0:00:00 –> 0:00:02.46 Support for Yale Cancer Answers
0:00:02.46 –> 0:00:04.92 comes from AstraZeneca, dedicated
0:00:04.999 –> 0:00:07.344 to advancing options and providing
0:00:07.344 –> 0:00:10.3 hope for people living with cancer.
0:00:10.3 –> 0:00:14 More information at astrazeneca-us.com.
0:00:14 –> 0:00:15.758 Welcome to Yale Cancer Answers
0:00:15.758 –> 0:00:17.166 with your host doctor
0:00:17.17 –> 0:00:19.627 Anees Chagpar. Yale Cancer Answers
0:00:19.63 –> 0:00:21.67 features the latest information on
0:00:21.67 –> 0:00:24.081 cancer care by welcoming oncologists and
0:00:24.081 –> 0:00:26.251 specialists who are on the forefront of
0:00:26.251 –> 0:00:28.43 the battle to fight cancer. This week,
0:00:28.43 –> 0:00:30.19 it's a conversation about experimental
0:00:30.19 –> 0:00:31.95 therapeutics with Doctor Pat LoRusso.
0:00:31.95 –> 0:00:33.942 Doctor LoRusso is a professor of
0:00:33.942 –> 0:00:36.529 medicine at the Yale School of Medicine,
0:00:36.53 –> 0:00:39.764 where Doctor Chagpar is a professor
0:00:39.764 –> 0:00:41.15 of surgical oncology.
0:00:41.15 –> 0:00:41.58 Pat,
0:00:41.58 –> 0:00:44.164 maybe we can start off by you telling
0:00:44.164 –> 0:00:47.622 us a little bit more about what
0:00:47.622 –> 0:00:49.81 exactly is experimental therapeutics.
0:00:49.81 –> 0:00:52.288 It sounds so obscure and
0:00:52.288 –> 0:00:54.57 intellectual and scientific and strange.
0:00:54.57 –> 0:00:56.31 It isn't obscure for
0:00:56.31 –> 0:00:58.903 me. I think it is somewhat intellectual,
0:00:58.903 –> 0:01:01.03 and it is very scientific,
0:01:01.03 –> 0:01:04.94 and so I hope that I'll be able to
0:01:04.94 –> 0:01:07.992 explain to you what all that means.
0:01:08 –> 0:01:11.52 So with every cancer drug that we have,
0:01:11.52 –> 0:01:14.152 that we treat patients for, every cancer

0:01:14.152 –> 0:01:15.93 drug that's commercially available,
0:01:15.93 –> 0:01:19.62 it has to go through a series of testing not
0:01:19.708 –> 0:01:23.148 only in the lab to identify its activity,
0:01:23.15 –> 0:01:25.556 not only in other animal species,
0:01:25.56 –> 0:01:28.178 to make sure that it is safe
0:01:28.178 –> 0:01:29.97 to administer to humans,
0:01:29.97 –> 0:01:31.97 which are called toxicology studies,
0:01:31.97 –> 0:01:35.327 but then it has to go through a series
0:01:35.327 –> 0:01:38.415 of tests in humans first to make
0:01:38.415 –> 0:01:41.71 sure that the drug is safe to give,
0:01:41.71 –> 0:01:44.668 and then to find
0:01:44.668 –> 0:01:47.08 out how active it is,
0:01:47.08 –> 0:01:49.52 either alone or in combination
0:01:49.52 –> 0:01:51.96 with other agents.
0:01:51.96 –> 0:01:55.47 So Phase one clinical trials
0:01:55.47 –> 0:01:57.81 are essentially trials
0:01:57.905 –> 0:02:01.041 whereby a new drug is tested
0:02:01.041 –> 0:02:03.849 for the first time in humans.
0:02:05.782 –> 0:02:08.68 Although the primary objective of a
0:02:08.767 –> 0:02:11.871 phase one trial is actually to make sure
0:02:11.871 –> 0:02:15.189 that the drug is safe to give to humans.
0:02:15.19 –> 0:02:18.158 We are also looking for a lot
0:02:18.158 –> 0:02:20.229 of other endpoints as well.
0:02:20.23 –> 0:02:23.618 What kind of activity does it have
0:02:23.618 –> 0:02:25.67 against specific tumor types?
0:02:25.67 –> 0:02:28.477 How is the exposure of the drug
0:02:28.477 –> 0:02:31.645 in man relative to what we saw
0:02:31.645 –> 0:02:33.99 previously in various animal species
0:02:33.99 –> 0:02:37.296 and to assure that we have the
0:02:37.296 –> 0:02:39.302 utmost safety in these trials.
0:02:39.302 –> 0:02:42.179 Obviously all trials have to be approved

0:02:42.179 –> 0:02:44.869 by the Food and Drug Administration
0:02:44.869 –> 0:02:47.87 before they can be initiated in humans,
0:02:47.87 –> 0:02:51.11 and that is the same thing with a
0:02:51.11 –> 0:02:54.278 phase one or first in human study.
0:02:54.28 –> 0:02:56.124 But what they do
0:02:56.124 –> 0:02:58.89 is based on animal trials previously
0:02:58.976 –> 0:03:01.844 done with the agent and toxicology
0:03:01.844 –> 0:03:05.21 studies that are also previously done.
0:03:05.21 –> 0:03:08.096 The FDA works with the sponsor
0:03:08.096 –> 0:03:11.18 or the drug company to identify
0:03:11.18 –> 0:03:13.296 a safe starting dose.
0:03:13.3 –> 0:03:16.835 A dose where we can feel quite
0:03:16.835 –> 0:03:19.915 assured that giving that dose will
0:03:19.915 –> 0:03:23.31 be safe to humans and to identify
0:03:23.418 –> 0:03:27.058 what the most relevant dose will be
0:03:27.06 –> 0:03:30.126 to go into subsequent phase two and
0:03:30.126 –> 0:03:32.916 three trials and then hopefully to
0:03:32.916 –> 0:03:35.694 go into FDA approvals for standard
0:03:35.694 –> 0:03:37.51 of care treatment.
0:03:37.51 –> 0:03:40.162 We do various escalation steps along
0:03:40.162 –> 0:03:44.592 the way to identify a safe dose that
0:03:44.592 –> 0:03:47.96 can be subsequently brought into a phase
0:03:47.96 –> 0:03:50.34 two efficacy or a phase
0:03:50.34 –> 0:03:52.332 two comparative efficacy study
0:03:52.332 –> 0:03:55.32 which may take anywhere from 3 to
0:03:55.414 –> 0:03:57.649 10 or 12 escalation steps.
0:03:57.65 –> 0:03:59.89 So that we're gradually increasing
0:03:59.89 –> 0:04:02.949 the dose to the point where we
0:04:02.949 –> 0:04:05.893 identify what a safe dose is that can
0:04:05.976 –> 0:04:08.816 be subsequently advanced to other
0:04:08.816 –> 0:04:11.656 phases of clinical trial development.

