00:00:00.000 --> 00:00:02.460 Support for Yale Cancer Answers
00:00:02.460 --> 00:00:04.920 comes from AstraZeneca, providing
00:00:05.002 --> 00:00:07.030 important treatment options for
00:00:07.030 --> 00:00:10.072 various types and stages of cancer.
00:00:10.080 --> 00:00:13.800 More information at astrazeneca-us.com.
00:00:13.800 --> 00:00:15.220 Welcome to Yale Cancer
00:00:15.220 --> 00:00:16.640 Answers with your host
00:00:16.640 --> 00:00:18.420 Doctor Anees Chagpar.
00:00:18.420 --> 00:00:20.315 Yale Cancer Answers features the
00:00:20.315 --> 00:00:22.643 latest information on cancer care by
00:00:22.643 --> 00:00:24.135 welcoming oncologists and specialists
00:00:24.135 --> 00:00:26.636 who are on the forefront of the
00:00:26.636 --> 00:00:28.358 battle to fight cancer. This week
00:00:28.360 --> 00:00:30.185 it's a conversation about pediatric
00:00:30.185 --> 00:00:31.280 cancers and lymphoblastic
00:00:31.280 --> 00:00:32.968 leukemia with doctor Aron Flagg.
00:00:33.312 --> 00:00:35.364 Doctor Flagg is an assistant professor
00:00:35.364 --> 00:00:37.176 of Pediatrics in hematology/oncology
00:00:37.176 --> 00:00:39.354 at the Yale School of Medicine,
00:00:39.360 --> 00:00:41.490 where doctor Chagpar is a
00:00:41.490 --> 00:00:42.910 professor of surgical oncology.
00:00:44.480 --> 00:00:46.768 Aron, maybe we can start off by
00:00:46.768 --> 00:00:49.216 you telling us a little bit about
00:00:49.216 --> 00:00:50.660 pediatric cancers in general.
00:00:50.660 --> 00:00:53.019 Nobody ever likes to think
00:00:53.019 --> 00:00:54.560 about cancer occurring in kids,
00:00:54.560 --> 00:00:56.510 but how common are pediatric cancers?
00:00:56.510 --> 00:00:57.160 Overall
00:00:57.160 --> 00:00:58.460 pediatric cancers are rare
00:00:58.460 --> 00:00:59.760 compared to adult cancers.
00:00:59.760 --> 00:01:02.056 The most common that we see is something

00:01:02.056 --> 00:01:04.309 called acute lymphoblastic leukemia or ALL,

00:01:04.310 --> 00:01:06.574 and we see several 1000 cases of ALL

00:01:06.574 --> 00:01:08.859 in the United States every year.

00:01:08.860 --> 00:01:09.478 Beyond that,

00:01:09.478 --> 00:01:11.641 the next most common types of cancers

00:01:11.641 --> 00:01:13.726 are brain tumors or brain cancers,

00:01:13.730 --> 00:01:14.621 of which there

00:01:14.621 --> 00:01:16.403 are a number of types and following

00:01:16.403 --> 00:01:18.412 that there are a number of different

00:01:18.412 --> 00:01:20.070 cancers we can see elsewhere

00:01:20.070 --> 00:01:20.946 throughout the body.

00:01:20.946 --> 00:01:23.589 So tell us a little bit more about ALL.

00:01:23.590 --> 00:01:24.758 How does it present?

00:01:24.758 --> 00:01:25.634 Because

00:01:25.640 --> 00:01:27.368 if you're a parent out there

00:01:27.368 --> 00:01:28.860 and you're listening to this,

00:01:28.860 --> 00:01:29.980 you're kind of thinking,

00:01:29.980 --> 00:01:32.380 I never want my kid to get cancer,

00:01:32.380 --> 00:01:34.249 but Gosh darn it if I ever

00:01:34.249 --> 00:01:35.900 find a sign or symptom,

00:01:35.900 --> 00:01:37.988 I want to know what that is so that

00:01:37.988 --> 00:01:40.288 I can take appropriate next steps.

00:01:40.290 --> 00:01:41.169 Sure, this can

00:01:41.170 --> 00:01:42.712 be tough sometimes because a lot

00:01:42.712 --> 00:01:44.390 of the symptoms are nonspecific,

00:01:44.390 --> 00:01:45.562 meaning they can happen

00:01:45.562 --> 00:01:47.027 for a variety of reasons,

00:01:47.030 --> 00:01:49.907 and many of them are not cancerous.

00:01:49.910 --> 00:01:51.698 So specifically with ALL or

00:01:51.698 --> 00:01:52.592 acute lymphoblastic leukemia,

00:01:52.600 --> 00:01:54.984 many children will be very tired or fatigued.

00:01:54.990 --> 00:01:56.490 They may look very pale.
00:01:56.490 --> 00:01:57.980 They may have bleeding or
00:01:57.980 --> 00:01:59.172 bruising for no reason,
00:01:59.180 --> 00:02:00.938 and then many children will also
00:02:00.938 --> 00:02:03.369 have pain in the bones or the joints,
00:02:03.370 --> 00:02:05.594 and so a limp is also a common
00:02:05.594 --> 00:02:07.249 symptom that patients can have.
00:02:07.250 --> 00:02:09.189 But for other types of cancers that
00:02:09.189 --> 00:02:11.139 can occur really throughout the body,
00:02:11.140 --> 00:02:13.058 the symptoms really depend on what type
00:02:13.058 --> 00:02:15.030 of cancer and where it's occurring,
00:02:15.030 --> 00:02:16.966 so it can be very hard to list
00:02:16.966 --> 00:02:18.609 off one specific symptom
00:02:18.610 --> 00:02:21.228 that might be a sign of cancer.
00:02:21.230 --> 00:02:22.074 So from my standpoint,
00:02:22.074 --> 00:02:23.340 if a parent is worried that
00:02:23.382 --> 00:02:24.310 something is going on,
00:02:24.310 --> 00:02:25.636 if symptoms are there and not
00:02:25.636 --> 00:02:26.730 getting better on their own,
00:02:26.730 --> 00:02:27.830 they should always talk with
00:02:27.830 --> 00:02:28.270 the pediatrician.
00:02:28.940 --> 00:02:30.739 So you know when we think about
00:02:30.739 --> 00:02:33.234 ALL and the symptoms that you
00:02:33.234 --> 00:02:35.304 mentioned are really non specific.
00:02:35.310 --> 00:02:37.648 I mean kids jump around they play,
00:02:37.650 --> 00:02:39.660 they get tired, they get bruised.
00:02:39.660 --> 00:02:41.340 They may have some pain.
00:02:41.340 --> 00:02:43.350 They get pale and
00:02:43.350 --> 00:02:45.247 a lot of people
00:02:45.247 --> 00:02:47.030 go into their pediatricians.
00:02:47.030 --> 00:02:49.375 I think it can be

00:02:49.380 --> 00:02:51.702 really tough and from my standpoint
00:02:51.702 --> 00:02:53.614 when patients finally come to
00:02:53.614 --> 00:02:55.707 see me they almost always have a
00:02:55.707 --> 00:02:57.965 diagnosis or they have a lab test
00:02:57.965 --> 00:02:59.555 that shows something is wrong.
00:02:59.560 --> 00:03:02.161 And so my job in some ways is simpler
00:03:02.161 --> 00:03:04.119 because I know there's a problem.
00:03:04.120 --> 00:03:06.388 I think it's much harder for an
00:03:06.388 --> 00:03:08.343 emergency room doctor or a pediatrician
00:03:08.343 --> 00:03:10.485 to take a child who's got these
00:03:10.547 --> 00:03:12.699 symptoms where 99 out of 100 may be
00:03:12.699 --> 00:03:15.368 fine and pick out the one in 100 who
00:03:15.368 --> 00:03:17.192 really does have a severe problem.
00:03:17.192 --> 00:03:19.016 How do they do that exactly?
00:03:19.020 --> 00:03:20.886 So through careful history, a
00:03:20.886 --> 00:03:22.969 physical exam and through taking
00:03:22.970 --> 00:03:25.259 lab tests to look for things is
00:03:25.259 --> 00:03:27.218 really the best way to do it.
00:03:27.220 --> 00:03:28.456 But far and wide,
00:03:28.456 --> 00:03:30.310 the most important thing is listening
00:03:30.367 --> 00:03:32.390 to parents and looking at the child.
00:03:33.000 --> 00:03:35.072 And what exactly are they listening
00:03:35.072 --> 00:03:36.850 for? And looking for?
00:03:36.850 --> 00:03:38.330 I think when they're listening,
00:03:38.330 --> 00:03:40.100 it's when symptoms don't get better.
00:03:40.100 --> 00:03:41.645 It's something that's been there
00:03:41.645 --> 00:03:43.659 that doesn't seem just like a virus,
00:03:43.660 --> 00:03:45.280 which is probably the most common
00:03:45.280 --> 00:03:47.498 reason for a lot of these complaints
00:03:47.500 --> 00:03:48.624 young kids will have,
00:03:48.624 --> 00:03:51.348 and so when that symptom is there over weeks,

00:03:51.350 --> 00:03:52.534 and instead of getting

00:03:52.534 --> 00:03:53.718 better is getting worse.

