.575 --> 00:01:46.855 than a a general blood

NOTE Confidence: 0.95317197

00:01:46.855 --> 00:01:49.335 donation, but outpatient procedure where

NOTE Confidence: 0.95317197

00:01:49.335 --> 00:01:50.854 the lymphocytes are filtered from

NOTE Confidence: 0.95317197

00:01:50.854 --> 00:01:52.055 a bloodstream for a few

NOTE Confidence: 0.95317197

00:01:52.055 --> 00:01:52.555 hours.

NOTE Confidence: 0.9986049

00:01:53.255 --> 00:01:54.455 Those cells are sent to

NOTE Confidence: 0.9986049

00:01:54.455 --> 00:01:55.115 a laboratory

NOTE Confidence: 0.9550781

00:01:55.735 --> 00:01:56.135 where

NOTE Confidence: 0.98479146

00:01:56.810 --> 00:01:57.690 We put a piece of

NOTE Confidence: 0.98479146

00:01:57.690 --> 00:01:59.210 DNA into that cell, and

NOTE Confidence: 0.98479146

00:01:59.210 --> 00:02:00.910 that DNA is a blueprint.

NOTE Confidence: 0.98479146

00:02:00.970 --> 00:02:01.790 It encodes

NOTE Confidence: 0.9728816

00:02:02.330 --> 00:02:03.690 what's called a receptor or

NOTE Confidence: 0.9728816

00:02:03.690 --> 00:02:04.890 a protein, and it's made

NOTE Confidence: 0.9728816

00:02:04.890 --> 00:02:05.870 up of two

NOTE Confidence: 0.9980469

00:02:06.490 --> 00:02:06.990 distinct

NOTE Confidence: 1

00:02:07.450 --> 00:02:07.950 parts.

NOTE Confidence: 0.97998047

00:02:08.490 --> 00:02:09.530 It's got one part that

NOTE Confidence: 0.97998047

00:02:09.530 --> 00:02:10.410 sticks out of the t

NOTE Confidence: 0.97998047

00:02:10.410 --> 00:02:11.885 cell that recognizes

NOTE Confidence: 0.99785155

00:02:12.345 --> 00:02:13.725 the molecule on the cancer

NOTE Confidence: 0.7664388

00:02:14.105 --> 00:02:15.084 and it's connected

NOTE Confidence: 0.9776804

00:02:15.465 --> 00:02:16.665 to a part that sticks

NOTE Confidence: 0.9776804

00:02:16.665 --> 00:02:18.584 into the cell that signals

NOTE Confidence: 0.9776804

00:02:18.584 --> 00:02:19.705 to the T cell to

NOTE Confidence: 0.9776804

00:02:19.705 --> 00:02:20.764 tell it to kill.

NOTE Confidence: 0.9841087

00:02:21.305 --> 00:02:22.185 And we call it a

NOTE Confidence: 0.9841087

00:02:22.185 --> 00:02:23.865 CAR because that stands for

NOTE Confidence: 0.9841087

00:02:23.865 --> 00:02:24.365 chimeric

NOTE Confidence: 0.99902344

00:02:25.145 --> 00:02:25.645 antigen

NOTE Confidence: 0.99658203

00:02:26.105 --> 00:02:26.605 receptor.

NOTE Confidence: 0.97579753

00:02:27.330 --> 00:02:28.610 And then they're expanded in

NOTE Confidence: 0.97579753

00:02:28.610 --> 00:02:29.650 a laboratory, so we have

NOTE Confidence: 0.97579753

00:02:29.650 --> 00:02:30.790 a lot of these cells

NOTE Confidence: 0.999163

00:02:31.090 --> 00:02:32.290 that we can infuse to

NOTE Confidence: 0.999163

00:02:32.290 --> 00:02:32.950 a patient.