0:04:15.08 –> 0:04:17.87 So this is really important work,

0:04:17.87 –> 0:04:21.569 because this is how we get the drugs into

0:04:21.569 –> 0:04:24.538 the clinics that actually provide the

0:04:24.538 –> 0:04:28.559 cures that all of us want for cancer.

0:04:28.56 –> 0:04:32.745 But it really starts very much in the lab,

0:04:32.75 –> 0:04:35.753 so help me to understand and

0:04:35.753 –> 0:04:38.33 help our listeners to understand

0:04:38.33 –> 0:04:42.04 what goes into

0:04:42.04 –> 0:04:44.308 getting a drug even into phase one

0:04:44.308 –> 0:04:46.557 because as you describe it Phase

0:04:46.557 –> 0:04:48.572 one clinical trials maybe seem

0:04:48.572 –> 0:04:50.836 really scary to a lot of patients.

0:04:50.84 –> 0:04:52.952 I mean this concept of being

0:04:52.952 –> 0:04:54.36 quote first in man.

0:04:54.36 –> 0:04:56.817 Many people are thinking

0:04:56.82 –> 0:04:59.204 why would I want to be the first

0:04:59.204 –> 0:05:01.237 ones for you to experiment and

0:05:01.237 –> 0:05:03.799 see what is safe and what is

0:05:03.799 –> 0:05:05.979 tolerable and what is efficacious?

0:05:05.98 –> 0:05:08.724 So let's take a step back before that

0:05:08.724 –> 0:05:11.506 and kind of lay the groundwork for me

0:05:11.506 –> 0:05:14.418 in terms of what goes on before that.

0:05:14.42 –> 0:05:15.772 How do we get

0:05:15.772 –> 0:05:18.933 to the point of a phase one trial

0:05:18.933 –> 0:05:21.538 where you're presenting data to

0:05:21.54 –> 0:05:26.307 the FDA?

0:05:26.31 –> 0:05:29.65 First a drug is developed in the lab based on a

0:05:29.738 –> 0:05:33.41 scientific principle or a scientific concept.

0:05:33.41 –> 0:05:36.962 So I think the best way to describe

0:05:36.962 –> 0:05:40.066 it would be to use an example.

0:05:40.07 –> 0:05:42.29 So in many tumor types,

0:05:42.29 –> 0:05:44.51 primarily non small cell lung
0:05:44.51 –> 0:05:46.286 cancer and colorectal cancer,
0:05:46.29 –> 0:05:48.51 but other tumors as well,
0:05:48.51 –> 0:05:52.694 there is a mutation called KRAS G12C.
0:05:52.7 –> 0:05:55.964 And that mutation in large part drives that
0:05:55.964 –> 0:05:59.167 tumor and makes it extremely aggressive.
0:05:59.17 –> 0:06:01.39 It's taken many, many,
0:06:01.39 –> 0:06:05.142 many years for chemists to develop a
0:06:05.142 –> 0:06:09.435 drug that can target or inhibit that
0:06:09.435 –> 0:06:12.65 mutation from continuing to allow
0:06:12.65 –> 0:06:16.518 the tumor to multiply and divide.
0:06:16.52 –> 0:06:18.984 So that drug probably
0:06:18.984 –> 0:06:21.562 took about 20 years conservatively of
0:06:21.562 –> 0:06:24.442 chemists working on trying to figure
0:06:24.442 –> 0:06:27.099 out how to target that mutation,
0:06:27.1 –> 0:06:29.004 which was extremely difficult
0:06:29.004 –> 0:06:32.288 because of the way that mutation is
0:06:32.288 –> 0:06:34.703 pocketed in the DNA of the tumor.
0:06:34.71 –> 0:06:38.756 Once they identify a compound that can
0:06:38.76 –> 0:06:41.166 bind to that mutation
0:06:41.166 –> 0:06:42.77 or attack that mutation,
0:06:42.77 –> 0:06:45.176 then they have to test it
0:06:45.18 –> 0:06:46.443 in animal models,
0:06:46.443 –> 0:06:48.969 tumors in animals that have that
0:06:48.969 –> 0:06:51.554 mutation to see whether or not the drug
0:06:51.554 –> 0:06:54.429 is going to work against those tumors
0:06:54.429 –> 0:06:56.804 inhibit those tumors from growing,
0:06:56.81 –> 0:06:59.456 preventing those tumors in animals from
0:06:59.456 –> 0:07:02.256 metastasizing or going beyond where
0:07:02.256 –> 0:07:04.656 the tumor was originally implanted.
0:07:04.66 –> 0:07:06.072 Once they do that,

0:07:06.072 –> 0:07:08.8 and identify that the drug is active,
0:07:08.8 –> 0:07:11.411 then we have to take it into
0:07:11.411 –> 0:07:13.705 toxicology studies where we test the
0:07:13.705 –> 0:07:15.535 drug in different animal species
0:07:15.535 –> 0:07:17.835 to make sure that
0:07:17.835 –> 0:07:20.449 we can safely give
0:07:20.449 –> 0:07:22.663 that drug to the animals without
0:07:22.663 –> 0:07:24.958 causing side effects or harms,
0:07:24.96 –> 0:07:27.588 and we usually have to do that in two
0:07:27.588 –> 0:07:30.229 or three different animal species,
0:07:30.23 –> 0:07:32.48 depending on what the drug is.
0:07:32.48 –> 0:07:34.832 But back in the olden days I call
0:07:34.832 –> 0:07:37.463 it when I first started doing
0:07:37.463 –> 0:07:38.939 clinical drug development,
0:07:38.94 –> 0:07:41.898 during development of drugs in humans,
0:07:41.9 –> 0:07:44.48 we didn't have the scientific
0:07:44.48 –> 0:07:48.071 basis that we have today and today
0:07:48.071 –> 0:07:51.263 there's a lot of science that is
0:07:51.27 –> 0:07:53.73 driving new drug
0:07:53.73 –> 0:07:55.698 discoveries in the lab,
0:07:55.7 –> 0:07:57.784 especially with targeted drugs
0:07:57.784 –> 0:08:00.91 because of the fact that unveiling
0:08:00.991 –> 0:08:03.637 the human genome several years ago
0:08:03.637 –> 0:08:06.503 allowed us to better understand the
0:08:06.503 –> 0:08:09.569 differences between the DNA and RNA.
0:08:09.57 –> 0:08:12.658 In tumors versus the DNA and RNA in
0:08:12.658 –> 0:08:15.64 the normal human and what we had to
0:08:15.64 –> 0:08:18.7 go after in those tumors to prevent
0:08:18.7 –> 0:08:21.826 them from growing and hopefully from
0:08:21.826 –> 0:08:24.585 prevent them eventually from even coming
0:08:24.585 –> 0:08:27.89 about in patients that may be high risk,