00:03:53.720 --> 00:03:55.200 Maybe children are losing weight,

00:03:55.200 --> 00:03:57.568 maybe they are having fevers for no good reason,

00:03:57.570 --> 00:03:59.220 and then again on physical exam

00:03:59.220 --> 00:04:01.492 they may be able to find something

00:04:01.492 --> 00:04:02.968 that's abnormal that

00:04:02.970 --> 00:04:04.356 they might have

00:04:04.356 --> 00:04:05.860 swollen lymph nodes, their liver or

00:04:05.860 --> 00:04:06.852 spleen might be enlarged.

00:04:06.852 --> 00:04:08.340 Something that tips them off to

00:04:08.390 --> 00:04:09.455 something going on that isn't

00:04:09.455 --> 00:04:10.920 the run of the mill problem.

00:04:10.920 --> 00:04:12.366 And you mentioned lab tests.

00:04:12.370 --> 00:04:14.057 What kind of lab tests do

00:04:14.057 --> 00:04:15.500 they get?

00:04:15.500 --> 00:04:16.223 This can be difficult because depending

00:04:16.223 --> 00:04:17.910 on what type of cancer it is,

00:04:17.910 --> 00:04:19.224 certain lab tests may

00:04:19.224 --> 00:04:20.938 or may not be a good screening

00:04:20.938 --> 00:04:22.243 test to use for leukemia.

00:04:22.250 --> 00:04:23.914 The most common lab test we would look

00:04:23.914 --> 00:04:25.798 at is a complete blood count where we

00:04:25.798 --> 00:04:28.030 can look under the microscope with the blood,

00:04:28.030 --> 00:04:29.476 look at the white blood cells,

00:04:29.480 --> 00:04:30.800 red blood cells and platelets to

00:04:30.800 --> 00:04:32.608 see if they are normal and

00:04:32.610 --> 00:04:34.522 to see if there might be leukemia

00:04:34.522 --> 00:04:35.990 cells in the blood as well.

00:04:36.620 --> 00:04:38.796 So for ALL, and we will focus our

00:04:38.796 --> 00:04:40.434 discussion on ALL because that's

00:04:40.434 --> 00:04:42.149 the most common pediatric cancer

00:04:42.149 --> 00:04:44.500 and the one that you specialize in,

00:04:44.500 --> 00:04:46.384 what would you see in that

00:04:46.384 --> 00:04:47.326 complete blood count?

00:04:47.330 --> 00:04:48.910 So children are often anemic,

00:04:48.910 --> 00:04:50.480 meaning the red blood

00:04:50.480 --> 00:04:53.315 cell count is low.

00:04:53.320 --> 00:04:55.840 And red blood cells give your body the ability to carry oxygen.

00:04:55.840 --> 00:04:57.610 It makes the blood red and

00:04:57.610 --> 00:04:59.300 so when children are anemic,

00:04:59.300 --> 00:05:01.190 they're often very pale as well.

00:05:01.190 --> 00:05:03.647 So again, that physical exam might clue

00:05:03.647 --> 00:05:06.496 us into the low red blood cell count.

00:05:06.500 --> 00:05:08.780 Platelets are tiny cells in the blood that

00:05:08.780 --> 00:05:11.410 help to prevent bleeding and to form clots.

00:05:11.410 --> 00:05:13.384 When you get a cut and when

00:05:13.384 --> 00:05:14.790 there's a leukemia present,

00:05:14.790 --> 00:05:16.106 those platelets often become

00:05:16.106 --> 00:05:18.697 also very low and so we can see

00:05:18.697 --> 00:05:20.615 that very easily on a lab test.

00:05:20.620 --> 00:05:22.727 Finally, will look at the white blood

00:05:22.727 --> 00:05:24.611 cell count and leukemia cells are

00:05:24.611 --> 00:05:26.760 an early type of white blood cell,

00:05:26.760 --> 00:05:28.909 and so for many patients with leukemia,

00:05:28.910 --> 00:05:31.059 we might see that white blood cell

00:05:31.060 --> 00:05:32.560 count very elevated because of

00:05:32.560 --> 00:05:34.440 the leukemia cells in the blood,

00:05:34.440 --> 00:05:37.130 and if they see this trifecta,

00:05:37.130 --> 00:05:38.590 they get worried absolutely.

00:05:38.590 --> 00:05:41.047 And does that cinch the diagnosis of ALL?

00:05:41.050 --> 00:05:41.869 Sometimes it does
00:05:41.870 --> 00:05:43.448 so if we can see circulating
00:05:43.448 --> 00:05:44.870 leukemia cells in the blood,
00:05:44.870 --> 00:05:46.774 there's really nothing else that it could be,
00:05:46.780 --> 00:05:48.418 but sometimes it's not so easy.
00:05:48.420 --> 00:05:49.780 Some kids, when they present,
00:05:49.780 --> 00:05:51.418 especially early on in the course,
00:05:51.420 --> 00:05:53.604 may not have leukemia cells in the blood,
00:05:53.610 --> 00:05:55.860 and so if we're not able to make the
00:05:55.860 --> 00:05:57.698 diagnosis directly from a blood count,
00:05:57.700 --> 00:05:59.436 we might talk about doing a bone
00:05:59.436 --> 00:06:01.250 marrow biopsy to confirm a diagnosis.
00:06:01.250 --> 00:06:02.886 And what do you see on
00:06:02.886 --> 00:06:03.974 the bone marrow biopsy?
00:06:03.980 --> 00:06:05.744 So all of the blood is made
00:06:05.744 --> 00:06:06.980 within the bone marrow,
00:06:06.980 --> 00:06:08.884 and so when a leukemia comes on,
00:06:08.890 --> 00:06:10.780 it starts in the bone marrow.
00:06:10.780 --> 00:06:12.383 And when it's there very early
00:06:12.383 --> 00:06:13.778 before it's gotten into the blood,
00:06:13.780 --> 00:06:15.243 we might be able to see it
00:06:15.243 --> 00:06:16.320 in the bone marrow.
00:06:16.320 --> 00:06:17.706 So in a bone marrow biopsy,
00:06:17.710 --> 00:06:19.018 and we place a small needle
00:06:19.018 --> 00:06:20.250 into one of the bones,
00:06:20.250 --> 00:06:21.410 usually in the hip bones,
00:06:21.410 --> 00:06:22.560 they take a sample to
00:06:22.560 --> 00:06:23.720 look at under the microscope,
00:06:23.720 --> 00:06:25.337 and then you see leukemia cells and
00:06:25.337 --> 00:06:26.490 that would
00:06:26.490 --> 00:06:27.941 be the definitive test.

00:06:27.941 --> 00:06:30.048 And then they come to

00:06:30.048 --> 00:06:31.969 you, correct, with this diagnosis?

00:06:31.970 --> 00:06:33.745 And then what happens after they

00:06:33.745 --> 00:06:36.105 get over the shock of, Oh my God,

00:06:36.110 --> 00:06:37.590 my kid has cancer right?

00:06:37.590 --> 00:06:39.578 So a lot of that first meeting

00:06:39.578 --> 00:06:40.850 really is talking about,

00:06:40.850 --> 00:06:43.870 what is cancer?

00:06:43.870 --> 00:06:46.558 And where do we go from here?

00:06:46.560 --> 00:06:48.564 And really trying to get over

00:06:48.564 --> 00:06:50.614 that initial shock which can take

00:06:50.614 --> 00:06:52.546 us several days to let

00:06:52.546 --> 00:06:54.620 everything to sink in and many children,

00:06:54.620 --> 00:06:55.964 when their leukemias first are

00:06:55.964 --> 00:06:57.308 diagnosed are quite ill,

00:06:57.310 --> 00:06:59.506 and so this is usually happening

00:06:59.506 --> 00:07:01.937 in the hospital where we have time

00:07:01.937 --> 00:07:04.023 to sit down and talk outside of

00:07:04.030 --> 00:07:06.333 the constraints of an office visit.

