0:00:00 –> 0:00:02.46 Support for Yale Cancer Answers

0:00:02.46 –> 0:00:04.92 comes from AstraZeneca, providing

0:00:05.002 –> 0:00:07.03 important treatment options for

0:00:07.03 –> 0:00:10.072 various types and stages of cancer.

0:00:10.08 –> 0:00:13.8 More information at astrazeneca-us.com.

0:00:13.8 –> 0:00:15.22 Welcome to Yale Cancer

0:00:15.22 –> 0:00:16.64 Answers with your host

0:00:16.64 –> 0:00:18.42 Doctor Anees Chagpar.

0:00:18.42 –> 0:00:20.315 Yale Cancer Answers features the

0:00:20.315 –> 0:00:22.643 latest information on cancer care by

0:00:22.643 –> 0:00:24.135 welcoming oncologists and specialists

0:00:24.135 –> 0:00:26.636 who are on the forefront of the

0:00:26.636 –> 0:00:28.358 battle to fight cancer. This week

0:00:28.36 –> 0:00:30.185 it's a conversation about pediatric

0:00:30.185 –> 0:00:31.28 cancers and lymphoblastic

0:00:31.28 –> 0:00:32.968 leukemia with doctor Aron Flagg.

0:00:33.312 –> 0:00:35.364 Doctor Flagg is an assistant professor

0:00:35.364 –> 0:00:37.176 of Pediatrics in hematology/oncology

0:00:37.176 –> 0:00:39.354 at the Yale School of Medicine,

0:00:39.36 –> 0:00:41.49 where doctor Chagpar is a

0:00:41.49 –> 0:00:42.91 professor of surgical oncology.

0:00:44.48 –> 0:00:46.768 Aron, maybe we can start off by

0:00:46.768 –> 0:00:49.216 you telling us a little bit about

0:00:49.216 –> 0:00:50.66 pediatric cancers in general.

0:00:50.66 –> 0:00:53.019 Nobody ever likes to think

0:00:53.019 –> 0:00:54.56 about cancer occurring in kids,

0:00:54.56 –> 0:00:56.51 but how common are pediatric cancers?

0:00:56.51 –> 0:00:57.16 Overall

0:00:57.16 –> 0:00:58.46 pediatric cancers are rare

0:00:58.46 –> 0:00:59.76 compared to adult cancers.

0:00:59.76 –> 0:01:02.056 The most common that we see is something

0:01:02.056 –> 0:01:04.309 called acute lymphoblastic leukemia or ALL,

0:01:04.31 –> 0:01:06.574 and we see several 1000 cases of ALL

0:01:06.574 –> 0:01:08.859 in the United States every year.

0:01:08.86 –> 0:01:09.478 Beyond that,

0:01:09.478 –> 0:01:11.641 the next most common types of cancers

0:01:11.641 –> 0:01:13.726 are brain tumors or brain cancers,

0:01:13.73 –> 0:01:14.621 of which there

0:01:14.621 –> 0:01:16.403 are a number of types and following

0:01:16.403 –> 0:01:18.412 that there are a number of different

0:01:18.412 –> 0:01:20.07 cancers we can see elsewhere

0:01:20.07 –> 0:01:20.946 throughout the body.

0:01:20.946 –> 0:01:23.589 So tell us a little bit more about ALL.

0:01:23.59 –> 0:01:24.758 How does it present?

0:01:24.758 –> 0:01:25.634 Because

0:01:25.64 –> 0:01:27.368 if you're a parent out there

0:01:27.368 –> 0:01:28.86 and you're listening to this,

0:01:28.86 –> 0:01:29.98 you're kind of thinking,

0:01:29.98 –> 0:01:32.38 I never want my kid to get cancer,

0:01:32.38 –> 0:01:34.249 but Gosh darn it if I ever

0:01:34.249 –> 0:01:35.9 find a sign or symptom,

0:01:35.9 –> 0:01:37.988 I want to know what that is so that

0:01:37.988 –> 0:01:40.288 I can take appropriate next steps.

0:01:40.29 –> 0:01:41.169 Sure, this can

0:01:41.17 –> 0:01:42.712 be tough sometimes because a lot

0:01:42.712 –> 0:01:44.39 of the symptoms are nonspecific,

0:01:44.39 –> 0:01:45.562 meaning they can happen

0:01:45.562 –> 0:01:47.027 for a variety of reasons,

0:01:47.03 –> 0:01:49.907 and many of them are not cancerous.

0:01:49.91 –> 0:01:51.698 So specifically with ALL or

0:01:51.698 –> 0:01:52.592 acute lymphoblastic leukemia,

0:01:52.6 –> 0:01:54.984 many children will be very tired or fatigued.

0:01:54.99 –> 0:01:56.49 They may look very pale.
0:01:56.49 –> 0:01:57.98 They may have bleeding or
0:01:57.98 –> 0:01:59.172 bruising for no reason,
0:01:59.18 –> 0:02:00.938 and then many children will also
0:02:00.938 –> 0:02:03.369 have pain in the bones or the joints,
0:02:03.37 –> 0:02:05.594 and so a limp is also a common
0:02:05.594 –> 0:02:07.249 symptom that patients can have.
0:02:07.25 –> 0:02:09.189 But for other types of cancers that
0:02:09.189 –> 0:02:11.139 can occur really throughout the body,
0:02:11.14 –> 0:02:13.058 the symptoms really depend on what type
0:02:13.058 –> 0:02:15.03 of cancer and where it's occurring,
0:02:15.03 –> 0:02:16.966 so it can be very hard to list
0:02:16.966 –> 0:02:18.609 off one specific symptom
0:02:18.61 –> 0:02:21.228 that might be a sign of cancer.
0:02:21.23 –> 0:02:22.074 So from my standpoint,
0:02:22.074 –> 0:02:23.34 if a parent is worried that
0:02:23.382 –> 0:02:24.31 something is going on,
0:02:24.31 –> 0:02:25.636 if symptoms are there and not
0:02:25.636 –> 0:02:26.73 getting better on their own,
0:02:26.73 –> 0:02:27.83 they should always talk with
0:02:27.83 –> 0:02:28.27 the pediatrician.
0:02:28.94 –> 0:02:30.739 So you know when we think about
0:02:30.739 –> 0:02:33.234 ALL and the symptoms that you
0:02:33.234 –> 0:02:35.304 mentioned are really non specific.
0:02:35.31 –> 0:02:37.648 I mean kids jump around they play,
0:02:37.65 –> 0:02:39.66 they get tired, they get bruised.
0:02:39.66 –> 0:02:41.34 They may have some pain.
0:02:41.34 –> 0:02:43.35 They get pale and
0:02:43.35 –> 0:02:45.247 a lot of people
0:02:45.247 –> 0:02:47.03 go into their pediatricians.
0:02:47.03 –> 0:02:49.375 I think it can be

0:02:49.38 –> 0:02:51.702 really tough and from my standpoint
0:02:51.702 –> 0:02:53.614 when patients finally come to
0:02:53.614 –> 0:02:55.707 see me they almost always have a
0:02:55.707 –> 0:02:57.965 diagnosis or they have a lab test
0:02:57.965 –> 0:02:59.555 that shows something is wrong.
0:02:59.56 –> 0:03:02.161 And so my job in some ways is simpler
0:03:02.161 –> 0:03:04.119 because I know there's a problem.
0:03:04.12 –> 0:03:06.388 I think it's much harder for an
0:03:06.388 –> 0:03:08.343 emergency room doctor or a pediatrician
0:03:08.343 –> 0:03:10.485 to take a child who's got these
0:03:10.547 –> 0:03:12.699 symptoms where 99 out of 100 may be
0:03:12.699 –> 0:03:15.368 fine and pick out the one in 100 who
0:03:15.368 –> 0:03:17.192 really does have a severe problem.
0:03:17.192 –> 0:03:19.016 How do they do that exactly?
0:03:19.02 –> 0:03:20.886 So through careful history, a
0:03:20.886 –> 0:03:22.969 physical exam and through taking
0:03:22.97 –> 0:03:25.259 lab tests to look for things is
0:03:25.259 –> 0:03:27.218 really the best way to do it.
0:03:27.22 –> 0:03:28.456 But far and wide,
0:03:28.456 –> 0:03:30.31 the most important thing is listening
0:03:30.367 –> 0:03:32.39 to parents and looking at the child.
0:03:33 –> 0:03:35.072 And what exactly are they listening
0:03:35.072 –> 0:03:36.85 for? And looking for?
0:03:36.85 –> 0:03:38.33 I think when they're listening,
0:03:38.33 –> 0:03:40.1 it's when symptoms don't get better.
0:03:40.1 –> 0:03:41.645 It's something that's been there
0:03:41.645 –> 0:03:43.659 that doesn't seem just like a virus,
0:03:43.66 –> 0:03:45.28 which is probably the most common
0:03:45.28 –> 0:03:47.498 reason for a lot of these complaints
0:03:47.5 –> 0:03:48.624 young kids will have,
0:03:48.624 –> 0:03:51.348 and so when that symptom is there over weeks,

0:03:51.35 –> 0:03:52.534 and instead of getting

0:03:52.534 –> 0:03:53.718 better is getting worse.