NOTE Confidence: 0.9751485

00:02:33.730 --> 00:02:35.250 These CAR T cells, when

NOTE Confidence: 0.9751485

00:02:35.250 --> 00:02:37.250 they work well, will not

NOTE Confidence: 0.9751485

00:02:37.250 --> 00:02:38.610 only go into the body,

NOTE Confidence: 0.9751485

00:02:38.610 --> 00:02:39.889 but they will divide there

NOTE Confidence: 0.9751485

00:02:39.889 --> 00:02:40.935 and they will stick

NOTE Confidence: 0.95166016

00:02:41.495 --> 00:02:42.474 around. And we've

NOTE Confidence: 0.99672854

00:02:43.014 --> 00:02:44.215 seen that many of these

NOTE Confidence: 0.99672854

00:02:44.215 --> 00:02:45.595 patients have actually been cured.

NOTE Confidence: 0.962786

00:02:46.294 --> 00:02:48.555 It takes many, many providers

NOTE Confidence: 0.962786

00:02:48.614 --> 00:02:49.355 and professionals,

NOTE Confidence: 0.9291585

00:02:50.135 --> 00:02:51.655 both clinically and in the

NOTE Confidence: 0.9291585

00:02:51.655 --> 00:02:52.155 laboratory,

NOTE Confidence: 0.9269354

00:02:52.455 --> 00:02:54.135 in our cell processing lab,

NOTE Confidence: 0.9269354

00:02:54.135 --> 00:02:56.510 in our epheresis unit to

NOTE Confidence: 0.9269354

00:02:56.730 --> 00:02:57.230 collaboratively

NOTE Confidence: 1

00:02:57.770 --> 00:02:58.270 orchestrate

NOTE Confidence: 0.97753906

00:02:58.570 --> 00:02:59.310 the treatment,

NOTE Confidence: 0.99690753

00:03:00.410 --> 00:03:01.550 that's this complicated.

NOTE Confidence: 0.99960935

00:03:01.850 --> 00:03:03.310 It's a pretty big undertaking

NOTE Confidence: 0.75

00:03:03.770 --> 00:03:04.169 and,

NOTE Confidence: 0.9254964

00:03:04.570 --> 00:03:06.330 it requires a program, not

NOTE Confidence: 0.9254964

00:03:06.330 --> 00:03:06.830 just

NOTE Confidence: 0.74658203

00:03:07.290 --> 00:03:08.110 a physician,

NOTE Confidence: 0.99938965

00:03:08.970 --> 00:03:10.510 to administer these treatments.

NOTE Confidence: 0.98553467

00:03:17.625 --> 00:03:19.465 The FDA approvals for these

NOTE Confidence: 0.98553467

00:03:19.465 --> 00:03:20.845 cells are for

NOTE Confidence: 0.91611737

00:03:21.145 --> 00:03:22.825 diseases really of the blood

NOTE Confidence: 0.91611737

00:03:22.825 --> 00:03:24.125 system, so hematologic

NOTE Confidence: 0.99853516

00:03:24.585 --> 00:03:25.085 neoplasms.

NOTE Confidence: 0.96936035

00:03:26.180 --> 00:03:27.060 There is a lot of

NOTE Confidence: 0.96936035

00:03:27.060 --> 00:03:28.900 research trying to harness the

NOTE Confidence: 0.96936035

00:03:28.900 --> 00:03:29.799 same technology

NOTE Confidence: 0.99938965

00:03:30.099 --> 00:03:31.560 to fight solid tumors.

NOTE Confidence: 0.99658203

00:03:32.500 --> 00:03:33.400 Solid tumors

NOTE Confidence: 0.91074216

00:03:33.940 --> 00:03:35.720 in general are more advanced

NOTE Confidence: 0.9168294

00:03:36.420 --> 00:03:37.799 than blood tumors,

NOTE Confidence: 0.9800166

00:03:38.145 --> 00:03:39.765 So they're much more mutant.

NOTE Confidence: 0.9800166

00:03:39.985 --> 00:03:41.285 They're much more heterogeneous.