00:07:06.333 --> 00:07:09.070 So how exactly is

00:07:09.070 --> 00:07:10.906 this treated?

00:07:10.906 --> 00:07:12.770 Is it treated through chemotherapy?

00:07:12.770 --> 00:07:14.450 It's given in several phases,

00:07:14.450 --> 00:07:16.130 some of them more intensive,

00:07:16.130 --> 00:07:17.234 especially at the beginning.

00:07:17.234 --> 00:07:20.192 Some of them later on in the course are much

00:07:20.192 --> 00:07:22.064 easier to tolerate the beginning course.

00:07:22.070 --> 00:07:23.732 We call induction chemotherapy some of

00:07:23.732 --> 00:07:25.669 that time is spent in the hospital,

00:07:25.670 --> 00:07:26.778 especially until the leukemia

00:07:26.778 --> 00:07:28.163 starts to go into remission.

00:07:28.170 --> 00:07:29.826 The majority of the rest of
00:07:29.826 --> 00:07:31.253 therapy is actually given in
00:07:31.253 --> 00:07:32.598 the office as an outpatient,
00:07:32.600 --> 00:07:34.476 where patients may have to come once
00:07:34.476 --> 00:07:36.363 or twice a week for several months
00:07:36.363 --> 00:07:38.420 in a row to get their therapy,
00:07:38.420 --> 00:07:40.904 and then it ends with the course of therapy
00:07:40.910 --> 00:07:41.974 that we call maintenance chemotherapy.
00:07:41.974 --> 00:07:43.960 Meaning leukemia is in remission,
00:07:43.960 --> 00:07:46.168 and we're trying to keep it that way.
00:07:46.170 --> 00:07:47.250 Maintenance therapy is usually
00:07:47.250 --> 00:07:49.220 given on a once a month basis.
00:07:49.220 --> 00:07:50.328 Also in the office,
00:07:50.328 --> 00:07:52.680 but goes on for many years, usually
00:07:52.680 --> 00:07:54.060 two to three years from diagnosis.
00:07:55.750 --> 00:07:57.440 So these children are essentially getting
00:07:57.440 --> 00:07:58.792 chemotherapy for potentially years?
00:07:58.800 --> 00:08:01.842 Yes, if it's a very long road and even
00:08:01.850 --> 00:08:02.846 in maintenance chemotherapy,
00:08:02.846 --> 00:08:06.257 or we think about a once a month visit to
00:08:06.257 --> 00:08:08.630 the oncology office when they're at home,
00:08:08.630 --> 00:08:10.320 they're often still taking chemotherapy
00:08:10.320 --> 00:08:12.699 by mouth every day or every week.
00:08:13.330 --> 00:08:15.430 And what are the effects of that?
00:08:15.430 --> 00:08:17.494 I mean, do they get sick and they
00:08:17.494 --> 00:08:19.606 still go to school?
00:08:19.606 --> 00:08:21.540 What happens to their friends and how
00:08:21.540 --> 00:08:23.530 does this affect their lives?
00:08:23.530 --> 00:08:24.630 That's a great question.
00:08:24.630 --> 00:08:26.670 Many of our patients can lead nearly
00:08:26.670 --> 00:08:28.325 normal lives going through this,

00:08:28.330 --> 00:08:29.830 although every patient is different.
00:08:29.830 --> 00:08:31.930 There certainly is a risk of infection,
00:08:31.930 --> 00:08:33.610 especially at the beginning when the
00:08:33.610 --> 00:08:35.230 chemotherapy is much more intensive.
00:08:35.230 --> 00:08:37.337 But really after that first month
00:08:37.337 --> 00:08:39.129 until the leukemia is in remission,
00:08:39.130 --> 00:08:41.510 after which we really advise children to
00:08:41.510 --> 00:08:44.497 try to have as normal a life as possible.
00:08:44.500 --> 00:08:46.726 We encourage kids to go to school.
00:08:46.730 --> 00:08:48.518 We encourage them to have normal
00:08:48.518 --> 00:08:50.240 relationships with friends and relatives.
00:08:50.240 --> 00:08:52.154 We really try to focus on
00:08:52.154 --> 00:08:53.430 keeping their quality of
00:08:53.430 --> 00:08:55.030 life as normal as possible.
00:08:55.030 --> 00:08:57.333 Tell me about the side effects of
00:08:57.333 --> 00:08:58.859 these chemotherapies because you know,
00:08:58.860 --> 00:09:01.420 I can imagine if you're a kid and
00:09:01.420 --> 00:09:03.638 you're trying to have a normal life,
00:09:03.640 --> 00:09:05.677 but you've lost your
00:09:05.677 --> 00:09:07.641 hair and your friends are calling
00:09:07.641 --> 00:09:09.699 you bald and you're feeling sick,
00:09:09.700 --> 00:09:11.856 and it might be easier said
00:09:11.856 --> 00:09:14.490 than done to have a normal life.
00:09:14.620 --> 00:09:15.727 Yeah, absolutely.
00:09:15.727 --> 00:09:18.310 And we're fortunate now that many children
00:09:18.373 --> 00:09:20.509 are able to be cured of their cancer.
00:09:20.510 --> 00:09:23.078 In fact, most children with ALL are
00:09:23.078 --> 00:09:26.070 able to be cured and so many years ago,
00:09:26.070 --> 00:09:28.345 our primary focus was curing the cancer.
00:09:28.350 --> 00:09:30.342 Now, because of the improvements in
00:09:30.342 --> 00:09:32.280 the chemotherapy that we can offer,

00:09:32.280 --> 00:09:34.527 we can focus on other issues like

00:09:34.527 --> 00:09:36.528 you mentioned quality of life,

00:09:36.530 --> 00:09:38.492 not just being able to get

00:09:38.492 --> 00:09:39.800 the cancer under control.

00:09:39.800 --> 00:09:42.680 We do work with psychologists to help with

00:09:42.680 --> 00:09:44.828 that transition back into normal life.

00:09:44.830 --> 00:09:46.816 You know, especially in teenagers

00:09:46.816 --> 00:09:49.168 body image is really important to be

00:09:49.168 --> 00:09:51.409 able to find ways to get through life.

00:09:51.410 --> 00:09:54.098 You know that may be different

00:09:54.098 --> 00:09:56.165 than it was before

00:09:56.165 --> 00:09:58.090 the chemotherapy in terms of side effects,

00:10:00.110 --> 00:10:02.462 Some patients may have a lot

00:10:02.462 --> 00:10:04.759 of nausea there may be infection.

00:10:04.760 --> 00:10:07.320 Many patients need transfusions because

00:10:07.320 --> 00:10:09.880 of side effects of chemotherapy.

00:10:09.880 --> 00:10:11.542 And we're not also focusing just

00:10:11.542 --> 00:10:13.523 on the side effects that we see

00:10:13.523 --> 00:10:15.155 right at the time of chemotherapy.

00:10:15.160 --> 00:10:16.828 We're also focusing now on the

00:10:16.828 --> 00:10:17.940 long term side effects.

00:10:17.940 --> 00:10:19.590 The late effects that might happen

00:10:19.590 --> 00:10:21.720 five years down the road, 10 years,

00:10:21.720 --> 00:10:22.440 20 years.

00:10:22.440 --> 00:10:24.600 Whether that's a problem with hormones

00:10:24.669 --> 00:10:26.967 affects on the heart or on bone development,

00:10:26.970 --> 00:10:29.386 really trying to find ways that we can

00:10:29.386 --> 00:10:31.424 improve upon those late outcomes and

00:10:31.424 --> 00:10:33.482 really give kids the best possible

00:10:33.490 --> 00:10:34.878 life after their therapy.