0:03:53.72 –> 0:03:55.2 Maybe children are losing weight,

0:03:55.2 –> 0:03:57.568 maybe they are having fevers for no good reason,

0:03:57.57 –> 0:03:59.22 and then again on physical exam

0:03:59.22 –> 0:04:01.492 they may be able to find something

0:04:01.492 –> 0:04:02.968 that's abnormal that

0:04:02.97 –> 0:04:04.356 they might have

0:04:04.356 –> 0:04:05.86 swollen lymph nodes, their liver or

0:04:05.86 –> 0:04:06.852 spleen might be enlarged.

0:04:06.852 –> 0:04:08.34 Something that tips them off to

0:04:08.39 –> 0:04:09.455 something going on that isn't

0:04:09.455 –> 0:04:10.92 the run of the mill problem.

0:04:10.92 –> 0:04:12.366 And you mentioned lab tests.

0:04:12.37 –> 0:04:14.057 What kind of lab tests do

0:04:14.057 –> 0:04:15.5 they get?

0:04:15.5 –> 0:04:16.223 This can be difficult because depending

0:04:16.223 –> 0:04:17.91 on what type of cancer it is,

0:04:17.91 –> 0:04:19.224 certain lab tests may

0:04:19.224 –> 0:04:20.938 or may not be a good screening

0:04:20.938 –> 0:04:22.243 test to use for leukemia.

0:04:22.25 –> 0:04:23.914 The most common lab test we would look

0:04:23.914 –> 0:04:25.798 at is a complete blood count where we

0:04:25.798 –> 0:04:28.03 can look under the microscope with the blood,

0:04:28.03 –> 0:04:29.476 look at the white blood cells,

0:04:29.48 –> 0:04:30.8 red blood cells and platelets to

0:04:30.8 –> 0:04:32.608 see if they are normal and

0:04:32.61 –> 0:04:34.522 to see if there might be leukemia

0:04:34.522 –> 0:04:35.99 cells in the blood as well.

0:04:36.62 –> 0:04:38.796 So for ALL, and we will focus our

0:04:38.796 –> 0:04:40.434 discussion on ALL because that's

0:04:40.434 –> 0:04:42.149 the most common pediatric cancer

0:04:42.149 –> 0:04:44.5 and the one that you specialize in,

0:04:44.5 –> 0:04:46.384 what would you see in that

0:04:46.384 –> 0:04:47.326 complete blood count?

0:04:47.33 –> 0:04:48.91 So children are often anemic,

0:04:48.91 –> 0:04:50.48 meaning the red blood

0:04:50.48 –> 0:04:53.315 cell count is low.

0:04:53.32 –> 0:04:55.84 And red blood cells give your body the ability to carry oxygen.

0:04:55.84 –> 0:04:57.61 It makes the blood red and

0:04:57.61 –> 0:04:59.3 so when children are anemic,

0:04:59.3 –> 0:05:01.19 they're often very pale as well.

0:05:01.19 –> 0:05:03.647 So again, that physical exam might clue

0:05:03.647 –> 0:05:06.496 us into the low red blood cell count.

0:05:06.5 –> 0:05:08.78 Platelets are tiny cells in the blood that

0:05:08.78 –> 0:05:11.41 help to prevent bleeding and to form clots.

0:05:11.41 –> 0:05:13.384 When you get a cut and when

0:05:13.384 –> 0:05:14.79 there's a leukemia present,

0:05:14.79 –> 0:05:16.106 those platelets often become

0:05:16.106 –> 0:05:18.697 also very low and so we can see

0:05:18.697 –> 0:05:20.615 that very easily on a lab test.

0:05:20.62 –> 0:05:22.727 Finally, will look at the white blood

0:05:22.727 –> 0:05:24.611 cell count and leukemia cells are

0:05:24.611 –> 0:05:26.76 an early type of white blood cell,

0:05:26.76 –> 0:05:28.909 and so for many patients with leukemia,

0:05:28.91 –> 0:05:31.059 we might see that white blood cell

0:05:31.06 –> 0:05:32.56 count very elevated because of

0:05:32.56 –> 0:05:34.44 the leukemia cells in the blood,

0:05:34.44 –> 0:05:37.13 and if they see this trifecta,

0:05:37.13 –> 0:05:38.59 they get worried absolutely.

0:05:38.59 –> 0:05:41.047 And does that cinch the diagnosis of ALL?

0:05:41.05 –> 0:05:41.869 Sometimes it does

0:05:41.87 –> 0:05:43.448 so if we can see circulating

0:05:43.448 –> 0:05:44.87 leukemia cells in the blood,

0:05:44.87 –> 0:05:46.774 there's really nothing else that it could be,

0:05:46.78 –> 0:05:48.418 but sometimes it's not so easy.

0:05:48.42 –> 0:05:49.78 Some kids, when they present,

0:05:49.78 –> 0:05:51.418 especially early on in the course,

0:05:51.42 –> 0:05:53.604 may not have leukemia cells in the blood,

0:05:53.61 –> 0:05:55.86 and so if we're not able to make the

0:05:55.86 –> 0:05:57.698 diagnosis directly from a blood count,

0:05:57.7 –> 0:05:59.436 we might talk about doing a bone

0:05:59.436 –> 0:06:01.25 marrow biopsy to confirm a diagnosis.

0:06:01.25 –> 0:06:02.886 And what do you see on

0:06:02.886 –> 0:06:03.974 the bone marrow biopsy?

0:06:03.98 –> 0:06:05.744 So all of the blood is made

0:06:05.744 –> 0:06:06.98 within the bone marrow,

0:06:06.98 –> 0:06:08.884 and so when a leukemia comes on,

0:06:08.89 –> 0:06:10.78 it starts in the bone marrow.

0:06:10.78 –> 0:06:12.383 And when it's there very early

0:06:12.383 –> 0:06:13.778 before it's gotten into the blood,

0:06:13.78 –> 0:06:15.243 we might be able to see it

0:06:15.243 –> 0:06:16.32 in the bone marrow.

0:06:16.32 –> 0:06:17.706 So in a bone marrow biopsy,

0:06:17.71 –> 0:06:19.018 and we place a small needle

0:06:19.018 –> 0:06:20.25 into one of the bones,

0:06:20.25 –> 0:06:21.41 usually in the hip bones,

0:06:21.41 –> 0:06:22.56 they take a sample to

0:06:22.56 –> 0:06:23.72 look at under the microscope,

0:06:23.72 –> 0:06:25.337 and then you see leukemia cells and

0:06:25.337 –> 0:06:26.49 that would

0:06:26.49 –> 0:06:27.941 be the definitive test.

0:06:27.941 –> 0:06:30.048 And then they come to

0:06:30.048 –> 0:06:31.969 you, correct, with this diagnosis?

0:06:31.97 –> 0:06:33.745 And then what happens after they

0:06:33.745 –> 0:06:36.105 get over the shock of, Oh my God,

0:06:36.11 –> 0:06:37.59 my kid has cancer right?

0:06:37.59 –> 0:06:39.578 So a lot of that first meeting

0:06:39.578 –> 0:06:40.85 really is talking about,

0:06:40.85 –> 0:06:43.87 what is cancer?

0:06:43.87 –> 0:06:46.558 And where do we go from here?

0:06:46.56 –> 0:06:48.564 And really trying to get over

0:06:48.564 –> 0:06:50.614 that initial shock which can take

0:06:50.614 –> 0:06:52.546 us several days to let

0:06:52.546 –> 0:06:54.62 everything to sink in and many children,

0:06:54.62 –> 0:06:55.964 when their leukemias first are

0:06:55.964 –> 0:06:57.308 diagnosed are quite ill,

0:06:57.31 –> 0:06:59.506 and so this is usually happening

0:06:59.506 –> 0:07:01.937 in the hospital where we have time

0:07:01.937 –> 0:07:04.023 to sit down and talk outside of

0:07:04.03 –> 0:07:06.333 the constraints of an office visit.