0:08:27.89 –> 0:08:29.382 such as in prevention,
0:08:29.382 –> 0:08:32.198 but no matter where the drug ends
0:08:32.198 –> 0:08:34.698 up treating advanced stage patients,
0:08:34.7 –> 0:08:36.404 patients that have cancer
0:08:36.404 –> 0:08:37.256 that's metastasized,
0:08:37.26 –> 0:08:39.816 or patients that have had cancer,
0:08:39.82 –> 0:08:42.07 but we've removed the tumor.
0:08:42.07 –> 0:08:44.638 And we want to prevent the
0:08:44.638 –> 0:08:46.35 cancer from coming back.
0:08:46.35 –> 0:08:49.486 Every drug that's given to humans in
0:08:49.486 –> 0:08:52.446 a general oncology office has to at
0:08:52.446 –> 0:08:55.264 first be tested in early phase clinical
0:08:55.264 –> 0:08:58.33 trials and back in the olden days.
0:08:58.33 –> 0:08:59.036 You know,
0:08:59.036 –> 0:09:01.507 we tested a lot of drugs based
0:09:01.507 –> 0:09:03.91 on just these high throughput
0:09:03.91 –> 0:09:06.862 screens in mouse models without a
0:09:06.949 –> 0:09:09.892 lot of science, there was science there,
0:09:09.892 –> 0:09:12.602 but today, in 2021 the science
0:09:12.602 –> 0:09:14.917 has advanced much more
0:09:14.92 –> 0:09:17.095 that we are even selecting
0:09:17.095 –> 0:09:18.835 out certain tumor types.
0:09:18.84 –> 0:09:20.905 Patients that have certain types
0:09:20.905 –> 0:09:23.64 of cancers based on the science.
0:09:23.64 –> 0:09:26.405 Because we know even in phase one
0:09:26.405 –> 0:09:29.385 trials that we may have a greater
0:09:29.385 –> 0:09:32.517 chance of response and benefit if we
0:09:32.517 –> 0:09:35.409 only treat patients with those tumors.
0:09:35.41 –> 0:09:38.69 Going back to the KRAS G12C mutation
0:09:38.69 –> 0:09:42.819 that I was talking about a few minutes ago,
0:09:42.82 –> 0:09:46.468 we only included in those phase one trials

0:09:46.47 –> 0:09:49.776 patients that we knew whose
0:09:49.776 –> 0:09:53.329 tumors had that mutation and in non
0:09:53.329 –> 0:09:56.825 small cell lung cancer in a phase one
0:09:56.825 –> 0:10:00.15 trial we were seeing close to 70-75%
0:10:00.15 –> 0:10:03.138 tumor response and in colon cancer,
0:10:03.138 –> 0:10:06.162 in patients who had colon cancer
0:10:06.162 –> 0:10:09.438 that had the KRAS G12 C mutation,
0:10:09.44 –> 0:10:12.856 we were seeing responses about 40 to
0:10:12.856 –> 0:10:16.222 50% and many of those patients had a
0:10:16.222 –> 0:10:20.198 lot of prior treatments either immunotherapy,
0:10:20.2 –> 0:10:20.689 chemotherapy,
0:10:20.689 –> 0:10:24.601 or both and yet despite having all those
0:10:24.601 –> 0:10:27.22 different cancers be treatments because
0:10:27.22 –> 0:10:30.292 their cancers had that one mutation,
0:10:30.3 –> 0:10:33.198 there was significant benefit as early
0:10:33.198 –> 0:10:36.918 as in the Phase one clinical trial.
0:10:36.92 –> 0:10:39.46 So even though these trials
0:10:39.46 –> 0:10:40.984 are primarily toxicity
0:10:40.99 –> 0:10:43.078 finding studies and finding
0:10:43.078 –> 0:10:45.688 the recommended phase two dose
0:10:45.688 –> 0:10:48.12 many times in these trials,
0:10:48.12 –> 0:10:51.41 if we have a specific target that
0:10:51.41 –> 0:10:54.537 we're targeting and we can identify
0:10:54.537 –> 0:10:57.789 patients whose tumors have that target,
0:10:57.79 –> 0:11:00.475 there is a potential therapeutic
0:11:00.475 –> 0:11:02.623 benefit for those patients
0:11:02.63 –> 0:11:05.294 either in terms of their tumors
0:11:05.294 –> 0:11:07.535 shrinking or staying stable for
0:11:07.535 –> 0:11:09.48 a prolonged period of time,
0:11:09.48 –> 0:11:12.469 even at some of the lower doses,
0:11:12.47 –> 0:11:14.17 because as I said,

0:11:14.17 –> 0:11:17.609 we have to start low and go high,
0:11:17.61 –> 0:11:21.026 and with the initial drug that targeted
0:11:21.03 –> 0:11:23.195 KRAS G12C, responses were seen
0:11:23.195 –> 0:11:25.74 regardless of what the dose was,
0:11:25.74 –> 0:11:27.408 which is extremely encouraging
0:11:27.408 –> 0:11:29.91 and that drug is moving forward
0:11:29.98 –> 0:11:31.728 hopefully to FDA approval.
0:11:32.66 –> 0:11:35.264 So I think that there's a few
0:11:35.264 –> 0:11:37.768 things there that you said that
0:11:37.768 –> 0:11:39.943 are so important to highlight,
0:11:39.95 –> 0:11:42.204 one of which is that our ability
0:11:42.204 –> 0:11:45.33 now to to figure out what the exact
0:11:45.33 –> 0:11:47.981 mutations are and to develop drugs
0:11:47.981 –> 0:11:50.476 that will target those mutations
0:11:50.48 –> 0:11:52.1 really not only benefits
0:11:52.1 –> 0:11:54.568 patients in terms of
0:11:54.568 –> 0:11:57.112 lack of side effects and potential
0:11:57.112 –> 0:11:59.521 better efficacy of a drug that
0:11:59.521 –> 0:12:01.005 targets a particular tumor,
0:12:01.01 –> 0:12:03.13 but it also really encourages
0:12:03.13 –> 0:12:04.826 patients to participate in
0:12:04.826 –> 0:12:06.89 clinical trials because you know
0:12:06.89 –> 0:12:10.186 that that drug, at least in animal models,
0:12:10.19 –> 0:12:12.668 has been shown to be efficacious
0:12:12.668 –> 0:12:14.32 against that particular mutation,
0:12:14.32 –> 0:12:16.798 and at least in animal models,
0:12:16.8 –> 0:12:18.448 doesn't have high toxicity.
0:12:18.448 –> 0:12:19.684 And so Pat,
0:12:19.69 –> 0:12:21.71 when you're designing a phase
0:12:21.71 –> 0:12:23.73 one trial and thinking about
0:12:23.8 –> 0:12:25.89 the patients who are eligible,