00:10:34.878 --> 00:10:36.960 So with chemotherapy, you

00:10:37.025 --> 00:10:39.355 tend to lose your hair, and I suppose
00:10:39.355 --> 00:10:41.638 that's the case with ALL as well.
00:10:41.640 --> 00:10:44.248 But you know, with other kinds of cancer,
00:10:44.250 --> 00:10:46.539 the therapies are much shorter and we
00:10:46.539 --> 00:10:48.810 always tell people don't worry your hair
00:10:48.810 --> 00:10:50.440 will grow back, but when they're
00:10:50.440 --> 00:10:52.400 getting years of therapy, I mean,
00:10:52.400 --> 00:10:54.675 do they ever grow their hair back?
00:10:54.680 --> 00:10:57.288 I mean, can they ever truly feel normal?
00:10:57.530 --> 00:10:59.066 Yeah, so the hair loss tends
00:10:59.066 --> 00:11:00.090 to be reasonably temporary,
00:11:00.090 --> 00:11:01.960 again we see it at the early parts of
00:11:02.010 --> 00:11:03.930 therapy with more intensive chemotherapy.
00:11:03.930 --> 00:11:05.210 Fortunately, by the time children
00:11:05.210 --> 00:11:05.978 are on maintenance chemotherapy,
00:11:05.980 --> 00:11:07.793 the low levels of medicines that we're
00:11:07.793 --> 00:11:09.818 giving do tend to allow hair to regrow,
00:11:09.820 --> 00:11:11.682 and so usually once you're in that
00:11:11.682 --> 00:11:13.150 maintenance cycle for a few months,
00:11:13.150 --> 00:11:15.190 we start to see the hair come back.
00:11:15.190 --> 00:11:15.702 And interestingly,
00:11:15.702 --> 00:11:17.750 a lot of the times it comes back
00:11:17.750 --> 00:11:18.886 thicker, it's curly,
00:11:18.886 --> 00:11:20.590 are so often it gives us something
00:11:20.642 --> 00:11:22.350 to talk about in the office in
00:11:22.350 --> 00:11:23.823 terms of comparing what their hair
00:11:23.823 --> 00:11:25.426 was before and what it is now.
00:11:26.130 --> 00:11:28.356 And one of
00:11:28.356 --> 00:11:29.946 the good things, I suppose,
00:11:29.946 --> 00:11:32.490 is that you know kids are living longer.
00:11:32.490 --> 00:11:35.026 Tell us about the prognosis with ALL.

00:11:35.030 --> 00:11:36.620 I mean, almost all patients
00:11:36.620 --> 00:11:37.892 you mentioned are cured.
00:11:39.800 --> 00:11:41.028 A very good proportion of them are.
00:11:41.028 --> 00:11:43.807 We are now able to identify for the most
00:11:43.807 --> 00:11:46.242 part which children are going to be cured
00:11:46.242 --> 00:11:48.650 by chemotherapy and cured
00:11:48.650 --> 00:11:51.248 of their ALL early on in their therapy.
00:11:51.250 --> 00:11:53.950 And then we can also predict which kids may
00:11:53.950 --> 00:11:56.497 have a harder time to achieve remission.
00:11:56.500 --> 00:11:58.360 How do we do that?
00:11:58.360 --> 00:12:00.488 Some of its based on very simple things
00:12:00.488 --> 00:12:02.616 like age, so we know that older kids,
00:12:02.620 --> 00:12:03.950 especially adolescents or young adults,
00:12:03.950 --> 00:12:06.946 have a harder time to be cured
00:12:06.946 --> 00:12:08.230 than younger kids.
00:12:08.230 --> 00:12:09.830 That said, very young children,
00:12:09.830 --> 00:12:12.070 especially less than one year, may also
00:12:12.070 --> 00:12:13.990 have a problem getting into remission.
00:12:13.990 --> 00:12:15.910 So we can start with that.
00:12:15.910 --> 00:12:17.830 We also follow response to therapy,
00:12:17.830 --> 00:12:18.649 and
00:12:18.649 --> 00:12:20.560 what most people have been looking at the
00:12:20.624 --> 00:12:22.700 past few years is something called
00:12:22.700 --> 00:12:24.870 minimal residual disease or MRD analysis.
00:12:24.870 --> 00:12:26.470 It's a way for us,
00:12:26.470 --> 00:12:28.070 through a bone marrow test,
00:12:28.070 --> 00:12:30.310 to see how much of a remission
00:12:30.310 --> 00:12:31.270 somebody gets into,
00:12:31.270 --> 00:12:33.601 and we know that the deeper a
00:12:33.601 --> 00:12:35.352 remission the patient enters early on
00:12:35.352 --> 00:12:37.077 in their therapy predicts whether

00:12:37.077 --> 00:12:38.719 or not they'll be cured.

00:12:38.720 --> 00:12:40.736 And so with this information we can

00:12:40.736 --> 00:12:42.416 tell patients within a few months

00:12:42.416 --> 00:12:43.928 of their diagnosis whether or not

00:12:43.928 --> 00:12:45.699 we expect with a good certainty

00:12:45.699 --> 00:12:46.867 that they'll be cured,

00:12:46.870 --> 00:12:48.662 or whether or not we think there may

00:12:48.662 --> 00:12:50.674 be a challenge for patients who respond

00:12:50.674 --> 00:12:53.330 quickly who are in a favorable age range.

00:12:53.330 --> 00:12:54.788 More than 95% of those children

00:12:54.788 --> 00:12:56.420 can be cured through chemotherapy.

00:12:56.420 --> 00:12:57.532 For some older children,

00:12:57.532 --> 00:12:58.922 especially young adults or patients

00:12:58.922 --> 00:13:00.638 who don't quickly go into remission,

00:13:00.640 --> 00:13:02.607 there may be more of a struggle,

00:13:02.610 --> 00:13:04.290 and sometimes that may be more

00:13:04.290 --> 00:13:05.407 50 or 70% chance.

00:13:05.684 --> 00:13:08.509 I'd hate to be in that last group where you

00:13:08.510 --> 00:13:11.471 tell me that there's going to be a bit

00:13:11.471 --> 00:13:14.529 of a challenge for me to get a cure.

00:13:14.530 --> 00:13:17.206 What do you do about that?

00:13:17.206 --> 00:13:19.534 I would be like,

00:13:19.540 --> 00:13:21.292 well thank you for telling me

00:13:21.292 --> 00:13:23.302 that I might struggle,

00:13:23.302 --> 00:13:25.380 but what are you gonna do about

00:13:25.380 --> 00:13:26.840 it right now?

00:13:26.840 --> 00:13:29.176 These are very hard conversations to have and

00:13:29.180 --> 00:13:30.640 it's really through research that

00:13:30.640 --> 00:13:32.390 we're trying to find better ways,

00:13:32.390 --> 00:13:34.088 especially in these high risk groups

00:13:34.088 --> 00:13:36.480 to do better to get them in remission.

00:13:36.480 --> 00:13:38.148 So we participate in a large
00:13:38.148 --> 00:13:39.260 Children's Hospital Consortium called
00:13:39.305 --> 00:13:40.569 the children's oncology group
00:13:40.570 --> 00:13:42.358 that's really doing most of the
00:13:42.358 --> 00:13:44.443 research in the country to look at
00:13:44.443 --> 00:13:46.105 how we can achieve better outcomes.
00:13:46.110 --> 00:13:48.096 And that's using new medications that
00:13:48.100 --> 00:13:49.705 may work differently than the
00:13:49.705 --> 00:13:50.989 older types of chemotherapy,
00:13:50.990 --> 00:13:53.237 or even doing much more aggressive treatment,
00:13:53.240 --> 00:13:55.480 such as things like bone marrow transplant
00:13:55.480 --> 00:13:56.528 earlier on.
00:13:56.528 --> 00:13:58.562 We're going to pick up the conversation
00:13:58.562 --> 00:14:00.956 looking at those newer treatments and
00:14:00.956 --> 00:14:03.074 other treatments right after we take
00:14:03.074 --> 00:14:04.790 a short break for medical minute.
00:14:04.790 --> 00:14:06.883 Please stay tuned to learn more about
00:14:06.883 --> 00:14:08.174 pediatric cancers and lymphoblastic
00:14:08.174 --> 00:14:10.568 leukemia with my guest Doctor Aron Flagg.
00:14:11.290 --> 00:14:13.855 Support for Yale Cancer Answers
00:14:13.855 --> 00:14:16.420 comes from AstraZeneca, working to
00:14:16.506 --> 00:14:19.425 eliminate cancer as a cause of death.
00:14:19.430 --> 00:14:23.330 Learn more at astrazeneca-us.com.
00:14:23.330 --> 00:14:26.179 This is a medical minute about Melanoma.
00:14:26.180 --> 00:14:28.215 While Melanoma accounts for only
00:14:28.215 --> 00:14:30.510 about 4% of skin cancer cases,
00:14:30.510 --> 00:14:32.730 it causes the most skin cancer
00:14:32.806 --> 00:14:34.730 deaths. When detected early,
00:14:34.730 --> 00:14:36.760 however, Melanoma is easily treated
00:14:36.760 --> 00:14:38.384 and highly curable. Clinical
00:14:38.390 --> 00:14:40.724 trials are currently underway to test

00:14:40.724 --> 00:14:42.870 innovative new treatments for Melanoma.