0:07:06.333 –> 0:07:09.07 So how exactly is

0:07:09.07 –> 0:07:10.906 this treated?

0:07:10.906 –> 0:07:12.77 Is it treated through chemotherapy?

0:07:12.77 –> 0:07:14.45 It's given in several phases,

0:07:14.45 –> 0:07:16.13 some of them more intensive,

0:07:16.13 –> 0:07:17.234 especially at the beginning.

0:07:17.234 –> 0:07:20.192 Some of them later on in the course are much

0:07:20.192 –> 0:07:22.064 easier to tolerate the beginning course.

0:07:22.07 –> 0:07:23.732 We call induction chemotherapy some of

0:07:23.732 –> 0:07:25.669 that time is spent in the hospital,

0:07:25.67 –> 0:07:26.778 especially until the leukemia

0:07:26.778 –> 0:07:28.163 starts to go into remission.

0:07:28.17 –> 0:07:29.826 The majority of the rest of
0:07:29.826 –> 0:07:31.253 therapy is actually given in
0:07:31.253 –> 0:07:32.598 the office as an outpatient,
0:07:32.6 –> 0:07:34.476 where patients may have to come once
0:07:34.476 –> 0:07:36.363 or twice a week for several months
0:07:36.363 –> 0:07:38.42 in a row to get their therapy,
0:07:38.42 –> 0:07:40.904 and then it ends with the course of therapy
0:07:40.91 –> 0:07:41.974 that we call maintenance chemotherapy.
0:07:41.974 –> 0:07:43.96 Meaning leukemia is in remission,
0:07:43.96 –> 0:07:46.168 and we're trying to keep it that way.
0:07:46.17 –> 0:07:47.25 Maintenance therapy is usually
0:07:47.25 –> 0:07:49.22 given on a once a month basis.
0:07:49.22 –> 0:07:50.328 Also in the office,
0:07:50.328 –> 0:07:52.68 but goes on for many years, usually
0:07:52.68 –> 0:07:54.06 two to three years from diagnosis.
0:07:55.75 –> 0:07:57.44 So these children are essentially getting
0:07:57.44 –> 0:07:58.792 chemotherapy for potentially years?
0:07:58.8 –> 0:08:01.842 Yes, if it's a very long road and even
0:08:01.85 –> 0:08:02.846 in maintenance chemotherapy,
0:08:02.846 –> 0:08:06.257 or we think about a once a month visit to
0:08:06.257 –> 0:08:08.63 the oncology office when they're at home,
0:08:08.63 –> 0:08:10.32 they're often still taking chemotherapy
0:08:10.32 –> 0:08:12.699 by mouth every day or every week.
0:08:13.33 –> 0:08:15.43 And what are the effects of that?
0:08:15.43 –> 0:08:17.494 I mean, do they get sick and they
0:08:17.494 –> 0:08:19.606 still go to school?
0:08:19.606 –> 0:08:21.54 What happens to their friends and how
0:08:21.54 –> 0:08:23.53 does this affect their lives?
0:08:23.53 –> 0:08:24.63 That's a great question.
0:08:24.63 –> 0:08:26.67 Many of our patients can lead nearly
0:08:26.67 –> 0:08:28.325 normal lives going through this,

0:08:28.33 –> 0:08:29.83 although every patient is different.
0:08:29.83 –> 0:08:31.93 There certainly is a risk of infection,
0:08:31.93 –> 0:08:33.61 especially at the beginning when the
0:08:33.61 –> 0:08:35.23 chemotherapy is much more intensive.
0:08:35.23 –> 0:08:37.337 But really after that first month
0:08:37.337 –> 0:08:39.129 until the leukemia is in remission,
0:08:39.13 –> 0:08:41.51 after which we really advise children to
0:08:41.51 –> 0:08:44.497 try to have as normal a life as possible.
0:08:44.5 –> 0:08:46.726 We encourage kids to go to school.
0:08:46.73 –> 0:08:48.518 We encourage them to have normal
0:08:48.518 –> 0:08:50.24 relationships with friends and relatives.
0:08:50.24 –> 0:08:52.154 We really try to focus on
0:08:52.154 –> 0:08:53.43 keeping their quality of
0:08:53.43 –> 0:08:55.03 life as normal as possible.
0:08:55.03 –> 0:08:57.333 Tell me about the side effects of
0:08:57.333 –> 0:08:58.859 these chemotherapies because you know,
0:08:58.86 –> 0:09:01.42 I can imagine if you're a kid and
0:09:01.42 –> 0:09:03.638 you're trying to have a normal life,
0:09:03.64 –> 0:09:05.677 but you've lost your
0:09:05.677 –> 0:09:07.641 hair and your friends are calling
0:09:07.641 –> 0:09:09.699 you bald and you're feeling sick,
0:09:09.7 –> 0:09:11.856 and it might be easier said
0:09:11.856 –> 0:09:14.49 than done to have a normal life.
0:09:14.62 –> 0:09:15.727 Yeah, absolutely.
0:09:15.727 –> 0:09:18.31 And we're fortunate now that many children
0:09:18.373 –> 0:09:20.509 are able to be cured of their cancer.
0:09:20.51 –> 0:09:23.078 In fact, most children with ALL are
0:09:23.078 –> 0:09:26.07 able to be cured and so many years ago,
0:09:26.07 –> 0:09:28.345 our primary focus was curing the cancer.
0:09:28.35 –> 0:09:30.342 Now, because of the improvements in
0:09:30.342 –> 0:09:32.28 the chemotherapy that we can offer,

0:09:32.28 –> 0:09:34.527 we can focus on other issues like

0:09:34.527 –> 0:09:36.528 you mentioned quality of life,

0:09:36.53 –> 0:09:38.492 not just being able to get

0:09:38.492 –> 0:09:39.8 the cancer under control.

0:09:39.8 –> 0:09:42.68 We do work with psychologists to help with

0:09:42.68 –> 0:09:44.828 that transition back into normal life.

0:09:44.83 –> 0:09:46.816 You know, especially in teenagers

0:09:46.816 –> 0:09:49.168 body image is really important to be

0:09:49.168 –> 0:09:51.409 able to find ways to get through life.

0:09:51.41 –> 0:09:54.098 You know that may be different

0:09:54.098 –> 0:09:56.165 than it was before

0:09:56.165 –> 0:09:58.09 the chemotherapy in terms of side effects,

0:10:00.11 –> 0:10:02.462 Some patients may have a lot

0:10:02.462 –> 0:10:04.759 of nausea there may be infection.

0:10:04.76 –> 0:10:07.32 Many patients need transfusions because

0:10:07.32 –> 0:10:09.88 of side effects of chemotherapy.

0:10:09.88 –> 0:10:11.542 And we're not also focusing just

0:10:11.542 –> 0:10:13.523 on the side effects that we see

0:10:13.523 –> 0:10:15.155 right at the time of chemotherapy.

0:10:15.16 –> 0:10:16.828 We're also focusing now on the

0:10:16.828 –> 0:10:17.94 long term side effects.

0:10:17.94 –> 0:10:19.59 The late effects that might happen

0:10:19.59 –> 0:10:21.72 five years down the road, 10 years,

0:10:21.72 –> 0:10:22.44 20 years.

0:10:22.44 –> 0:10:24.6 Whether that's a problem with hormones

0:10:24.669 –> 0:10:26.967 affects on the heart or on bone development,

0:10:26.97 –> 0:10:29.386 really trying to find ways that we can

0:10:29.386 –> 0:10:31.424 improve upon those late outcomes and

0:10:31.424 –> 0:10:33.482 really give kids the best possible

0:10:33.49 –> 0:10:34.878 life after their therapy.