0:12:25.89 –> 0:12:29.322 I think the other thing that was really
0:12:29.322 –> 0:12:32.333 critical that you said was not only
0:12:32.333 –> 0:12:34.97 how you target the population to
0:12:34.97 –> 0:12:36.622 those patients who could
0:12:36.622 –> 0:12:38.274 potentially benefit from this,
0:12:38.28 –> 0:12:39.104 for example,
0:12:39.104 –> 0:12:41.591 those who have a specific mutation.
0:12:41.591 –> 0:12:44.538 But also those for whom
0:12:44.538 –> 0:12:46.958 standard of care may be falling
0:12:46.958 –> 0:12:49.707 short where there may not be other
0:12:49.707 –> 0:12:51.812 options who have been through
0:12:51.812 –> 0:12:54.368 a number of series of different
0:12:54.368 –> 0:12:56.972 regiments and have come to exhaust
0:12:56.972 –> 0:12:59.682 standard of care options tell us more
0:12:59.682 –> 0:13:02.319 about how you go about designing a
0:13:02.319 –> 0:13:05.098 phase one trial in terms of who's
0:13:05.098 –> 0:13:07.5 eligible and how
0:13:07.5 –> 0:13:10.181 many patients are eligible and how
0:13:10.181 –> 0:13:13.628 you kind of figure out how many patients
0:13:13.63 –> 0:13:15.688 you need to have on that trial
0:13:15.688 –> 0:13:17.788 to get the information that you
0:13:17.788 –> 0:13:20.448 need before you can open this up
0:13:20.528 –> 0:13:23.17 to wider clinical trials?
0:13:23.17 –> 0:13:25.18 Right, so first of all,
0:13:25.18 –> 0:13:27.388 there are a limited number of
0:13:27.388 –> 0:13:29.885 patients that go on the phase
0:13:29.885 –> 0:13:32.25 one trials because we're really
0:13:32.25 –> 0:13:34.441 looking for potential side effects
0:13:34.441 –> 0:13:37.201 of the drug to make sure that the
0:13:37.21 –> 0:13:40.01 drug is safe to give to patients.
0:13:40.01 –> 0:13:42.635 So we slowly increase the dose will

0:13:42.635 –> 0:13:45.462 treat one to three patients and we'll

0:13:45.462 –> 0:13:48.384 have to get them through at least

0:13:48.384 –> 0:13:50.82 three to six weeks of treatment

0:13:50.82 –> 0:13:53.628 before we then can increase the dose

0:13:53.628 –> 0:13:56.01 and add another one to three

0:13:56.089 –> 0:13:57.877 patients as an example.

0:13:59.59 –> 0:14:01.795 And so I wanted to pick up

0:14:01.795 –> 0:14:04.374 on all of the things that we

0:14:04.374 –> 0:14:07.13 look at in terms of Phase one,

0:14:07.13 –> 0:14:09.314 clinical trials and how we actually

0:14:09.314 –> 0:14:11.464 get these drugs to market right

0:14:11.464 –> 0:14:13.324 after we take a short break

0:14:13.324 –> 0:14:15.029 for a medical minute.

0:14:15.03 –> 0:14:16.458 Please stay tuned to

0:14:16.46 –> 0:14:18.889 learn more with my guest Doctor Pat LoRusso.

0:14:18.889 –> 0:14:21.203 Support for Yale Cancer Answers

0:14:21.203 –> 0:14:23.621 comes from AstraZeneca, working to

0:14:23.621 –> 0:14:25.8 eliminate cancer as a cause of death.

0:14:25.8 –> 0:14:29.028 Learn more at astrazeneca-us.com.

0:14:29.03 –> 0:14:31.115 This is a medical minute

0:14:31.115 –> 0:14:32.366 about smoking cessation.

0:14:32.37 –> 0:14:34.45 There are many obstacles to

0:14:34.45 –> 0:14:36.114 face when quitting smoking

0:14:36.12 –> 0:14:39.039 as smoking involves the potent drug nicotine.

0:14:39.04 –> 0:14:41.959 But it's a very important lifestyle change,

0:14:41.96 –> 0:14:43.208 especially for patients

0:14:43.208 –> 0:14:44.456 undergoing cancer treatment.