00:14:42.870 --> 00:14:45.474 The goal of the specialized programs

00:14:45.474 --> 00:14:47.662 of research excellence in skin

00:14:47.662 --> 00:14:50.308 cancer or spore grant is to better

00:14:50.308 --> 00:14:52.750 understand the biology of skin cancer.

00:14:52.750 --> 00:14:54.625 With a focus on discovering

00:14:54.625 --> 00:14:57.165 targets that will lead to improved

00:14:57.165 --> 00:14:58.920 diagnosis and treatment,

00:14:58.920 --> 00:15:00.684 more information is available

00:15:00.684 --> 00:15:01.566 at yalecancercenter.org.

00:15:01.570 --> 00:15:05.428 You're listening to Connecticut public radio.

00:15:05.430 --> 00:15:05.820 Welcome

00:15:05.820 --> 00:15:07.750 back to Yale Cancer Answers.

00:15:07.750 --> 00:15:09.922 This is doctor Anees Chagpar

00:15:09.922 --> 00:15:11.862 and I'm joined tonight

00:15:11.862 --> 00:15:14.310 by my guest Doctor Aron Flagg.

00:15:14.310 --> 00:15:16.240 We're talking about pediatric cancers,

00:15:16.240 --> 00:15:17.395 and in particular,

00:15:17.395 --> 00:15:18.550 acute lymphoblastic leukemia,

00:15:18.550 --> 00:15:20.925 which is the most common

00:15:20.925 --> 00:15:22.350 cancer affecting children.

00:15:22.350 --> 00:15:24.882 And right before the break

00:15:24.882 --> 00:15:27.449 Aron you said that

00:15:27.450 --> 00:15:29.360 we've done really well in

00:15:29.360 --> 00:15:32.313 terms of treating ALL and for a

00:15:32.313 --> 00:15:34.245 particular subgroup of patients,

00:15:34.250 --> 00:15:36.658 those who tend to be younger

00:15:36.658 --> 00:15:39.256 children but not too young who

00:15:39.256 --> 00:15:41.248 achieve remission with induction

00:15:41.248 --> 00:15:42.742 chemotherapy that

00:15:42.750 --> 00:15:45.725 those patients have a reasonably good shot,

00:15:45.730 --> 00:15:48.280 95% chance of achieving a cure.
00:15:48.280 --> 00:15:51.248 But then there's another group of patients,
00:15:51.250 --> 00:15:54.470 those who may not respond so well
00:15:54.470 --> 00:15:57.466 to initial chemotherapy who may be older
00:15:59.610 --> 00:16:04.600 who don't have as good of a shot of cure.
00:16:04.600 --> 00:16:06.889 And so you started to mention that
00:16:06.889 --> 00:16:09.899 in that group of patients there are
00:16:09.899 --> 00:16:11.859 other things besides traditional
00:16:11.859 --> 00:16:13.728 chemotherapy that you look at.
00:16:13.730 --> 00:16:15.720 Tell us more about that.
00:16:15.720 --> 00:16:16.908 Sure, I
00:16:16.910 --> 00:16:20.870 like to think of chemotherapy as
00:16:20.870 --> 00:16:22.400 very non specific medicine that
00:16:22.400 --> 00:16:24.686 attack cells in the body that are
00:16:24.686 --> 00:16:26.426 growing quickly, like cancer cells.
00:16:26.430 --> 00:16:29.041 They also cause a lot of side effects,
00:16:29.041 --> 00:16:31.770 but as we've kind of plateaued with how
00:16:31.770 --> 00:16:34.032 well those medicines work we're looking
00:16:34.032 --> 00:16:36.813 for other avenues and so we are now using
00:16:36.813 --> 00:16:38.528 many drugs called targeted agents,
00:16:38.528 --> 00:16:41.160 so not just to blindly kill off all
00:16:41.224 --> 00:16:43.660 the cancer cells but really to find
00:16:43.660 --> 00:16:45.642 specific targets on those cancer cells
00:16:45.642 --> 00:16:48.181 to hone in on that and make them
00:16:48.181 --> 00:16:51.187 much more effective than other drugs.
00:16:51.190 --> 00:16:53.110 We have used methods like pursuing
00:16:53.110 --> 00:16:55.117 a bone marrow transplant that allows
00:16:55.117 --> 00:16:57.133 us to give extraordinary doses of
00:16:57.133 --> 00:16:58.657 chemotherapy and give new bone
00:16:58.657 --> 00:17:00.512 marrow and then really in the past
00:17:00.520 --> 00:17:02.557 few years we've also used types of

00:17:02.557 --> 00:17:03.940 interventions called cellular therapies,

00:17:03.940 --> 00:17:06.196 so we're now able to take a patient's

00:17:06.196 --> 00:17:08.184 own immune system to engineer cells

00:17:08.184 --> 00:17:10.704 in a laboratory, put them back in,

00:17:10.704 --> 00:17:12.450 and allow those cells to attack

00:17:12.511 --> 00:17:13.579 the cancer itself.

00:17:13.580 --> 00:17:15.350 And so we have really many

00:17:15.350 --> 00:17:17.000 new ways to treat these,

00:17:17.000 --> 00:17:18.555 to provide options for patients

00:17:18.555 --> 00:17:19.799 who previously didn't have

00:17:19.800 --> 00:17:21.184 those.

00:17:21.184 --> 00:17:22.556 That sounds really interesting, so let's take

00:17:22.556 --> 00:17:24.608 each of those three in turn.

00:17:24.610 --> 00:17:26.320 Sure, so first, targeted therapies.

00:17:26.320 --> 00:17:28.570 I mean, we've spent a lot of time on

00:17:28.570 --> 00:17:30.678 this show talking about precision

00:17:30.678 --> 00:17:32.474 medicine and targeted therapy,

00:17:32.480 --> 00:17:33.998 and personalized medicine

00:17:33.998 --> 00:17:37.034 and so on and so forth

00:17:37.040 --> 00:17:39.482 where there's often a target on

00:17:39.482 --> 00:17:42.853 a cancer cell and we have a drug

00:17:42.853 --> 00:17:44.923 that will attack said target,

00:17:44.930 --> 00:17:47.025 essentially being more like a

00:17:47.025 --> 00:17:49.490 sniper rather than a machine gun

00:17:49.919 --> 00:17:52.064 at attacking these cancers.

00:17:52.064 --> 00:17:54.890 Tell us more about that approach in ALL.

00:17:54.890 --> 00:17:56.129 Yeah, so we

00:17:56.130 --> 00:17:58.560 know that mutations in the genetic

00:17:58.560 --> 00:18:01.047 code of these cancer cells is

00:18:01.047 --> 00:18:03.032 really what turns them from

00:18:03.032 --> 00:18:05.259 normal cells into cancer cells,

00:18:05.260 --> 00:18:07.430 and many of those changes,
00:18:07.430 --> 00:18:09.254 do have medicines that might
00:18:09.254 --> 00:18:11.072 affect those and slow down the
00:18:11.072 --> 00:18:12.955 growth of those cancer cells so we
00:18:12.955 --> 00:18:15.156 do have several of those available.
00:18:15.160 --> 00:18:15.706 In particular,
00:18:15.706 --> 00:18:17.344 there's a type of ALL called
00:18:17.344 --> 00:18:18.318 Philadelphia chromosome positive
00:18:18.318 --> 00:18:19.479 acute lymphoblastic leukemia,
00:18:19.480 --> 00:18:21.316 where there have been drugs on
00:18:21.316 --> 00:18:23.189 the market even since the 1990s,
00:18:23.190 --> 00:18:24.422 that specifically attack that
00:18:24.422 --> 00:18:25.038 Philadelphia chromosome,
00:18:25.040 --> 00:18:27.189 and so this was a disease that
00:18:27.189 --> 00:18:28.440 again 10-20 years ago,
00:18:28.440 --> 00:18:29.985 we might have recommended everybody
00:18:29.985 --> 00:18:31.530 have a bone marrow transplant,
00:18:31.530 --> 00:18:33.606 now most children don't need a
00:18:33.606 --> 00:18:35.303 bone marrow transplant because we
00:18:35.303 --> 00:18:37.088 can give a target before that.
00:18:37.090 --> 00:18:38.980 In that case,
00:18:38.980 --> 00:18:42.770 where we have targeted agents,
00:18:42.770 --> 00:18:45.194 do we give that instead of the induction
00:18:45.200 --> 00:18:47.055 chemotherapy and so on and so forth
00:18:47.055 --> 00:18:48.850 that you had mentioned before?
00:18:48.850 --> 00:18:50.370 Because it sounds like if
00:18:50.370 --> 00:18:51.890 you have a sniper, why
00:18:51.890 --> 00:18:53.410 use the machine gun, right?
00:18:53.410 --> 00:18:55.538 So right now these are really adjunctive,
00:18:55.540 --> 00:18:57.668 we give them in addition
00:18:57.668 --> 00:18:58.580 to traditional chemotherapy.