0:10:34.878 –> 0:10:36.96 So with chemotherapy, you

0:10:37.025 –> 0:10:39.355 tend to lose your hair, and I suppose
0:10:39.355 –> 0:10:41.638 that's the case with ALL as well.
0:10:41.64 –> 0:10:44.248 But you know, with other kinds of cancer,
0:10:44.25 –> 0:10:46.539 the therapies are much shorter and we
0:10:46.539 –> 0:10:48.81 always tell people don't worry your hair
0:10:48.81 –> 0:10:50.44 will grow back, but when they're
0:10:50.44 –> 0:10:52.4 getting years of therapy, I mean,
0:10:52.4 –> 0:10:54.675 do they ever grow their hair back?
0:10:54.68 –> 0:10:57.288 I mean, can they ever truly feel normal?
0:10:57.53 –> 0:10:59.066 Yeah, so the hair loss tends
0:10:59.066 –> 0:11:00.09 to be reasonably temporary,
0:11:00.09 –> 0:11:01.96 again we see it at the early parts of
0:11:02.01 –> 0:11:03.93 therapy with more intensive chemotherapy.
0:11:03.93 –> 0:11:05.21 Fortunately, by the time children
0:11:05.21 –> 0:11:05.978 are on maintenance chemotherapy,
0:11:05.98 –> 0:11:07.793 the low levels of medicines that we're
0:11:07.793 –> 0:11:09.818 giving do tend to allow hair to regrow,
0:11:09.82 –> 0:11:11.682 and so usually once you're in that
0:11:11.682 –> 0:11:13.15 maintenance cycle for a few months,
0:11:13.15 –> 0:11:15.19 we start to see the hair come back.
0:11:15.19 –> 0:11:15.702 And interestingly,
0:11:15.702 –> 0:11:17.75 a lot of the times it comes back
0:11:17.75 –> 0:11:18.886 thicker, it's curly,
0:11:18.886 –> 0:11:20.59 are so often it gives us something
0:11:20.642 –> 0:11:22.35 to talk about in the office in
0:11:22.35 –> 0:11:23.823 terms of comparing what their hair
0:11:23.823 –> 0:11:25.426 was before and what it is now.
0:11:26.13 –> 0:11:28.356 And one of
0:11:28.356 –> 0:11:29.946 the good things, I suppose,
0:11:29.946 –> 0:11:32.49 is that you know kids are living longer.
0:11:32.49 –> 0:11:35.026 Tell us about the prognosis with ALL.

0:11:35.03 –> 0:11:36.62 I mean, almost all patients
0:11:36.62 –> 0:11:37.892 you mentioned are cured.
0:11:39.8 –> 0:11:41.028 A very good proportion of them are.
0:11:41.028 –> 0:11:43.807 We are now able to identify for the most
0:11:43.807 –> 0:11:46.242 part which children are going to be cured
0:11:46.242 –> 0:11:48.65 by chemotherapy and cured
0:11:48.65 –> 0:11:51.248 of their ALL early on in their therapy.
0:11:51.25 –> 0:11:53.95 And then we can also predict which kids may
0:11:53.95 –> 0:11:56.497 have a harder time to achieve remission.
0:11:56.5 –> 0:11:58.36 How do we do that?
0:11:58.36 –> 0:12:00.488 Some of its based on very simple things
0:12:00.488 –> 0:12:02.616 like age, so we know that older kids,
0:12:02.62 –> 0:12:03.95 especially adolescents or young adults,
0:12:03.95 –> 0:12:06.946 have a harder time to be cured
0:12:06.946 –> 0:12:08.23 than younger kids.
0:12:08.23 –> 0:12:09.83 That said, very young children,
0:12:09.83 –> 0:12:12.07 especially less than one year, may also
0:12:12.07 –> 0:12:13.99 have a problem getting into remission.
0:12:13.99 –> 0:12:15.91 So we can start with that.
0:12:15.91 –> 0:12:17.83 We also follow response to therapy,
0:12:17.83 –> 0:12:18.649 and
0:12:18.649 –> 0:12:20.56 what most people have been looking at the
0:12:20.624 –> 0:12:22.7 past few years is something called
0:12:22.7 –> 0:12:24.87 minimal residual disease or MRD analysis.
0:12:24.87 –> 0:12:26.47 It's a way for us,
0:12:26.47 –> 0:12:28.07 through a bone marrow test,
0:12:28.07 –> 0:12:30.31 to see how much of a remission
0:12:30.31 –> 0:12:31.27 somebody gets into,
0:12:31.27 –> 0:12:33.601 and we know that the deeper a
0:12:33.601 –> 0:12:35.352 remission the patient enters early on
0:12:35.352 –> 0:12:37.077 in their therapy predicts whether

0:12:37.077 –> 0:12:38.719 or not they'll be cured.
0:12:38.72 –> 0:12:40.736 And so with this information we can
0:12:40.736 –> 0:12:42.416 tell patients within a few months
0:12:42.416 –> 0:12:43.928 of their diagnosis whether or not
0:12:43.928 –> 0:12:45.699 we expect with a good certainty
0:12:45.699 –> 0:12:46.867 that they'll be cured,
0:12:46.87 –> 0:12:48.662 or whether or not we think there may
0:12:48.662 –> 0:12:50.674 be a challenge for patients who respond
0:12:50.674 –> 0:12:53.33 quickly who are in a favorable age range.
0:12:53.33 –> 0:12:54.788 More than 95% of those children
0:12:54.788 –> 0:12:56.42 can be cured through chemotherapy.
0:12:56.42 –> 0:12:57.532 For some older children,
0:12:57.532 –> 0:12:58.922 especially young adults or patients
0:12:58.922 –> 0:13:00.638 who don't quickly go into remission,
0:13:00.64 –> 0:13:02.607 there may be more of a struggle,
0:13:02.61 –> 0:13:04.29 and sometimes that may be more
0:13:04.29 –> 0:13:05.407 50 or 70% chance.
0:13:05.684 –> 0:13:08.509 I'd hate to be in that last group where you
0:13:08.51 –> 0:13:11.471 tell me that there's going to be a bit
0:13:11.471 –> 0:13:14.529 of a challenge for me to get a cure.
0:13:14.53 –> 0:13:17.206 What do you do about that?
0:13:17.206 –> 0:13:19.534 I would be like,
0:13:19.54 –> 0:13:21.292 well thank you for telling me
0:13:21.292 –> 0:13:23.302 that I might struggle,
0:13:23.302 –> 0:13:25.38 but what are you gonna do about
0:13:25.38 –> 0:13:26.84 it right now?
0:13:26.84 –> 0:13:29.176 These are very hard conversations to have and
0:13:29.18 –> 0:13:30.64 it's really through research that
0:13:30.64 –> 0:13:32.39 we're trying to find better ways,
0:13:32.39 –> 0:13:34.088 especially in these high risk groups
0:13:34.088 –> 0:13:36.48 to do better to get them in remission.

0:13:36.48 –> 0:13:38.148 So we participate in a large
0:13:38.148 –> 0:13:39.26 Children's Hospital Consortium called
0:13:39.305 –> 0:13:40.569 the children's oncology group
0:13:40.57 –> 0:13:42.358 that's really doing most of the
0:13:42.358 –> 0:13:44.443 research in the country to look at
0:13:44.443 –> 0:13:46.105 how we can achieve better outcomes.
0:13:46.11 –> 0:13:48.096 And that's using new medications that
0:13:48.1 –> 0:13:49.705 may work differently than the
0:13:49.705 –> 0:13:50.989 older types of chemotherapy,
0:13:50.99 –> 0:13:53.237 or even doing much more aggressive treatment,
0:13:53.24 –> 0:13:55.48 such as things like bone marrow transplant
0:13:55.48 –> 0:13:56.528 earlier on.
0:13:56.528 –> 0:13:58.562 We're going to pick up the conversation
0:13:58.562 –> 0:14:00.956 looking at those newer treatments and
0:14:00.956 –> 0:14:03.074 other treatments right after we take
0:14:03.074 –> 0:14:04.79 a short break for medical minute.
0:14:04.79 –> 0:14:06.883 Please stay tuned to learn more about
0:14:06.883 –> 0:14:08.174 pediatric cancers and lymphoblastic
0:14:08.174 –> 0:14:10.568 leukemia with my guest Doctor Aron Flagg.
0:14:11.29 –> 0:14:13.855 Support for Yale Cancer Answers
0:14:13.855 –> 0:14:16.42 comes from AstraZeneca, working to
0:14:16.506 –> 0:14:19.425 eliminate cancer as a cause of death.
0:14:19.43 –> 0:14:23.33 Learn more at astrazeneca-us.com.
0:14:23.33 –> 0:14:26.179 This is a medical minute about Melanoma.
0:14:26.18 –> 0:14:28.215 While Melanoma accounts for only
0:14:28.215 –> 0:14:30.51 about 4% of skin cancer cases,
0:14:30.51 –> 0:14:32.73 it causes the most skin cancer
0:14:32.806 –> 0:14:34.73 deaths. When detected early,
0:14:34.73 –> 0:14:36.76 however, Melanoma is easily treated
0:14:36.76 –> 0:14:38.384 and highly curable. Clinical
0:14:38.39 –> 0:14:40.724 trials are currently underway to test