0:14:44.46 –> 0:14:46.704 Quitting smoking has been shown to

0:14:46.704 –> 0:14:48.739 positively impact response to treatments

0:14:48.739 –> 0:14:51.109 decrease the likelihood that patients

0:14:51.109 –> 0:14:53.005 will develop second malignancies

0:14:53.065 –> 0:14:54.88 and increase rates of survival.
0:14:54.88 –> 0:14:56.52 Tobacco treatment programs are
0:14:56.52 –> 0:14:58.57 currently being offered at federally
0:14:58.57 –> 0:15:00.559 designated Comprehensive cancer centers
0:15:00.56 –> 0:15:02.29 and operate on the principles
0:15:02.29 –> 0:15:04.688 of the US Public Health Service
0:15:04.688 –> 0:15:06.497 Clinical Practice guidelines.
0:15:06.5 –> 0:15:08.61 All treatment components are evidence
0:15:08.61 –> 0:15:11.165 based and therefore all patients are
0:15:11.165 –> 0:15:13.475 treated with FDA approved first line
0:15:13.475 –> 0:15:15.603 medications for smoking cessation as
0:15:15.603 –> 0:15:17.863 well as smoking cessation counseling
0:15:17.863 –> 0:15:20.24 that stresses appropriate coping skills.
0:15:20.24 –> 0:15:22.79 More information is available at
0:15:22.79 –> 0:15:24.32 yalecancercenter.org. You're listening
0:15:24.38 –> 0:15:26.06 to Connecticut Public Radio.
0:15:26.06 –> 0:15:26.42 Welcome
0:15:26.42 –> 0:15:28.24 back to Yale Cancer Answers.
0:15:28.24 –> 0:15:30.22 This is doctor Anees Chagpar
0:15:30.22 –> 0:15:32.41 and I'm joined tonight by
0:15:32.41 –> 0:15:34.405 my guest doctor Pat LoRusso.
0:15:34.41 –> 0:15:35.496 We're talking about
0:15:35.496 –> 0:15:36.22 experimental therapeutics,
0:15:36.22 –> 0:15:38.04 and phase one clinical trials,
0:15:38.04 –> 0:15:39.85 and right before the break,
0:15:39.85 –> 0:15:42.335 Pat, we were talking about how you
0:15:42.335 –> 0:15:44.568 go about designing these phase one
0:15:44.57 –> 0:15:46.784 first in man clinical trials and
0:15:46.784 –> 0:15:49.289 we were talking about the fact that,
0:15:49.29 –> 0:15:52.55 you know, it seems to me to be a little
0:15:52.643 –> 0:15:56.075 less scary than it was in previous years.

0:15:56.08 –> 0:15:58.943 Because drugs these days are so much
0:15:58.943 –> 0:16:01.8 more targeted and there is a lot of
0:16:01.8 –> 0:16:03.91 regulation and a lot of preclinical
0:16:03.91 –> 0:16:06.766 work in terms of animal studies,
0:16:06.77 –> 0:16:09.36 that goes into really making sure that
0:16:09.36 –> 0:16:12.319 these drugs are efficacious and not toxic,
0:16:12.32 –> 0:16:14.84 at least in a couple of animals
0:16:14.84 –> 0:16:16.882 species before it ever hits
0:16:16.882 –> 0:16:18.646 phase one clinical trials.
0:16:18.65 –> 0:16:21.778 But you were starting to tell us right
0:16:21.778 –> 0:16:25 before the break about how you design
0:16:25 –> 0:16:27.355 these phase one clinical trials.
0:16:27.36 –> 0:16:29.41 How many patients you involve,
0:16:29.41 –> 0:16:31.46 what your inclusion criteria are,
0:16:31.46 –> 0:16:33.51 the safeguards that you put
0:16:33.51 –> 0:16:34.74 around these trials.
0:16:34.74 –> 0:16:37.2 Because still, for some patients,
0:16:37.2 –> 0:16:39.624 this may seem really scary and
0:16:39.624 –> 0:16:42.529 often is used as a last resort,
0:16:42.53 –> 0:16:43.679 so can you
0:16:43.679 –> 0:16:47.858 talk a little bit about that?
0:16:47.86 –> 0:16:48.68 Oh yes,
0:16:48.68 –> 0:16:51.14 absolutely. And thank you for the
0:16:51.14 –> 0:16:54.416 opportunity to do so. So to begin with,
0:16:54.416 –> 0:16:57.749 how do we design these trials.
0:16:57.75 –> 0:17:01.17 In terms of finding the dose that we want to
0:17:01.248 –> 0:17:04.584 start with and how we're going to escalate,
0:17:04.59 –> 0:17:07.565 that pretty much comes from the toxicology
0:17:07.565 –> 0:17:10.217 studies that we've done before we get
0:17:10.217 –> 0:17:12.949 into the clinic before we go in demand.
0:17:12.95 –> 0:17:15.23 But also exposure of the drug.

0:17:15.23 –> 0:17:18.062 So what was the exposure that was needed
0:17:18.062 –> 0:17:20.739 in the various model systems that we
0:17:20.739 –> 0:17:23.88 used in order to see benefit to see
0:17:23.88 –> 0:17:26.624 the tumor regress either in the mouse
0:17:26.63 –> 0:17:29.758 models or in the in vitro Petri dishes?
0:17:30.486 –> 0:17:33.87 Because we know that we have to start safe.
0:17:33.87 –> 0:17:36.494 But we also want to make sure that
0:17:36.494 –> 0:17:39.476 we can get to an adequate exposure,
0:17:39.48 –> 0:17:41.35 because if we can't get
0:17:41.35 –> 0:17:42.846 to an adequate exposure,
0:17:42.85 –> 0:17:45.856 we are concerned that we may not see the
0:17:45.856 –> 0:17:48.314 benefit and oftentimes there is a very
0:17:48.314 –> 0:17:51.079 large what we call therapeutic window,
0:17:51.08 –> 0:17:54.45 a window or a dose at which we started to
0:17:54.538 –> 0:17:58.093 see activity to a dose where we saw side
0:17:58.093 –> 0:18:01.289 effects in animals and
0:18:01.29 –> 0:18:04.602 the easier it is for us to identify how
0:18:04.602 –> 0:18:07.905 fast we're going to increase our doses.
0:18:07.91 –> 0:18:11.591 Another thing is we look at the inclusion and
0:18:11.591 –> 0:18:14.536 exclusion criteria and in terms of toxicity,
0:18:14.54 –> 0:18:18.092 if we know that the drug preclinically in
0:18:18.092 –> 0:18:21.579 animals led to some type of a side effect,
0:18:21.58 –> 0:18:24.064 we have to select out our
0:18:24.064 –> 0:18:25.72 patients based on that,
0:18:25.72 –> 0:18:28.48 or do some additional tests to make sure
0:18:28.48 –> 0:18:31.68 we can hopefully safeguard patients and
0:18:31.68 –> 0:18:34.008 follow them closely so that
0:18:34.008 –> 0:18:36.59 they don't have a side effect.
0:18:36.59 –> 0:18:39.25 But in terms of efficacy as well,
0:18:39.25 –> 0:18:40.77 it would not be
0:18:41.53 –> 0:18:44.298 in 2021 because we know so much more