00:18:58.580 --> 00:19:00.836 It certainly may hit a point though that
00:19:00.836 --> 00:19:03.104 as these medicines improve or we find
00:19:03.104 --> 00:19:05.269 different ones that we might not have
00:19:05.270 --> 00:19:06.780 to give the same traditional
00:19:06.780 --> 00:19:07.384 chemotherapy anymore.
00:19:07.390 --> 00:19:08.910 But we're not there yet.
00:19:08.910 --> 00:19:11.054 OK, so if you have a particular kind
00:19:11.054 --> 00:19:13.468 of ALL that has a particular marker,
00:19:13.470 --> 00:19:15.410 for example the Philadelphia
00:19:15.410 --> 00:19:16.865 chromosome positive ALL,
00:19:16.870 --> 00:19:18.865 then targeted therapy is something
00:19:18.865 --> 00:19:20.860 that should certainly be
00:19:20.927 --> 00:19:22.495 part of the regimen absolutely,
00:19:22.495 --> 00:19:24.994 but then you mentioned the 2nd
00:19:24.994 --> 00:19:27.274 which was bone marrow transplant and
00:19:27.274 --> 00:19:29.644 you had mentioned before the break
00:19:29.644 --> 00:19:32.311 that the bone marrow is really the
00:19:32.311 --> 00:19:34.498 place where these cells are developed,
00:19:34.498 --> 00:19:37.144 and so in the factory that's making
00:19:37.144 --> 00:19:40.365 all of your red blood cells and white
00:19:40.365 --> 00:19:42.748 blood cells and platelets and so on.
00:19:42.750 --> 00:19:44.246 In that bone marrow,
00:19:44.246 --> 00:19:46.116 that's where the leukemias developed,
00:19:46.120 --> 00:19:48.616 and so with bone marrow transplant,
00:19:48.620 --> 00:19:50.100 you're really thinking about
00:19:50.100 --> 00:19:51.950 wiping out that bone marrow,
00:19:51.950 --> 00:19:54.330 and you mentioned that the purpose of
00:19:54.330 --> 00:19:57.446 that is to give really high doses of
00:19:57.446 --> 00:20:00.179 chemotherapy. Tell us more about how that works.
00:20:00.820 --> 00:20:02.850 So right now when you
00:20:02.850 --> 00:20:04.660 give regular doses of chemotherapy,

00:20:04.660 --> 00:20:06.580 it does attack the leukemia cells,
00:20:06.580 --> 00:20:09.460 but we can only give so much of it.
00:20:09.460 --> 00:20:11.315 And when you try to give very
00:20:11.315 --> 00:20:12.980 high doses of chemotherapy,
00:20:12.980 --> 00:20:14.900 we see so many side effects,
00:20:14.900 --> 00:20:16.820 especially to healthy bone marrow cells,
00:20:16.820 --> 00:20:18.584 that there's really a limit to how
00:20:18.584 --> 00:20:20.676 much we can give in the setting
00:20:20.676 --> 00:20:21.948 of bone marrow transplantation
00:20:21.948 --> 00:20:23.820 or stem cell transplantation for
00:20:23.820 --> 00:20:25.775 treating a cancer like leukemia.
00:20:25.780 --> 00:20:27.726 The idea is that we give astronomically
00:20:27.726 --> 00:20:29.300 high doses of chemotherapy,
00:20:29.300 --> 00:20:30.452 sometimes radiation therapy,
00:20:30.452 --> 00:20:34.099 to try to wipe out not just the leukemia,
00:20:34.100 --> 00:20:36.788 but we might also remove the healthy bone
00:20:36.788 --> 00:20:39.377 marrow as well by giving a transplant.
00:20:39.380 --> 00:20:41.486 It allows us to restore that
00:20:41.490 --> 00:20:42.894 normal bone marrow function.
00:20:42.894 --> 00:20:44.616 So two questions, first question,
00:20:44.616 --> 00:20:46.947 if you're going to give somebody an
00:20:46.947 --> 00:20:48.530 astronomical amount of chemotherapy,
00:20:48.530 --> 00:20:51.514 so much so that is going to wipe
00:20:51.514 --> 00:20:54.050 out their entire bone marrow,
00:20:54.050 --> 00:20:56.826 doesn't that give them a whole lot of
00:20:56.826 --> 00:20:58.877 side effects like why do that?
00:20:58.880 --> 00:21:01.232 I mean, unless we know that the
00:21:01.232 --> 00:21:03.368 response rate is better to that,
00:21:03.370 --> 00:21:05.785 but we're using it in people who
00:21:05.785 --> 00:21:07.163 aren't responding anyways, right?
00:21:07.163 --> 00:21:07.849 So the

00:21:07.850 --> 00:21:09.920 idea is that for some patients,
00:21:09.920 --> 00:21:11.990 if they have some resistance to
00:21:11.990 --> 00:21:13.370 the chemotherapy they're getting
00:21:13.370 --> 00:21:15.440 that if we give different types
00:21:15.440 --> 00:21:16.820 of chemotherapy, and especially
00:21:16.820 --> 00:21:18.545 very high doses of chemotherapy,
00:21:18.550 --> 00:21:20.590 that we can hopefully overcome some
00:21:20.590 --> 00:21:22.340 of that resistance that's there.
00:21:22.340 --> 00:21:23.772 But you're absolutely right,
00:21:23.772 --> 00:21:25.562 there's a lot of toxicity
00:21:25.570 --> 00:21:28.747 to this and one of the key areas of
00:21:28.747 --> 00:21:31.493 research right now is how can we
00:21:31.493 --> 00:21:33.840 provide similar rates of response,
00:21:33.840 --> 00:21:36.205 but without so much toxicity there.
00:21:36.205 --> 00:21:38.176 There's definitely favorable
00:21:38.176 --> 00:21:40.145 studies on the horizon, again,
00:21:40.145 --> 00:21:42.910 some of this is targeted therapies.
00:21:42.910 --> 00:21:44.462 There's even newer chemotherapies
00:21:44.462 --> 00:21:47.197 that are out there that can still
00:21:47.197 --> 00:21:48.912 provide we call myeloablation
00:21:48.912 --> 00:21:51.180 a strong dose of chemotherapy,
00:21:51.180 --> 00:21:54.330 but without so many side effects to the
00:21:54.330 --> 00:21:55.686 other organs.
00:21:55.686 --> 00:21:57.042 Who exactly would need a
00:21:57.042 --> 00:21:58.390 bone marrow transplant?
00:21:58.390 --> 00:22:00.100 Because it sounds right now
00:22:00.100 --> 00:22:01.810 the way you've described it, pretty scary.
00:22:06.256 --> 00:22:07.966 It's absolutely something that
00:22:07.966 --> 00:22:10.357 I think should be taken with caution.
00:22:10.360 --> 00:22:12.442 We use bone marrow transplant really
00:22:12.442 --> 00:22:14.808 for patients who really need it,