0:14:40.724 –> 0:14:42.87 innovative new treatments for Melanoma.
0:14:42.87 –> 0:14:45.474 The goal of the specialized programs
0:14:45.474 –> 0:14:47.662 of research excellence in skin
0:14:47.662 –> 0:14:50.308 cancer or spore grant is to better
0:14:50.308 –> 0:14:52.75 understand the biology of skin cancer.
0:14:52.75 –> 0:14:54.625 With a focus on discovering
0:14:54.625 –> 0:14:57.165 targets that will lead to improved
0:14:57.165 –> 0:14:58.92 diagnosis and treatment,
0:14:58.92 –> 0:15:00.684 more information is available
0:15:00.684 –> 0:15:01.566 at yalecancercenter.org.
0:15:01.57 –> 0:15:05.428 You're listening to Connecticut public radio.
0:15:05.43 –> 0:15:05.82 Welcome
0:15:05.82 –> 0:15:07.75 back to Yale Cancer Answers.
0:15:07.75 –> 0:15:09.922 This is doctor Anees Chagpar
0:15:09.922 –> 0:15:11.862 and I'm joined tonight
0:15:11.862 –> 0:15:14.31 by my guest Doctor Aron Flagg.
0:15:14.31 –> 0:15:16.24 We're talking about pediatric cancers,
0:15:16.24 –> 0:15:17.395 and in particular,
0:15:17.395 –> 0:15:18.55 acute lymphoblastic leukemia,
0:15:18.55 –> 0:15:20.925 which is the most common
0:15:20.925 –> 0:15:22.35 cancer affecting children.
0:15:22.35 –> 0:15:24.882 And right before the break
0:15:24.882 –> 0:15:27.449 Aron you said that
0:15:27.45 –> 0:15:29.36 we've done really well in
0:15:29.36 –> 0:15:32.313 terms of treating ALL and for a
0:15:32.313 –> 0:15:34.245 particular subgroup of patients,
0:15:34.25 –> 0:15:36.658 those who tend to be younger
0:15:36.658 –> 0:15:39.256 children but not too young who
0:15:39.256 –> 0:15:41.248 achieve remission with induction
0:15:41.248 –> 0:15:42.742 chemotherapy that
0:15:42.75 –> 0:15:45.725 those patients have a reasonably good shot,

0:15:45.73 –> 0:15:48.28 95% chance of achieving a cure.
0:15:48.28 –> 0:15:51.248 But then there's another group of patients,
0:15:51.25 –> 0:15:54.47 those who may not respond so well
0:15:54.47 –> 0:15:57.466 to initial chemotherapy who may be older
0:15:59.61 –> 0:16:04.6 who don't have as good of a shot of cure.
0:16:04.6 –> 0:16:06.889 And so you started to mention that
0:16:06.889 –> 0:16:09.899 in that group of patients there are
0:16:09.899 –> 0:16:11.859 other things besides traditional
0:16:11.859 –> 0:16:13.728 chemotherapy that you look at.
0:16:13.73 –> 0:16:15.72 Tell us more about that.
0:16:15.72 –> 0:16:16.908 Sure, I
0:16:16.91 –> 0:16:20.87 like to think of chemotherapy as
0:16:20.87 –> 0:16:22.4 very non specific medicine that
0:16:22.4 –> 0:16:24.686 attack cells in the body that are
0:16:24.686 –> 0:16:26.426 growing quickly, like cancer cells.
0:16:26.43 –> 0:16:29.041 They also cause a lot of side effects,
0:16:29.041 –> 0:16:31.77 but as we've kind of plateaued with how
0:16:31.77 –> 0:16:34.032 well those medicines work we're looking
0:16:34.032 –> 0:16:36.813 for other avenues and so we are now using
0:16:36.813 –> 0:16:38.528 many drugs called targeted agents,
0:16:38.528 –> 0:16:41.16 so not just to blindly kill off all
0:16:41.224 –> 0:16:43.66 the cancer cells but really to find
0:16:43.66 –> 0:16:45.642 specific targets on those cancer cells
0:16:45.642 –> 0:16:48.181 to hone in on that and make them
0:16:48.181 –> 0:16:51.187 much more effective than other drugs.
0:16:51.19 –> 0:16:53.11 We have used methods like pursuing
0:16:53.11 –> 0:16:55.117 a bone marrow transplant that allows
0:16:55.117 –> 0:16:57.133 us to give extraordinary doses of
0:16:57.133 –> 0:16:58.657 chemotherapy and give new bone
0:16:58.657 –> 0:17:00.512 marrow and then really in the past
0:17:00.52 –> 0:17:02.557 few years we've also used types of

0:17:02.557 –> 0:17:03.94 interventions called cellular therapies,
0:17:03.94 –> 0:17:06.196 so we're now able to take a patient's
0:17:06.196 –> 0:17:08.184 own immune system to engineer cells
0:17:08.184 –> 0:17:10.704 in a laboratory, put them back in,
0:17:10.704 –> 0:17:12.45 and allow those cells to attack
0:17:12.511 –> 0:17:13.579 the cancer itself.
0:17:13.58 –> 0:17:15.35 And so we have really many
0:17:15.35 –> 0:17:17 new ways to treat these,
0:17:17 –> 0:17:18.555 to provide options for patients
0:17:18.555 –> 0:17:19.799 who previously didn't have
0:17:19.8 –> 0:17:21.184 those.
0:17:21.184 –> 0:17:22.556 That sounds really interesting, so let's take
0:17:22.556 –> 0:17:24.608 each of those three in turn.
0:17:24.61 –> 0:17:26.32 Sure, so first, targeted therapies.
0:17:26.32 –> 0:17:28.57 I mean, we've spent a lot of time on
0:17:28.57 –> 0:17:30.678 this show talking about precision
0:17:30.678 –> 0:17:32.474 medicine and targeted therapy,
0:17:32.48 –> 0:17:33.998 and personalized medicine
0:17:33.998 –> 0:17:37.034 and so on and so forth
0:17:37.04 –> 0:17:39.482 where there's often a target on
0:17:39.482 –> 0:17:42.853 a cancer cell and we have a drug
0:17:42.853 –> 0:17:44.923 that will attack said target,
0:17:44.93 –> 0:17:47.025 essentially being more like a
0:17:47.025 –> 0:17:49.49 sniper rather than a machine gun
0:17:49.919 –> 0:17:52.064 at attacking these cancers.
0:17:52.064 –> 0:17:54.89 Tell us more about that approach in ALL.
0:17:54.89 –> 0:17:56.129 Yeah, so we
0:17:56.13 –> 0:17:58.56 know that mutations in the genetic
0:17:58.56 –> 0:18:01.047 code of these cancer cells is
0:18:01.047 –> 0:18:03.032 really what turns them from
0:18:03.032 –> 0:18:05.259 normal cells into cancer cells,

0:18:05.26 –> 0:18:07.43 and many of those changes,
0:18:07.43 –> 0:18:09.254 do have medicines that might
0:18:09.254 –> 0:18:11.072 affect those and slow down the
0:18:11.072 –> 0:18:12.955 growth of those cancer cells so we
0:18:12.955 –> 0:18:15.156 do have several of those available.
0:18:15.16 –> 0:18:15.706 In particular,
0:18:15.706 –> 0:18:17.344 there's a type of ALL called
0:18:17.344 –> 0:18:18.318 Philadelphia chromosome positive
0:18:18.318 –> 0:18:19.479 acute lymphoblastic leukemia,
0:18:19.48 –> 0:18:21.316 where there have been drugs on
0:18:21.316 –> 0:18:23.189 the market even since the 1990s,
0:18:23.19 –> 0:18:24.422 that specifically attack that
0:18:24.422 –> 0:18:25.038 Philadelphia chromosome,
0:18:25.04 –> 0:18:27.189 and so this was a disease that
0:18:27.189 –> 0:18:28.44 again 10-20 years ago,
0:18:28.44 –> 0:18:29.985 we might have recommended everybody
0:18:29.985 –> 0:18:31.53 have a bone marrow transplant,
0:18:31.53 –> 0:18:33.606 now most children don't need a
0:18:33.606 –> 0:18:35.303 bone marrow transplant because we
0:18:35.303 –> 0:18:37.088 can give a target before that.
0:18:37.09 –> 0:18:38.98 In that case,
0:18:38.98 –> 0:18:42.77 where we have targeted agents,
0:18:42.77 –> 0:18:45.194 do we give that instead of the induction
0:18:45.2 –> 0:18:47.055 chemotherapy and so on and so forth
0:18:47.055 –> 0:18:48.85 that you had mentioned before?
0:18:48.85 –> 0:18:50.37 Because it sounds like if
0:18:50.37 –> 0:18:51.89 you have a sniper, why
0:18:51.89 –> 0:18:53.41 use the machine gun, right?
0:18:53.41 –> 0:18:55.538 So right now these are really adjunctive,
0:18:55.54 –> 0:18:57.668 we give them in addition
0:18:57.668 –> 0:18:58.58 to traditional chemotherapy.