0:18:44.298 –> 0:18:46.988 about the science and how the science
0:18:46.988 –> 0:18:49.51 is driving the tumor in humans,
0:18:49.51 –> 0:18:52.214 we want to select out patients that will
0:18:52.214 –> 0:18:54.829 have the greatest chance of benefit.
0:18:54.83 –> 0:18:57.371 So back 25 years ago when I
0:18:57.371 –> 0:18:59.39 started doing Phase one trials,
0:18:59.39 –> 0:19:02.81 we would do what we called all comer studies.
0:19:02.81 –> 0:19:05.09 All patients, regardless of the tumor,
0:19:05.09 –> 0:19:08.338 were allowed to go on phase one trials.
0:19:08.34 –> 0:19:10.825 Because we didn't know enough about the
0:19:10.825 –> 0:19:13.609 science that was driving particular tumors.
0:19:13.61 –> 0:19:15.962 And nowadays in 2021 it's not
0:19:15.962 –> 0:19:18.846 uncommon for us to design a trial
0:19:18.846 –> 0:19:21.3 that may only have two tumors,
0:19:21.3 –> 0:19:23.925 or maybe two tumors and a third
0:19:23.925 –> 0:19:26.768 arm of tumors that have a specific
0:19:26.768 –> 0:19:29.721 mutation an like the KRAS G12C
0:19:29.721 –> 0:19:32.633 story that I was telling you about.
0:19:32.64 –> 0:19:35.608 We knew that the primary tumors that
0:19:35.608 –> 0:19:39.046 we needed to go after were the lung
0:19:39.05 –> 0:19:41.84 tumors that were either lung cancer
0:19:41.84 –> 0:19:44.275 or colon cancer that harbored
0:19:44.275 –> 0:19:46.7 this KRAS G12C mutation.
0:19:46.7 –> 0:19:49.682 But there are other tumors that
0:19:49.682 –> 0:19:52.43 rarely harbor this mutation as well.
0:19:52.43 –> 0:19:52.973 Cholangiocarcinoma,
0:19:52.973 –> 0:19:56.774 you know various tumors and so we
0:19:56.774 –> 0:20:00.186 allowed a third arm or a third
0:20:00.19 –> 0:20:02.506 basket of tumors to be enrolled
0:20:02.506 –> 0:20:04.524 of those different tumors that
0:20:04.524 –> 0:20:06.148 might have that mutation.

0:20:06.15 –> 0:20:06.546 Additionally,

0:20:06.546 –> 0:20:08.526 back in the olden days,

0:20:09.23 –> 0:20:12.03 we used to see patients that had failed

0:20:12.104 –> 0:20:14.454 everything, even drugs that really

0:20:14.454 –> 0:20:17.26 were not doing that much for them,

0:20:17.26 –> 0:20:19.24 but might have been FDA

0:20:19.24 –> 0:20:20.824 approved for commercial use.

0:20:20.83 –> 0:20:22.69 But nowadays we realize that

0:20:22.69 –> 0:20:25.474 that may not be the best patients

0:20:25.474 –> 0:20:27.579 to put on these studies,

0:20:27.58 –> 0:20:28.9 especially seeing that

0:20:28.9 –> 0:20:30.22 we're targeting science.

0:20:30.22 –> 0:20:32.29 And we're not looking necessarily for

0:20:32.29 –> 0:20:34.939 patients now that have exhausted everything.

0:20:34.94 –> 0:20:36.224 But like for instance,

0:20:36.224 –> 0:20:38.638 we have a trial that only wants

0:20:38.638 –> 0:20:41.543 patients that have failed what we call

0:20:41.543 –> 0:20:44.168 frontline therapy for colon cancer or

0:20:44.168 –> 0:20:46.323 frontline therapy for pancreas cancer.

0:20:46.33 –> 0:20:48.29 Only one treatment for their

0:20:48.29 –> 0:20:49.074 metastatic disease,

0:20:49.08 –> 0:20:51.816 and then we want to bring them on

0:20:51.816 –> 0:20:54.049 the trial because we know that

0:20:54.049 –> 0:20:56.783 the farther out you go in terms

0:20:56.783 –> 0:20:59.053 of number of different treatments

0:20:59.053 –> 0:21:01.331 that a patient is given,

0:21:01.792 –> 0:21:04.558 many times there's a significant

0:21:04.558 –> 0:21:07.409 decrease in the ability for that tumor

0:21:07.409 –> 0:21:10.09 to respond to a certain treatment,

0:21:10.09 –> 0:21:13.586 and so we're requesting even in early phase

0:21:13.59 –> 0:21:16.32 once we've gotten to that dose that

0:21:16.32 –> 0:21:19.481 we want to advance forward instead of
0:21:19.481 –> 0:21:22.76 just going right into a phase two,
0:21:22.76 –> 0:21:26.256 we may do what we call expansion cohorts.
0:21:26.26 –> 0:21:27.391 In that phase
0:21:27.391 –> 0:21:30.03 one trial and where we put only
0:21:30.116 –> 0:21:32.38 patients with colon cancer,
0:21:32.38 –> 0:21:35.296 or only patients with ovarian cancer.
0:21:35.3 –> 0:21:38.333 And only those that may harbor as an example,
0:21:38.34 –> 0:21:39.624 a certain mutation.
0:21:39.624 –> 0:21:42.62 Because we want to move the drug
0:21:42.706 –> 0:21:45.256 through as quickly as possible,
0:21:45.26 –> 0:21:48.221 but as safely as possible so that
0:21:48.221 –> 0:21:50.955 we can hopefully advance that drug
0:21:50.955 –> 0:21:53.715 right into a phase three trial,
0:21:53.72 –> 0:21:56.408 which is a randomized trial looking
0:21:56.408 –> 0:21:59.633 at standard of care versus the new
0:21:59.633 –> 0:22:02.321 drug or standard of care versus
0:22:02.321 –> 0:22:03.509 standard of care.
0:22:03.51 –> 0:22:06.212 Plus the new drug together so that
0:22:06.212 –> 0:22:08.996 we can hopefully advance that drug
0:22:08.996 –> 0:22:12.08 to commercialization to make it accessible
0:22:12.08 –> 0:22:14.594 to all patients that could benefit
0:22:14.594 –> 0:22:17.97 from that drug as quickly as possible.
0:22:17.97 –> 0:22:21.127 Yeah, I think that's so important right
0:22:21.127 –> 0:22:24.387 in thinking about the fact that even if
0:22:24.387 –> 0:22:27.48 you look at our standard chemotherapies,
0:22:27.48 –> 0:22:30.672 many of these are drugs that were
0:22:30.672 –> 0:22:34.278 developed back in the quote the good old days,
0:22:34.28 –> 0:22:36.656 which really aren't targeted and now
0:22:36.656 –> 0:22:39.71 that we have these targeted therapies
0:22:39.71 –> 0:22:42.818 it may be patients who