00:22:14.810 --> 00:22:16.966 so we wouldn't want to give a
00:22:16.966 --> 00:22:18.595 transplant to somebody who we
00:22:18.595 --> 00:22:20.515 think is likely to be cured
00:22:20.515 --> 00:22:21.990 through traditional chemotherapy.
00:22:21.990 --> 00:22:24.384 So for a patient with leukemia again,
00:22:24.390 --> 00:22:26.250 these are patients we anticipate
00:22:26.250 --> 00:22:27.954 to be at very high risk,
00:22:27.960 --> 00:22:29.316 maybe their cancer has
00:22:29.316 --> 00:22:30.658 already come back and we're trying
00:22:30.658 --> 00:22:32.023 to cure it for a second time.
00:22:34.360 --> 00:22:37.360 We can use this also for a lot of other
00:22:37.443 --> 00:22:40.138 cancers that aren't just leukemias.
00:22:40.140 --> 00:22:41.692 Sometimes we use chemotherapy
00:22:41.692 --> 00:22:43.632 and high dose chemotherapy with
00:22:43.632 --> 00:22:45.907 a rescue transplant or rescue the
00:22:45.907 --> 00:22:48.220 bone marrow for other solid tumors.
00:22:48.220 --> 00:22:50.656 So sometimes for lymphomas or lymph node
00:22:50.656 --> 00:22:53.229 cancers for a common abdominal tumor,
00:22:53.230 --> 00:22:55.410 and young children with neuroblastoma
00:22:55.410 --> 00:22:58.636 we will give chemotherapy as a way to maximize
00:22:58.636 --> 00:23:01.310 how much treatment we can give them.
00:23:01.310 --> 00:23:03.734 We also use stem cell transplant
00:23:03.734 --> 00:23:05.920 for diseases that aren't cancer.
00:23:05.920 --> 00:23:07.551 We can use them to treat a
00:23:07.551 --> 00:23:08.800 variety of blood diseases,
00:23:08.800 --> 00:23:09.583 especially sickle cell
00:23:09.583 --> 00:23:10.366 disease or thalassemia.
00:23:10.370 --> 00:23:11.942 We can also use them to
00:23:11.942 --> 00:23:12.990 replace an immune system,
00:23:12.990 --> 00:23:14.824 so for a child that has a
00:23:14.824 --> 00:23:15.348 severe immunodeficiency,

00:23:15.350 --> 00:23:17.030 but you can use this to restore
00:23:17.030 --> 00:23:18.230 their normal immune function,
00:23:18.230 --> 00:23:18.884 and then lastly,
00:23:18.884 --> 00:23:20.763 we can also use transplant as a way
00:23:20.763 --> 00:23:22.263 to treat certain genetic diseases
00:23:22.263 --> 00:23:23.463 or metabolic diseases where,
00:23:23.470 --> 00:23:23.711 say,
00:23:23.711 --> 00:23:25.398 a patient is missing an enzyme and
00:23:25.398 --> 00:23:27.381 we can give them a new bone marrow
00:23:27.381 --> 00:23:29.014 that can then make that enzyme
00:23:29.014 --> 00:23:30.549 from which they're deficient so
00:23:30.550 --> 00:23:32.908 it can be used for a lot of things,
00:23:32.910 --> 00:23:35.259 but it still has a lot of side effects.
00:23:35.880 --> 00:23:37.576 And so again we are
00:23:37.576 --> 00:23:39.247 always very careful to make sure when
00:23:39.247 --> 00:23:40.920 we recommend a transplant for a patient,
00:23:40.920 --> 00:23:42.856 that we really think that is the best
00:23:42.856 --> 00:23:44.350 option compared to what else might be
00:23:44.350 --> 00:23:45.283 available for them.
00:23:45.283 --> 00:23:47.149 My second question is,
00:23:47.150 --> 00:23:49.534 you talk about wiping out the bone marrow,
00:23:49.540 --> 00:23:51.640 but people need bone marrow to survive.
00:23:51.640 --> 00:23:54.024 because that's where all of our cells are
00:23:55.154 --> 00:23:57.320 and the blood cells don't last forever.
00:23:57.320 --> 00:23:59.060 So you need a factory continuing
00:23:59.060 --> 00:24:00.610 to make these blood cells.
00:24:00.610 --> 00:24:02.994 Where do you get the bone marrow from?
00:24:03.000 --> 00:24:04.188 So there's a
00:24:04.190 --> 00:24:06.290 lot of places we can get it.
00:24:06.290 --> 00:24:08.018 For some diseases we can actually
00:24:08.018 --> 00:24:09.869 use the patients own bone marrow,

00:24:09.870 --> 00:24:11.670 so again, for certain solid tumors,
00:24:11.670 --> 00:24:13.458 we might collect their bone marrow,
00:24:13.460 --> 00:24:14.210 keep it stored,
00:24:14.210 --> 00:24:16.750 and then after a high dose of chemotherapy,
00:24:16.750 --> 00:24:18.440 give it back to them
00:24:18.440 --> 00:24:20.624 to replenish their own healthy bone marrow.
00:24:20.630 --> 00:24:21.882 But for most patients,
00:24:21.882 --> 00:24:23.134 when they hear transplant,
00:24:23.140 --> 00:24:25.060 we're really talking about somebody who's
00:24:25.060 --> 00:24:27.199 donating a bone marrow to that patient,
00:24:27.200 --> 00:24:30.017 so that could be from a variety of people.
00:24:30.020 --> 00:24:31.590 Traditionally it's from a sibling,
00:24:31.590 --> 00:24:34.070 so a brother or a sister whose immune
00:24:34.070 --> 00:24:36.276 system is a match to the patient,
00:24:36.280 --> 00:24:38.158 but we may also use parents.
00:24:38.160 --> 00:24:40.656 We can now use even more distant relatives,
00:24:40.660 --> 00:24:42.538 and when those people aren't available,
00:24:42.540 --> 00:24:44.105 we can take volunteer donors
00:24:44.105 --> 00:24:45.357 from an unrelated bone
00:24:45.360 --> 00:24:46.299 marrow donor registry.
00:24:46.299 --> 00:24:48.177 And so when you do that,
00:24:48.180 --> 00:24:50.665 I mean when we think about transplant,
00:24:50.670 --> 00:24:52.294 you think it has
00:24:52.294 --> 00:24:54.139 to be a match because otherwise
00:24:54.139 --> 00:24:55.954 your immune system is going
00:24:55.954 --> 00:24:57.870 to attack that foreign stuff.
00:24:57.870 --> 00:24:59.802 Now granted, your immune system is
00:24:59.802 --> 00:25:02.043 part of your blood cells and you
00:25:02.043 --> 00:25:04.122 kind of wiped out your bone marrow,
00:25:04.130 --> 00:25:06.554 but don't you have the risk of still
00:25:06.554 --> 00:25:08.200 attacking the new bone marrow?

00:25:08.200 --> 00:25:10.078 If it's not your own right?
00:25:10.080 --> 00:25:12.580 So we definitely do need a match, and
00:25:12.580 --> 00:25:15.076 we match based on the immune system,
00:25:15.080 --> 00:25:17.897 so it's not the same as the blood type,
00:25:17.900 --> 00:25:21.547 which a lot of people think about.
00:25:21.550 --> 00:25:24.046 A sibling has about a 25% chance of being
00:25:24.046 --> 00:25:26.638 a match, and so if you have multiple
00:25:26.638 --> 00:25:28.882 siblings your chance of one of them
00:25:28.882 --> 00:25:30.905 being a match continues to go up
00:25:30.910 --> 00:25:32.470 the more siblings you have,
00:25:32.470 --> 00:25:34.030 but with even several siblings,
00:25:34.030 --> 00:25:35.590 many patients still don't have
00:25:35.590 --> 00:25:37.150 a donor within the family
00:25:37.150 --> 00:25:38.338 that's a good match,
00:25:38.338 --> 00:25:40.580 and that's where we go to these
00:25:40.580 --> 00:25:41.828 unrelated donor registries where
00:25:41.828 --> 00:25:43.388 right now across the world
00:25:43.390 --> 00:25:45.292 there are more than 30 million
00:25:45.292 --> 00:25:46.947 people who have volunteered to
00:25:46.947 --> 00:25:48.562 potentially donate bone marrow or
00:25:48.562 --> 00:25:50.569 stem cells to patients who need it.
00:25:50.570 --> 00:25:51.878 The most recent advance
00:25:51.878 --> 00:25:54.272 in the field is that we know
00:25:54.272 --> 00:25:56.087 that parents are 1/2 match,
00:25:56.090 --> 00:25:58.798 so their immune system will be 50% the
00:25:58.798 --> 00:26:01.502 same as their children and 10 years ago
00:26:01.510 --> 00:26:03.110 that wasn't good enough.
00:26:03.110 --> 00:26:05.510 We now have technology that allows
00:26:05.577 --> 00:26:07.944 us to use a parent or a half match,
00:26:07.950 --> 00:26:09.590 or we call Haploidentical
00:26:09.590 --> 00:26:11.680 relative as a bone marrow donor,