0:18:58.58 –> 0:19:00.836 It certainly may hit a point though that
0:19:00.836 –> 0:19:03.104 as these medicines improve or we find
0:19:03.104 –> 0:19:05.269 different ones that we might not have
0:19:05.27 –> 0:19:06.78 to give the same traditional
0:19:06.78 –> 0:19:07.384 chemotherapy anymore.
0:19:07.39 –> 0:19:08.91 But we're not there yet.
0:19:08.91 –> 0:19:11.054 OK, so if you have a particular kind
0:19:11.054 –> 0:19:13.468 of ALL that has a particular marker,
0:19:13.47 –> 0:19:15.41 for example the Philadelphia
0:19:15.41 –> 0:19:16.865 chromosome positive ALL,
0:19:16.87 –> 0:19:18.865 then targeted therapy is something
0:19:18.865 –> 0:19:20.86 that should certainly be
0:19:20.927 –> 0:19:22.495 part of the regimen absolutely,
0:19:22.495 –> 0:19:24.994 but then you mentioned the 2nd
0:19:24.994 –> 0:19:27.274 which was bone marrow transplant and
0:19:27.274 –> 0:19:29.644 you had mentioned before the break
0:19:29.644 –> 0:19:32.311 that the bone marrow is really the
0:19:32.311 –> 0:19:34.498 place where these cells are developed,
0:19:34.498 –> 0:19:37.144 and so in the factory that's making
0:19:37.144 –> 0:19:40.365 all of your red blood cells and white
0:19:40.365 –> 0:19:42.748 blood cells and platelets and so on.
0:19:42.75 –> 0:19:44.246 In that bone marrow,
0:19:44.246 –> 0:19:46.116 that's where the leukemias developed,
0:19:46.12 –> 0:19:48.616 and so with bone marrow transplant,
0:19:48.62 –> 0:19:50.1 you're really thinking about
0:19:50.1 –> 0:19:51.95 wiping out that bone marrow,
0:19:51.95 –> 0:19:54.33 and you mentioned that the purpose of
0:19:54.33 –> 0:19:57.446 that is to give really high doses of
0:19:57.446 –> 0:20:00.179 chemotherapy. Tell us more about how that works.
0:20:00.82 –> 0:20:02.85 So right now when you
0:20:02.85 –> 0:20:04.66 give regular doses of chemotherapy,

0:20:04.66 –> 0:20:06.58 it does attack the leukemia cells,
0:20:06.58 –> 0:20:09.46 but we can only give so much of it.
0:20:09.46 –> 0:20:11.315 And when you try to give very
0:20:11.315 –> 0:20:12.98 high doses of chemotherapy,
0:20:12.98 –> 0:20:14.9 we see so many side effects,
0:20:14.9 –> 0:20:16.82 especially to healthy bone marrow cells,
0:20:16.82 –> 0:20:18.584 that there's really a limit to how
0:20:18.584 –> 0:20:20.676 much we can give in the setting
0:20:20.676 –> 0:20:21.948 of bone marrow transplantation
0:20:21.948 –> 0:20:23.82 or stem cell transplantation for
0:20:23.82 –> 0:20:25.775 treating a cancer like leukemia.
0:20:25.78 –> 0:20:27.726 The idea is that we give astronomically
0:20:27.726 –> 0:20:29.3 high doses of chemotherapy,
0:20:29.3 –> 0:20:30.452 sometimes radiation therapy,
0:20:30.452 –> 0:20:34.099 to try to wipe out not just the leukemia,
0:20:34.1 –> 0:20:36.788 but we might also remove the healthy bone
0:20:36.788 –> 0:20:39.377 marrow as well by giving a transplant.
0:20:39.38 –> 0:20:41.486 It allows us to restore that
0:20:41.49 –> 0:20:42.894 normal bone marrow function.
0:20:42.894 –> 0:20:44.616 So two questions, first question,
0:20:44.616 –> 0:20:46.947 if you're going to give somebody an
0:20:46.947 –> 0:20:48.53 astronomical amount of chemotherapy,
0:20:48.53 –> 0:20:51.514 so much so that is going to wipe
0:20:51.514 –> 0:20:54.05 out their entire bone marrow,
0:20:54.05 –> 0:20:56.826 doesn't that give them a whole lot of
0:20:56.826 –> 0:20:58.877 side effects like why do that?
0:20:58.88 –> 0:21:01.232 I mean, unless we know that the
0:21:01.232 –> 0:21:03.368 response rate is better to that,
0:21:03.37 –> 0:21:05.785 but we're using it in people who
0:21:05.785 –> 0:21:07.163 aren't responding anyways, right?
0:21:07.163 –> 0:21:07.849 So the

0:21:07.85 –> 0:21:09.92 idea is that for some patients,
0:21:09.92 –> 0:21:11.99 if they have some resistance to
0:21:11.99 –> 0:21:13.37 the chemotherapy they're getting
0:21:13.37 –> 0:21:15.44 that if we give different types
0:21:15.44 –> 0:21:16.82 of chemotherapy, and especially
0:21:16.82 –> 0:21:18.545 very high doses of chemotherapy,
0:21:18.55 –> 0:21:20.59 that we can hopefully overcome some
0:21:20.59 –> 0:21:22.34 of that resistance that's there.
0:21:22.34 –> 0:21:23.772 But you're absolutely right,
0:21:23.772 –> 0:21:25.562 there's a lot of toxicity
0:21:25.57 –> 0:21:28.747 to this and one of the key areas of
0:21:28.747 –> 0:21:31.493 research right now is how can we
0:21:31.493 –> 0:21:33.84 provide similar rates of response,
0:21:33.84 –> 0:21:36.205 but without so much toxicity there.
0:21:36.205 –> 0:21:38.176 There's definitely favorable
0:21:38.176 –> 0:21:40.145 studies on the horizon, again,
0:21:40.145 –> 0:21:42.91 some of this is targeted therapies.
0:21:42.91 –> 0:21:44.462 There's even newer chemotherapies
0:21:44.462 –> 0:21:47.197 that are out there that can still
0:21:47.197 –> 0:21:48.912 provide we call myeloablation
0:21:48.912 –> 0:21:51.18 a strong dose of chemotherapy,
0:21:51.18 –> 0:21:54.33 but without so many side effects to the
0:21:54.33 –> 0:21:55.686 other organs.
0:21:55.686 –> 0:21:57.042 Who exactly would need a
0:21:57.042 –> 0:21:58.39 bone marrow transplant?
0:21:58.39 –> 0:22:00.1 Because it sounds right now
0:22:00.1 –> 0:22:01.81 the way you've described it, pretty scary.
0:22:06.256 –> 0:22:07.966 It's absolutely something that
0:22:07.966 –> 0:22:10.357 I think should be taken with caution.
0:22:10.36 –> 0:22:12.442 We use bone marrow transplant really
0:22:12.442 –> 0:22:14.808 for patients who really need it,