0:22:42.818 –> 0:22:44.372 have specific mutations.
0:22:44.38 –> 0:22:48.013 To really look at clinical trials before
0:22:48.013 –> 0:22:51.078 they've exhausted all of their options.
0:22:51.08 –> 0:22:55.166 So Pat, my next question is,
0:22:55.17 –> 0:22:58.298 do you find that patients are still
0:22:58.298 –> 0:23:01.19 resistant to looking at clinical trials?
0:23:01.19 –> 0:23:03.355 Do they have enough information
0:23:03.355 –> 0:23:06.02 about where to find these clinical
0:23:06.02 –> 0:23:08.528 trials and for the people who
0:23:08.528 –> 0:23:11.078 are listening on the radio today
0:23:11.08 –> 0:23:12.536 who may be thinking,
0:23:12.536 –> 0:23:15.81 I failed my first round of chemotherapy,
0:23:15.81 –> 0:23:17.96 or maybe even two rounds,
0:23:20.84 –> 0:23:21.788 and you know,
0:23:21.788 –> 0:23:24.451 how far do we keep going down the
0:23:24.451 –> 0:23:27.076 line thinking about the next line of
0:23:27.076 –> 0:23:29.736 therapy in the next line of therapy,
0:23:29.74 –> 0:23:32.001 all of which may be less effective
0:23:32.001 –> 0:23:34.01 versus trying a clinical trial.
0:23:34.01 –> 0:23:36.775 And how do I get information about
0:23:36.775 –> 0:23:39.325 what clinical trials are out there that
0:23:39.325 –> 0:23:42.199 might be well suited to me in my tumor?
0:23:44.72 –> 0:23:47 In the Connecticut area obviously you
0:23:47.075 –> 0:23:50.115 know Yale Cancer Center is an
0:23:50.115 –> 0:23:52.309 outstanding resource for clinical trials.
0:23:52.31 –> 0:23:54.285 And you know, contacting somebody
0:23:54.285 –> 0:23:55.865 at Yale Cancer Center,
0:23:55.87 –> 0:23:59.191 if you have a GI cancer
0:23:59.191 –> 0:24:01.81 cancer of the colon or stomach,
0:24:01.81 –> 0:24:04.978 contacting the GI team to see
0:24:04.98 –> 0:24:06.96 do they have trials available?

0:24:06.96 –> 0:24:10.024 Or if you have metastatic disease, your cancer
0:24:10.024 –> 0:24:12.95 is spread outside of its primary source,
0:24:12.95 –> 0:24:16.91 contacting our team as an example,
0:24:16.91 –> 0:24:20.51 and if you contact Yale,
0:24:20.51 –> 0:24:23.39 they will get ahold of the right physician
0:24:23.39 –> 0:24:26.51 to be able to answer those questions.
0:24:26.51 –> 0:24:28.91 You can also go on cancerclinicaltrials.gov,
0:24:28.91 –> 0:24:32.074 a website that is
0:24:32.074 –> 0:24:34.569 sometimes very difficult to maneuver.
0:24:34.57 –> 0:24:37.216 You can ask your primary oncologist,
0:24:37.22 –> 0:24:39.425 but depending on how comfortable
0:24:39.425 –> 0:24:41.63 they feel in referring you,
0:24:41.63 –> 0:24:44.591 you're at the disposal and
0:24:44.591 –> 0:24:48.112 you're at the mercy of them sending you
0:24:48.112 –> 0:24:51.709 for a second opinion or sending you to
0:24:51.709 –> 0:24:54.852 a site that may have clinical trials
0:24:54.86 –> 0:24:59.347 that may not be available to them.
0:25:00.366 –> 0:25:02.906 Sometimes it's very difficult for
0:25:02.906 –> 0:25:06.019 these patients to find these trials.
0:25:06.02 –> 0:25:06.585 Unfortunately,
0:25:06.585 –> 0:25:09.975 of all patients that are diagnosed
0:25:09.975 –> 0:25:12.37 and treated for cancer,
0:25:12.37 –> 0:25:15.212 less than 3% of them are ever
0:25:15.212 –> 0:25:18.139 put on a clinical trial,
0:25:18.14 –> 0:25:20.545 and there are certain communities
0:25:20.545 –> 0:25:21.507 of patients,
0:25:21.51 –> 0:25:23.373 the underrepresented minorities,
0:25:23.373 –> 0:25:26.478 those patients in rural communities
0:25:26.478 –> 0:25:30.196 that have the greatest
0:25:30.196 –> 0:25:32.686 impact of not being offered
0:25:32.686 –> 0:25:35.528 a clinical trial or not being able

0:25:35.528 –> 0:25:38.826 to get access to a clinical trial.

0:25:38.83 –> 0:25:40.261 So I mean,

0:25:40.261 –> 0:25:42.169 there are some organizations

0:25:42.169 –> 0:25:44.43 that you can contact

0:25:44.43 –> 0:25:47.622 that may help you find a trial

0:25:47.622 –> 0:25:50.42 or calling the NCI directly,

0:25:50.42 –> 0:25:52.91 but many times it's difficult

0:25:52.91 –> 0:25:53.41 unfortunately,

0:25:53.41 –> 0:25:55.41 to even maneuver those

0:25:55.41 –> 0:25:56.91 avenues of information.

0:25:57.96 –> 0:26:00.27 So Pat, you mentioned underrepresented

0:26:00.27 –> 0:26:03.608 minorities and I just want to pick up

0:26:03.608 –> 0:26:05.841 on this just for a minute because

0:26:05.85 –> 0:26:09.042 for many patients who may be

0:26:09.042 –> 0:26:10.41 from underrepresented minorities

0:26:10.484 –> 0:26:12.308 African American patients,

0:26:12.31 –> 0:26:15.208 for example, they may be reluctant

0:26:15.208 –> 0:26:17.78 to participate in clinical trials

0:26:17.78 –> 0:26:20.15 given historical events

0:26:20.15 –> 0:26:23.25 that have happened in this country,

0:26:23.25 –> 0:26:26.806 which have been deplorable in terms of

0:26:26.806 –> 0:26:30.2 clinical research and how it was conducted,

0:26:30.2 –> 0:26:33.679 can you alleviate some of their fears

0:26:33.68 –> 0:26:36.998 and anxieties?

0:26:37 –> 0:26:39.81 Because of some of those

0:26:39.81 –> 0:26:42.058 previous events that occur,ed

0:26:42.06 –> 0:26:44.632 especially with minority populations,

0:26:44.632 –> 0:26:47.847 the Food and Drug Administration

0:26:47.847 –> 0:26:51.396 the FDA has put very strict rules

0:26:51.396 –> 0:26:53.915 and regulations in place that

0:26:53.915 –> 0:26:56.665 will prevent that from happening.