00:26:11.680 --> 00:26:14.060 and so this has hugely opened up
00:26:14.060 --> 00:26:16.088 the availability of finding a donor.
00:26:16.090 --> 00:26:18.190 Now for patients who previously
00:26:18.190 --> 00:26:20.332 didn't have a sibling match or
00:26:20.332 --> 00:26:22.027 didn't have a registry match,
00:26:22.030 --> 00:26:24.046 almost everybody has a family member
00:26:24.046 --> 00:26:26.018 who may be 1/2 identical
00:26:26.018 --> 00:26:28.290 match to use and so do these kids
00:26:28.290 --> 00:26:29.860 who get bone marrow transplants.
00:26:29.860 --> 00:26:31.743 Do they need to be on some
00:26:31.743 --> 00:26:32.984 sort of immuno suppression
00:26:32.984 --> 00:26:35.174 for the rest of their life?
00:26:35.180 --> 00:26:37.524 Like you would be if you had a
00:26:37.524 --> 00:26:38.930 liver transplant for example?
00:26:38.930 --> 00:26:39.869 Or kidney transplant?
00:26:39.869 --> 00:26:41.434 Yeah, that's a great question.
00:26:41.440 --> 00:26:43.860 So at least at first we do need to use
00:26:43.931 --> 00:26:46.151 immune suppression so the donor immune
00:26:46.151 --> 00:26:48.639 system does run the risk of attacking
00:26:48.639 --> 00:26:51.165 the patient and we want to quiet that
00:26:51.165 --> 00:26:53.175 donor immune system down for awhile.
00:26:53.180 --> 00:26:55.042 The really unique thing about doing a bone
00:26:55.042 --> 00:26:57.133 marrow or a stem cell transplant is
00:26:57.133 --> 00:26:58.987 because we're giving a new immune
00:26:59.049 --> 00:27:01.233 system, that new immune system overtime
00:27:01.233 --> 00:27:03.324 actually becomes tolerant to the patient,
00:27:03.324 --> 00:27:05.226 and so with a liver transplant,
00:27:05.230 --> 00:27:07.132 patients need to remain on immuno
00:27:07.132 --> 00:27:08.014 suppression, really lifelong,
00:27:08.014 --> 00:27:09.706 to quiet the immune system, but with
00:27:09.706 --> 00:27:11.250 a bone marrow transplant

00:27:11.250 --> 00:27:13.092 we really just need it for
00:27:13.092 --> 00:27:14.740 a brief period of time.
00:27:14.740 --> 00:27:16.868 So for many patients they are on
00:27:16.868 --> 00:27:18.851 immune suppression for three to six
00:27:18.851 --> 00:27:20.536 months after their transplants and
00:27:20.536 --> 00:27:22.453 most patients are off of immune
00:27:22.453 --> 00:27:23.928 suppression by one year after.
00:27:24.740 --> 00:27:27.477 Interesting and then the third
00:27:27.477 --> 00:27:29.935 bucket of therapies that you mentioned
00:27:29.935 --> 00:27:32.770 as something that you would consider
00:27:32.840 --> 00:27:35.528 in people who did not respond or
00:27:35.528 --> 00:27:37.402 aren't responding well to chemotherapy,
00:27:37.402 --> 00:27:39.568 was this whole bucket of therapies
00:27:39.568 --> 00:27:41.460 you called cellular therapies?
00:27:41.460 --> 00:27:43.836 Tell us more about that.
00:27:43.840 --> 00:27:45.040 So cellular therapies
00:27:45.040 --> 00:27:47.686 are a way to leverage a patient's
00:27:47.686 --> 00:27:49.718 immune system to recognize the
00:27:49.718 --> 00:27:52.595 cancer in their body and attack it.
00:27:52.600 --> 00:27:55.024 So really, the first licensed cellular
00:27:55.024 --> 00:27:58.289 therapy was for acute lymphoblastic leukemia.
00:27:58.290 --> 00:28:00.538 And the way this works is we can
00:28:00.538 --> 00:28:02.162 actually collect lymphocytes or the
00:28:02.162 --> 00:28:04.160 immune system cells from our patient
00:28:04.160 --> 00:28:06.479 in the laboratory we can teach them
00:28:06.479 --> 00:28:08.378 to recognize markers on their leukemia
00:28:08.378 --> 00:28:10.506 and then re infuse those cells back
00:28:10.506 --> 00:28:12.696 into the patient to allow their own
00:28:12.696 --> 00:28:14.638 immune system cells that have been
00:28:14.638 --> 00:28:16.298 modified to attack their cancer.
00:28:16.300 --> 00:28:18.280 This has been really an incredible

00:28:18.280 --> 00:28:19.940 breakthrough therapy over the past
00:28:19.940 --> 00:28:21.682 several years in almost 100% of
00:28:21.682 --> 00:28:23.292 patients who receive this therapy
00:28:23.292 --> 00:28:25.243 will go into remission within the
00:28:25.243 --> 00:28:27.043 first 30 days after receiving it.
00:28:27.050 --> 00:28:27.989 It's really miraculous.
00:28:28.140 --> 00:28:31.218 Wow, so a few questions. First question,
00:28:31.220 --> 00:28:36.309 when you said you harvest a patients
00:28:36.310 --> 00:28:38.242 lymphocytes, but your leukemia cells are
00:28:38.242 --> 00:28:40.956 part of your immune system aren't they?
00:28:40.956 --> 00:28:43.280 They are, but
00:28:43.280 --> 00:28:44.608 we're able to differentiate
00:28:44.608 --> 00:28:45.936 them in the laboratory,
00:28:45.940 --> 00:28:48.124 and so really we're able to isolate
00:28:48.124 --> 00:28:49.821 mature kind of healthy lymphocytes
00:28:49.821 --> 00:28:52.250 to be able to re infuse back.
00:28:52.250 --> 00:28:53.096 But they made
00:28:53.096 --> 00:28:54.788 it possible that there may
00:28:54.788 --> 00:28:56.706 be leukemia cells in these
00:28:56.706 --> 00:28:57.888 cell therapy products,
00:28:57.890 --> 00:28:59.645 but the engineered cells can
00:28:59.645 --> 00:29:01.049 actually still recognize those
00:29:01.049 --> 00:29:02.870 leukemia cells to attack them, and
00:29:02.870 --> 00:29:04.530 the engineered cells will continue
00:29:04.530 --> 00:29:06.853 to attack the cancer cells
00:29:06.853 --> 00:29:08.508 and everybody gets a response.
00:29:08.620 --> 00:29:09.888 So almost everybody responds.
00:29:09.888 --> 00:29:12.174 One of the big questions is what
00:29:12.174 --> 00:29:14.130 happens to these patients long term.
00:29:14.130 --> 00:29:16.475 So there are some patients where these
00:29:16.475 --> 00:29:18.020 engineered lymphocytes persist long term,

00:29:18.020 --> 00:29:19.700 but for many patients the
00:29:19.700 --> 00:29:20.708 lymphocytes actually disappear
00:29:20.708 --> 00:29:22.878 over a period of about six months,
00:29:22.880 --> 00:29:25.024 and so one of the questions is how
00:29:25.024 --> 00:29:27.002 do we maintain that remission and
00:29:27.002 --> 00:29:29.999 what do we do after the cell therapy?
00:29:30.000 --> 00:29:31.148 And for many patients,
00:29:31.148 --> 00:29:33.313 that might mean still doing a bone
00:29:33.313 --> 00:29:35.190 marrow transplant once they're in
00:29:35.190 --> 00:29:35.852 remission.
00:29:35.852 --> 00:29:37.838 doctor Aron Flagg is an assistant
00:29:37.838 --> 00:29:39.585 professor of Pediatrics and hematology
00:29:39.585 --> 00:29:41.979 oncology at the Yale School of Medicine.
00:29:41.980 --> 00:29:43.440 If you have questions,
00:29:43.440 --> 00:29:44.900 the address is canceranswers@yale.edu
00:29:44.900 --> 00:29:46.916 and past editions of the program
00:29:46.916 --> 00:29:48.758 are available in audio and written
00:29:48.814 --> 00:29:50.350 form at Yalecancercenter.org.
00:29:50.350 --> 00:29:52.950 We hope you'll join us next week to
00:29:52.950 --> 00:29:55.482 learn more about the fight against
00:29:55.482 --> 00:29:58.194 cancer here on Connecticut public radio.