0:22:14.81 –> 0:22:16.966 so we wouldn't want to give a
0:22:16.966 –> 0:22:18.595 transplant to somebody who we
0:22:18.595 –> 0:22:20.515 think is likely to be cured
0:22:20.515 –> 0:22:21.99 through traditional chemotherapy.
0:22:21.99 –> 0:22:24.384 So for a patient with leukemia again,
0:22:24.39 –> 0:22:26.25 these are patients we anticipate
0:22:26.25 –> 0:22:27.954 to be at very high risk,
0:22:27.96 –> 0:22:29.316 maybe their cancer has
0:22:29.316 –> 0:22:30.658 already come back and we're trying
0:22:30.658 –> 0:22:32.023 to cure it for a second time.
0:22:34.36 –> 0:22:37.36 We can use this also for a lot of other
0:22:37.443 –> 0:22:40.138 cancers that aren't just leukemias.
0:22:40.14 –> 0:22:41.692 Sometimes we use chemotherapy
0:22:41.692 –> 0:22:43.632 and high dose chemotherapy with
0:22:43.632 –> 0:22:45.907 a rescue transplant or rescue the
0:22:45.907 –> 0:22:48.22 bone marrow for other solid tumors.
0:22:48.22 –> 0:22:50.656 So sometimes for lymphomas or lymph node
0:22:50.656 –> 0:22:53.229 cancers for a common abdominal tumor,
0:22:53.23 –> 0:22:55.41 and young children with neuroblastoma
0:22:55.41 –> 0:22:58.636 we will give chemotherapy as a way to maximize
0:22:58.636 –> 0:23:01.31 how much treatment we can give them.
0:23:01.31 –> 0:23:03.734 We also use stem cell transplant
0:23:03.734 –> 0:23:05.92 for diseases that aren't cancer.
0:23:05.92 –> 0:23:07.551 We can use them to treat a
0:23:07.551 –> 0:23:08.8 variety of blood diseases,
0:23:08.8 –> 0:23:09.583 especially sickle cell
0:23:09.583 –> 0:23:10.366 disease or thalassemia.
0:23:10.37 –> 0:23:11.942 We can also use them to
0:23:11.942 –> 0:23:12.99 replace an immune system,
0:23:12.99 –> 0:23:14.824 so for a child that has a
0:23:14.824 –> 0:23:15.348 severe immunodeficiency,

0:23:15.35 –> 0:23:17.03 but you can use this to restore
0:23:17.03 –> 0:23:18.23 their normal immune function,
0:23:18.23 –> 0:23:18.884 and then lastly,
0:23:18.884 –> 0:23:20.763 we can also use transplant as a way
0:23:20.763 –> 0:23:22.263 to treat certain genetic diseases
0:23:22.263 –> 0:23:23.463 or metabolic diseases where,
0:23:23.47 –> 0:23:23.711 say,
0:23:23.711 –> 0:23:25.398 a patient is missing an enzyme and
0:23:25.398 –> 0:23:27.381 we can give them a new bone marrow
0:23:27.381 –> 0:23:29.014 that can then make that enzyme
0:23:29.014 –> 0:23:30.549 from which they're deficient so
0:23:30.55 –> 0:23:32.908 it can be used for a lot of things,
0:23:32.91 –> 0:23:35.259 but it still has a lot of side effects.
0:23:35.88 –> 0:23:37.576 And so again we are
0:23:37.576 –> 0:23:39.247 always very careful to make sure when
0:23:39.247 –> 0:23:40.92 we recommend a transplant for a patient,
0:23:40.92 –> 0:23:42.856 that we really think that is the best
0:23:42.856 –> 0:23:44.35 option compared to what else might be
0:23:44.35 –> 0:23:45.283 available for them.
0:23:45.283 –> 0:23:47.149 My second question is,
0:23:47.15 –> 0:23:49.534 you talk about wiping out the bone marrow,
0:23:49.54 –> 0:23:51.64 but people need bone marrow to survive.
0:23:51.64 –> 0:23:54.024 because that's where all of our cells are
0:23:55.154 –> 0:23:57.32 and the blood cells don't last forever.
0:23:57.32 –> 0:23:59.06 So you need a factory continuing
0:23:59.06 –> 0:24:00.61 to make these blood cells.
0:24:00.61 –> 0:24:02.994 Where do you get the bone marrow from?
0:24:03 –> 0:24:04.188 So there's a
0:24:04.19 –> 0:24:06.29 lot of places we can get it.
0:24:06.29 –> 0:24:08.018 For some diseases we can actually
0:24:08.018 –> 0:24:09.869 use the patients own bone marrow,

0:24:09.87 –> 0:24:11.67 so again, for certain solid tumors,
0:24:11.67 –> 0:24:13.458 we might collect their bone marrow,
0:24:13.46 –> 0:24:14.21 keep it stored,
0:24:14.21 –> 0:24:16.75 and then after a high dose of chemotherapy,
0:24:16.75 –> 0:24:18.44 give it back to them
0:24:18.44 –> 0:24:20.624 to replenish their own healthy bone marrow.
0:24:20.63 –> 0:24:21.882 But for most patients,
0:24:21.882 –> 0:24:23.134 when they hear transplant,
0:24:23.14 –> 0:24:25.06 we're really talking about somebody who's
0:24:25.06 –> 0:24:27.199 donating a bone marrow to that patient,
0:24:27.2 –> 0:24:30.017 so that could be from a variety of people.
0:24:30.02 –> 0:24:31.59 Traditionally it's from a sibling,
0:24:31.59 –> 0:24:34.07 so a brother or a sister whose immune
0:24:34.07 –> 0:24:36.276 system is a match to the patient,
0:24:36.28 –> 0:24:38.158 but we may also use parents.
0:24:38.16 –> 0:24:40.656 We can now use even more distant relatives,
0:24:40.66 –> 0:24:42.538 and when those people aren't available,
0:24:42.54 –> 0:24:44.105 we can take volunteer donors
0:24:44.105 –> 0:24:45.357 from an unrelated bone
0:24:45.36 –> 0:24:46.299 marrow donor registry.
0:24:46.299 –> 0:24:48.177 And so when you do that,
0:24:48.18 –> 0:24:50.665 I mean when we think about transplant,
0:24:50.67 –> 0:24:52.294 you think it has
0:24:52.294 –> 0:24:54.139 to be a match because otherwise
0:24:54.139 –> 0:24:55.954 your immune system is going
0:24:55.954 –> 0:24:57.87 to attack that foreign stuff.
0:24:57.87 –> 0:24:59.802 Now granted, your immune system is
0:24:59.802 –> 0:25:02.043 part of your blood cells and you
0:25:02.043 –> 0:25:04.122 kind of wiped out your bone marrow,
0:25:04.13 –> 0:25:06.554 but don't you have the risk of still
0:25:06.554 –> 0:25:08.2 attacking the new bone marrow?

0:25:08.2 –> 0:25:10.078 If it's not your own right?
0:25:10.08 –> 0:25:12.58 So we definitely do need a match, and
0:25:12.58 –> 0:25:15.076 we match based on the immune system,
0:25:15.08 –> 0:25:17.897 so it's not the same as the blood type,
0:25:17.9 –> 0:25:21.547 which a lot of people think about.
0:25:21.55 –> 0:25:24.046 A sibling has about a 25% chance of being
0:25:24.046 –> 0:25:26.638 a match, and so if you have multiple
0:25:26.638 –> 0:25:28.882 siblings your chance of one of them
0:25:28.882 –> 0:25:30.905 being a match continues to go up
0:25:30.91 –> 0:25:32.47 the more siblings you have,
0:25:32.47 –> 0:25:34.03 but with even several siblings,
0:25:34.03 –> 0:25:35.59 many patients still don't have
0:25:35.59 –> 0:25:37.15 a donor within the family
0:25:37.15 –> 0:25:38.338 that's a good match,
0:25:38.338 –> 0:25:40.58 and that's where we go to these
0:25:40.58 –> 0:25:41.828 unrelated donor registries where
0:25:41.828 –> 0:25:43.388 right now across the world
0:25:43.39 –> 0:25:45.292 there are more than 30 million
0:25:45.292 –> 0:25:46.947 people who have volunteered to
0:25:46.947 –> 0:25:48.562 potentially donate bone marrow or
0:25:48.562 –> 0:25:50.569 stem cells to patients who need it.
0:25:50.57 –> 0:25:51.878 The most recent advance
0:25:51.878 –> 0:25:54.272 in the field is that we know
0:25:54.272 –> 0:25:56.087 that parents are 1/2 match,
0:25:56.09 –> 0:25:58.798 so their immune system will be 50% the
0:25:58.798 –> 0:26:01.502 same as their children and 10 years ago
0:26:01.51 –> 0:26:03.11 that wasn't good enough.
0:26:03.11 –> 0:26:05.51 We now have technology that allows
0:26:05.577 –> 0:26:07.944 us to use a parent or a half match,
0:26:07.95 –> 0:26:09.59 or we call Haploidentical
0:26:09.59 –> 0:26:11.68 relative as a bone marrow donor,