NOTE Confidence: 0.9960693

00:03:42.065 --> 00:03:43.584 And so Yale has a

NOTE Confidence: 0.9960693

00:03:43.584 --> 00:03:45.265 number of scientists who are

NOTE Confidence: 0.9960693

00:03:45.265 --> 00:03:47.185 working on finding the right

NOTE Confidence: 0.9960693

00:03:47.185 --> 00:03:49.045 target in a cancer cell.

NOTE Confidence: 0.99401855

00:03:49.425 --> 00:03:50.944 The targets are proteins usually

NOTE Confidence: 0.99401855

00:03:50.944 --> 00:03:51.825 on the surface of those

NOTE Confidence: 0.99401855

00:03:51.825 --> 00:03:52.725 cancer cells.

NOTE Confidence: 0.99658203

00:03:53.280 --> 00:03:53.780 However,

NOTE Confidence: 0.9819336

00:03:54.160 --> 00:03:55.440 the cancer cells can often

NOTE Confidence: 0.9819336

00:03:55.440 --> 00:03:57.920 lose those targets, making them

NOTE Confidence: 0.9819336

00:03:57.920 --> 00:03:58.660 not susceptible.

NOTE Confidence: 0.99902344

00:03:59.280 --> 00:03:59.780 So

NOTE Confidence: 0.9922038

00:04:00.320 --> 00:04:02.000 people are looking for targets

NOTE Confidence: 0.9922038

00:04:02.000 --> 00:04:03.040 that it's very hard for

NOTE Confidence: 0.9922038

00:04:03.040 --> 00:04:04.340 the cancer cell to lose.

NOTE Confidence: 0.99853516

00:04:05.365 --> 00:04:06.565 We have a very active

NOTE Confidence: 0.99853516

00:04:06.565 --> 00:04:08.025 clinical trial portfolio

NOTE Confidence: 0.9983724

00:04:08.645 --> 00:04:09.865 for solid tumors,

NOTE Confidence: 0.98598635

00:04:10.725 --> 00:04:11.765 for a lot of different

NOTE Confidence: 0.98598635

00:04:11.765 --> 00:04:13.525 kinds of cancers and different

NOTE Confidence: 0.98598635

00:04:13.525 --> 00:04:15.065 types of CAR T cells

NOTE Confidence: 0.98598635

00:04:15.125 --> 00:04:17.065 or other T cell redirection

NOTE Confidence: 0.9980469

00:04:17.525 --> 00:04:18.025 type

NOTE Confidence: 0.9995117

00:04:18.404 --> 00:04:18.904 therapies.

NOTE Confidence: 0.9969308

00:04:20.160 --> 00:04:21.279 It's a whole range of

NOTE Confidence: 0.9969308

00:04:21.279 --> 00:04:22.180 research from

NOTE Confidence: 0.99902344

00:04:22.480 --> 00:04:22.980 developing

NOTE Confidence: 0.94596356

00:04:23.440 --> 00:04:24.339 in a laboratory

NOTE Confidence: 0.9591191

00:04:24.640 --> 00:04:25.680 what is going to work

NOTE Confidence: 0.9591191

00:04:25.680 --> 00:04:27.120 and then eventually putting it

NOTE Confidence: 0.9591191

00:04:27.120 --> 00:04:28.720 into people. And that whole

NOTE Confidence: 0.9591191

00:04:28.720 --> 00:04:30.240 range of research is super

NOTE Confidence: 0.9591191

00:04:30.240 --> 00:04:31.600 important if we're gonna get

NOTE Confidence: 0.9591191

00:04:31.600 --> 00:04:33.060 more therapies like this

NOTE Confidence: 0.98264384

00:04:33.360 --> 00:04:34.814 that could really change the

NOTE Confidence: 0.98264384

00:04:34.814 --> 00:04:35.614 face of how we treat

NOTE Confidence: 0.98264384

00:04:35.614 --> 00:04:36.114 cancer.