0:26:56.67 –> 0:27:00.597 And in fact, there are many investigators,
0:27:00.6 –> 0:27:02.292 epidemiologists and scientists
0:27:02.292 –> 0:27:05.112 that are trying to understand
0:27:05.112 –> 0:27:07.08 why underrepresented minorities
0:27:07.08 –> 0:27:09.901 are not as well represented and the
0:27:09.901 –> 0:27:12.432 number one reason is because they
0:27:12.432 –> 0:27:14.916 are not offered a clinical trial.
0:27:14.92 –> 0:27:18.07 One of the other reasons is
0:27:18.07 –> 0:27:20.17 geographic and financial barriers.
0:27:20.17 –> 0:27:23.845 Those are two of the other reasons,
0:27:23.85 –> 0:27:26.475 but it isn't because they've
0:27:26.475 –> 0:27:29.1 necessarily refused a clinical trial,
0:27:29.1 –> 0:27:31.72 the lack of being offered
0:27:31.72 –> 0:27:33.816 far outweighs their refusal.
0:27:33.82 –> 0:27:35.92 The geographic barriers far
0:27:35.92 –> 0:27:37.495 outweigh their refusal,
0:27:37.5 –> 0:27:40.65 and in fact there are very,
0:27:40.65 –> 0:27:43.465 very slim statistics of the
0:27:43.465 –> 0:27:45.717 last 17 FDA approved
0:27:45.72 –> 0:27:49.82 cancer drugs and less than 4% of all
0:27:49.82 –> 0:27:53.33 patients that were recruited were black,
0:27:53.33 –> 0:27:56.834 less than 4% of all patients
0:27:56.834 –> 0:27:58.586 recruited were Hispanic,
0:27:58.59 –> 0:28:01.054 and those two underrepresented
0:28:01.054 –> 0:28:03.518 minorities represent a significantly
0:28:03.518 –> 0:28:06.2 larger population of cancer patients.
0:28:06.2 –> 0:28:09.7 And it's important to have
0:28:09.7 –> 0:28:11.8 underrepresented minorities offered
0:28:11.8 –> 0:28:14.657 and participate in clinical trials
0:28:14.657 –> 0:28:18.57 because we need to see if their tumors
0:28:18.57 –> 0:28:20.725 respond the same way their

0:28:20.725 –> 0:28:22.88 tumors may have some genetic,

0:28:22.88 –> 0:28:25.346 or some germline

0:28:25.346 –> 0:28:27.477 mutation or differences

0:28:27.477 –> 0:28:29.901 and we need to understand that

0:28:29.901 –> 0:28:32.788 and how it impacts their tumors.

0:28:34.95 –> 0:28:37.53 I think that's so important because

0:28:37.53 –> 0:28:40.116 at the end of the day,

0:28:40.12 –> 0:28:43.783 once all of these trials are done and these

0:28:43.783 –> 0:28:47.019 drugs are marketed as standard of care,

0:28:47.02 –> 0:28:49.714 these patients are going to receive

0:28:49.714 –> 0:28:51.988 these same therapies that may

0:28:51.988 –> 0:28:53.58 have been developed on a

0:28:53.58 –> 0:28:57.63 completely different population.

0:28:57.63 –> 0:29:00.286 So Pat very quickly in our last minute,

0:29:00.29 –> 0:29:03.125 I just want to get one last question in

0:29:03.125 –> 0:29:06.036 which is you mentioned financial barriers.

0:29:06.04 –> 0:29:07.81 Are clinical trials covered by

0:29:07.81 –> 0:29:10.212 insurance or do people have to pay

0:29:10.212 –> 0:29:11.904 out of pocket for these drugs?

0:29:13.17 –> 0:29:14.334 The drugs themselves,

0:29:14.334 –> 0:29:16.274 if they are investigational drugs,

0:29:17.788 –> 0:29:20.95 they do not have to pay for them.

0:29:20.95 –> 0:29:23.3 They will be given free

0:29:23.3 –> 0:29:25.65 of charge by the sponsors.

0:29:25.65 –> 0:29:26.997 Medicare coverage analysis

0:29:26.997 –> 0:29:30.14 covers a lot of the tests that

0:29:30.218 –> 0:29:32.658 are needed for clinical trials,

0:29:32.66 –> 0:29:35.95 but I think some of the greatest

0:29:35.95 –> 0:29:37.923 financial barriers are commuting

0:29:37.923 –> 0:29:40.273 back and forth to places

0:29:40.273 –> 0:29:42.929 some of the standard of care

0:29:42.93 –> 0:29:44.758 copays that are required,
0:29:44.758 –> 0:29:47.5 and hopefully we will be able
0:29:47.586 –> 0:29:50.61 to work towards getting a lot of
0:29:50.61 –> 0:29:53.108 those things funded through new
0:29:53.108 –> 0:29:55.898 initiatives that can help patients.
0:29:55.9 –> 0:29:58.075 Because the patients that need
0:29:58.075 –> 0:30:00.25 these studies the most sometime
0:30:00.25 –> 0:30:02.65 are patients that do have
0:30:02.65 –> 0:30:05.055 a problem gaining access to their
0:30:05.055 –> 0:30:07.239 copays or paying a babysitter so
0:30:07.239 –> 0:30:10.404 that they can go and
0:30:10.404 –> 0:30:12.365 participate in these clinical trials,
0:30:12.365 –> 0:30:15.445 or drive or pay for parking at the
0:30:15.445 –> 0:30:18.235 sites that they have to be treated.
0:30:19.8 –> 0:30:20.19 Doctor Pat LoRusso
0:30:20.19 –> 0:30:22.724 is a professor of medicine
0:30:22.724 –> 0:30:25.268 at the Yale School of Medicine.
0:30:25.27 –> 0:30:26.954 If you have questions,
0:30:26.954 –> 0:30:28.638 the address is canceranswers@yale.edu
0:30:28.638 –> 0:30:30.986 and past editions of the program
0:30:30.986 –> 0:30:33.146 are available in audio and written.
0:30:33.15 –> 0:30:34.299 Farm at yalecancercenter.org.
0:30:34.299 –> 0:30:37.372 We hope you'll join us next week to
0:30:37.372 –> 0:30:39.298 learn more about the fight against
0:30:39.298 –> 0:30:41.88 cancer here on Connecticut Public Radio.