0:26:11.68 –> 0:26:14.06 and so this has hugely opened up
0:26:14.06 –> 0:26:16.088 the availability of finding a donor.
0:26:16.09 –> 0:26:18.19 Now for patients who previously
0:26:18.19 –> 0:26:20.332 didn't have a sibling match or
0:26:20.332 –> 0:26:22.027 didn't have a registry match,
0:26:22.03 –> 0:26:24.046 almost everybody has a family member
0:26:24.046 –> 0:26:26.018 who may be 1/2 identical
0:26:26.018 –> 0:26:28.29 match to use and so do these kids
0:26:28.29 –> 0:26:29.86 who get bone marrow transplants.
0:26:29.86 –> 0:26:31.743 Do they need to be on some
0:26:31.743 –> 0:26:32.984 sort of immuno suppression
0:26:32.984 –> 0:26:35.174 for the rest of their life?
0:26:35.18 –> 0:26:37.524 Like you would be if you had a
0:26:37.524 –> 0:26:38.93 liver transplant for example?
0:26:38.93 –> 0:26:39.869 Or kidney transplant?
0:26:39.869 –> 0:26:41.434 Yeah, that's a great question.
0:26:41.44 –> 0:26:43.86 So at least at first we do need to use
0:26:43.931 –> 0:26:46.151 immune suppression so the donor immune
0:26:46.151 –> 0:26:48.639 system does run the risk of attacking
0:26:48.639 –> 0:26:51.165 the patient and we want to quiet that
0:26:51.165 –> 0:26:53.175 donor immune system down for awhile.
0:26:53.18 –> 0:26:55.042 The really unique thing about doing a bone
0:26:55.042 –> 0:26:57.133 marrow or a stem cell transplant is
0:26:57.133 –> 0:26:58.987 because we're giving a new immune
0:26:59.049 –> 0:27:01.233 system, that new immune system overtime
0:27:01.233 –> 0:27:03.324 actually becomes tolerant to the patient,
0:27:03.324 –> 0:27:05.226 and so with a liver transplant,
0:27:05.23 –> 0:27:07.132 patients need to remain on immuno
0:27:07.132 –> 0:27:08.014 suppression, really lifelong,
0:27:08.014 –> 0:27:09.706 to quiet the immune system, but with
0:27:09.706 –> 0:27:11.25 a bone marrow transplant

0:27:11.25 –> 0:27:13.092 we really just need it for
0:27:13.092 –> 0:27:14.74 a brief period of time.
0:27:14.74 –> 0:27:16.868 So for many patients they are on
0:27:16.868 –> 0:27:18.851 immune suppression for three to six
0:27:18.851 –> 0:27:20.536 months after their transplants and
0:27:20.536 –> 0:27:22.453 most patients are off of immune
0:27:22.453 –> 0:27:23.928 suppression by one year after.
0:27:24.74 –> 0:27:27.477 Interesting and then the third
0:27:27.477 –> 0:27:29.935 bucket of therapies that you mentioned
0:27:29.935 –> 0:27:32.77 as something that you would consider
0:27:32.84 –> 0:27:35.528 in people who did not respond or
0:27:35.528 –> 0:27:37.402 aren't responding well to chemotherapy,
0:27:37.402 –> 0:27:39.568 was this whole bucket of therapies
0:27:39.568 –> 0:27:41.46 you called cellular therapies?
0:27:41.46 –> 0:27:43.836 Tell us more about that.
0:27:43.84 –> 0:27:45.04 So cellular therapies
0:27:45.04 –> 0:27:47.686 are a way to leverage a patient's
0:27:47.686 –> 0:27:49.718 immune system to recognize the
0:27:49.718 –> 0:27:52.595 cancer in their body and attack it.
0:27:52.6 –> 0:27:55.024 So really, the first licensed cellular
0:27:55.024 –> 0:27:58.289 therapy was for acute lymphoblastic leukemia.
0:27:58.29 –> 0:28:00.538 And the way this works is we can
0:28:00.538 –> 0:28:02.162 actually collect lymphocytes or the
0:28:02.162 –> 0:28:04.16 immune system cells from our patient
0:28:04.16 –> 0:28:06.479 in the laboratory we can teach them
0:28:06.479 –> 0:28:08.378 to recognize markers on their leukemia
0:28:08.378 –> 0:28:10.506 and then re infuse those cells back
0:28:10.506 –> 0:28:12.696 into the patient to allow their own
0:28:12.696 –> 0:28:14.638 immune system cells that have been
0:28:14.638 –> 0:28:16.298 modified to attack their cancer.
0:28:16.3 –> 0:28:18.28 This has been really an incredible

0:28:18.28 –> 0:28:19.94 breakthrough therapy over the past
0:28:19.94 –> 0:28:21.682 several years in almost 100% of
0:28:21.682 –> 0:28:23.292 patients who receive this therapy
0:28:23.292 –> 0:28:25.243 will go into remission within the
0:28:25.243 –> 0:28:27.043 first 30 days after receiving it.
0:28:27.05 –> 0:28:27.989 It's really miraculous.
0:28:28.14 –> 0:28:31.218 Wow, so a few questions. First question,
0:28:31.22 –> 0:28:36.309 when you said you harvest a patients
0:28:36.31 –> 0:28:38.242 lymphocytes, but your leukemia cells are
0:28:38.242 –> 0:28:40.956 part of your immune system aren't they?
0:28:40.956 –> 0:28:43.28 They are, but
0:28:43.28 –> 0:28:44.608 we're able to differentiate
0:28:44.608 –> 0:28:45.936 them in the laboratory,
0:28:45.94 –> 0:28:48.124 and so really we're able to isolate
0:28:48.124 –> 0:28:49.821 mature kind of healthy lymphocytes
0:28:49.821 –> 0:28:52.25 to be able to re infuse back.
0:28:52.25 –> 0:28:53.096 But they made
0:28:53.096 –> 0:28:54.788 it possible that there may
0:28:54.788 –> 0:28:56.706 be leukemia cells in these
0:28:56.706 –> 0:28:57.888 cell therapy products,
0:28:57.89 –> 0:28:59.645 but the engineered cells can
0:28:59.645 –> 0:29:01.049 actually still recognize those
0:29:01.049 –> 0:29:02.87 leukemia cells to attack them, and
0:29:02.87 –> 0:29:04.53 the engineered cells will continue
0:29:04.53 –> 0:29:06.853 to attack the cancer cells
0:29:06.853 –> 0:29:08.508 and everybody gets a response.
0:29:08.62 –> 0:29:09.888 So almost everybody responds.
0:29:09.888 –> 0:29:12.174 One of the big questions is what
0:29:12.174 –> 0:29:14.13 happens to these patients long term.
0:29:14.13 –> 0:29:16.475 So there are some patients where these
0:29:16.475 –> 0:29:18.02 engineered lymphocytes persist long term,

0:29:18.02 –> 0:29:19.7 but for many patients the

0:29:19.7 –> 0:29:20.708 lymphocytes actually disappear

0:29:20.708 –> 0:29:22.878 over a period of about six months,

0:29:22.88 –> 0:29:25.024 and so one of the questions is how

0:29:25.024 –> 0:29:27.002 do we maintain that remission and

0:29:27.002 –> 0:29:29.999 what do we do after the cell therapy?

0:29:30 –> 0:29:31.148 And for many patients,

0:29:31.148 –> 0:29:33.313 that might mean still doing a bone

0:29:33.313 –> 0:29:35.19 marrow transplant once they're in

0:29:35.19 –> 0:29:35.852 remission.

0:29:35.852 –> 0:29:37.838 doctor Aron Flagg is an assistant

0:29:37.838 –> 0:29:39.585 professor of Pediatrics and hematology

0:29:39.585 –> 0:29:41.979 oncology at the Yale School of Medicine.

0:29:41.98 –> 0:29:43.44 If you have questions,

0:29:43.44 –> 0:29:44.9 the address is canceranswers@yale.edu

0:29:44.9 –> 0:29:46.916 and past editions of the program

0:29:46.916 –> 0:29:48.758 are available in audio and written

0:29:48.814 –> 0:29:50.35 form at Yalecancercenter.org.

0:29:50.35 –> 0:29:52.95 We hope you'll join us next week to

0:29:52.95 –> 0:29:55.482 learn more about the fight against

0:29:55.482 –> 0:29:58.194 cancer here on Connecticut public radio.